

# 33rd International Geographical Congress 第33届国际地理大会



## BOOK OF ABSTRACTS





## International Geographical Union

The International Geographical Union (IGU) is an international, non-governmental, professional organization devoted to the development of the discipline of Geography. The IGU was formally established in Brussels in 1922. However, the history of international meetings of geographers is much longer. The first of a series of congresses met in 1871 in Antwerp. Since its early days the Union has consisted of three major components: a General Assembly of the delegates appointed by the member countries which meets at the time of the Congress and is the highest authority of the Union; an Executive Committee which consists of a President, eight Vice-Presidents and a Secretary-General and Treasurer; Commissions and Study Groups which continue their work between General Assembly meetings. The working

languages of the Union are English and French.

The purposes of the IGU are primarily to promote Geography through initiating and coordinating geographical research and teaching in all countries of the world. Its work is conducted through the instruments of its National Committees, Commissions and Task Forces.

The IGU hosts the International Geographical Congress every four years and also promotes regional conferences and other meetings that further of the objectives of the Union. The IGU also facilitates the participation of geographers in the global community of scientists through its formal affiliation as a Member Union within the International Council for Science (ICSU), the International Social Science Council (ISSC) and the International Council for Philosophy and Human Sciences (CIPSH).

The forthcoming major events include IGU Thematic Conferences (LA PAZ, Baku, 2017); IGU Regional Conference (Quebec, 2018); 34th International Geographical Congress (Istanbul, 2020); Extraordinary International Geographical Congress (Paris, 2022). More current projects include the International Year of Global Understanding, the Journals Project and Our Sustainable Cities.

Further details can be found on the IGU website at : [www.igu-online.org](http://www.igu-online.org)



## Geographical Society of China

The Geographical Society of China (GSC) is one of the earliest established academic societies in China. Her predecessor is the Chinese Geographical Society organized by Zhang Xiangwen in Tianjin in 1909. In 1934, Weng Wenhao, Zhu Kezhen, and Zhang Qiyun, some well-known scientists, founded the Geographical Society of China in Nanjing. At the founding of the P.R. China, the two organizations were merged into the current Geographical Society of China in 1950.

At the present, the Society has more than 10,000 individual member, who are geographical workers from research institutes, colleges and universities, middle schools and governmental agencies etc.. There are 31 provincial societies located in the capitals of provinces and autonomous regions, as well as the municipalities of Beijing, Shanghai, Tianjin and Chongqing (not including Taiwan, Hong Kong and Macao). The Society has established 20 academic commissions, 9 branch (academic) societies, 8 working committees, 5 study or working groups and 7 regional offices. There are 16 academic journals and Chinese National Geography (popular science magazine). It is a member of IGU, IAG, IPA and China Association for Science and Technology (CAST). It has established cooperation relation with Japan, France, Korea, United States, and Russia. It has hosted the IGU Regional conference (Beijing, 1990), 6th International Conference on Permafrost (Beijing, 1993), IAG Thematic Conference (Nanjing, 2000) and the First Asian Conference on Geography (Shanghai, 2015).

Main activities: GSC Annual Meeting, Annual Meeting of Human geography of China, China-Japan-Korea Joint Conference on Geography, etc.



## Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences

The Institute of Geographic Sciences and Natural Resources Research (IGSNRR), Chinese Academy of Sciences (CAS) was established in 1999 through the merger of the former Institute of Geography, founded in 1940, and the former Commission for the Integrated Survey of Natural Resources, founded in 1956.

In the past half century, IGSNRR and its predecessors have led the way in geographical research in China, making major research contributions in the rational use of natural resources; ecological and environmental protection; comprehensive land consolidation; sustainable regional development; and resource and environmental information systems.

Much of the work conducted by these institutes has had a very great national impact and has received national awards. Examples include research on the spatial differentiation of China's natural environment; research on the comprehensive management and exploitation of land in medium- and low-yield fields in the Huang-Huai-Hai Plain; study of the uplift of the Qinghai-Tibet Plateau and its effects on the natural environment and human activity; compilation of the National Physical Atlas of China; theoretical and applied research on regional development patterns; and establishment of the Chinese Ecosystem Research Network (CERN), etc.

IGSNRR is a multidisciplinary research institute focusing on, among other things, physical geography and global change, human geography and regional development, natural resources and the environment, geographical information systems and surface simulation, the terrestrial water cycle and water resources, ecosystem network observation and modeling, and Chinese agricultural policy. Through research in these domains, the institute aims to solve major natural resource and environmental problems related to national sustainable development and improve its own innovative capacity at the same time.

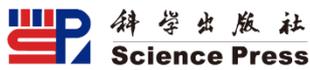
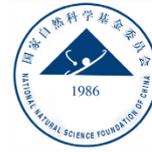
The institute is home to the State Key Laboratory of Resources and Environmental Information Systems; the Chinese Academy of Sciences (CAS) Key Laboratory of Water Cycle and Related Land Surface Processes; the CAS Key Laboratory of Ecosystem Network Observation and Modeling; and the CAS Key Laboratory of Sustainable Regional Development and Modeling. It also supports two national field observation stations: the ChinaFLUX observation station at Yucheng, Shandong Province and the Lhasa Plateau Ecological Research Station. In addition, the institute has a Physical and Chemical Analysis Center and five specialized laboratories. These facilities provide excellent conditions for scientific research and observation.

IGSNRR has a staff of 603, of whom 450 are faculty members. Among the institute's faculty are five CAS members, three members of the Chinese Academy of Engineering and three members of the Third World Academy of Sciences—a UNESCO-associated institution devoted to furthering scientific research in the developing world.

The institute offers Ph.D and M.Sc. programs in the fields of physical geography, human geography, cartography and GIS, natural resources, ecology, agro-forestry economic management, and environmental science. In addition, it offers M.Sc. programs in the fields of rural and regional development, meteorology, agricultural informatics, and environmental engineering. It also offers postdoctoral positions in geography and biology.

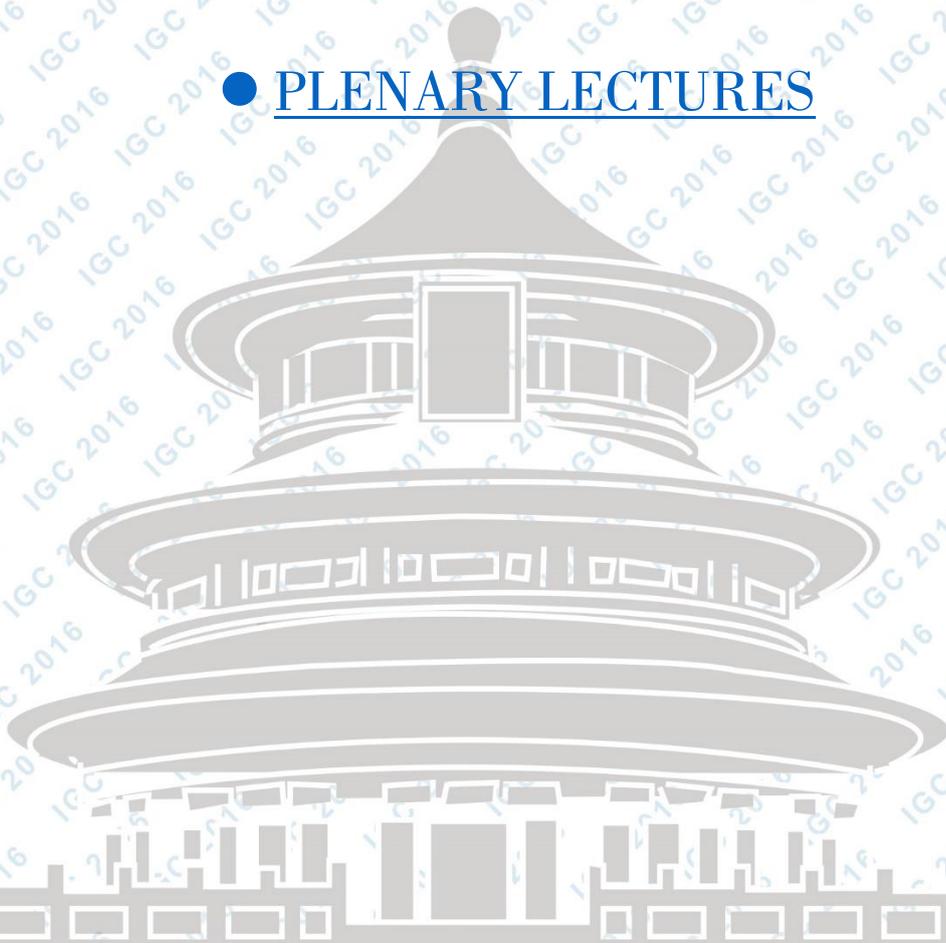
IGSNRR is very active in international and domestic cooperation and communication. It has established cooperative arrangements with academic institutions in more than 50 countries and regions. Currently, IGSNRR houses 12 branch organizations of international scientific programs and nine joint research laboratories. Every year, around 400 staff members participate in domestic and international scientific events and more than 400 academics and scientists visit the institute. In addition, the institute holds more than 10 international conferences or workshops annually.

Nine academic journals and popular science magazines are affiliated with the institute, including the Journal of Geographical Sciences, the Journal of Natural Resources, and Chinese National Geography.



# CONTENT

- IGU COMMISSIONS
- FORUMS, SYMPOSIUMS & SPECIAL SESSIONS
- JOINT COMMISSIONS
- KEY TOPICS
- PLENARY LECTURES



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## 1. IGU COMMISSIONS

### C12.01 Applied Geography

[Applied Cultural and Social Geography](#)

### C12.02 Arid Lands, Human Kind and Environment

[Sustainable Development in Arid Lands](#)

[Water Crises in Arid Environment](#)

[Sand Dunes and Sand Encroachment](#)

[Evidences of Paleo Climatic Changes in Arid Areas](#)

[Compact of Climatic Changes in Arid Lands](#)

[Hazards and Risks in Arid Environments](#)

[Geoarchaeology in Desert Areas](#)

[Political Problems in Arid Areas](#)

### C12.03 Biogeography and Biodiversity

[Response of Mountain Ecosystems to Climate Change](#)

[Conservation of Biodiversity](#)

[Recent Developments and Expansions in Biogeography](#)

### C12.04 Climatology

[Climate Change and Variability in Different Scales](#)

[Weather and Climate Extremes](#)

[Urban Climates and Bioclimatic Aspects](#)

### C12.05 Coastal Systems

[Harmonizing Pacific Coastal Oceans: Sustainability For a Future Earth](#)

### C12.06 Cold Region Environments

[Sustainability and Resilience Monitoring in the Arctic](#)

[Land Cover Change and Ecosystem Dynamic in High Mountain Asia](#)

### C12.08 Dynamics of Economic Spaces

[Rethinking the Dynamics of Economic Spaces: New Themes, New Ideas, and New Approaches](#)

[Placing Finance in Urban and Regional Development](#)

[Foreign Direct Investment and Migration](#)



Home

## C12.09 Environment Evolution

[Environment Evolution and Human Activity in the Late Quaternary](#)

[Climate - Vegetation Interaction Under Past and Future Climate Conditions](#)

[Prehistoric Human Occupation and Environmental Changes on Tibetan Plateau and Surroundings](#)

[Climate Change and Human-Environment Interaction From Neolithic to Historical Periods](#)

## C12.10 Gender and Geography

[Mapping Changing Landscapes of Care in Asia: Towards Gendered Theoretical and Empirical Frameworks](#)

[Gendered Rights: Space, Culture and Society](#)

[Addressing Gendered Insecurities in the Urban Global South](#)

[Gendered Aspects of Migration and Multiculturalism](#)

[Island Bodies](#)

[Gendered Inequalities and Empowerment: Men and Women in the Public and Private Sphere](#)

[Women in Rural India](#)

## C12.11 Geographical Education

[Research Which Examines the Value and Values of a Geographical Education](#)

[Research in Ways Geographical Education May Contribute to Sustainability and Environmental Awareness](#)

[Research in Geographical Education, Geo-spatial Technologies and Information Communication Technologies](#)

[Research on Pedagogy in Geographical Education](#)

[Research on Comparative Standards and National Curricula in International Geographical Education](#)

[Research on the Current Status of Geographical Education across the World – Can Goals and Objectives Be Harmonised Internationally?](#)

[Research in the Preparation of Geography Teachers at All Levels, Including Evidence of Their Effect on Affective Goals Such as Shaping a Harmonious World](#)

[Research in the Development and Effects of Curriculum in Geographical Education Addressing Global Geopolitical and Ideological Conflicts: Towards a Harmonious World](#)

[Towards a Harmonious Geographical Education community: aspects of research conducted in Geographical Education Not Otherwise included above.](#)

[A Comparative Geography of China and the U.S.](#)

[Educational Value of Geography](#)

[Geography Education for Sustainability](#)

## C12.12 Geographical Information Science

## C12.13 Geography of Governance

[Environmental Governance – Spaces, Actors and Powers](#)

[In Search For More Inclusive Governance](#)



Home

[Citizen e-participation in Local Governance](#)

[Innovations in Public Sector, Public Administration and Public Services](#)

## C12.14 Geography of the Global Information Society

[Information Society and Culture](#)

[Information Society and Quality of Life](#)

[Green Economics and Smart Cities](#)

## C12.15 Geography of Tourism, Leisure, and Global Change

[Tourism and Empowerment Issues in Traditional Communities](#)

[Tourism and Violence](#)

[Tourism, Heritage and Globalization](#)

[Urban Tourism and Tourism Urbanization](#)

[Lifestyle Mobility and the Local Community](#)

[Tourism and Carbon Emission](#)

[Tourism Planning and Destination Sustainability](#)

[Tourism, Environmental Change and Sustainability](#)

[Nature-based Tourism in Asia](#)

[Resilience Approaches to Managing Change in Tourism Places](#)

[“Tourism Geographies” in Asia: Contrasting issues, approaches and traditions](#)

[Tourism and Economic Geography](#)

[Tourism and Environment](#)

[ICT and Modern Technology in Tourism](#)

[Tourism and Mobility](#)

[Is Tourism a Help or Hindrance to Global Awareness and Understanding?](#)

## C12.16 Geopark

[Geoheritage](#)

## C12.17 Global Change and Human Mobility

[Moving World, Moving Actors: Global Changes and Personal Challenges](#)

[Information, communication, new media, and human mobility](#)

[Development Safeguards, Forced Displacement and Resettlement - Inside China and Going Out](#)

[Youth Mobility. An Emerging Phenomenon at the Global Scale](#)

## C12.18 Hazard and Risk

[Hazard and Risk](#)

[Participation, Geo-Technology and Risk Governance](#)

[Cold Socio-ecological Systems Under Hazards and Risks: Harmonious Approaches to Resilience Building](#)



Home

## C12.19 Health and Environment

[Environmental Change and Health](#)

[Health and Health Care](#)

[Health and GIS](#)

[Global Health](#)

## C12.20 History of Geography

[Studies in the History of Geography: Past and Present](#)

## C12.22 Islands

[Islands and Future Earth](#)

## C12.23 Karst

[Karst Landscapes: Tourism and Conservation](#)

## C12.24 Land Degradation and Desertification

[Land Degradation and Environmental Change](#)

## C12.25 Landscape Analysis and Landscape Planning

## C12.26 Land Use and Land Cover Change

[Comparative Study on Land Cover and Land Use Change \(LCLUC\) and Their Driving Forces in Different Regions](#)

[Evaluation of Dominant Trends of Human Impact on Land Use/Land Cover \(LU/LC\) Changes as in Multi-Levels \(/State as Regional and Local Levels\)](#)

[Policies and Economic Conditions Impact on Urban, Agricultural and Forestry Landscapes Change](#)

[Land Use/Land Cover \(LU/LC\) Change Mapping in Multi-Scales: Data and Methodology](#)

[Land Cover/Land Use Databases and Data Sharing](#)

## C12.27 Latin American Studies

## C12.28 Local and Regional Development

[Local and Regional Development](#)

## C12.29 Marginalization, Globalization, and Regional and Local Responses

[Long Forgotten Backward Spaces in the Focus of Global Economy](#)

## C12.30 Mediterranean Basin

[The Mediterranean within Global Contexts](#)

## C12.31 Modeling Geographical Systems

[Geocomputation and Modelling of Geographical Systems](#)

## C12.32 Mountain Response to Global Change

[Mountain Communities in High Asia: Searching For a Position in a Globalized World](#)

[Methodological Development of Monitoring Studies on Mountain Trial Degradation under Accelerating Recreational Use](#)



Home

## C12.33 Political Geography

[Sociocultural Encounters in Geography: Borders, Borderlands, Grassroots Non-State Actors and the Southern African Integration Project](#)

[Politics of Environment and People](#)

[The Transformation of Political Space and Prospects for New Governance in the Contemporary Phase of Globalization](#)

[A Reexamination of Militarization and “the Space of Occupation”: A Comparison Perspective](#)

[Changing Geopolitical Imaginations of Asia](#)

[China’s Geopolitical \(Re\) Positionings in a Changing World](#)

[Changing Borderlands between China and Mainland Southeast Asia: A Global Perspective](#)

## C12.34 Population Geography

[Migration and Changing Social Worlds in Asia: Negotiating Gender Subjectivities and Family Relations](#)

[Demographic Divide: Coping with Shrinking](#)

[Demographic Divide: Coping with Growth](#)

[Processes of Population Change and Migration](#)

[‘Urbanization and Population Change in China: Parallels and Differences to the Developed World’](#)

[Migration and Climate Change an Overview with a Specific Focus on China and Asia](#)

## C12.35 Sustainability of Rural Systems

[Globalization and Rural Sustainability](#)

[Environment Change and Migration in the Rural-Urban Interactions](#)

[Land Use and Rural Sustainability](#)

## C12.36 Toponymy (Jointly with International Cartographic Association)

[Place Names as Social Constructs](#)

## C12.37 Transformation Process in Megacities

[Megacity Development and Governance](#)

[Informality and the Transformation of Governance](#)

[Transformation of Megaurban Economies](#)

## C12.38 Transport and Geography

[Comparative Air Transport Geographies: China and Other Places](#)

[High-speed Rail : Accessibility and Regional Development](#)

[Transport and Social Equity](#)

[Smart Cities and Transit Oriented Development](#)

[Transport, Logistics, and Global Consumption Network](#)



Home

## C12.39 Urban Commission: Urban Challenges in a Complex World

[Complex Urban Systems](#)

[New Concepts and Methods in Urban Studies](#)

[Technological Innovations, Creative Activities in Cities, Innovative and Smart Building and Transportation in Cities](#)

[Polycentrism, Small and Medium Size Cities](#)

[Creating Sustainability](#)

[Dilemmas of Aging Cities](#)

[Urban Governance, Planning and Participative Democracy](#)

[Contested Social Spaces](#)

[Increasing Insecurity](#)

[Urban Heritage and Conservation](#)

[China's Great Urban Transformation: Multidisciplinary Research on Urban China](#)

## C12.40 Water Sustainability

[Water Pollution and Health Impacts](#)

[Water Availability Between Floods and Droughts](#)

[Water and Energy](#)

[Water Resources in Eurasia in the 21st Century](#)

## C12.41 Geomorphology and Society (GAS & IAG)

[Geomorphological Hazards For a Sustainable Society \(Sponsored by the IAG\)](#)

[Geomorphology, Geomorphosites and Landscape \(Sponsored by the IAG\)](#)

## 2. FORUMS, SYMPOSIUMS & SPECIAL SESSIONS

[Interactions Between Geomorphic Processes and Human Activities and Geographical Aspects in Geoarchaeology \(Sponsored by the IAG\)](#)

[3rd International Conference on Mountain Environment and Development, ICMED Theme: Future Mountain Development](#)

[Comparative Study of Danxia Landform Between Different Countries](#)

[Inheritance and Innovation of Geography: Young Scholars in Action](#)

[Area Development and Policy](#)



Home

[Round Table on Arctic](#)

[The International Dean/ Chair's Forum on Geography Education](#)

[Earth Surface Processes and Landforms in East Asia - 17th Cross-Straits Symposium on Geomorphology](#)

[Forum on Remaking the Global Economy: GPN Research in Geography](#)

[Joint session with China-Japan-Korea Joint Conference on Geography](#)

[Symposium on Ecological Security of the Poyang Lake](#)

[Forum on Local Studies: Theory and Practice](#)

[Geocomputation in the Cloud Age: Recent Advances](#)

[IGU Project Our Sustainable Cities/Oursus: International & Chinese Experiences](#)

[IGU Project Our Sustainable Cities/Oursus: The Way Forward](#)

[Forum for Think Tank of International Scientists Union of “the Belt and Road Initiative”](#)

[Hydrological Regime and Water Consumption: Changing Facts, Causes and Projected Trends](#)

[IGC Special Session-Global Environment](#)

### 3. JOINT COMMISSIONS

C12.07 & C12.14 Cultural Approach in Geography / Geography of the Global Information Society

[Cultural Geographies of the Digital](#)

[Mega Events](#)

C12.07&C12.20 Cultural Approach in Geography / History of Geography

[Geographical Imaginations, Practices and Stories of Finisterrae and Border Spaces](#)

C12.07&C12.39 Cultural Approach in Geography / Urban Geography

[Cultural Aspects of Sustainable Urban Development](#)

C12.10&C12.39 Gender and Geography / Urban Geography

[A Woman's Place is in the City!](#)

C12.17&C12.34 Global Change and Human Mobility / Population Geography

[Demographic Sources and Methodologies to Study Human Mobility](#)

C12.39&C12.17 Urban Geography / Global Change and Human Mobility

[Human Mobility and Urban Vulnerabilities](#)

C12.33&C12.10 Political Geography / Gender and Geography

[Conversations Between Gender and Political Geographies Key Concepts, Methods and Themes](#)



Home

C12.34&C12.10 Population Geography/ Gender and Geography Understanding

[Understanding Contemporary Dynamics of International Student Mobilities](#)

C12.25 & C12.07 Landscape Analysis and Landscape Planning / Cultural Approach in Geography

[Role of Heritage Sites and Cultural Landscapes in Harmonizing the World](#)

C12.06 & C12.18 Cold Region Environments / Hazards and Risk

[Cold Socio-ecological Systems Under Hazards and Risks: Harmonious Approaches to Resilience Building](#)

## 4. KEY TOPICS

Climate Change and Global Understanding

[Characteristics of the Pressure Distribution Between Matsumoto Iida in central Japan in sunny day](#)

[Research on Water Scarcity and Water Allocation for Integrated River Basin Management](#)

[Regional Science Collaboration on Integrated Transboundary River Basin Management – Case on Koshi River basin](#)

[Transboundary Waters - Cooperative Utilization and Management](#)

[Theoretical Analysis and Case Studies of Free Economic Zone](#)

[Climate Change and Anthropocene](#)

[Geo-political, Economic, Cultural Change and Conflicts](#)

[Global Observation and World Data Systems](#)

[Local Action and Global Social Governance](#)

[Cryospheric Change and Its Impacts to Sustainability](#)

[Rapid Change and Its Dynamics in Cryosphere During the Last Decade](#)

[The Role of Snow in Cryospheric Change](#)

[Permafrost Engineering Under a Persistent Warming Climate](#)

[Global Change and Biometeorology](#)

Environment-Health and Social Welfare

[Environmental, Socio-economic and Climatic Changes in Northern Eurasia and Their Feedbacks to the Global](#)

[Earth System and Society](#)

[Dynamics of Coupled Human and Natural Systems in Water-limited Regions](#)

[Natural Disasters and Vulnerable Spaces, Resilience, Coping and Adaptation in South Asia](#)

[Women's Health and Well Being: An Indian Perspective](#)

[Spatially Integrated Humanities and Social Sciences](#)

[Environmental Pollution and Monitoring](#)

[Human Health and Wellbeing](#)

[Public Services and Social Welfare](#)

[Resource Efficiency and Equity](#)



Home

## Geographical Science and Future Earth

[China's Changing Food System](#)

[Industrial Dynamics and Regional Industrial Restructuring](#)

[Integrated Modeling of the Human-nature System Co-evolution and the Interactions between Different](#)

[Components of the Human-nature System](#)

[Urban Physical Geography: Theory, Practice and Progress](#)

[River Forms in Different Geographic Regions](#)

[Geography and Innovation](#)

[Big Data, GISciences and Decision-making](#)

[Ecosystem Diversity and Eco-civilization](#)

[GIS Data Integration and Harmonization](#)

[VGE as a Key Component of Geographic Knowledge Engineering](#)

[Ecological Security in Mongolian Plateau and Regional Coordinated Development](#)

## Geography in Different Cultures

[Cultural Tourism in Saudi Arabia](#)

[Mobility of China Model](#)

[Historical Geography in Multi-Prospect](#)

[Chinese Culture and Geography](#)

## Urbanization and Sustainable Development

[Urban soils](#)

[Hong Kong and the Pearl River Delta at the Cross Road](#)

[Space-time Behavior and Planning in Urban China](#)

[Rethinking Urban Transformations from the Perspective of Geography in an Urban Era](#)

[Developmental Dilemma in the Third World Cities](#)

[Urban Climate and urban Planning](#)

[Urbanization, Global Environment Change and City Sustainability](#)

[Urban and Regional Planning](#)

[Land Use and Urban Environments](#)

[Demographic Change and Migration](#)

[Risk and Vulnerability Analysis and Urban Safety](#)

[Urban Transport Geography: Transitions to Sustainable Mobility](#)

[Land System Dynamics and Regional Sustainable Development](#)



[Urbanization and Its Impacts on Ecosystem Services](#)

[Sustainable Development of Urban Agglomeration and Eco-Environment Effects of Urbanization](#)



Home

## 5. PLENARY LECTURES

# IGU COMMISSIONS

IGU COMMISSIONS

FORUMS, SYMPOSIUMS & SPECIAL SESSIONS

JOINT COMMISSIONS

KEY TOPICS

PLENARY LECTURES



## C12.01 Applied Geography

### Applied Cultural and Social Geography

#### Oral



Home

1. [An Explorative Process of 'China Rural Social Construction'](#)  
Huasong YAO (Guangzhou university, China)
2. [Analysis of Spatio-temporal Coupling of Urban Poverty and the Urban Environment in Xi'an City](#)  
Beibei MA, Dongqian XUE, Huan ZHAO (Shaanxi Normal University, China)
3. [Assessing Social Values of Ecosystem Services in the Guanzhong-Tianshui Economic Region](#)  
J Liu, Jing Li, Keyu Qin (Tourism and environmental college of Shaanxi Normal University, China),  
Xiaonan Yang
4. [Causes of Urban Houselessness: A Geographical Analysis](#)  
Shamshad. (Aligarh Muslim University, India)
5. [Characterizations of Traditional Settlement Landscape Genome Map of China](#)  
Hu Zui, LiuPei Lin (Hengyang Normal University, China)
6. [Concepts and Method of Measuring Human Resource Development](#)  
Braj Raj Kumar Sinha (Department of Geography, Institute of Science, Banaras Hindu University,  
Varanasi, India, India)
7. [Determining Incommensurables in The Spatial Structure of City Regions Using Fractal Scaling](#)  
Herman Geyer (Stellenbosch University, South Africa)
8. [Drought Threats on Ecological Services: The Case of Nomadic Population](#)  
Tal Svoray (Ben Gurion University, Israel)
9. [Economic Evolution in China Ecologically Fragile Regions](#)  
Xiangzheng Deng, Zhan Wang (IGSNRR, China), Chunhong Zhao (Department of Geography, Texas  
State University, San Marcos, USA, China)
10. [Environmental Impacts on Corruption Crime in China --Based on Geography of Crime Theory](#)  
LI Yijing (China Executive Leadership Academy Pudong, China)
11. [Geographic Perspective in Transdisciplinary Research on Social Pathology](#)  
Tomasz WITES (University of Warsaw, Faculty of Geography and Regional Studies, Warsaw, Poland)
12. [Geospatial Analysis of Juvenile Sex Ratios in India](#)  
Praveen Kumar Pathak (Delhi School of Economics, University of Delhi, India)
13. [Informalisation and Informal Employment in Indian Economy: Emerging Debate](#)

Kundan DAS (Jawaharlal Nehru University, India)

14. [Landscape Evaluation and Most Beautiful Route Planning from Big Website Data](#)  
Zhang Xia, Zhao Weidan, Tang Luliang, Jiang Wenping (Wuhan University, China)
15. [Mapping the Relations Between Immigrants and Place Under the Perspective of Mobility](#)  
Han Zhang, Hong Zhu (South China Normal University, China)
16. [Mosque-centered Trade as a Spatial Pattern in China: Mosque Proximity, Market Proximity and Cultural Embeddedness](#)  
Shaowei Ai (Henan university, China)
17. [Multifaceted Approach to Natural Resource Management: Ethnology, Geography, Culture](#)  
Mikhail Slipenchuk, Elena Vorobyevskaya, Alisa Mazurova (Lomonosov Moscow State University, Russian Fed)
18. [Place Alchemy](#)  
Nayan Srivastava, Manas Ranjan (School of Planning and Architecture, Bhopal, India)
19. [Quality of Life in Slum : A Case Study of Bhopal City](#)  
Archana Sen, Srabani Sanyal (Banaras Hindu University, India)
20. [Relationship Between Reference Values of High Sensitive C-reactive Protein and Geographical Factors](#)  
Qianyi Lin (Institute of Health and Geography, College of Tourism and Environment, Shaanxi Normal University, Xi'an, China)
21. [Research on Spatial Logical-Relations of the Historical and Cultural Blocks place-names in the landscape and its Evolution Mechanism in Kaifeng City](#)  
Qianlong Bie (Henan University, China)
22. [Residential Perception of Floating Population in Urban Villages in Xi'an City Based on the Context and Complex Network Analysis](#)  
Yuqian Lv (Shaanxi Normal University, China)
23. [Signs taken for wanders : Tourist Gaze and the Logic of Re-appropriation of Colonial Monuments in Postcolonial Sri Lanka](#)  
Mahesh Hapugoda, Iraj Rathnayake (Sabaragamuwa University of Sri Lanka, Sri Lanka)
24. [Spatial Dependency of Factors Affecting the Evaluation of Subjective Well-being](#)  
Yoshiki Wakabayashi (Tokyo Metropolitan University, Japan)
25. [Spatial Distribution of Agricultural Land Resources and Population in India with special reference to](#)

[Jalgaon District of Maharashtra: A Geographical Analysis.](#)

Sanjay Bharambe (ADPM's Womens college of Arts Commerce and Home Science, Jalgaon Maharashtra, India)

26. [Spatial-temporal Analysis of Kongtang tombs Based on LiDAR Data](#)

Yi Wu, Lin Yang, Xiaoting Zhu, Ning Li (Nanjing Normal University, China)

27. [Study on Characteristics and Influence Factors of Middle Class in Guangzhou -Based on the Empirical Analysis of Maslow's Hierarchy of Needs Theory](#)

Dandan DAI (School of Geography and Planning, Sun Yat sen University)

28. [Study on the Evolution of the Spatial Pattern of the Highway Network Density in Hunan Province since the Reform and Opening up](#)

Chen Zheng, Zhaoyong Yao (Hunan Normal University, )

29. [The Bottom-up Discourse Construction of Urban Village Based on the Discourse Theory and Body Practice of New Citizen](#)

Tao Wei, Zhao Yongqi (South China Normal University, China)

30. [The Design and Implementation of Beijing Historical and Cultural Geographic Information System](#)

Lei Cai (Beijing Institute of Surveying and Mapping, China)

31. [The Effect of Traditional village Landscape Genes in Construction Place Identity: Taking the Dong Minority Village as an example](#)

Liguo YANG, Peilin LIU (Hengyang Normal University, China)

32. [The Implications of Population Ageing on the Geography of Health and Residential Care for the Elderly: A Case Study of Cornwall, UK](#)

Graham Clarke (University of Leeds, Leeds, UK)

33. [The Potentiality in the Contribution of Geographers to the Planning and Management of Historical Environment](#)

Je Hun Ryu (Korea National University of Education, South Korea)

34. [The Relationship Between Reference Value of Fibrinogen and Geographical Factors based on Neural Network](#)

LI Mengjiao (Shaanxi Normal University, China)

35. [The Spatiotemporal Trends of Religious Institutions in Zhejiang Province, China](#)

Jay Lee, Jay Lee (Kent State University, United States)

36. [Theoretical Construction on Spatial-Temporal Integration of Cultural Information Flow Between Urban](#)

## and Rural Areas

Zhu Yuanyuan (Key Laboratory for Geographical Process Analysis & Simulation Hubei province, Central China Normal University, China)

37. Traditional cultural Taboos and its Impact on Socio-economic Conditions of Gadia Lohar Tribal Community of Rajasthan

Dr Rani Singh (University of Rajasthan, India)

38. Traditional technology and Development of Village Industries: Case Study in North Bengal, India

Suman Sao (University of North Bengal, India)

39. Using Enhanced Two-step Floating Catchment Analysis Techniques to Examine the Spatial Variations in Accessibility to Fire Services: A Case Study of Brisbane Statistical Division, Australia

Kiran KC (University of Queensland, Australia)

40. Visual Discrimination of Urban Historic Landscapes

Eliahu STERN (Ben Gurion University of the Negev, Israel)

## **poster**

1. A Geo-ethical Issue of Caste Base Human Discrimination-A fault line for Harmonious World

Prakash Chanyal (India, Kumaun University Nainital)

2. Analysis and Prediction of Land Use Change in Beijing: A Cellular Automata-Markov Model

Huang Yingchun (China, Beijing Institute of Surveying and Mapping)

3. Diffusion and Displacement of Residential Burglary Based on Environmental Characteristics in a Small-area

YiCheng Tang; XinYan Zhu; Wei Guo (China, State Key Laboratory of Information Engineering in Surveying, Mapping and Engineering)

4. Discussion of Excavation and Inheritance of Traditional Rice Culture in Hollow Villages

Shunqing Zhong, Peilin Liu, Yunyuan Deng (China, Hengyang Normal University)

5. Endogenous & Exogenous Patterns: Two Ways of Regional Developments of Chinese history

Youjiang Wu (China, Institute of Historical Geography, Wuhan University)

6. Measurement and Identification and Classification of Multidimensional Poverty in Rural China

Baixue Wang (China, Beijing Key Laboratory of Resource Environment and Geographic Information System, Capital Normal University)

7. Migrants' Inhabitation of Religiosity: Christianity, Social Transformation and Negotiated Empowerment of Peasant-workers in Shenzhen



- Gao Quan; Junxi Qian (China, South China Normal University)
8. [Relationship Between Reference Value of Hematocrit of Newborn Girls and Altitude](#)  
Miao Ge, Xue Ni (China, Shaanxi Normal University)
9. [Research of Urban Culture Construction Mode in the Undeveloped Area under the Background of New-Type Urbanization: A Case Study for Country Area of Chengkou](#)  
Yiduo Chen; Qingyuan Yang; Yin Zhang (China, Southwest University)
10. [Research Summarization Dynamic Characteristics of Ecological Footprint and Ecological Carrying Capacity of Water Resources in Jiujiang City During 2010—2104](#)  
Che Jinping (China, Gannan Normal University)
11. [Social Life and Social Implications of Tribals in Telangana State, India](#)  
Ashok Kumar Lonavath; Jhansi K; Karunakar Virugu (India, Osmania University)
12. [Socio-spatial Differentiation Based on the 2010 Community Level Census Data: A Case Study of Guangzhou](#)  
Chunshan Zhou; Jincan Hu (China, Sun Yet-sen University)
13. [Study on Rural Livable Evaluation and Planning Strategy in Mega-city Suburb: The Case of Weixing Village in Chongming County of Shanghai City](#)  
Lu Daodian (China, Tongji University)
14. [The Analysis about Coordinated Development Problems of Land and Sea Economy in China based on the Symbiosis Theory](#)  
Shaoyu Dong (China, Liaoning Normal University)
15. [The Geographical Spreading of Critics of Dufu Poetry in Song and Yuan Dynasties](#)  
Huiling Zhang (China, Zhejiang Yuexiu University of Foreign Languages)
16. [The Spatial Visualization and Relational Analysis of the Regional Difference of Education and Economy](#)  
Zheng Meiling (China, Wuhan University)
17. [The Structure of Folk Belief's Scared Space and Believer's Religious Geographic Identity: Between Family and Community](#)  
Hengmi Zheng (China, Collage of Geographical Sciences, Fujian Normal University)
18. [The Theory and Practice exploration of "Remembering Nostalgia" in the Construction of New Urbanization](#)  
Peilin Liu (China, Hengyang Normal University)

## **An Explorative Process of ‘Rural Social Construction’**

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### **Abstract**

China’s regional development is witnessing two polarized process: one side is unprecedented and unstoppable urban growth driven by government-led urbanization statics, the other is numerous urban diseases such as traffic jam, air pollution, weak social relations, etc. as a result, lots of theoretical findings on anti-urbanism, ruralism, rural attachment, home, home making occurred. In terms of rural identity, almost all comments and reviews highlighted on rural depression, rural Population hollowing, rural submerge, disappearance of rural identity. This paper put forward, beyond laments and complaints, practice is more powerful than description. We should focus more on how to do and what we can do, compared with what rural is and how about rural. The author took his own hometown as an example, discussed the path and process of rural social construction based on activism. We found that, passion and heart meant more than profession and technology, activate, employ and evoke local social capital and improve rural participatory capacity played a vitally important role in rural social construction.

### **Key word:**

rural social construction; empowerment; rural attachment

## **Analysis of Spatio-temporal Coupling of Urban Poverty and the Urban Environment in Xi'an City**

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### **Abstract**

Based on the residents' income and expenses data and statistical urban environmental data of Xi'an city nearly 20 years, through ARCGIS spatial analysis technology and the multistage fuzzy comprehensive evaluation model, with urban internal microscopic areas (streets) as the carrier, the spatio-temporal coupling and evolution rule of urban poverty and environment are analyzed. The results show the urban poverty structure changed from radial distribution of nested to layers distribution, the degree of urban poverty reduced continuously; the comprehensive environmental quality in suburb was better than that in the centre, but the integrated environmental quality became worse gradually in the whole city, especially in the southern region; the coupling of urban poverty and comprehensive environmental quality changed and did not present some unified rules, but it showed a more refined coupling characteristic in the inner.

### **Key words:**

urban poverty; environmental quality; temporal and spatial evolution; Xi'an city

## Assessing Social Values of Ecosystem Services in the Guanzhong-Tianshui Economic Region

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### Abstract

Ecosystem services are the benefits provided by nature, which contribute to human well-being. As the use of these benefits continues to increase, additional pressures are placed on the natural ecosystems providing them. This makes it all the more important when assessing possible tradeoffs among ecosystem services to consider the human attitudes and preferences that express underlying social values associated with their benefits. Since the politic, economy and culture get rapid development, the ecological environment of the Guanzhong-Tianshui economic region become increasingly fragile. Therefore, it is particularly important to study the social value of ecosystem services in the Guanzhong-Tianshui economic region. There are no efficient methods to quantify social values of ecosystem services in the past. Our study integrated and quantified the ecosystem services with human attitudes and preferences. 12 most representative indicators including aesthetic, biodiversity, cultural, economic, future, historic, intrinsic, learning, life sustaining, recreation, spiritual and therapeutic were chosen in this study. And then combining human attitudes and preferences that were analyzed through our questionnaires with selected environmental background layer, social values were quantified and mapped by using SolVES software. The results show that environmental background layer has a strong influence on social values. High social value appeared in flat area while residents living in gentle slope got a high value of recreation. Owning rich and varied tourism resources, Xi'an has the highest historic and cultural value. Our research provides a reference for the policy makers and researchers of ecosystem services.

### Keywords:

Ecosystem services; social value; Guanzhong-Tianshui economic region; SolVES software

## Causes of Urban Houselessness: A Geographical Analysis

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### Abstract

The genesis of houselessness runs the gamut of the loss of jobs, business closings, broken relationships, low level of education & skills, drug or alcohol addiction, family violence, mental illness, lack of affordable housing, poverty, etc. In fact, the houselessness is not a sudden event in the lives of most of the houseless people. It is more usually the culmination of a long process of economic hardship, isolation, and social dislocation that can be regarded as the cycle of houselessness. Therefore, an attempt has been made to analyse the migration status of houseless households and various socio-economic causes of houselessness in the Kanpur city. The study is based on primary source of data generated through a comprehensive field survey in Kanpur city carried out during 2012. The study reveals that number of houseless migrants was greater than non-migrants in all the zones of Kanpur city, because out of the total houseless households surveyed (1384), 1282 houseless households have been found as migrants which was more than ninety percent of the total houseless households recorded in the Kanpur city. Moreover, the economic reasons, by far, predominated among the causes of houselessness the city in comparison to social, biological and natural causes of houselessness, because nearly three-fourth proportion of the houseless population in the city was the upshot of the economic causes while more than one-fifth people became houseless due to social causes, followed by the biological factors and natural calamities.

### Keywords:

Migration; Socio-Economic Causes; Houseless Population; Houselessness

## Characterizations of Traditional Settlement Landscape Genome Map of China

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### Abstract

Traditional settlements of China, which have prominent historical and cultural information, are considered as the Chinese treasures. Those play an important role in the new tide of social-economic and urbanization processes of China. Recently, the Landscape Gene Theory (LGT), which aims to understand the cultural features of traditional settlements of China, is a powerful tool for understanding of the landscape patterns of traditional settlements and gaining comprehensive interesting. Plenty of prominent cultural factors which are derived from the traditional settlements are identified by LGT. Those very help to catch the gut features of the traditional settlements. However, LGT does not still cope well with the co-relationships among landscape genes of traditional settlements. Therefore, LGT cannot interpret the mechanisms between the prominent cultural factors and landscape images of traditional settlements. Targeted to partly resolve this issue, at first, this paper employs methods of genome mapping of biology and LGT. Then, this paper tries to integrate these methods into a new research framework that is named as traditional settlement landscapes' genome maps (GSLGM). Firstly, the authors clarify the definition and classification of TSLGM by theoretical features of LGT. Secondly, the authors highlight the functions and significances of TSLGM. Thirdly, the authors present a flowchart for organizing an instance of TSLGM. And here, 30 well-known traditional settlements of Hunan Province of China are taken as cases. The paper portrays the spatial pattern for the cases according to their TSLGM. Lastly, this paper performs an experiment of genome identification. According to this paper, TSLGM can play a paramount role in capturing characteristics of the traditional settlements, which is a potential methodological progress for LGT. It is also suggested that TSLGM has some potential points in traditional settlement digitalization, planning pattern mining and characteristics of regional traditional landscapes identification.

### Key words:

genomics; traditional settlements; landscape gene; landscape genomics; genomics graphs; China

## Concepts and Method of Measuring Human Resource Development

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### Abstract

Human Resource Development (HRD) is one of the most important themes of present day study because the core concept of human welfare lies in the optimum development and efficient utilization of human resources. Human resource development plays a very crucial role in agriculture, industry, mining, trade and commerce, construction, transport and communication, and in other social, cultural, economic and political activities and helps people to lead fuller and richer lives; less bound by tradition and unlocks the door to modernization. In fact, it is an important and more reliable indicator of development than any other single measure and brings the best from the nature and culture for the quality of life of the people. Several geographers and scholars from other disciplines have made their best attempts in analyzing and mapping HRD data but have not paid much attention to devise a reliable method.

This paper aims at demonstrating the underlying facts relating to methodological steps and to develop the way of constructing a logical and reasonable composite index to measure HRD at the individual level in a given area at a given point of time. To accomplish the objectives, several HRD indicators have been suggested and arranged in a logical and practical form for ranking and assigning an acceptable weight as per the nature of variables for devising a reliable and meaningful Index as a result or a guiding tool to apply by the researchers in the field of HRD study.

### Key words:

Human Welfare; Human Resource Development; Agriculture; Modernization; Methodological Steps; Composite Index; Indicators; Rank and Assigning Weight; Guiding Tool

## Determining Incommensurables in the Spatial Structure of City Regions Using Fractal Scaling

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### Abstract

Complexity theory analyses the development of urban systems as an open system which is taxonomically the sum product of the elementary components from which it is derived, and is described in terms of its perceived spatiotemporal condition. It is a system which is separate from its component elements, independent of the spatiotemporal condition. Related to this is the metaphor of fractals, being the repetition of patterns at different scales, both as the repetition of a form in a subsystem nested within a system or between autonomous subsystems of different scales. However, it is expected that there will be a very real variance between real discrete structure of the city and predicted effects. Fractals serve to illustrate that within the perceived randomness and unpredictability in systems, structure emerges. What we've thus have is equifinality, in which chaos produces a finely tuned and ordered system that is coherent and intelligible. However, as the Mandelbrot set has indicated, there are new details in every successive iteration of the oscillation or fractal, resulting in a level of unpredictability in the system, which is why systems and complex theory is only relatively predictable with a degree of error, not absolutely predictable.

### Key words:

Complexity; Fractals; Reflexivity; City Regions

## Drought Threats on Ecological Services: The Case of Nomadic Population

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### Abstract

Rangelands provide food to herds of domesticated animals and, therefore, provide the infrastructure for the meat and wool industries. In the semiarid zone, rangelands have a socio-economic role as they support the economy and culture of pastoral societies. However, despite their importance, rangelands are under constant threat due to drought effects. Here, we simulate: (i) the possible effect of global warming on rangelands in the semiarid zone; and (ii) the use of the land by nomadic shepherds in their search for food supply to the animals. These simulations are achieved by linking a model that predicts space-time dynamics in habitat productivity and GPS-based monitoring of the movement of sheep and goats. The results show that the semiarid zone is indeed under clear threat of drought due to expected climate change scenarios. These may cause undesirable phenomena such as tree mortality, decrease in herbaceous vegetation productivity and shortage in water availability. Such a decrease in productivity may indeed affect the local nomadic population, that survived many years in the region, as our GPS results show the dependency of the herds movement on crop biomass in their search for food along the hillslopes. That is, the impact of biomass quality and quantity on the retention time of herds was statistically significant. In addition, the simulations shown here can be used for purposes such as: leading the herds to areas not typically accessed via free will, minimizing grazing in sensitive areas and identifying areas enduring high use, to reduce grazing effects on vegetation.

### Key words:

GIS; GPS; space-time modelling; nomadic population; ecological services

## Economic Evolution in China Ecologically Fragile Regions

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### Abstract

Economic evolution is considered as being driven by innovation of research and development (R&D) even if regional characteristics usually have critical impacts on various culture-oriented living styles that change in a social transformation dynamically. In documented Chinese history, climate changes and geographic conditions are constraints of the economic evolution in ecologically fragile regions. Lots of unpublished indigenous knowledge of environmental adaptation as a part of culture have been excluded from innovative records. In this research, we review research records of several key factors closely associated with economic evolution in the history of study regions, including climate change, cultural transition, economic base, resource endowment, and transportation accessibility. By surveying previous research records and contents, we examine the paths of economic evolution mixed with adaptive cultures response to climate change in each region, and draw conclusions that (1) the economic evolution with regional climate changes interactively experience three stages of culture-hindered, culture-mixed, and culture-impelled adaptation diversely; (2) regions that have higher economic performance with less innovative records highly likely have a relatively large number of indigenous knowledge unpublished throughout cultural evolution; and (3) English world has research preference to the regions where have lower economic performance with a distinctive culture in China.

### Key words:

China; climate changes; culture; economic evolution; ecologically fragile region

## Environmental Impacts on Corruption Crime in China: Based on Geography of Crime Theory

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### Abstract

The geography of crime theory emphasizes the effects of place, time and environment in shaping crimes, and proposes to take the criminogenic and crime-mediating environmental conditions into consideration when analyzing crime issues. Corruption has been deemed as a high rank problem in almost all the countries, and China has long been trying the best to fight corruptions, especially since the 18<sup>th</sup> CPC National Congress. However, researches in relevant fields so far mainly focus on the criminals' psychological portfolios, the impetus from deficit institutions and regulations, and the subject driving elements, etc., rarely give enough attention to the objective influences from both natural and social environments.

This study overlaid the corruption numbers in each province of China since 1978, together with local socio-economic and demographic data, as well as the corresponding climate, natural resources and infrastructure layers, in ArcGIS 10. It is designed to build up spatio-temporal models on identifying the criminogenic and crime mediating environmental conditions to corruption crime by stages, from the shaping of potentiality, the original beginning of corruption, its development mechanism, the results and the effects. It aims to provide suggestions to policy makers on making finer institutional construction against corruption, through inhibiting the effects of criminogenic conditions and promoting crime-mediating conditions' influences, and finally helps to reduce the opportunities and atmosphere for committing corruption crimes.

### Key words:

environmental conditions; corruption; geography of crime; criminogenic; crime mediating; GIS; spatio-temporal

## Geographic Perspective in Transdisciplinary Research on Social Pathology

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### Abstract

Social geography faces a huge challenge in the form of application-oriented studies, aimed at working out tangible, hands-on measures to include geography in the solution of real-life problems. The research of social pathology, understood as a set of acts that departs from norms established in society, is the object of interest of representatives of various areas. Since it displays the chief problems of civilisation, social pathology is, due to its changeability in time and space, also the object of research of social geography.

The object of this paper is to exhibit a shift in social pathology research from a disciplinary approach, via a multidisciplinary and then interdisciplinary approach, to a transdisciplinary approach. The role of social geography in far-reaching studies on social pathology seems insufficient and often remains imperceptible. The reasons for that are complex and multifaceted. Understood as studies transcending disciplinary divisions and involving stakeholders, transdisciplinary studies represent an opportunity to engage geography in the solving of real-life problems (HADORN et. al 2008). The transdisciplinarity of research is an argument in favour of examining the same issue, in this case – social pathology, on many levels. applying a multitude of methods.

The summary of this paper will indicate a geographical perspective in transdisciplinary research of social pathology. Involving geography in transdisciplinary research on social pathology does not constitute a threat to the cohesion of geography as such, either, but it only reveals the attributes of geography that emphasises the application-centred character of that branch of science.

### Key words:

social pathology; transdisciplinarity; social geography; applied geography

## Geospatial Analysis of Juvenile Sex Ratios in India

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### Abstract

Despite India's impressive records on economic growth over past two decades, the gender inequalities remain stark across all spheres of modern life (economic, education, health, political, social) over the years. Any further delay in promptly addressing and promoting wider issues of gender equity may deter prospects of India's inclusive and sustainable progress. Using the data from Census of India 2011 and other recent rounds of nationally representative household surveys (District Level Household Survey 2008, sub-national level analysis of juvenile sex ratios (JSR) has been performed. Further, theoretically pertinent demographic, economic, social, and cultural variables were constructed to examine the determinants of juvenile sex ratios in across 76 agro-climatic regions in India. Geospatial techniques (Bi-variate LISA and OLS regression models) were employed to examine the association between juvenile sex ratios and its correlates. ArcGIS 10.1, GeoDA, and STATA 13.0 software were used for performing the analysis. This regional level analysis of juvenile sex ratios offered a fresh relook at the sub-national level about the major hotspots (*low JSR*) *vis-a-vis* cold spots (*high JSR*) of juvenile sex ratios in India. Further, the descriptive and spatial regression analysis helped to test the geographic association between JSR and its selected demographic, economic, social and cultural determinants. This research also highlights outliers of JSR and its determinants. These results will help to inform policy decision regarding ameliorating the status of girl child and women in general, particularly via regional specific and cultural sensitive approach. Findings may help to identify and characterize regions with favourable JSR. Similar approaches may be propagated for regions with deficit of female children.

### Key words:

Juvenile sex-ratios; Bivariate-LISA; OLS Regression; Regions of India

## Informalisation and Informal Employment in Indian Economy: Emerging Debate

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### Abstract

The “informal sector” in India and in developing country is considered as “dispersed development engine” as everybody wants to get job in “formal sector”, but at the present scenario this sector is unable to absorb the entire workforce. Those who are unable to find job in the formal sector or retrenched by the formal sector generally get absorbed in the informal sector. If formal sector squeezes (i.e., job cut in the formal sector), the retrenched people immediately move to informal sector. On the other hand, if formal sector expands, people move from informal sector to formal sector. That means informal sector serves the role of “reserve army of labour”. According to first school, informal sector is an autonomous segment of the economy producing mainly for consumption within the sector. The second school believes that the informal sector has a dependent relationship with the formal sector and is exploited by the formal sector. According to the third school, the informal sector is integrated with the rest of the economy through complementary linkages. The purpose of the paper is to deal with the debate arising in case of “informal sector” as in recent years, there has been a deep interest among policy-makers and academics on the one hand and a demand from unorganised sector workers themselves on the other, for economic and social security. An earnest attempt has been made to examine the formal-informal sector linkages and impact of trade liberalisation on informal sector, to estimate the size and growth of employment in this sector and status of employment condition and lastly to find out the rural- urban and male-female work force participation in informal sector. Along with the unorganised sector issues, quality of employment and social protection has also been given importance in this paper.

### Key words:

Formal & Informal sector; Informal employment; Informalisation; trade liberalisation.

## Roadside Landscape Evaluation and the Most Beautiful Route Planning Based on Big Internet Data

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### Abstract

Road Beauty Degree (RBD) is a comprehensive evaluation of attractiveness and comfort of roads' cultural history and natural view. On one hand, beautiful routes make public enjoyable and comfortable, and improves the travel's safety and efficiency. On the other hand, it is helpful for urban transportation planning and construction. Firstly, this paper presents a Roadside Landscape Evaluation Model (RLEM) based on big Internet data such as web searching data, web check-in data and web voting data. Secondly, the RBDs are calculated on the road network by the proposed RLEM as well as the landscapes' visual ranges along road. Thirdly, the most beautiful route planning algorithm is designed and realized based on the RBDs. Finally, an experiment is conducted in Wuhan, China, where twenty-eight landscapes are evaluated by RLEM, and the RBDs are calculated, and 230 most beautiful routes are planned. The result shows us that the proposed method is promising to find the most beautiful route than the traditional shortest route planning method.

### Key words:

Road Beauty Degree; the most beautiful route; big Internet data

## Mapping the Relations between Immigrants and Place under the Perspective of Mobility

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### Abstract

In recent years, with the intensification of urbanization. Mobility become one of the most core characteristics of Chinese society, and the flow of a large number of immigrants have become one of the most important groups for the long-term development of China. The flow is really remarkable in the Spring Festival (one of the most traditional, most solemn Chinese festivals). At the same time, since the 21st century, the rapid development of information technology has brought the advent of the era of "big data", It is great significant to explain People's Daily production and life practice in China. I adopt ArcGIS, and Echart (open-source data visualization software) as the data analysis and processing softwares, analysis Tencent online data during the period of Spring Festival in 2015, the baidu migration data during the Spring Festival of 2015 and 2016, as well as, Chinese National statistics yearbook. Discusses the overall trend of the national population flow during Spring Festival, and the flow mechanism of floating population in Guangzhou. The study found that: 1) The designated population distribution on QQ online 3D figure of Chinese provinces is essentially consistent with "aihui tengchong line". At the same time, as the most populous province, guangdong province, is also the largest number of provinces of tencent online, followed by Yangtze river delta region and the eastern coastal areas; I choose the sixth national census as reference, Beijing is the top one city of whose percentage of tencent online in all over the China; the tencent online number has closely relative with the provincial population and the level of economic development; Eastern coastal areas are significantly higher than the western interior provinces. At the same time in the pearl river delta, Yangtze river delta, bohai rim as the axis, others are around the radiation. 2) As for 21 days during the period of Spring Festival, the distribution of tencent online data of some provinces is high on both sides, and low in middle, generally show "concave" glyph structure, namely the tencent online than during the Spring Festival after the Spring Festival and spring. It also conforms to the general trend of our country's population flow; some populous provinces, whose the distribution of the tencent online data is high on both sides of low, was "convex" glyph structure, the main reason is before Chinese lunar New Year's eve, there are many people return home for the holiday. 3) Before the Spring Festival, baidu migration is the image of the "home hot", the population flow migrate from first-tier cities (such as



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Shanghai, Beijing, shenzhen) into populous provinces (such as anhui, henan, shandong, chongqing, etc.), and after the Spring Festival, the hot line of baidu migration is mainly from populous provinces (such as chongqing, shandong, henan, anhui) moved to first-tier cities (e.g., shenzhen, tianjin, Beijing, Shanghai).

**Key words:**

new urban immigrants; Spring Festival travel; big data, population flow; mobility

## Mosque-centered Trade as a Spatial Pattern in China: Mosque Proximity, Market Proximity and Cultural Embeddedness

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### Abstract

The "mosque-centered trade is an important and impressive feature of the urban Hui Muslims in China, but it is a big open question and has not been paid enough attention by the academic circle for a long time. Based on the observations on the complication and variability of "mosque-centered trade", the theoretical debates on spatial agglomeration, the focus on cultural construction or cultural embeddedness, and the deep investigation and spatial analysis on the typical case of Eastern Grand Mosque of Shunhe Hui District in Kaifeng, our aim in this paper is, firstly, to highlight the unresolved issues on the spatial pattern of "mosque-centered trade" and, secondly, to made a heuristic theoretical explanation on its spatial characteristics, co-occurring conditions and mechanisms. When doing so, the paper highlights the conditions under which the spatial model of "mosque-centered trade" can be represented geographically and culturally. The findings have been shown as follows: 1) It is argued that the spatial pattern of "mosque-centered trade" can be demonstrated as the variable "mosque-market-proximity" configuration which is contingent on the interactive spatial relationship between the mosque and local markets and its relation to the cultural embeddedness and spatiality of commercial traditions of Hui Muslims in China. According to the case study, a "two-centers and one-belt" "mosque-market-proximity" configuration can be identified spatially surrounding the Eastern Grand Mosque, but, at the same time, due to the obvious differences on the different types and sizes, the "mosque-market-proximity" configuration will be close or loose spatially; 2) The co-occurring conditions can be classified in terms of how the "mosque-market-proximity" configuration occurs. The spatial forms of "mosque-market-proximity" configuration are not only geographically dependent on the market-oriented proximity, but also culturally dependent on the mosque-centered proximity. Additionally, it seems to be controlled by the external conditions which are related to a temporal and spatial context, such as local government and urbanization. In these conditions, none of the three is dispensable and the market-oriented proximity is just as equally important to the formation of the "mosque-market-proximity" configuration as the mosque-centered proximity. On the other hand, the temporal-spatial context is considerable as well; 3) Proximity, location and

space play a geographically decisive role in the formation of "mosque-centered trade" and its "mosque-market-proximity" configuration. At the same time, the multi-markets structure, market differentiation and the irreplaceability of the local "Halal markets" play a basic role in the formation of "mosque-market-proximity" configuration. Additionally, cultural embeddedness, place identity and path dependence to the "mosque-market-proximity" configuration for the Hui Muslims play a culturally decisive role in the spatial pattern of the "mosque-centered trade". We argue that the "mosque-market-proximity" (MMP) model may provide an important theoretical basis for understanding the spatial pattern of the "mosque-centered trades" and, therefore, it will be seen as an exploration or a heuristic breakthrough of doing research on the Hui community in the geography circle.

**Key words:**

Mosque-market-proximity model; Mosque-centered trade; Mosque-centered proximity; Market-oriented proximity; Cultural embeddedness

## Multifaceted Approach to Natural Recourse Management: Ethnology, Geography, Culture

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### Abstract

Nowadays, the issue of interaction between man and nature is one of the most pressing challenges. One of the aspects of this interaction, as well as one of the prior scientific directions and use of natural resources, is natural recourse management. A limited amount of many resources and the limits of environmental capacity of nature raise questions of equity to the interests of different generations, which implies the need to decide on the optimal use of natural resource potential of territories currently and in the future. The complex nature of the relationships that form the structure of resources management as a complex system, dictates the need for a comprehensive approach to its study. System analysis is this type of approach. It allows holding studies of the functions of resources management and identifying problems to its development.

### Key words:

multifaceted approach; natural recourse management; ethnology; geography, culture

## Place Alchemy

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### Abstract

Culture defines a community by its social ways and habits and how they go about their daily life. This on occasion, is the result of what profession they engage in guided along with the geography, climate, location, qualities or issues. The cultural aspects are even more involved into the realization of space when communities themselves involve in one profession. The growth of an urban precinct into the city at times loses its sense due to cultural transformation affected by varied changes from the local to the global facing a threat of losing their identity due to various shifts in paradigm at all scales. The silk weavers' community in the city of Varanasi demonstrate the social ways and habits of 16 families residing since the 17th century involved in the handloom silk saree weaving craft. Their occupation had shaped the neighborhood of Reori Talab, one of the many weavers' neighborhoods in the historic city of Varanasi. However, the site is degenerating, losing its identity due to weavers shifting profession as the traditional craft is losing out to cheaper imitation and infrastructural bottlenecks. This has degraded working environment and quality of life and living conditions. The paper discusses the precinct in terms of its culture, profession and its day to day manifestation on spatial configuration which has become the identity of the place and its city. An incremental living-working space strategy would be talked about within the neighborhood in the heart of the city with an aim of preserving the heterogeneous identity.

### Key words:

Culture; Social; Profession; Urban; Growth; Community; Transformation; Weavers; Varanasi

## Quality of Life in Slum: A Case study of Bhopal City

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### Abstract

Increasing urbanization has resulted in faster growth of slum population. Generally, slums are found in most large cities and vary from one country to another depending upon its socio-economic conditions. Due to migration urban environment depredeating in India, about 6.54 crore population lives in slums which are in appalling condition due to dilapidated and infirm housing structures, poor ventilation, over-crowding, lake of safe drinking water, lighting, absence of toilet facilities, and inadequate provision of sewerage, sanitation, non-availability of basic services.

Bhopal being capital of Madhya Pradesh (23010'-23020' latitude & 77020'-77030' longitude) has a huge influx of population who resides in slums and squatter settlements. According to Census 2011, the total area of Bhopal city is (287.17 sq km) with (17.96 lakh) population. There are 380 slums distributed in Bhopal city with 4.91 lakh (27.38%) living in miserable condition and spread all over the city.

This study is based on primary survey of 350 respondents of 7 selected slums distributed in different wards in the city. Life in slum will examine by composite index. It will calculate through variable related to infrastructure and basic services. This paper attempts relationship between objective and subjective quality of life in slum and find out major issues so there is a need to conduct a deep analysis. It will also helpful to come out with more practical policy implication at the grass root level.

### Key word:

Slums; quality of life; infrastructure; basic services; health; major issue

## Relationship between Reference Values of High Sensitivity C - reactive protein and Geographical Factors

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### Abstract

To reveal the relationship between the normal reference value of high sensitivity C-reactive protein (hs-CRP) and geographical factors, taken China as an example, and to formulate a unified standard of establishing reference hs-CRP values. Collected the measured hs-CRP values of 8 350 Chinese healthy adults from 84 cities in China. The spatial autocorrelation analysis is conducted with ArcGIS 10.0 and the correlation analysis method was carried out to investigate the relationship between the reference value and 25 geographical factors with SPSS 21.0. The geographical factors that significantly correlated with the reference value were selected for performing the Ridge Regression (RR) model and the Support Vector Machine Regression (SVR) modeling respectively. Then one of them was selected to estimate reference hs-CRP values of 2 322 cities in China. Finally, kriging interpolation was executed using ArcGIS 10.0, the geographic distribution map of the reference hs-CRP values was produced. The reference hs-CRP value was significantly correlated with the altitude, the average relative humidity, the annual average precipitation, the annual temperature range and the annual average wind speed. The SVR model is better in estimation in this case. Reference hs-CRP values is strongly associated with the geographical factors and regional variations do exist in it. In general, the reference hs-CRP values is higher in northwest and north China than which in the southeast.

### Key words:

hs-CRP; geographical factors; Ridge Regression; Support Vector Machine; Regression; geostatistical analysis; kriging

## Research on Spatial Logical-Relations of the Historical and Cultural Blocks Place-names in the Landscape and Its Evolution Mechanism in Kaifeng City

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### Abstract

The Historical and Cultural Block is part of world cultural heritage, and the spatial logic-relation and its evolution mechanism of the street place-names in the landscape is a research category of cultural geography, which has important guiding significance for the overall protection, organic update and sustainable development of the historical and cultural blocks.

The layout changes of Historical street and the evolution of place-names containing a certain spatial order. The order means the charm, the rule and the logical relationship in the space of the historical blocks. Kaifeng is the world-famous ancient capital of history and culture. There are numerous precious cultural relics and historic sites that scattered in the city. However, after several changes and replacement, the street place-names implied complex spatial logic relationships, including the representation of space, and the practice of space. Using text analysis method and GIS method, this program expounds the history and present conditions of historic and cultural blocks place-names, and explains the association between the representation of space and the spatial practice. In the study program, the long-time developing course of perspective will be accepted to analysis the evolution of the cultural landscape of place-names and the driving mechanism. Based on the previous research, the program will abstract the innovated developing spatial strategies for conservation and sustainable development of the place-names in Kaifeng city Historical and Cultural Block. It will provide a scientific decision-making basis to revitalize the place-names and innovate name management in the national historical and cultural blocks. Besides, this program will be very positive important to develop and enrich the exploratory research of social geography on the place in China.

### Key words:

the Historical and Cultural Blocks; place-names in the landscape; Spatial Logical-Relations; place; Kaifeng city.

## Residential Perception of Floating Population in Urban Villages in Xi'an City Based on the Context and Complex Network Analysis

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### Abstract

The residential perceptions of floating population in urban villages are significant to the urban development and the new pattern urbanization. In addition, internet offer researchers a lot of ways to understand how floating population think about the urban villages they live in. firstly, this thesis explores the important emotional factor perception through online narrative texts. The author collected the data from the Website [www.tianya.cn](http://www.tianya.cn). Context analysis was then used to analyze the filtered data. The factors were evaluated by semantic analysis. Then, the network analysis method is used to analyze the data and determine the important emotional factor. Finally, the result has shown to us: There are 18 attributes which form the residential perception system. Public environment and infrastructure, interpersonal communication and emotional space are defined as system of residential perceptions. It also explores the structure of these attributes and divided them into three layers. They are core perceptions, expected and perceived perceptions and latent perceptions. Based on these results, we discussed relevant policy suggestions to protect the local residents' emotions during the transformation of urban villages.

### Key words:

urban villages; residential perception; text analysis; network analysis

## ***Signs taken for wonders*<sup>1</sup>: Tourist Gaze and the Logic of Re-appropriation of Colonial Monuments in Postcolonial Sri Lanka**

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### **Abstract**

Re-appropriating colonial monument for tourism purposes has been a common and lucrative commercial practice in the postcolonial nations. Though they are often redesigned by the government agencies for public display in keeping with their grandeur and archeological significance intact, these monuments also function to regenerate the postcolonial *signifiers* memories of centuries-old Imperial oppression, exploitation and alienation of the indigenous communities in the respective nations. When these monuments are reformed to 'cater to the view' (MacCannel 1985) of the heroic historical nostalgia of the European tourists, they, at the same time, permanently alienate the locals in their own cultural environment who still suffer from their failed project of decolonization. In relation to the history of the postcolonial subjects whose present is retroactively represented by their traumatic and disturbed past, let along the immediate commercial success in tourism, this paper testifies, in line with Homi K. Bhabha who further develops and confirms Frantz Fanon's decolonization paradigm, that these archeological artifacts 'intercut with' the postcolonial identity that further alienate their subjects within their own setting (Bhabha 1994: 40-41). In this light, this paper reviews the ideology behind the rise of restored colonial monuments on the identity formation, depersonalization of once colonized subjects and re-interrogates the role of the present postcolonial rulers with the initial Fanonian question redesigned, 'what do the European tourists and the postcolonial governments want?' It therefore argues that though we do not believe in colonialism, the meaninglessness of these monumental *signs* are presented to give the tourists a '*santa-claus effect*' (emphasis added Zizek 2000) in which *touristic gaze* (MacCannell 1973; Urry 1990) functions devoid of any 'historical meaning' where sight-seeing emptily functions even though nobody truly believes believe in them.

### **Key words:**

colonial monuments; tourist gaze; decolonized identity; sightseeing alienation

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<sup>1</sup> This phrase is borrowed, with a slight alteration in the word 'wonders', from a popular postcolonial critic Homi K. Bhabha's *Signs Taken for Wonders: Question of Ambivalence and Authority Under a Tree Outside* (1985) in which he observes the ambivalence in colonial existence. Bhabha claims that the colonial presence is always split between the appearance (civilized people who maintain law and order) or visibility and true authority (racial and cultural discrimination).

## Spatial Dependency of Factors Affecting the Evaluation of Subjective Well-being

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### Abstract

During the last few decades, subjective and objective evaluation of happiness or well-being as a quality of life (QOL) indicator has been attracted attentions of social scientists and policy makers. This trend is exemplified as the development of measures of Gross National Happiness (GNH) in Bhutan and Better Life Index (BLI) by OECD as alternatives to the existing indices of economic affluence, namely, GDP. Compared with the previous indicators of QOL which is usually measured objectively, well-being or happiness tends to be measured subjectively being aggregated into an areal unit. Based on the findings of the previous studies that personal attributes (i.e., age, sex, and income) have considerable influence on the subjective evaluation of well-being, population composition of a region can affect the spatially aggregated evaluation of well-being. In addition, evaluation of well-being represented in areal unit is usually affected by the conditions of neighboring areas according to the Tobler's first law of geography. The aim of this study is to examine these compositional and contextual effects by analyzing empirical data from Japan. Regression analysis of the compositional effect on the subjective well-being at the sub-national level revealed that the population composition have limited effects on the level of subjective well-being. Even after adjusting for the population composition, substantial differences remained in the well-being level across areal units. Spatial autocorrelation analysis detected some spatial clusters with high/low levels of well-being, which indicates spatial dependence of QOL evaluation. At the district level, however, the contextual effect was not obviously observed.

### Key words:

Quality of Life; compositional effect; contextual effect; subjective well-being; multilevel model

## **Spatial Distribution of Agricultural Land Resources and Population in India with Special Reference to Jalgaon District of Maharashtra: A Geographical Analysis**

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### **Abstract**

Agricultural land use and population, its management and relationship is basic problem of modern developing ward. Land may be regarded as a basic resource within and upon which human activities are carried out indisputably leading to all types of productions. In agricultural perspective world's cultivated land are limited while population is growing rapidly and consequently, with passage of time each one of us will get less food, fiber, fuel and fodder. In order to meet this challenge a rational and efficient use of agricultural land need to be given top priority in its developmental strategy and planning. The population continues to grow rapidly in the developing countries and great pressure is being placed on arable land, water, energy and biological resources to provide an adequate supply of food and energy requirements. (Ms. Soumya Mahanty) .

From the global scenario, the agricultural circumstances on the Indian scene are not much different. In contrast to galloping population, its growing greed and need in terms of both quality as well as quantity, the per capita agricultural land is gradually and perceptibly limited and less available. In near future, it is bound to be further reduced. Thus, what is happening at global national and regional levels is very well reflected in the studies carried out at the sub-regional and local level. The present study analyses the spatial characteristics of per capita land available and factors influencing variations in land-man ratio and studies the intensity of population pressure particularly suited to diversified terrain where maximum proportion of daily caloric intake per person is obtained from food grain.

### **Key words:**

Spatial; Land Resources; diversified terrain; Land-man Ratio

## Spatial-temporal Analysis of Kongtang tombs Based on LiDAR Data

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### Abstract

Archaeological site is the first information source of archaeological research. It's important for archaeological site to record accurately and the site spatial-temporal analysis. In this paper, Kongtang site is taken as instance, which is located in Jurong City, Jiangsu Province, China and has nearly 200 tombs with complex spatial-temporal relationships. In order to record the spatial-temporal relationships of the tombs accurately, the 3D laser scanner was adopted to collect the multi-temporal LiDAR data of tombs. Through a series of data processing of denosing, resampling, registration, segmentation and modeling of the LiDAR data, we rebuilt the 3D scene of the tombs, providing data base for further spatial-temporal analysis. At the beginning of analysis, to express the spatial information of a single tomb object, a new file structure of point cloud was designed based on segmented data. Then, tombs could be divided into several groups by spatial clustering method, and the time division of tombs depends on layer relationships. The spatial overlay of multi-stage tombs could show the tombs developing tendency clearly. Apart from this, by means of spatial-temporal statistical analysis, the attribute data including funerary objects, tomb occupants and animal bones were associated with the spatial data to infer the composition and grade of social units. Based on the precision LiDAR data and spatial-temporal analysis methods, the spatial-temporal relationships of Kongtang multi-temporal tombs were discussed in this paper. The proposed method breaks the limitation of traditional manual methods and the lacking in spatial-temporal analysis, having important significance to related research.

### Key words:

spatial-temporal analysis; LiDAR Data; archaeology; tombs

## Study on Characteristics and Influence Factors of Middle Class in Guangzhou: The Empirical Analysis of Maslow's Hierarchy of Needs Theory

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### Abstract

Middle classes in Chinese metropolitan cities have become important social groups, and have increasing influence on urban transformation, economic development and social stability. Therefore, it becomes essential to understand the middle class. Firstly, using the 1130 questionnaire survey data, on the basis of Maslow's hierarchy of needs theory, we analyze the characteristics on the society, substance, values, identity and self-actualization of middle class in Guangzhou. The results show that the physiological needs of middle class is manifested as they have high income and wealth, mainly work in the central district and their jobs-housing relative balance; the safety needs are presented as they feel optimistic about life, have diversified lifestyle, their recreational space of working day is smaller than that of weekend day, and the shopping space for purchasing distinct goods is different; the love or belonging needs and esteem needs are expressed as they have strong subjective identity and higher happiness index, as well as the self-actualization needs is denoted as they basically realize personal ideal, and youngsters want to seek greater development, elders want more time to recreation and to accompany their families. Secondly, using multiple linear regression and logistic regression analysis, we analyze the factors influencing characteristics of middle class, finding that age, residential location, income, number of children and education are five main factors. Then, compared with the Maslow's hierarchy of needs of the ordinary class, that of middle class presents the spindle structure, namely "small at both ends but big in the middle".

### Key words:

Middle class; Characteristics; Maslow's Hierarchy of Needs; Guangzhou

## Study on the Evolution of the Spatial Pattern of the Highway Network Density in Hunan Province since the Reform and Opening up

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### Abstract

Select counties in Hunan province as the research unit, and 1:4.4 million GIS vector map data (2012) of Hunan Province for reference base map, using ArcGIS overlay analysis and Spatial auto-correlation function, study of characteristics of density spatial distribution of highway network in Hunan province County. The road network density as the main object of study, study the spatial correlation between the district road network density, analysis of the district road network density and socio-economic, demographic and topographic relationship. Combination five cross section map since the reform and opening, to build database of highway network in Hunan province. Using Nuclear density analysis and hotspot analysis features, study spatial pattern analysis of highway network. Studies have shown that in 2012, uneven distribution of highway network in Hunan province density index for 0.24092, the Highway network distribution has a certain imbalance; The road network density of global Moran's I is 0.826078, road density has a strong positive correlation between districts; spatial distribution characteristics of road network density has a strong convergence and relevance on topography, population density, GDP density. On the evolution of spatial pattern, links between the core road network density levels becomes closely, nuclear renders the all-round and rapid development features. Investment, transportation planning, the development of urban system, administrative changes, and other factors that affect the development of highway network in Hunan province.

### Key words:

Highway Network Density; Spatial Distribution; Patterns of Evolution; Hunan Province

## The Bottom-up Discourse Construction of Urban Village Based on the Discourse Theory and Body Practice of New Citizen

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### Abstract

Urban village is a unique phenomenon in Chinese urban development process. Due to the special system design, urban villages have become one of the most competitive place where most intense discourse collision gathered. This study takes the case of Guangzhou Liede village renovation, and examines the process of rights protection that residents dissatisfied with opaque deal making among village committee, the government and developers in the process of Liede village renovation. Data collection focused on in-depth qualitative interviews with a total of 45 residents and participatory observation. We found that villagers construct a bottom-up Liede village picture which is different from the image pictured by the media and government through group petition, blocking roads, containing shops, appealing against the elections and appealing court. Residents in Liede take their action to defend their Liede village master's status. Finally, we analyse discourse about rights protection under the view of Foucault's discourse theory to explore the essence of rights protection and urban village reconstruction from the perspective of body practice and discourse practice of the villagers. Foucault discourse theory connects space, power and discourse together, realizes the interaction and transformation of integrated, which provides a new theoretical perspective for the microcosmic research of urban village reconstruction. This research will inspire the urban renewal under the situation of China's rapid urbanization, it also will provide a significant guiding for the process of villager to citizen and fulfil the urbanization routine which based on the people-oriented.

### Key words:

urban village; discourse construction; power space; body practice; Liede rights protection; citizenization

## The Design and Implementation of Beijing Historical and Cultural Geographic Information System

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### Abstract

Beijing is a world famous historical and cultural city which is rich in historical and cultural resources with extremely important historical, scientific and artistic value. With the increasing urbanization of Beijing in recent years, the economic development and the cultural heritage conservation has become a contradiction. Therefore, it has become an important and urgent task to protect, manage and display the historical and cultural resources. Geographic information system, as the special technology of dealing with spatial data, is suitable for information collection, management, analysis and display of various resources. It is of great significance to establish the Beijing Historical and Cultural Geographic Information System (BHCGIS). It can provide historical and present-day information of the Beijing's historical and cultural resources. And it can also record the evolution of the status of the resources to provide decision support and research basis for the urban planning departments and cultural heritage bureau. In this paper, we set the establishment of BHCGIS as the goal. We analysis and catalogue the various historical and cultural resources including Hutong, former residence, palace, Great Wall, etc in order to establish the spatial database for BHCGIS which is the basis to build other applications. We utilize the service-oriented architecture(SOA) based on secondary development to build the system. Some key technologies in system design and implementation are discussed in detail.

### Key words:

Heritage Conservation; Geographic Information System; Protection of the Famous Historical and Cultural City

## The Effect of Traditional Village Landscape Genes in Construction Place Identity:

### Taking the Dong Minority Village as an example

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#### Abstract

The interpretation of inheritance and development of traditional village culture is inseparable from the interpretation of village landscape; it is important to explore the role of the Dong Minority Village Landscape gene in construction of Place identity to the national cultural heritage protection. Based on recognition of Dong Minority traditional village landscape gene as Drum tower, SA altar, surrounded Drum tower layout, China fir paddy, this paper researches the effect of landscape gene in construction Place identity rely on construction structural equation model with 272 questionnaires in Taro Tongdao, Zhaoxing Liping, Gaoding Sanjiang. 1) Village landscape gene have an active effect on construction Place identity, and SA altar > surrounded Drum tower layout = China fir paddy > Drum Tower; 2) Effect of landscape gene in construction Place identity is the intention identity > emotional identity > recognition identity; 3) In the measurement model of Place identity, the following factors have obvious influence to place identity, as residence time, birthplace, occupation, income, level of education, the development of villages, residents type, Drum Tower, SA altar, surrounded Drum tower layout, China fir paddy, ect; 4) In the three measurement models, as the personal characteristics, social economy, landscape gene individual living time has the most influence of obvious characteristics, village development has the strongest influence of social and economic, SA altar has the greatest contribution to landscape gene perception; 5) Personal characteristics, social and economic factors have indirect effects on the Place identity through the landscape gene sense.

#### Key words:

Traditional village; Landscape genes; Place identity; Effects of action.

## The Implications of Population Ageing on the Geography of Health and Residential Care for the Elderly: A Case Study of Cornwall, UK

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### Abstract

One of the greatest challenges to providers and planners of health, residential and nursing care over the next 10-20 years will come from population aging. According to the UK Office of National Statistics, the percentage of the population in the UK over the age of 65 is set to increase from 23% today to 30% by 2030. Population aging is already putting great stress on care provision. The lack of care beds for the elderly is said to have increased 'bed blocking' in hospitals and is putting great strain on NHS budgets. An additional core issue for future planning is whether the population will age in good or bad health. Although people are living longer, they are more likely to be living with disabilities and increasingly prone to aging diseases – dementia, rheumatoid arthritis for example.

The aim of this paper is to first map the socio-economic variations in the elderly population in one UK region, Cornwall, using geodemographic data. This region has been selected as it already has the lowest rate of council-supported permanent admissions of people aged 65 years and over to nursing and residential care home settings in the UK (the NHS Atlas of Variation in Healthcare 2015). Then, the paper will present a set of most likely future scenarios for 2030, modelling population aging under various what-if scenarios relating to aging with good and poor health. The implications of these scenarios for the geography of future health, residential and nursing care provision will be discussed and analysed.

### Keywords:

Population ageing; health care; residential care; accessibility

## The Potentiality in the Contribution of Geographers to the Planning and Management of Historical Environment

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### Abstract

Since the concept of place was introduced through the *Burra Charter* (1979), the concept of heritage has become broader and deeper to embrace various spatial implications. The *Burra Charter*, by itself, was the most notable evidence for the recent trend of integrating the pervasive dichotomous thinking between cultural and natural heritages into a spatial and humanistic interpretation. From these changing perspectives, the category of cultural landscape has provided a new angle for the heritage field, while challenging the old concept of heritage in the 1960s and 1970s. Cultural landscape has emerged as a new paradigm in the field of heritage since the 1990s, and a number of countries have set up the heritage policies to follow the UNESCO guidelines and conserve their outstanding cultural landscapes. Along with the notion of cultural landscape, sustainability of historic environment in the field of heritage management has emerged as a key topic to be pursued to be integrated into the planning issues. As cultural landscape is one of the major topics for cultural geography, geographers will be potentially able to make a substantial contribution to the planning and management of historic environment. The aim of this paper is to discuss the geographer's potential engagement with the problems in association with the multiple and complicated aspects of historic environment in South Korea.

### Key words:

*Burra Charter*; cultural landscape; historic environment; heritage management; cultural geography

## The Relationship Between Reference Value of Fibrinogen and Geographical Factors based on Neural Network

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### Abstract

To analyze the relationship between the reference value of fibrinogen(FIB) of Chinese healthy adults and geographical factors and to provide scientific evidences for establishing the uniform standard. Reference values of Fib of 10701 Chinese healthy adults from 103 cities were collected. The correlation analysis method was adopted to investigate the relationship between the reference value and 18 geographical factors, including spatial index, terrain index, climate index, and soil index. Geographical factors that significantly correlated with the reference value were selected for conducting BP neural network model, the spatial distribution map of the reference value of Fib of Chinese healthy adults was fitted by the disjunctive kriging interpolation. The reference value of Fib of Chinese healthy adults was significant correlated with the latitude, sunshine duration, annual average temperature, annual average relative humidity, annual precipitation, annual range of air temperature, average annual soil gravel content, soil cation exchange capacity (silt). The artificial neural networks were created to analyze the simulation of the selected indicators of geographical factors. This research chooses 5 layer neural networks 11 hidden layers and 2000 times of training to build a simulation rule, and this rule thereafter was used to simulate the relationship between FIB of Chinese healthy adults and geographical environment use the MATLAB software. The spatial distribution map of the reference value of Fib of Chinese healthy adults showed a distribution feature of higher in the south and lower in the north, the higher in the east and the lower in the west. If the geographical factors of a certain area are known, the reference value of Fib of Chinese healthy adults can be obtained by establishing the neural network mode or plotting the spatial distribution map.

### Key words:

fibrinogen; BP neural network; geostatistical analyst; spatial analysis

## The Spatiotemporal Trends of Religious Institutions in Zhejiang Province, China

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### Abstract

Religion institutions live on supports by their followers in most cases. They have been, however, heavily influenced by social, economic, cultural, and even political factors in their development. Using a dataset that has the locations, years, and other associated information of religious institutions in Zhejiang Province, China, we show that the spatio-temporal trends of how religions diffused and evolved can be quantitatively measured and qualitatively discussed with social and cultural factors.

We applied a spatial statistic, nearest neighbor index, to calculate the spatial patterns of established religious institutions in different years. The patterns in different years were then regressed to formulate their temporal evolution pattern. Curve estimation method was used to classify the spatio-temporal patterns according to the classic spatial diffusion patterns: contagious, expansion, hierarchical and relocation diffusion patterns.

Our analytic results showed that the methodology applied in this study was indeed feasible and effective. With these results, we will review the spatiotemporal trends we found with respect to social, economic, and cultural trends in the studied area.

### Key words:

spatiotemporal analysis and mapping; spatial diffusion patterns

## Theoretical Construction on Spatial-Temporal Integration of Cultural Information Flow Between Urban and Rural Areas

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### Abstract

Problems reflected from the communication of cultural information between rural and urban areas have already impeded the process in which our country devotes its effort to promote the development of rural and urban cultures' integration. Little contents on the researches of "information flow", however, have involved in cultural information flow, and there were weak in academic fundamentals on cultural integration. In order to explore the basic rules of cultural information flowing between rural and urban areas, the scientific questions which are how to simulate quantitatively the flowing state and how to construct the spatial-temporal integration model are to be answered based on the big-data thinking, Petri network theory, RS-GIS-GPS integration technology and the analysis tool of State flow. From the perspective of dynamic "field" of rural and urban cultures, the spatial-temporal integration of cultural information flow between urban and rural areas is our research object. While, the research is to explore the influences of culture information flow on the forming of rural-urban cultures in space, uncover its mechanism, construct spatial-temporal integration model, initially establish spatial-temporal integration theory of rural-urban cultural information flow, and strive to promote the integrative development of multidiscipline such as culture geography and information sociology and create new theory list, which is to establish the theoretical foundation for accelerating the development of urban-rural cultural integration, and to provide the scientific and theoretical basis for sustainable construction of Cultural Information Resources Sharing Project between rural and urban areas in china.

### Key words:

space of flows; spatial-temporal integration; cultural metropolitan circle; rural-urban cultures; the theoretical system

## Traditional Cultural Taboos and its Impact on Socio-economic Conditions of Gadia Lohar Tribal Community of Rajasthan

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### Abstract

Cities –culture, technology, wealth and power presents a complex structure. Jaipur city in Rajasthan is facing a dilemma, which we call microcosm. Urban environment and the location of different activities have adversely influenced the community. The present paper is an attempt to find out how the process of urbanization and development has affected a community which was primarily living in the heart of city are now living in peripheral region. Gadia Lohar is a social group that shares a common and distinctive culture, religion and language. They claim themselves that the Chittorgarh was their home and in the 1568 A.D., they moved from the fort when the Mughals took over Delhi and surrounding areas (singh 1998). But now, they are socially neglected group and led a life of isolation which made them so vulnerable and they are unable to with stand with the society. The methodology applied is personal interviews and search along with secondary sources with statistical techniques. The objectives of the study are, to know the reasons for their migration, to know the socio-economic status, to find out the present distribution of the community and to study the government assistance being sanctioned for the community. As, most of these people are illiterate, they remain unaware of their rights and have never approach any authorities regarding the lack of basic facilities in the area. The living condition of these people tells all about their problems and need. The government and NGOs need to take urgent initiatives to help these deprived Indians.

### Key words:

Socio-economic; gadia; urbanization; community



## Traditional technology and Development of Village Industries: Case Study in North Bengal, India

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### Abstract

Village industries which constitute an important segment of rural India exhibit the great tradition and cultural heritage of our country. Technological innovations were made prior to the advent of modern means of industrial development in India. Traditional technologies followed in village industries have stood the test of time and remain popular even today. Modern industrial development in some of the rural areas has led to a gradual decay of the symbiotic functional system of rural society. This has ruined the economy of village industry, shattered the economic integration of the communities, and brought a complete holocaust to the cultural distinctness. Subsistence agriculture economy of the rural areas continues to dispel part of its working force which leads to out migration of work force to urban areas. The situation necessitates creation of job opportunities in areas where people are living now; development of work places which are cheap; adoption of production technology which are relatively simple; promotion of less sophisticated organizational forms related to supply, finance and marketing and production for the conservation of local resources. Thus development of village industries which follow traditional technology, are economically viable as well as appropriate to rural environment seems a rational solution. Objective of the present study which is based on case study of different village industries of North Bengal which constitutes six districts of the state of West Bengal is to identify the role of traditional skill in the production process and to formulate strategies for the development of selected village industry.

### Key words:

Traditional technology; Traditional skill; Village Industry; India

## Using Enhanced Two-step Floating Catchment Analysis Techniques to Examine the Spatial Variations in Accessibility to Fire Services: A Case Study of Brisbane Statistical Division, Australia.

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### Abstract

Fire services are essential public agencies which ensure the safety of people and properties. A relatively large literature base exists on the use of traditional access based methods such as location-allocation model to examine the spatial variations in access to emergency response to fire services. Although such methods identify locales that are either covered or not by a fire station based on its service delivery standard, it does not reveal how accessible such locales are to fire services in relation to their coverage. Drawing on unit record data from Brisbane Statistical Division in Australia, this paper critically assesses the use of enhanced two step floating catchment analysis techniques to examine the spatial variation in accessibility to fire services according to service delivery standards so as to determine strategic location of fire station in relation to inaccessibility. Results reveal that locales with most vulnerable population have less access to fire services compared to those living in least vulnerable locales in the case study area. The findings offer a new evidence base to inform policy decisions from a resource allocation perspective through the spatial allocation of finite fire resources.

### Key words:

Fire services; accessibility; floating catchment analysis; GIS; Brisbane Statistical Division; vulnerable population; socioeconomic disadvantage

## Visual Discrimination of Urban Historic landscapes

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### Abstract

Subjective discrimination of historic landscapes is rarely studied by geographers. The need to deepen into the perceptual and visual aspects of the urban historic landscape has recently increased due to the growing interest of preserving historical structures and elements within the current, dynamic, urban areas. For example, the 2009 conference of UNESCO Forum – University and Heritage, dealt solely with the conservation and function of urban historic landscapes in both western and non-western countries. Assuming that the individuals' ability to identify urban historic landscapes within the modern urban structure is the first step in defining a preservation policy and means, the present study examines the subjective visual discrimination of such urban fabrics. More specifically, what are the visual attributes that determine the perceived level of historicity, and what are the effects of familiarity and ratio of contemporary development on the individuals' perception.

Subjective evaluations of historicity were solicited from 90 geography students in a laboratory - type experiment. Each participant evaluated the level of historicity of nine historic urban landscapes based on photographs from Israel and Europe. Their task also involved discrimination of visual attributes and subjective landscape preferences. The main contributing attributes to the level of historicity were architectural style, visual landmarks, buildings density, and the perceived contrast between old and modern buildings. Familiarity and preliminary knowledge were found irrelevant to the perception of historicity. The subjective preferences to urban historic landscapes were found to be affected mainly by salient historic elements (e.g. city walls, towers, domes), and the visual absence of modern structures. Finally, the paper contributes to the integration of visual perceptions in shaping conservation policies of urban historic landscapes.

### Key words:

Urban historic landscapes; historicity; subjective discrimination; perception; conservation policy

## A Geo-ethical Issue of Caste Base Human Discrimination-A Fault Line For Harmonious World

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### Abstract

Caste has been one of the oldest and most distinctive feature of human society of the world, which are discriminate in layers basis on various parameters such as, color, occupation, heredity, rituals and religious as well as by birth. Caste Discrimination Effects (CDE) an estimated 360 million peoples on worldwide, the huge population living in South Asia. These are facing massive violation of civil, untouchability, sexual assault, murdered, economic, social, festivals, and political, however their have suffering from fundamental rights and needs. Caste systems is spreading other country such are Jati in Nepal, Pakistan, Sri Lanka, Burkumin in japan, Baekjeon in Korea, Al-Akhdam in Yeman and as well as in African countries similar to India. Caste system divided peoples into unequal and hierarchical social groups. Those at the bottom are considered lesser human being and polluting to other caste group.

It is a geo-ethical issue for as geographers. In this paper, I will compiled and correlated that we cannot reduce and make harmonious world without mitigation of Caste base discrimination of the human societies in the world. We have try to analyze, how can mitigate the impact of man-made & natural disaster, Climate changes, Inequality, Poverty, Chronic Diseases and Terrorism also. We want introduce also, a new discipline in geography education as a “Caste & Casteism Geography–A Geoethics”, because we believe the sustainable social Development is must be our first priority and we cannot go as untoward, than will be influenced on another issues.

### Keywords:

Caste Geography; Mitigation of Disasters; Caste Discrimination Effects (CDE); Sustainable Society

## Analysis and Prediction of Land Use Change in Beijing: A Cellular Automata-markov Model

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### Abstract

The rapid urbanization that has dramatically changed land use in Beijing over the past 20 years is clear from an analysis of the evolution of land use change during the period 1992-2012. This paper combines remote sensing, geographic information systems and integrated cellular automata, or Markov models, to predict changes in land use for 2020 and 2030. The key findings: 1) in the period 1992-2012, land-use structure has changed significantly, and the rate of change for every type, including farmland, ecological land, construction land and other uses, is greater than 6%; 2) the transition areas from farmland to construction land are 778km<sup>2</sup>, the largest among land use patterns, and they are mainly concentrated to the north, east and south of the city center; 3) according to the 2030 projection, land use change will result in a reduction in farmland, from 22.14% to 19.05%, and an increase in construction land, from 18.14% to 19.74%, relative to the total area in 2012. The evolution of land use change and the process of urbanization are predicted to result in structural changes that will stabilize after an initially dramatic period, but achieving stability will require an accelerated level of comprehensive planning. Urban sprawl and diminishing farmland are found to be current problems in Beijing that will continue in the future, suggesting the need for planners and government officials to improve land use management strategies to better balance urban expansion and ecological conservation and thereby reach a stable state.

### Key words:

land use; land-use structure; CA-Markov, prediction; Beijing

## Diffusion and Displacement of Residential Burglary Based on Environmental Characteristics in a Small-area

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### Abstract

Like diseases which can transmit and diffuse, residential burglary may also spread in a certain period of time and to a certain area. This spread is known as near-repeat effect. Traditional near-repeat analysis focuses on spatial spread of crimes to adjacent areas, with little regard to the displacement effect. Crime displacement refers to the changes offenders make, primarily in the target area, when they are deterred from committing crime or find crime not worthwhile. If this phenomenon is neglected, the near-repeat analysis will tend not to obtain the overall spatial distribution pattern of residential burglary, leading to limited effectiveness of crime control. For this reason, we present a non-homogeneous diffusion model where crime spreads not only to spatially and temporally adjacent areas, but also to areas with similar environmental characteristics. The characteristics can be incorporated into residential burglary risk value; the diffusion equation is applied to stimulate the crime spread in order to identify the risky places not recognized by the historical crime data and find the distribution pattern of the crime. The algorithm we described is an expandable model, which allows easy inclusion of more environmental characteristics for further study and for provision of more valuable information for the crime control. By virtue of spatial constraints and environmental characteristics, the most crucial areas to residential burglary are identified, and this will be helpful for developing policing strategy.

### Key words:

near repeat; burglary; hotspot analysis; PDE; Non-homogenous; data fusion

## Discussion of Excavation and Inheritance of Traditional Rice Culture in Hollow Villages

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### Abstract

Traditional rice culture is disappearing gradually in rural villages. In order to carry forward the traditional rice culture and play the role and function of rice culture in the construction and development in new rural areas, it is urgent to excavate and inherit the rice culture. By the means of visiting and questionnaire survey system of rice cultural diversities in hollow village, its root of the loss was revealed currently that it was a large number of rural labour force emigrating, land use changing in rural, and cropping pattern has undergone a fundamental change, which make traditional rice culture lost its basic soil. In this context, such measures should be taken: (1) to fully seek for and classify the rice culture in the hollow village. (2) to display and save the traditional rice culture in the modern media with the help of modern information technology. (3) to establish exhibition hall and interactive museum to learn from traditional rice culture, it becomes the regional traditional culture education base, only by these, traditional rice culture in the hollow village never be vanished and the future generations will carry forward the rice culture, then, the hollow village culture will be forever.

### Key words:

Rice culture; hollow village; labour force emigration; interactive museum hall

## Endogenous & Exogenous Patterns: Two Ways of Regional Developments of Chinese history

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### Abstract

The survival and development of a human social group depend on material resources, and the meaning of life and social norms are derived from social culture. Resource endowment and culture system are the basic variables of regional developments of Chinese history. It can be concluded that the regional development of China's historical period can be classified as two models, endogenous and exogenous ones. This kind of thought has the important significance to the construction of development process of Chinese human geography. During Unification period China generally had the trend of endogenous development, and the development of various political entities in the period of separation was mainly the exogenous pattern. This situation has gradually been changed after the Opium War, even if it is a unified period, the development of Chinese society is also the exogenous pattern, and this trend in twenty-first Century seems to have been no change.

### Key words:

Endogenous Model; Exogenous Model

## Measurement and Identification and Classification of Multi-Dimensional Poverty in Rural China

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### Abstract

Since the 13th Five-Year Plan started, the precise poverty has become the new stage of Chinese poverty alleviation strategy. The effective targeting of rural poverty population and effective identification of its spatial distribution are urgent problems to rural poverty alleviation of the contiguous poor areas. Taking emphases depressed region--Hechi City as the object of study, this paper is based on the perspective of capability poverty, selected four dimensions--housing, health, education and living standers, systematically designed the Multidimensional Poverty Index, calculation method and used "dimension aggregated" and "dimension decomposition" of "A-F dual cutoff" to calculate and analyze the Multidimensional Poverty at a village level. This paper used Kriging method to deal with the measurement results with spatial interpolation, thus, it could systematically analysis the spatial distribution pattern of multidimensional poverty.

The results showed: (1) 830 villages were identified as multidimensional poverty village which involved in the population of 623846 people. (2) The spatial distribution showed from northeast to southwest as the boundary, and the multidimensional poverty village gathered in the southeastern region of relatively flat terrain; most of the Multidimensional Poverty distribution was at the junction of two counties. (3) 66.3% of designated poor counties overlap with identified poor counties' villages, and identification of the non-national key support multidimensional poverty village areas are in a more serious disadvantage at infrastructure level. (4) According to the disadvantage/deprivation situation of different dimensions, multidimensional poor villages are classified into eleven types, i.e., lack of financial capital, lack of medical facilities et al.

### Key words:

Multidimensional poverty measurement; Multidimensional Poverty recognition; Multidimensional Poverty index; type of poverty; rural Hechi City

## **Migrants' Inhabitation of Religiosity: Christianity, Social Transformation and Negotiated Empowerment of Peasant-workers in Shenzhen**

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### **Abstract**

This paper presents a case study of migrant workers' religious practices in Shenzhen. In particular, it examines how communal life organised around shared faith in Christianity enables communal participation and the building of belonging and "home". Due to the marginalized status in the cities, increasing migrant workers start to convert to Christianity, which has been refigured Shenzhen's religious landscape. In Shenzhen, the peasant-workers has constituted the majority of churchgoers of many churches around or in the areas where the migrant workers concentrate. Interestingly, Christianity has become an anchor of identity and community, providing emotional shelter for migrant labourers working in manufacturing factories to negotiate with labour regime and sense of alienation. This paper attempts situate the case study within China's dramatic social transformation and the context of emerging modernity, seeking to link individuals' religious experience with the wider social and political process. We are particularly interested in the ways in which religious practices enable migrants to manoeuvre local cultural resources and negotiate the existential conditions of being migrants. Three aspects of this negotiated process of empowerment will be discussed, namely the building of communal belonging and home, the mobilisation of communal participation, and the use of religious values to re-interpret actually existing social inequalities and labour alienation.

### **Key words:**

Migrant workers; religiosity; Christianity; empowerment; social transformation

## Relationship between Reference Value of Hematocrit of Newborn Girls and Altitude

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### Abstract

To study the relationship between the reference value of hematocrit of newborn girls and altitude, this paper aims at supplying a scientific basis for unifying the reference value standard of hematocrit of newborn girls. A research is made about the relationship between the reference value of 2443 examples of hematocrit of newborn girls and altitude in 42 areas in China. It is found that the correlation of altitude and the reference value of hematocrit of newborn girls are quite significant ( $r=0.473$ ,  $F=11.542$ ,  $P=0.002$ ). One regression model is given out:  $\hat{Y}=48.64+0.004371X1\pm 3.09$ . If altitude is obtained in some areas, the reference value of hematocrit of newborn girls of this area can be reckoned by using the regression equations. Furthermore, according to the similarity of the reference value of hematocrit of newborn girls, China can be divided into three regions: Qinghai-Tibet plateau region, central region, eastern region.

### Key words:

Hematocrit; Reference value; Altitude; Regression analysis

## Research of Urban Culture Construction Mode in the Undeveloped Area under the Background of New-Type Urbanization: A Case Study for Country Area of Chengkou

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### Abstract

Chengkou county is located in the northeast of Chongqing, it's transportation is inconvenient and with undeveloped economy, but the development of cultural industry is perfect. The paper makes the new-type urbanization as research direction and the culture construction of Chengkou as research object, we use the space production theory, the cultural function theory, the case literature research, the case analysis method and the comparative method, research on how cultural construction promote social and economic development of undeveloped areas. The purpose of this paper is to explore by analyzing inner and outer environment of the Chengkou culture construction, we can get the deep reason of Society economic development lagging, summary the unique urban culture construction mode of Chengkou, and we put forward the concrete measure in the undeveloped areas. It has been discovered:(1) The meaning of urban culture construction is discussing urbanization by culture construction, this paper creates a mode called "Culture+", it includes construct cultural system and carrier, develop culture industry and build a urban cultural space system, by building a Chengkou characteristic culture blend of folk culture, red culture and ecological culture, economic and social development in Chengkou has been promoted.(2) There are some reference significance for those undeveloped areas, and for those counties have characteristic culture that are developing specialty industry, we could provide some worthy advices.

### Key words:

urban culture ; undeveloped areas; new-type urbanization; Chengkou county

## Research Summarization Dynamic Characteristics of Ecological Footprint and Ecological Carrying Capacity of Water Resources in Jiujiang City During 2010—2104

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### Abstract

Water is a unique natural resources on earth, with its unique physical and chemical properties, its role and status of human production and living, is any other resources cannot be replaced. In response to development of urban agglomeration in the middle reach of Yangtze river, Jiujiang stepped up, is in a period of rapid development. The sustainable development of the rational use of water resources in Jiujiang region plays an important role. Therefore, the Jiujiang reasonable evaluation on the sustainable utilization of water resources has important significance. The ecological footprint theory provides quantitative evaluation scale for the sustainable utilization of water resources. In Jiujiang city water resources construction of the ecological footprint and ecological carrying capacity model, calculation and analysis for 2010-2014 Jiujiang ecological footprint and ecological carrying capacity of water resources, at the same time, choose the water ecological deficit (surplus), ten thousand yuan GDP ecological footprint of water resources, water resources load index, water resources per capital ecological deficit (surplus), ten thousand yuan GDP ecological footprint of water resources, water resources load index and index to evaluate the situation of sustainable utilization of water resources.

### Key words:

Jiujiang; Water resource; Ecological Footprint; Ecological Capacity; Load Index of water resource

## **Social Life and Social Implications of Tribals in Telangana State, India**

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### **Abstract**

Social life is the essence of human life. It grows out of constant patterning of social interactions and relationships among human beings as such. Social implication is often correlated word to social life. In broader terms the social implications can be defined as the impacts of social life of individual or communities. The factors which form the matrix of social life are five. Natural environments, Population, Human being, Material technology and Social environment constitute the parameter for organized social life and implication is inherent. The natural environment is often conceived as the basic. The human being is another factor in this regard and the action of an individual in a group or society is responsible for the patterns and ways of the social life of the tribal groups. Material technology always is inseparably linked with social life. This technique helps in obtaining natural resources, erecting a shelter making tools, preparing food, etc. In Telangana state the tribal social life is specific in nature and has their own ways of life. There are different factors of primitive structure and organization in tribal people viz., sex discrimination, age differences, local feelings, social position, political participation, occupational characteristics, religion, totemism and civil societal organization etc., of these religion and totemism are special features of the tribal life of state. Particularly, tribal people of Telangana have all intermingled organizations- socio-economic, socio-political, religio-economic and so on. The social life is a composite whole of the web of different social organizations and phenomena.

### **Key words:**

Social life; Social Implications; Social structure; Totemism; Socio-cultural



## **Socio-spatial Differentiation Based on the 2010 Community Level Census Data: A Case Study of Guangzhou**

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### **Abstract**

Socio-spatial differentiation study has been one of the hot topics and has contributed significantly to the understanding of urban spatial and social structures. However, few Chinese case studies published in recent decades were based on the community level. This paper aims to research the socio-spatial differentiation of Guangzhou based on the 2010 community level census data. Our findings reveal that the socio-spatial differentiation base on the community is much more complex than that base on the sub-district level, and affected by the total influence of the market, administrative, and the family life cycle, and have shaped a complex pattern of socio-spatial differentiation.

### **Key words:**

Socio-spatial differentiation; community level; Guangzhou

## **Study on Rural Livable Evaluation and Planning Strategy in Mega-City Suburb: the Case of Weixing Village in Chongming County of Shanghai City**

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### **Abstract**

Shanghai is a typical mega-city in China, which population more than twenty million. There are more than 1000 villages in the suburbs of Shanghai. Weixing village is one of them in Chongming County. It has some prominent features in livability of community, including the basic safety requirements for people, a strong sense of belonging and identity, convenient traffic conditions, reasonable spatial layout, better green environment and so on. Meanwhile, it exists some shortcoming too, such as the micro level security risks, no-specification for Parking, rural aging, and the low quality of ecological environment. This article propose some suggestions, for example, develop a rural community planning, transformation of public service facilities and public space for elderly people, introduction of new building materials and technology to reform residence, and guide residents to participate in community governance. All of these suggestions is to improve the livability of rural community.

### **Key words:**

rural; livability; evaluation; planning strategy; Shanghai city

## The Analysis about Coordinated Development Problems of Land and Sea Economy in China based on the Symbiosis Theory

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### Abstract

The development of both sea and land economy is the necessary choice to break through the bottleneck of land economic development and achieve overall construction on sea power by both sea and land. Based on Symbiosis theory, the paper discusses sea and land economic symbiosis mechanism and mode, and takes Logistic symbiotic function to construct symbiosis evolution model of sea and land economy. What's more, after making determination, division and feature analysis of the interactive mode between sea and land economy of 11 provinces or cities along the coast of China during 1996 to 2013, the paper discusses issues about the mode of sea and land economic development of these provinces or cities. The results show that during the study time, the coordinated development mode of national sea and land economy is belong to symbiotic mode; Fujian province shows mutualism model; Jiangsu, Hebei, Shandong and Guangdong show dominance symbiosis mode; Tianjin, Zhejiang and Shanghai show parasitic mode; Guangxi and Hainan show competition mode; Liaoning shows symbiotic mode. Except that the land economic development mode of Jiangsu and Fujian and the sea economic development mode of Guangdong are improving the quality and efficiency of Factors of production, other provinces' development mode are all improving productivity of factors of production, which achieves economic development by improving productivity of factors of production to expand the scale of production.

### Key words:

symbiosis theory; Logistic model; sea and land economic system; the coordinated development

## The geographical spreading of critics of Dufu poetry in Song and Yuan dynasties

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### Abstract

The study of Dufu poetry reached its first high point in Song and Yuan dynasties. By the statistics on whole collection of Song dynasty's poetry notes and whole collection of poetry notes in Liao Jin Yuan dynasties, there were 307 critics at this period all over the 16 provinces, especially in Zhejiang, Jiangsu, Jiangxi, Sichuan and Fujian. Jin is a northern dynasty, most of the 26 critics were from Shanxi, Hebei, Shandong. Yuan dynasty has 96 critics and almost half of them came from Zhejiang and Jiangxi province. These statistics show the center of literature went from North to South. Song Dynasty's center located in Zhejiang and Jiangsu, there are much more information like economy, policy and culture to learn from the situation at this time, which we can also analyze in aspect of Jiangxi poetry party.

### Key words:

critics of Dufu poetry in Song Dynasty; Geographical distribution pattern; Reason of spreading situations.

## The Spatial Visualization and Relational Analysis of the Regional Difference of Education and Economy

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### Abstract

This thesis mainly discussed the space difference and relational analysis of the regional education and economic development. From the perspective of spatial econometrics, introducing Geographical Information Systems(GIS) to regional education study, and using GIS, Exploratory spatial data analysis(ESDA) and traditional statistical methods, this thesis designed the research frame to analysis the regional education development, made qualitative analysis of spatial difference and dynamic imbalance of regional education geographical distribution, mapping the spatial evolution.

The main research questions include: (1) The spatial difference of regional education in China and its evolution. Then from the provincial levels, the results of variation coefficient and Theil coefficient show that the spatial difference of many education indicators are increasing. The result of Moran's I and LISA clustering analysis indicates that there exists obvious spatial autocorrelation of regional education development. (2) The spatial analysis of regional education and regional economy. The matching situation and discrete degree of the two improved a lot along with the time. Further more, it sets up a model of relations of the development of the two and produces related thematic maps and knowledge maps based on cartographic visualization. (3) And make the regression analysis for the link between education and economic development for the urban historical data, to conclude the cities' transition by the established model.

Eventually, this paper presents some policy suggestions for the mutual coordination problems of the China's education and social economic development.

### Key words:

Region education development; Spatial Statistics Analysis; Regional Difference; Relational Analysis; Education and Economy; Cartographic Visualization

## The Structure of Folk Belief's Scared Space and Believer's Religious Geographic Identity: Between Family and Community

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### Abstract

In China, folk belief is a significant signs of place's religion tradition, it is obviously included both religion tradition and region of place, so it is an appropriate case to reveal place scared space's structure and it's building. In this paper, we make an investigation of folk belief's scared space in Fujian Fuzhou with an aim to understand the structure of place scared space and believers' religious geographic identity. We found: 1, On Fuzhou, scared space has the characteristic of multiple spatial scale. Multiple spatial scales include scared space in family, community corresponds to public temple, and community alliance corresponds to public temple. 2, scared space in family and public temple may both be the base of place religion tradition. The two can contact with each other. In this process, the religion tradition is rooted in daily life and be inherited. 3, with some scared activity, such as the deity parade, the boundary of scared space of community or community alliance is determined regularly. At the same time, through these scared activities, believers recognize their religious geographic identity.

### Key words:

place scared space structure; Multiple spatial scale; religious geographic identity

## The Theory and Practice exploration of “Remembering Nostalgia” in the Construction of New Urbanization

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### Abstract

The national working conference of new urbanization proposed that to improve the level of urban construction, we should let the residents see mountain, see water, and remember the nostalgia. Nostalgia is a kind of memory、missing or longing for hometown or the places you have once lived in your deep heart; Nostalgia is the softest inner emotion and a kind of spiritual demands. On the one hand, the nostalgia which the new urbanization should remember is to protect its historical culture, historical memory and humanistic spirit of the hometown; On the other hand, the nostalgia should preserve the historical gene of these places and inherit rural civilization. The foundation of remembering the nostalgia is to intensify culture protection. And by means of protecting cultural heritage and style of the traditional settlement practically, preserving cultural gene, inheriting cultural memory, creating cultural brand and characteristic landscape etc., the nostalgia can meet the spiritual demand of the residents’ homesickness, life emotion, historical emotion and cultural emotion in the process of new urbanization construction. The key of remembering the nostalgia is to promote the construction of small characteristic towns vigorously. Relying on site urbanization, the significant ways of achieving new urbanization are star-studded layout of small towns and the construction of characteristic tourism small town. The construction of Hunan characteristic tourism small town is the helpful attempt and positive exploration of remembering the nostalgia, and it could help to create a beautiful homeland filled with poetics for new urbanization construction which is full of humanistic care.

### Key Words:

New urbanization; Remembering Nostalgia; cultural gene; characteristic tourism small town

## C12.02 Arid Lands, Human Kind and Environment

### Sustainable Development in Arid Lands



#### Oral

1. [A Preliminary Estimation of Human Influence Intensity in Tibetan Plateau for 2000-2010](#)  
Shicheng Li, Yili Zhang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
2. [Assessment of Risk of Endangering Environmental Sustainability in a Fragile Ecosystem –A Case Study of Indian Arid lands](#)  
Azizur Rahman Siddiqui (University of Allahabad, PIN 211002(Uttar Pradesh), INDIA, India)
3. [Causes and Countermeasures of Rural Households Livelihood Poverty and Environmental Degradation in Agro-pastoral zone--the case of Shuangyushu Gaqa; Horqin Right Middle Banner, Inner Mongolia, China](#)  
Chaoketu Siqin, Yangang Fang, Yongfang Wang (Northeast Normal University, China)
4. [Desert National Park- A Unique Ecosystem](#)  
Meena Ved Prakash (M.S.J. Govt P.G College Bhartpur (Rajasthan) India, India)
5. [Effects of Conversion of Rangelands to Corn Fields on Carbon Storage \(Case study: Semnan Province-Iran\)](#)  
Mahshid Ebrahimi (FRWO/FAO, Iran), Sima Mohtashami (Skogforsk, Sweden), Mona Ebrahimi (student, China)
6. [Migration and de-agrarianisation as Climate Change Adaptation Strategies in West African Drylands](#)  
Maryam Liman Nuhu (Bayer University, Kano, Nigeria)
7. [Precipitation Gradient Determines the Tradeoff Between Soil Moisture and Three Plant-soil System Variables in the Loess Plateau, China](#)  
Cong Wang, Shuai Wang, Zongshan Li, Bojie Fu (Research Center for Eco Environmental Sciences, Chinese Academy of Sciences, Beijing, China, China)
8. [Spatial Prediction of Soil Inorganic Carbon Using Spatially Correlated Auxiliary Information in the Loess Plateau](#)  
Luping Ye (Institute of Soil and Water Conservation, China)
9. [Surface Soil Moisture Change under Large-scale Re-Vegetation on the Chinese Loess Plateau Using Remote Sensing Datasets](#)

Fei WANG (Institute of Soil and Water Conservation, Northwest A&F University, China), Qiao JIAO (College of Natural Resources and Environment, Northwest A&F University, China), Rui LI (Institute of Soil and Water Conservation, Chinese Academy of Sciences and Ministry of Water Resources, China), Xingmin MU (Institute of Soil and Water Conservation, Northwest A&F University, China)

10. [Urban Energy Pressures in the West African Drylands](#)

Adamu Idris Tanko, Maryam Liman (Bayero University, Nigeria)

11. [Validation and Calculation of the Coordination Degree of Interactive Relationships of System for Sustainable Development of Inner Mongolia's Regional Economy -With the Case of Hohhot-Baotou-Ordos Zone](#)

Yali Guo (Liaoning Normal University, China), Tao Liu (Baoji University of Arts and science, China), Qianbin Di (Center for Studies of Marine Economy and Sustainable Development, Liaoning Normal University, China)

12. [Woody Vegetation Structure in Protected Versus Farmed Parkland in Parts of Nigeria's Drylands](#)

Adamu Idris Tanko, M M Badamasi, S B Momale (Bayero University, Nigeria)

## Poster

1. [Ecological footprint of rural households and its determinants in agro-pastoral interlaced region](#)

Haiguang Hao (China, Chinese Research Academy of Environmental Sciences); Jiping Zhang (China, Beijing Municipal Research Institute of Environmental Protection); Huiyuan Zhang (China, Chinese Research Academy of Environmental Sciences)

2. [Evaluation of Farmers' Perception on Comprehensive Management of Small Watershed Based on IPA Method](#)

Jianying CHEN (Qiannan Normal College for Nationalities)

3. [IHPACT: Analysis Framework of Sustainable Consumption —Take the Low Water Consumption Patterns of Zhangye City in the Perspective of Water Footprint as Case](#)

Yang Ding, Haiyang SHANG (China, Lanzhou University of Finance and Economics)

4. [Influencing mechanism of energy-related carbon emissions in Xinjiang based on IO-SDA model](#)

Changjian Wang (China, Guangzhou Institute of Geography Guangdong Open Laboratory of Geospatial Information Technology and Application); Fei Wang (China, College of Geography Science and Tourism, Xinjiang Normal University)

5. [Optimal Spatial Land-use Allocation for Limited Development Ecological Zones Based on the Geographic Information System and a Genetic ant Colony Algorithm](#)

Nan Mi; Wenbao Mi (China, Ningxia University)

6. [Study of Interspecific Hybridization Between Populus Laurifolia L with Populus Suaveolens Fisch](#)  
Batdorj Enkhbayar (Mongolia, Institute of Geography and Geoecology, Mongolian Academy of Sciences)
7. [Study on Ecological Effect Factors on Native Grassland in Ningxia Based on Fitting-analysis](#)  
Tuoye Qi (China, Ningxia University); Rüdiger Wittig (Germany, Goethe University Frankfurt am Main); Kaiyang Qiu (Germany, Leibniz University Hannover)"
8. [Study on the Effect of Water Resources on Grain Yield in Western Songnen Plain —Take Tao'er River Basin for Example](#)  
Yumei Liu (China, Suzhou university of science and technology); Jiuyi Li (China, Institute of Geographic sciences and natural resources research, CAS)
9. [The Effect of Payments for Ecosystem Services Programs on the Relationship of Livelihood Capital and Livelihood Strategy among Rural Communities in Northwestern China](#)  
Fei Wang; Li Jiao (China, School of Geography Science and Tourism, Xinjiang Normal University); Degang Yang (China, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences)
10. [The Health Evaluation of Stelleria Chamaejasme Community in Qilian Mountains of QINGHAI Province](#)  
Zhimei Zhu; Junbin Deng; Yongmei Liu (China, Department of Urban and Resources of Northwest University)

## A Preliminary Estimation of Human Influence Intensity in Tibetan Plateau for 2000-2010

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### Abstract

The Tibetan Plateau (TP) is the third pole of the world. Because of its high altitude and harsh climate conditions, the natural environment of TP is fragile and vulnerable to human activities. And the objective of this research is to assess the human influence intensity (HII) in TP. On the basis of in-depth analysis of local physiographic characteristics and previous studies, four factors, including population density, land use, grazing intensity and road density/distribution, were selected. Then, grading and quantization were carried out at county level and 1 km level respectively to assess HII of TP for 2000 and 2010. The results show that the mean HII of the whole TP is low for both time points. At county scale, the counties with a high HII value, including Xining city, Ping'an County, Chengguan District and Dazi County, distribute at east and southeast of the TP. And the HII value of counties in the mid-west of TP close to zero. At 1 km scale, the Yellow River-Huangshui River Valley region and the middle reaches of Brahmaputra River and its two tributaries (including Lhasa River and Nyang Qu River) Valley region have highest HII value. The HII value of 2010 is higher than that of 2000, which means the HII increased over the past decade. Comparison with previous studies indicated that the results of this study are rational.

### Key words:

Tibetan Plateau; human influence intensity; assessment; 1km and county scales; 2000-2010

## Assessment of Risk of Endangering Environmental Sustainability in a Fragile Ecosystem: A Case Study of Indian Arid lands

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### Abstract

Endangering environmental Sustainability and declining production potential of land is a universal phenomenon but the problem is more alarming and sensitive p [particularly in an arid environment due to weak and inherent morphological and environmental vulnerability. Man has been one of the most important and active agent of biotic interference in an arid ecosystem. It has been observed that there are some serious observation and consequences of adverse Climatic characteristics and adverse human practices and mismanagement of resources in desert ecosystem which endangers the sustainability of the region. It has been observed in recent time that there are risk of endangering ecological and environmental sustainability due to stress of human and animal population in the form of reducing the availability of arable land, problem of overcultivation, shrinking vegetation fraction cover, eroded agricultural field, lowering of water table etc. The study carried out on the basis of Satellite derived data mainly used for monitoring vegetation health Index(VHI), Temperature Condition Index(TCI) and Normalised Difference Vegetation Index(NDVI). An attempt have also been made to examine the status of grazing system in Indian desert ecosystem.

### Key words:

Endangering; sustainability; vulnerability; potential; morphological; arable

## **Causes and Countermeasures of Rural Households Livelihood Poverty and Environmental Degradation in Agro-Pastoral Zone--The Case of Shuangyushu Gaqa; Horqin Right Middle Banner, Inner Mongolia, China**

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### **Abstract**

Poverty life and environmental degradation are threatening the rural households in global arid areas, which have seriously restricted the sustainable development in these areas. Combined the questionnaire and structured interview method, this study investigated the typical village of Shuangyushu Gaqa (Gaqa is the smallest administrative unit in Inner Mongolia) in Agro-pastoral zone, Inner Mongolia. Land degradation in pasture and farmland has led to changes in households' livelihood, reduction of household's income even the impoverishment. According to the income, production method, land use patterns and activities of livelihood, living type of rural households can be divided into three aspects of pastoral, farming and off-farm. Then, the study divided the different types of households into three levels of rich, medium and poor based on capital (natural, physical, human, financial, social) at their disposal. In addition, the study also expounded the resource of households, labor, type of operation, production pattern, analyzed the relationship between rural households and land degradation and the causes of reduction in household incomes. What's more, the study proposed the counter measures which coordinated the national, local and households that help farmers and pastoralists out of trouble, improve the environmental degradation and alleviate the poverty of rural households.

### **Key words:**

Inner Mongolia; Agro-pastoral zone; households' Livelihood; Type of households; Environmental Degradation

## Desert National Park- A Unique Ecosystem Center in the Rajasthan (India)

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### Abstract

The mystique of desert national park is its bio-diversity within a big area, exhibited in a myriad form of animals, birds, insects, aquatic plants and tree vegetation which has developed by relentless efforts, of man over the year. In their continued efforts the people living within the ecosystem should be educated and made aware of the great advantages of maintaining the quality of the desert ecosystems by dedication to the national park. They should be made to understand that the conservation of the natural system would also improve the quality of their life within the desert. They may be provided gas for their kitchens from the oil fields which have been explored in the vicinity in recent years. This would save the trees from cutting for fuel wood. Efforts may be made in scientific harvesting of the sewan grass for the upkeep and earning revenue to the park. The indigenous system of water harvesting and utilization of the water of the intending I.G. Canal is a prime requisite as the biotic life may vanish with water famine.

The Glory of this natural desert ecosystem can be enhanced if the aforesaid points are taken into consideration.

### Key words:

National Park; Flora; Fauna; Biodiversity; Ecosystem; scientific harvesting

## Effects of Conversion of Rangelands to Corn Fields on Carbon Storage: Case Study:

### Semnan Province- Iran

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#### Abstract

The twentieth century has witnessed the population growth, increase in agricultural output, and the reduction of natural lands. The climate change, increase in temperature, and global warming, the result of the carbon dioxide (CO<sub>2</sub>) increase, are some of the environmental issues which have attracted many scientists as well as ordinary people in last years. A great part of CO<sub>2</sub> emission is due to the change in land use. The objective of this study is to investigate the effect of conversion of land use types on carbon storage. Two adjacent land use types are including the corn fields, and rangelands dominated by *Artemisia sieberi*. This was achieved by collecting soil and plant samples from three sites of the Semnan province. Soil samples were collected randomly at 0-50 cm deep with 3 and 5 profiles respectively on *Artemisia sieberi* rangelands and cultivated lands. Vegetation data was collected systematic-random in 20 to 30 plots 1\*1 along two to three 200 meters transects in *Artemisia sieberi* rangeland. The amount of carbon storages in corn fields with 57.98 ton/ha was more than rangelands with 40.15 ton/ha. As a whole, the statistical analyses indicate that the effects of conversion of rangelands to corn fields in Semnan province on carbon storage were not significant; however, considering per site, it was significant at the level of 1% that shows changes of land use rely on some environmental factors of rangelands including geography, density, aerial cover, rainfall amount, etc. In conclusion, it is advisable to promote sustainable agriculture approach in the areas with the same condition due to the up scaling of this land use change.

#### Key words:

land use change; carbon storage; rangelands; *Artemisia sieberi*; Corn field; Semnan province; Iran

## Migration and De-agrarianisation as Climate Change Adaptation Strategies in West African Drylands

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### Abstract

The concerns over climate change in recent times are of greater relevance in dryland Africa. The drylands of West Africa are particularly prone to devastating impacts of climate change due to its geo-physical position and socioeconomic context. This is a vast land but constrained by desiccation and aridity that forces some form of migration. This paper has the objectives of investigating the type, nature and pattern of climate induced adaptation strategies in the nature, forms, patterns and length of migration in some parts of northern Nigeria and southern Niger Republic. It further seeks to identify the communities that engage in the migration, their destinations and movement timeframe; as well as the implications of the migration types/patterns as they may reflect in the possible de-agrarianisation. Data on the migrants' demographics, migratory histories and general assessment of climatic conditions was collected through interviews as captured on the Open Data Kit (ODK), focus group discussions and field observation. Findings indicate southward movement of the people (which is wetter) especially during dry seasons. Patterns have been ascertained to take the form of short-term movements at first which later lengthens to permanence. There are also change of livelihood options and eventual de-agrarianisation. The end result may show that the de-agrarianisation might be explained by the Climate Change phenomenon through seasonal migration. When this is confirmed the study will propose appropriate policy direction towards a credible adaptation programme especially at the source regions [of migrants].

### Key words:

Climate Change; seasonal migration; livelihood options; de-agrarianisation; adaptation

## Precipitation Gradient Determines the Tradeoff Between Soil Moisture and Three Plant-soil System Variables in the Loess Plateau, China

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### Abstract

A tight coupling exists between ecosystem productivity, surface energy balance, biogeochemical cycles, and water resource availability in drylands, in which soil moisture (SM) is fundamental to the biophysical processes (Wang et al., 2012). However, few studies focused on the close coupling among soil moisture, soil carbon/nitrogen, and vegetation structure, and the challenge of clarifying these relationships changing with climate gradient in the arid environments is daunting. Thus, soil organic carbon (SOC), total nitrogen (TN), and species richness (SR) were selected as plant-soil system variables, and the tradeoff relationships between soil moisture and these variables and their variations with the precipitation gradient were quantified in the Loess Plateau, China. Results showed that the SM, SOC, TN, and SR increased linearly with the precipitation gradient in the woodland, shrubland, and grassland, respectively ( $p < 0.05$ ). Covariance analysis revealed that SM-SOC tradeoff was affected by the mean annual precipitation (MAP), vegetation type, and their interaction ( $p < 0.01$ ,  $p < 0.05$ ); SM-TN tradeoff was affected by the MAP ( $p < 0.01$ ); and SM-SR tradeoff was affected by vegetation type, and vegetation-MAP interactions ( $p < 0.01$ ). The linear piece-wise quantile regression was applied to determine the inflection points of these tradeoffs response to the precipitation gradient. SM-SOC tradeoff was increased with the precipitation gradient till MAP=570mm, and then decreased slightly; SM-TN tradeoff was increased with the precipitation gradient, and no inflection point was detected; SM-SR tradeoff variation trend with the precipitation gradient were different in the woodland and grassland, and the inflection points were detected at MAP=370mm and MAP=570mm, respectively. The results demonstrate the tradeoff relationship exists in the plant-soil system, and it's affected by vegetation type and precipitation gradient. Consequently, tradeoffs could be an ecological indicator and tool for restoration management and decision-making in the Loess Plateau. In further study, the mechanism of how the tradeoff is affected by the precipitation gradient should be clarified.

### Key words:

tradeoff analysis; plant-soil system; precipitation gradient; Loess Plateau

## Spatial Prediction of Soil Inorganic Carbon Using Spatially Correlated Auxiliary Information in the Loess Plateau

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### Abstract

Loess plateau is located at arid and semi-arid area. There is much calcium carbonate which has important contribution to carbon cycle in China. Zhifanggou watershed is a typical watershed in hilly region of loess Plateau. It is used as a case study to predict the spatial variation of soil inorganic carbon (SIC) by integrating spatial information technology and remote sensing. In pedometrics, it has been widely recognized that using spatially correlated auxiliary information can improve the prediction accuracy of soil properties. However, the prediction of SIC based on the analysis of categorical variables (e.g., land use types and topographies) has not been taken account of. In this study, a grid method (200m×200m) was used to collect 142 soil profiles and 1750 samples. We aimed to examine whether quantification of categorical variables can improve the accuracy of SIC prediction. Then a geospatial prediction model has been established for predicting the spatial distribution of SIC by considering factors including terrain features, climate factors, vegetation index and land use. Spatial distribution of SIC was predicted by multiple linear stepwise regressions, ordinary Kriging, regression Kriging, geographical weighted regression and geographically weighted regression Kriging, respectively. Results indicated that spatial variation of SIC was mainly affected by terrain indices, vegetation and soil genetic types. And quantification of categorical variables, such as land use types, improved the prediction accuracy for a given prediction method.

### Key words:

Loess plateau; soil inorganic carbon; spatial prediction; land use types; topographies

## Surface Soil Moisture Change under Large-scale Re-Vegetation on the Chinese Loess Plateau Using Remote Sensing Datasets

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### Abstract

The water, as the most important limiting factor in the Chinese Loess Plateau, challenges and tests the large-scale re-vegetation, especially the Grain for Green Project (GGP) since 1999. It is important to know how, exactly, re-vegetation influences soil moisture conditions, which not only crucially constrain growth and distribution of vegetation, and hence, further re-vegetation, but also determine the degree of soil desiccation and, thus, erosion risk in the region. Three eco-environmental factors, which are Soil Water Index (SWI), the Normalized Difference Vegetation Index (NDVI), and precipitation, were used to investigate the response of soil moisture of top layer of above one-meter to the re-vegetation during the GGP. Two separate periods, which are 1998–2000 and 2008–2010, are selected to examine the spatiotemporal pattern of the chosen eco-environmental factors. It shows that the amount of precipitation in 1998–2000 was close to that of 2008–2010 (a difference of 13.10 mm). From 1998–2000 to 2008–2010, the average annual NDVI increased for 80.99%, while the SWI decreased for 72.64%. The average NDVI increased rapidly by 17.76% after the 10-year GGP project. However, the average SWI decreased by 4.37% for two-thirds of the area. More specifically, 57.65% of the area had an increasing NDVI and decreasing SWI. These results indicate the re-vegetation has consumed a large quantity of soil water and the GGP should be pay more attention on its sustainability on the Loess Plateau.

### Key words:

Grain for Green Project; Soil moisture; remote sensing; precipitation

## Urban Energy Pressures in the West African Drylands

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### Abstract

Drylands have been the focus of academic and policy enquiry into the links between vegetation modification and woodfuel production, consumption and exchange. Researchers have warned that the dynamic impacts of rapidly changing world economy – including the limited physical availability of, and economic accessibility to, non-wood energy substitutes – is challenging traditional resource management systems, and is threatening the long-term diversification and sustainability of local and regional systems in urban centres. Attempts to deal with the problems through scientific/technical sector-based interventions designed and implemented through science-based action plans have been disappointing. It is clear that sustainable solutions require social transformation over a platform of consensus through which societies can be mobilized, community trust and flexibility built, and empowerment through dialogue promoted. In the drylands of sub-Saharan Africa (SSA), where there are presently several cities with huge population that continue to expand through high growth rates and rural-urban migration, different expert groups and other stakeholders on urban management from different parts of the SSA are mobilized and are working as a team to: build trust for community empowerment and consensus; and focus critical areas of enquiry with a view to addressing the urban energy challenges through socio-cultural interventions. The paper is an attempt to widen consultation and mobilise wider inputs towards finding acceptable learning situation through dialogue and negotiations that will lead to self-critique and evolution of scientific humility.

### Key words:

Vegetation modification; Woodfuel production; Energy substitutes; Social transformation; sub-Saharan Africa; Dialogue; Scientific humility

## **Validation and Calculation of the Coordination Degree of Interactive Relationships of System for Sustainable Development of Inner Mongolia's Regional Economy - With the Case of Hohhot-Baotou-Ordos zone**

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### **Abstract**

Based on the interactive relationship between stress theory and the coordinated development of the theory of dynamic coupling, by building regional economic - social - Comprehensive Evaluation Index System of ecosystems, HuBaoE Economic Area - the interactive relationship between stress and coupling coordination degree verified and Measurement in 2004-2013. The results showed that: HuBaoE significant relationship between stress interact Economic Zone social and ecological subsystems and in line with a double exponential curve variation; comprehensive coordination value reflects the region's low-coordinated development stage coupled to the run-in stage of development changes in which social - ecological systems and economic - ecology integrated system coordinated development trend is consistent, and the ecological pressure on the economic and social development stress intensifies, leading to social - economic system coupling coordinated development speed slowed.

### **Key words:**

Stress relations; double exponential curve; coupling coordination degree; HuBaoE economic zone

## Woody Vegetation Structure in Protected Versus Farmed Parkland in Parts of Nigeria's Drylands

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### Abstract

Long term changes in natural vegetation in “farm parkland” have demonstrated the need to explore the ecology of vegetation at different landscapes and its connection to human use. This is the focus of this paper that determines the woody vegetation structure of plant communities at two different sites – farmed parkland and forest reserve – within a similar environment, and relating the differences to the impacts of disturbance. This was carried out through the quantification of the differences in the vegetation structure measured and classified in nine plots. Results indicate diversity of species was higher in the farmed parkland than in the conserved area basically due to the management practices of agroforestry. In terms of the structure, similarities were found in almost all classes except two. The distribution of all species height and stem diameter shows that the values were also similar with the exception of one species which have an inverse relationship between height and the stem diameter. Statistical analyses confirmed the observation. Attempts were made to understand the impact of the main drivers of vegetation dynamic, i.e. climate, fire, animal and human activities. It is finally concluded that farmed parkland shows more prospect of sustainable vegetation resource management in drylands than the conserved areas. Hence, farmers should be encouraged to practice agroforestry using fast growing species.

### Key words:

Farm parkland; forest reserve; agro-forestry; ecology; vegetation dynamics; disturbance

## Ecological Footprint of Rural Households and Its Determinants in Agro-Pastoral Interlaced Region

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### Abstract

The impact of human production and consumption on ecosystem is always at the center of academic attention, and an understanding of their linkages is important for effective environmental policy and decision-making. Based on rural household survey data in three counties in the Inner Mongolia Autonomous Region, China, we calculated ecological footprint of rural households and investigated its determinants. We defined and calculated six kinds of ecological footprint (EF): total production footprint (PEF), arable land production footprint (APEF), grassland production footprint (GPEF), total consumption footprint (CEF), arable land consumption footprint (ACEF), and grassland consumption footprint (GCEF). The results showed that the PEF was three times more than the CEF. The ecological footprint, especially the GCEF and GPEF had a significant positive correlation with income, which indicated that increasing of income more depend on livestock production and the household with more income consume more livestock products. Part-time farming or non-farming employment reduces the occupancy of local natural resources to some extent. The ethnic minority households, the households with higher proportion of income obtained from livestock rearing, and the households with more grassland per capita had bigger ecological footprint and bigger GCEF and GPEF, while their ACEF and APEF were smaller. Ecosystem conservation policy makers should take measures to reduce the ecological footprint and improve the welfare of farm households such as establishing and improving the ecological compensation mechanism, transforming livestock- rearing patterns from an extensive style to an effective style, and improving the diversification of livelihoods of farm households.

### Key words:

rural households; production and consumption; ecological footprint; non-farming employment; agro-pastoral interlaced region

## **Evaluation of Farmers' Perception on Comprehensive Management of Small Watershed Based on IPA Method: A Case Study of Qinzhuanggou Watershed in the Dry Upland to North of the Weihe River**

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### **Abstract**

Based on on-the-spot investigation and questionnaire, IPA analysis is used to study local farmers' perception on the comprehensive management of Qinzhuanggou watershed. Results showed that farmers' perception on comprehensive control of soil and water loss can be embodied in associated factors. Combined with the comprehensive soil and water conservation planning of the small watershed, 28 factors for farmers' perception are divided into 4 quadrants of the IPA. Advantage and disadvantage factors are in quadrants I and II, respectively. Based on the analysis of the advantage and disadvantage factors, the corresponding countermeasures are presented for the comprehensive management of the small watershed, such as sustaining superiority development of soil and water conservation, promoting economy so as to increase local farmer's income, improving residential environment and extending ecological agriculture. To deal with the problems concerning local farmers, a model of comprehensive management for a small watershed should be established in order to improve the level of comprehensive management of the small watershed and meet the needs of local farmers for production and life.

### **Key words:**

IPA; Qinzhuanggou watershed; farmers' perception; comprehensive management of small watershed

## **IHPACT: Analysis Framework of Sustainable Consumption: Take the Low Water Consumption Patterns of Zhangye city in the perspective of Water Footprint as Case**

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### **Abstract**

“Low-carbon” has been the topical focus of global attention and becomes a common view in society at large, while the water crisis that is one of the most severe questions of reality human facing in 21st century, compels us to pay close attention to the low water problems as soon as possible. Population growth, technological change and increased consumption are considered to be the three most important reasons generating environmental crisis. The environmental problems caused by consumption do not get enough attention and in-depth study at present. Classical IPAT built the identical equation of accounts which are about the influencing relationship between humanity factor and environmental implication. According to extending IPAT equation, this paper gets influence factors which analyze influencing sustainable consumption, and directed the IHPACT frame which is set by sustainable consumption policy. Meanwhile, this paper discussed feasibility and necessity of the analysis framework from the perspective of water footprint based on the study and accounting data of Heihe River Basin Zhangye city. The research results indicated that decreasing meat consumption known as water footprint luxury in food consuming—eat more vegetables and eat less meat—can effectively adjust residential consumption water footprint; the more enhance of power of consumption will increase residential consumption water footprint, but Kuznets curve hypotheses establish between environmental influence represented by water footprint and power of consumption, that is to say, the enhance of power of consumption will finally decrease the environmental influence of consumption.

### **Key words:**

water footprint; IPAT; IHPACT; sustainable consumption

## Influencing Mechanism of Energy-related Carbon Emissions in Xinjiang Based on IO-SDA Model

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### Abstract

Global warming and climate change are issues that have garnered widespread attention, and the need for a low carbon economic transition has become the consensus of the international community. China has become one of the world's largest energy consuming countries, as well as one of the biggest emitters of greenhouse gases. Questions like whether China can fulfill the most restrictive carbon emission reduction commitments while maintaining rapid and stable socioeconomic development further highlight the importance and urgency of research on carbon emissions from energy consumption. Based on regional perspectives of its impacts on energy consumption, the analysis of carbon emission mechanism is an important research method capable of achieving energy savings and emission reductions. Xinjiang, an important Chinese energy production base, is currently going through a period of strategic opportunities for rapid development. Ensuring stable socioeconomic development while achieving energy savings and meeting emission reductions targets, thus preserving the harmonious development of "society - economy - energy - environment", is the key issue currently facing the region. This paper is based on the input - output theory, and conducts a structural decomposition analysis on the factors affecting energy-related carbon emissions in Xinjiang from 1997 to 2007; this analysis employs a hybrid input-output analysis framework of "energy - economy - carbon emissions", and uses an extended IO-SDA model. The data for this study comes from the Xinjiang input - output tables (1997, 2002, and 2007). Population, economic and energy source data are derived from the statistical yearbook of the Xinjiang Uygur Autonomous Region. ① Xinjiang's carbon emissions from energy consumption increased from 20.70 million tons in 1997 to 40.34 million tons in 2007; carbon emissions growth was mainly concentrated in the production and processing of energy resources, the mining of mineral resources, and the processing industry. ② The analysis of the direct effects of the influencing factors on carbon emissions showed that the change in per capita GDP, the final demand structure, the population scale, and the production structure were the important factors causing an increase in carbon emissions, while the decrease

in carbon emission intensity during this period was the important influencing factor in stopping the growth of carbon emissions. This showed that while the sizes of Xinjiang's economy and population were growing, the economic structure had not been effectively optimized and the production technology had not been efficiently improved, resulting in a rapid growth of carbon emissions from energy consumption. ③ The analysis of the indirect effects of the influencing factors of carbon emission showed that the inter-provincial export, fixed capital formation, and the consumption by urban residents had significant influence on the changes in carbon emissions from energy consumption in Xinjiang. ④ The growth of investments in fixed assets of carbon intensive industry sectors, in addition to the growth of inter-provincial exports of energy resource products, makes the transfer effect of inter- provincial "embodied carbon" very significant.

**Key words:**

carbon emissions; Input output-structural decomposition analysis; Influencing factors; Xinjiang

## Optimal Spatial Land-use Allocation for Limited Development Ecological Zones Based on the Geographic Information System and A Genetic Ant Colony Algorithm

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### Abstract

Limited development ecological zones (LDEZs) are often located in poverty-stricken, ecologically vulnerable areas where ethnic minorities reside. Studies on optimal spatial land-use allocation in LDEZs can promote economic and intensive land use, improve soil quality, facilitate local socioeconomic development, and maintain environmental stability. In this study, we optimized spatial land-use allocations in an LDEZ using the geographic information system (GIS) and a genetic ant colony algorithm (GACA). The multi-objective function considers economic benefits and ecological green equivalents, and improves soil erosion. We developed the GACA by integrating a genetic algorithm (GA) with an ant colony algorithm (ACA). This avoids a large number of redundant iterations and the low efficiency of the GA, and the slow convergence speed of the ACA. The study area is located in Pengyang County, Ningxia, China, which is a typical LDEZ. The land-use data were interpreted from remote sensing (RS) images and GIS. We determined the optimal spatial land-use allocations in the LDEZ using the GACA in the GIS environment. We compared the original and optimal spatial schemes in terms of economic benefits, ecological green equivalents, and soil erosion. The results of the GACA were superior to the original allocation, the ACA, and the multiobjective genetic algorithm, in terms of the optimum, time, and robust performance indexes. We also present some suggestions for the reasonable development and protection of LDEZs.

### Keywords:

optimal allocation; land use; limited development ecological zone; geographical information system; genetic ant colony algorithm

## Study of Interspecific Hybridization Between *Populus Laurifolia* L with *Populus Suaveolens* Fisch

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### Abstract

The objective of this study was to investigate and evaluate possible breeding, propagating values of the isolated population of laurel leaf poplars in Zuunsaikhan mountain of Gobi-Altai. As being southernmost and only natural stand of *P.laurifolia* in Gobi region of Mongolia, this small population amidst of dry Gobi region presented the value of use in tree improvement programs for drought resistant poplar varieties.

During our work it was observed that in Ulaanbaatar city, flowering began since 1 of May and seed dispersal on 14 of June, which equals 40 days after flowering.

Also in one seedpod of *P.suaveolens* counted 28-32 seeds, while in branch culture it was 8-12 seeds per seedpod. Seeds germinated within 36 hours after it put on wet tissue paper. We used 2 different approaches to grow poplar seedlings first half were grown in ordinary seedbed ground of greenhouse, the other half were grown in containers.

In greenhouse condition, containerized seedlings had slightly more growth than seedlings grown in open ground.

Poplar growth was most intensive in July and August. Highest containerized seedling was 41 cm and highest bareroot seedling was 33.5 cm. Apical growth stops by 15 August, foliage begins on 15 September and by 4 December seedlings completed winter bud dormancy.

Pollen collection: Collected pollens were stored in glass tube until the artificial pollination whit-25°C. Pollen grain of Laurel leaf poplar is of orange color, 24-32 mkm, round shaped. Pollen grains that not round shaped are dead pollen unable to fertilize the egg cell.

### Key words:

Populus; isolation; pollen; population structure

## Study On Ecological Effect Factors on Native Grassland in Ningxia Based on Fitting-analysis

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### Abstract

Ascertaining the ecological effect factors on grassland is a conundrum which has been troubling scientists for many years. According to research findings in this field, we found that most papers focus on a single factor or several factors, but research on multiple factors is rare. Facing this conundrum, we introduced the fitting-analysis method. By analyzing the ecological effect factors on native grassland in Ningxia from 2001 to 2011 we obtained the following results: i) regarding the whole period, except for precipitation, not natural but anthropogenic factors had the main effect on native grassland in Ningxia. ii) during the 11 years considered, grazing had the greatest influence on native grassland ecosystem in Ningxia. iii) considering each year separately, from 2001 to 2008 human activities and grazing were the main ecological effect factors, while from 2008 to 2011 natural factors were dominant. From these results we conclude that, during the period 2001 – 2008, grassland was not well protected in Ningxia, in particular grazing prohibition did not work or showed no effect. In the more recent years, however, grazing was obviously reduced. For the future, we suggest that measures should be taken in order to improve the native grassland ecosystem of Ningxia.

### Key words:

ecological effect factors; ecosystem; fitting-analysis; grassland; grazing; human activities; Ningxia

## Study on the Effect of Water Resources on Grain Yield in Western Songnen Plain: Take Tao'er River Basin for Example

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### Abstract

Western Songnen Plain is an important commodity grain production base. Meanwhile, it is a typical water shortage area. In order to achieve efficient use of water resources and food security, the relationship between water resources and food production must be clarified. Taking the Tao'er River Basin (TRB) as a typical area, gray correlation method (GSM) was used to evaluate the relationship between grain yield and its relative factors on the basis of the grain yield data, agricultural data and meteorological data from 1990 to 2013. Then, water shortage was calculated by Penman-Monteith equation and crop coefficient approach. Finally, the relationship between grain yields and water shortage rate of different growth stages was analyzed. The results indicated that:(1) Grain planting area, fertilizer input and rural labor force are important to the grain yield. And the effective irrigation area and supporting the number of production wells associated with the continuous improvement of crop yield. (2) Different crops at different stages have different water requirement, corn: early > mid> development> mature, rice: early > mid> Mature> development, soybean: mid > initial> mature> development. (3) The influence of water shortage rate in different stages to different crops is different, for rice, the influence of water shortage rate to yields showed early > mature> development> mid; for corn, the early> development> mature> mid; for soybean, early > mature> mid> development. Conclusively, the work will provide a reference for agriculture ministry as increasing the crop yields and developing water saving agriculture.

### Key words:

grain yield; water shortage rate; gray correlation method (GSM); Tao'er River Basin

## The Effect of Payments for Ecosystem Services Programs on the Relationship of Livelihood Capital and Livelihood Strategy among Rural Communities in Northwestern China

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### Abstract

The security and quality of livelihoods for peasant households is the core issue for rural areas in China. A stable livelihood contributes to the harmonious development of related policies, poverty eradication and sustainable use of resources. In Qinghe County, located in the extremely arid zone of Northwest China, 238 validated surveys were conducted. The analysis focuses on the importance of livelihood capitals for the selection of on- or off-farm livelihood strategies among beneficiaries of different kinds of ecological compensation packages. The goal is to see if different groups of beneficiaries are better able to pursue off-farm livelihoods activity, which reduces pressure on the resource base, and whether specific capitals are especially effective in helping households pursue off-farm livelihoods, which benefits their well-being. The findings show that proportionally more herdsmen (who participated in a pastureland rehabilitation program) were able to pursue off-farm livelihoods than farmers (who participated in the cultivated land reforestation program), and especially agro-pastoralists (who participated in both programs). Further, models of livelihood strategy show that human and financial capitals facilitate off-farm livelihoods, while productive capital tends to lead to on-farm livelihoods. These findings indicate that there is no single determinant of livelihood strategy, and future policies must consciously differentiate among beneficiaries to reach the desired result.

### Key words:

ecological compensation; livelihood capital; livelihood strategy; rural mountain community

## The Health Evaluation of *Stellera Chamaejasme* Community in Qilian Mountains of QINGHAI Province

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### Abstract

Using principal component analysis (PCA), the health status of grassland degradation in Qilian County of *Stellera chamaejasme* community in Qinghai province was evaluated for. The results showed that grassland health index (HI) could be obtained by the extraction and combination of the least indicators of community characteristic factors, geographical factors and soil factors. By HI's quantitative classification, status of degradation in survey sample in Mole town Duolong pasture moderately degraded for geographical boundaries ( $0.3 < HI < 0.6$ ), respectively, the Amidongsuo scenic was in potential degradation ( $HI > 0.9$ ) and the Huangcaogou village and Mangzha pasture in Epu town were in slight degradation ( $0.6 < HI < 0.9$ ); part of the pasture of Arou town were in strong, even severe degradation ( $HI < 0.3$ ), accounted for 50% of the sample under investigation. A quantitative determination and evaluation of the study area of grassland degradation succession status, and the analysis shows that the degradation of different stages is due to the different grassland use and intensity of use there is a big difference, namely, grassland degradation and grazing, management conditions and geographical environment to adapt. This paper provides a theoretical basis for the establishment and classification management of the grassland degradation research and evaluation system, and provides some reference value for the vegetation restoration and ecosystem health assessment.

### Key words:

grassland ecosystem; *Stellera chamaejasme* community; health index; principal component analysis (PCA); geographical factor

## C12.02 Arid Lands, Human Kind and Environment

### Water Crises in Arid Environment



Home

#### Oral

1. [A GWR-Based Study on Spatial differentiation and Impact factor of Keriya Oasis's Soil Surface Salt](#)  
Wahap HALIK (College of Tourism Management, Xinjiang University, China)
2. [Factor Analysis of Daihai Wetland Dynamic Change in Recent 40 Years](#)  
Wenjun Liang, Jiyao Liu, Xi Chun, Bilige Siqin, Zhiwen Wu, Shixin Huang (Inner Mongolia Normal University, China)
3. [Geographical Analysis of Water Resources of Rajasthan State, India](#)  
Sheikh Mohammed Muslim (Government Lohia College, Churu, India)
4. [Implications of the Looming Drought and Surging Food Price Hikes on Food Security in Low-Income Households in South Africa](#)  
Edwin Mutiyenyoka (University of Limpopo, South Africa)
5. [Lake Baikal Basin Rivers Runoff Under Climate Change Conditions](#)  
Endon Garmaev, Alexander Ayurzhanov (Baikal Institute of Nature Management SB RAS, Russian Fed)
6. [Minimum Instream Flow requirement for the Water-reduction Section of Diversion-type Hydropower Station: A Case Study of the Zagunao River, China](#)  
peng li, su chunjiang, chen tiantian (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)
7. [Problems of Productive Using and Protection of Water Resources in Dry Regions of Ararat Hollow of the Republic of Armenia](#)  
Varduhi Margaryan (Yerevan State University, Armenia)
8. [Remote Quantification of Surface Area Dynamics for Large Endoheic Lake Using Landsat Imagery: A Global Perspective](#)  
Kaishan Song, Yanqiu Li, Jingjing Zang (NEIGAE, China)
9. [Soils and Water Interplay in Sokoto-Rima Flood Plain, Northwestern Nigeria](#)  
Murtala Gada Abubakar, Sheikh D. Abubakar, Gaddafi Bala, Abdulkadir A. Usman (Usmanu Danfodiyo University, Sokoto, Nigeria)
10. [Spatial-Temporal Change of Surface Water in The Middle Mu Us Desert Areas from 1999 To 2013](#)  
Peiyun Zhang, Shiqiang Zhang, Gefei Wang, Liwen Liang (Northwest University, China)
11. [The Lake Chad Basin: Past, Present and Future Prospects](#)

Haruna Kuje Ayuba (Nasarawa State University, Keffi Department of Geography)

12. [Water Scarcity and The Dynamics in The Lake Chad Basin](#)

Haruna Kuje Ayuba (Nasarawa State University, Keffi Department of Geography, Nigeria)

## Poster

1. [An Evaluation of 5 Kinds Water Indexes for Land Surface Water Extraction with Landsat-8 OLI Imagery](#)

Wang Xuhong; Yan dajiang (China, Northwest University)

2. [Application of DPSIR-PLS to Assess Water Poverty in China](#)

SUN Caizhi WU Yongjie (China, Liaoning Normal University)

3. [Comparison of Six Normalized Difference Water Indexes Focus On Turbid River Mapping in Yellow River Basin](#)

Yan Dajiang; Wang Xuhong; Huang Chang (China, Northwest University)

4. [Contribution of the 3D Geological Model to the Study of the Sahel-Abda Aquifers Structure \(Coastal Meseta, Morocco\)](#)

Elbchari Fatima; SOUHEL Abdellatif (Morocco, Cadi Ayyad University)

5. [Distribution of Vegetation Types and Their Influences on the Hydrological Processes in Dongling Mountain in Beijing](#)

Xu Fei; Jia Yangwen; Niu Cunwen (China, China Institute of Water Resources & Hydropower Research)

6. [Long Time Series Remote Sensing Monitoring of Evapotranspiration in Xilin River Basin and related factors](#)

Yu Hongbo; Zhang Qiaofeng (China, Inner Mongolia Normal University)

7. [Monthly and Seasonal Dynamics of ET in Xilingol Grassland and Related Factors Analysis](#)

Qiaofeng Zhang (China, Inner Mongolia Normal University)

8. [Temporal-spatial Characteristics of Drought Based on the Vegetation Health Index in Longdong, Gansu Province, China](#)

Jianhua Yang; Jianjun Wu; Hongkui Zhou (China, Academy of Disaster Reduction and Emergency Management, Beijing Normal University)

9. [The Moderate Intensive Utilization of Cultivated Land under the Restriction of Water Resources on Agro-pasture Zone](#)

Yingcheng LIU (China, China Agricultural University)

## A GWR-Based Study on Spatial differentiation and Impact factor of Keriya Oasis's Soil Surface Salt

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### Abstract

Salt in arid area oasis irrigated soil is soil characteristics of the most active and most complex part, analysis of the spatial variation of soil salinity in the region and influence factors is to understand the process of soil salinization, the premise and foundation of the saline soil improvement. In Keriya Oasis as a study target, the use of 24 sampling points of the surface soil salinity data and selected nine and soil salinity is closely related to the impact factor, combined with spatial auto correlation, the traditional regression analysis and geographically weighted regression model, analysis the salinity of surface space distribution characteristic and influence factor of spatial differentiation, results show that: 1. Keriya Oasis Soil Salinity in space are not randomly distributed, but there is strong spatial dependence, spatial autocorrelation indices 0.479 was positive spatial autocorrelation. 2. the mineralization degree of groundwater and groundwater buried depth, elevation and temperature is the main factor of the influence of arid plain oasis soil salt accumulation, these factors with spatial heterogeneity, selected nine environmental variables in addition to the pH value of the soil, strength of other variables impact on soil salinity there are significant spatial differentiation. 3. The ability to explain and the estimation accuracy of GWR model for spatial non-stationary data is superior to the OLS model, and has obvious advantages in the visualization model to estimate the parameters of the regression.

### Key word:

GWR model; Soil surface salt; Spatial differentiation; Impact factor; Keriya oasis

## Factor Analysis of Daihai Wetland Dynamic Change in Recent 40 Years

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### Abstract

The paper takes Daihai wetland as the researching object to discuss the changing process and reasons by visual interpretation method to extract the area of Daihai wetland from topographic map and MSS/TM/OLI etc remote sensing images in recent 40 years. The results showed that, the wetland area gradually shrank from 149.55km<sup>2</sup> in 1976 to 60.54 km<sup>2</sup> in 2015. It is mainly affected by Precipitation, Temperature, Evaporation and Human activities. Precipitation showed a reducing trend in fluctuations and the temperature had an increasing trend annually, which results in the shrinkage of wetland area with a negative correlation with precipitation. On the other hand, the pressure from rapid expansion of cultivated land with population growth has a great effect on the wetland area, becoming one of the most important factors.

### Key words:

Inner Mongolia; Daihai wetland; Remote sensing analysis; Influential factors

## Geographical Analysis of Water Resources of Rajasthan State, India

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### Abstract

Rajasthan is the largest state in India covering an area of 342,226 sq.km. The state is predominantly agrarian as the livelihood of 70 percent of its population depends on agriculture based activities. Though it covers 10.5 percent of the country's geographical area, it shares only 1.15 percent of its water resources. Planning, development, operation and maintenance of all water resources to support the growth of the state economy and the well-being of the population, in response to the growing need for drinking water, agricultural products, industrial production. The ground water also plays an important role especially in agriculture and drinking water supply. The situation of ground water exploitation is also not satisfactory as in areas where surface irrigation is provided there is a tendency of not using ground water for agriculture which creates problem of water table rise and even water logging. On the contrary, in large areas of the State, ground water is being over exploited and the water table in some areas is going down even at the rate of 3 meter per year. Our ancestors were very careful about the harvesting of rain-water and conservative use of ground water. But with the expansion of population volume and consequently enhanced use of ground water for drinking, industrial and irrigation purposes, the balance of ground water recharge and exploitation has lost its existence. This paper describes the present water situation and future demand of water with the increasing of population.

### Key words:

Water resources; rain water harvesting; demand and population

## Implications of the Looming Drought and Surging Food Price Hikes on Food Security in Low-Income Households in South Africa

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### Abstract

The purview of this contribution predicts significant threats posed by a consortium of a looming drought, a grappling economic downturn, an acute economic austerity and surging inflation-driven food price hikes to already-stringent food security of, especially, low-income households in a South Africa where a third of the population is unemployed. With the National Weather Service reporting 32 temperature records being broken already in the first two weeks of 2016, South Africa is ostensibly on the verge of its worst drought since 1904. The National Agricultural Marketing Council, on the other hand, recorded a maize production plunge of up to 30% over the years and forecast an even more drastic plummet in the current agricultural season. These plights are further compounded by the fact that the contingency of importing food is, not only, coincidental but as prejudicing as the value loss plaguing the local currency against international trading currencies. Such trends have the aptitude to inflate and hike local food prices whilst simultaneously turning up the heat on hand-to-mouth aliment conditions already endured by most low-income households in post-apartheid South Africa. This paper tentatively projects prospective implications of a combination of an imminent drought and the ensuing food price hikes on the propensity of low income households to sustain their float just above the lower bound poverty line.

### Key Words:

Drought; Food Prices; Food Security; Wellbeing; South Africa

## Lake Baikal Basin Rivers Runoff Under Climate Change Conditions

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### Abstract

Lake Baikal is a unique water body included in the UNESCO World Heritage List. In recent years, environmental problems of Lake Baikal and its catchment area manifested in the reduction of water availability, increasing the number and area of the fires, the spread of Spirogyra, etc. are concerned.

In the report the issues of formation of Lake Baikal basin rivers runoff and its spatial distribution patterns are examined. We analyze the water regime of rivers, depending on the dynamics of total precipitation amount. From 1980 to the present time on the territory of Lake Baikal basin two wetness periods were marked - wet and dry. The dynamics of the flow rate annual values of major rivers forming the filling of Lake Baikal is consistent with trends in precipitation. It is shown that the dry period is currently ongoing, which is reflected in a decreasing in total precipitation amount throughout the territory of the Lake Baikal basin with a minimum value down to -30 mm per year.

In the given report the spatial correlation between total precipitation amount and various indices oscillations is analyzed. It was found that the greatest impact on the amount of precipitation in the Baikal Lake basin have Arctic Oscillation Index and the El Niño – Southern Oscillation Index.

### Key words:

Lake Baikal; river runoff; climate change; total precipitation amount; oscillation indices

## Minimum Instream Flow requirement for the Water-reduction Section of Diversion-type Hydropower Station: A Case Study of the Zagunao River, China

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### Abstract

Diversion-type hydropower development can reduce instream flow and destroy river ecosystem continuity. Therefore, the minimum instream flow must be assessed for proper ecosystem recovery. The Physical Habitat Simulation System (PHABSIM) still probably remains as the most widespread habitat method used to establish instream flow standards or to link habitat variations with fish population dynamics. This study applies the PHABSIM models, which create a habitat-flow relationship, describing the physical habitat suitability of alternative instream flow releases. Selecting the water-reduction section of the Sangping Power Station on the Zagunao River as the research object, the hydraulic pressure at a cross section was obtained through habitat simulation. The cyprinidae family of fish, dominant in this region, was targeted using velocity and depth suitability curves. The quantitative relationship between flow and suitable habitat area was established, with the minimum instream flow of the study area calculated as 30.0m<sup>3</sup>/s, according to the weighted usable area-flow curve. The minimum instream flow of the study area was also estimated through common hydrologic and hydraulic methods. The resulting comparison indicated that the habitat simulation model achieved very similar results to those of the wetted perimeter method and achieved between “good” and “very good” levels using the Tennant method.

### Key words:

Habitat simulation; minimum instream flow; hydropower development; Zagunao River

## **Problems of Productive Using and Protection of Water Resources in Dry Regions of Ararat Hollow of the Republic of Armenia**

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### **Abstract**

In last ten years considerably increased the interest to productive using and protection of water resources, which conditioned mainly by development of world economy, growth of requirements to drinking water, as well as by global change of climate. It is especially mentioned in dry low-lying regions of Ararat hollow of our republic because of shortage of surface water resources and irregular distribution. In future the water resources can be more vulnerable because of global climate change.

The study territory is an agricultural region of intensive irrigation. On the other side, the region occupies less than 1/10 part of republic's territory here are more than half of industrial enterprises and population of the republic. Therefore, productive using and protection of water resources of dry regions of Ararat hollow has an important significance.

Taking account this, the purpose of this work was to study the dynamics change of water resources of region, estimate the vulnerability of water resources discover the problems of using and protection of surface water resources.

For solving these problems in the work as a theoretical base were appropriate studies, and as material base – actual data of long-term observations of air temperature and atmospheric precipitation, river runoff of study territory, which are kept in the fond of Armstatehydromrt of the Ministry of emergency situation of the Republic of Armenia. As a methodological base in the work are used general scientific, characteristics, analyses, statistical analyses, mathematic, extrapolation and correlation methods.

Analysis of observations of historical data shows, that during all period of observations are mentioned considerable changes of climate and river runoff characteristics. Mainly is observed the tendency of increasing of values of average annual means of air temperature and atmospheric precipitation and deceasing of average annual values of river runoff. So, in the case of possible change of climate the estimation of vulnerability of water resources and realization of adaptation arrangements have important significance for future development of economy of the republic and for improve of social conditions of population. Productive using

and protection of water resources is necessary to realize by systematized and ecosystem approach. At the same time have to be account, that some catchment basins are various ecosystems. Ecosystem studies require concrete approaches and actions, which more correspond to conditions of ecosystems.

Thus, based on the provisions of the aquatic environment of the study territory and the existing problems, to improve the productivity of activities, rational use and protection of water resources, regulation and management, to address the primary tasks necessary:

- ✓ quantitative and qualitative comprehensive systematic and continuous monitoring of water resources;
- ✓ ecosystem studies of water resources;
- ✓ reduce and prevent water loss in the water consumption, water saving and reuse, operation of collecting rainwater and sewerage system;
- ✓ repair and maintenance of irrigation networks and other hydraulic structures, construction of new, progressive introduction of modern technologies;
- ✓ improvement of water supply and sewerage services;
- ✓ prevent water pollution, improve the quality and control the observance of sanitary norms of water resources, the expansion of the network of sanitary zones;
- ✓ strengthening of the legislative (legal) and the institutional framework and implementation of reforms;
- ✓ the development of strategic programs for further development of water resources management, the scope of water management;
- ✓ participation of the general public and communities in the use and nature conservation.

**Key words:**

Water resources; productive using and protection; air temperature; atmospheric precipitation; river runoff; the Republic of Armenia; dry Regions of Ararat Hollow

## Remote Quantification of Surface Area Dynamics for Large Endoheic Lake Using Landsat Imagery: A Global Perspective

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### Abstract

Saline lakes, mostly situated in endoheic basins, are sensitive to both climatic and anthropogenic changes. The endoheic basins ( $2.05 \times 10^7 \text{ km}^2$ ) were retrieved for all continents except Antarctica and Greenland Island using SRTM data. Images acquired by Landsat series sensor during 2009–2011 were used to delineate water bodies in endoheic basins across the world, while images acquired by Landsat during 1972–2014 were applied to examine typical saline water bodies across the world. Endorsed with extensive endoheic area, Asia possesses the vast area and numbers of saline waters (N: 173896; A:  $1.85 \times 10^7 \text{ km}^2$ ), followed by Oceania (N: 9716; A:  $1.85 \times 10^4 \text{ km}^2$ ), South America (N: 2109; A:  $1.15 \times 10^4 \text{ km}^2$ ), North America (N: 10741;  $0.99 \times 10^4 \text{ km}^2$ ), and Africa (N: 9651; A:  $0.97 \times 10^4 \text{ km}^2$ ) with respect to water surface area. The results indicated that most of the saline lakes are showing a decreasing trend during 1972–2014, i.e., the Aral Sea, the Great Salt Lake, the Chiquita Lake, and the Lake Chad. In the contrast, some of the closed saline lakes locating in the alpine regions (Nam Co and Shiling Co) fed with glacier or snow melting waters showed an inverse trend, particularly these situated in the Tibetan Plateau or the Pamir. Our investigations also demonstrated that saline lakes of Tectonic origins tend to be more stable than these shallow lakes sitting in flat plains. The investigation revealed that anthropogenic activities are the major driving forces for saline lake areal variations, particularly these feeding rivers diverted for irrigation, while the alpine saline lakes are more sensitive to climatic change. It also should be highlighted that shallow saline lakes in Oceania and Africa is more sensitive to climatic variation caused fluctuations, rather anthropogenic driving forces.

### Key words:

saline lakes; water surface area; endoheic region; satellite imagery

## Soils and Water Interplay in Sokoto-Rima Flood Plain

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### Abstract

Groundwater hydrochemistry can be affected by multiple natural factors, such as chemical reactions between water and soil or sediments, biochemical reactions, and surface water–groundwater interactions, as well as human activities. The aim of this research is to assess the soils and water interaction as it affects groundwater quality along Sokoto-Rima flood plain; the correlation analysis was used to find the degree of relationship between pollutants in soils and water. Seven sample points were selected systematically from the map at 6.13km interval, and in each sample point, three samples were taken for soils and water from the river at hundred meters' interval giving a total of 21 samples each of soils and water. After the laboratory analysis of the samples, the results revealed positive correlations between soils and river in P and  $PO_4$ , Mg, Ca, and Fe.  $R^2$  (co-efficient of determination) values are .124, .013, .053, and .445 respectively. While, negative correlations exist between soils and river in pH, N and  $NO_3$ , K, and OC and  $CO_3$ .  $R^2$  values are .015, .224, .075, and .027 respectively. It was confirmed that the correlation is statistically significant between N and  $NO_3$  at 0.05 and also, it is significant in Fe at 0.01 levels.

### Key words:

Soils; Water; Interplay; Sokoto-Rima; Flood plain.

## Spatial-Temporal Change of Surface Water in The Middle Mu Us Desert Areas from 1999 To 2013

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### Abstract

The information of surface water plays an important role in economic development and ecological protection in Mu Us Desert. This study uses 1999-2013 Landsat TM/ETM+ image, with the research object of representative Mu Us Desert in arid area of Northwest China. To acquire the surface water area of the middle area of Mu Us Desert and its temporal and spatial variation in 14 years. The results demonstrate a phenomenon that the surface water in the study area has shrunk first and then picked up, but the overall area is severely reduced. Total area of the surface water reduced from 368.51km<sup>2</sup> in 1999 to 299.04km<sup>2</sup> in 2013, the overall area of the area reduced by 69.47km<sup>2</sup> (18.8%).

### Key words:

surface water in arid area; area change; remote sensing; visual interpretation

## The Lake Chad Basin: Past, Present and Future Prospects

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### Abstract

Several factors have decimated what was once the sixth-largest lake in the world, the Lake Chad. Over the past four decades, the lake's surface has shrunk significantly in size. These problems are expected to worsen in the coming years as population and water demands increase. If this trend in the shrinking of the Lake Chad continues unabated, economic activities such as fishing, livestock rearing and farming will be adversely affected. This paper examines the origin of the Lake Chad, major causes of the shrinkage of its water, current situation, threats to its sustainability, and, opportunities offered by the Lake Chad Basin.

### Key words:

Lake Chad; Lake Chad Basin; Environmental Sustainability

## Water Scarcity and The Dynamics in The Lake Chad Basin

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### Abstract

Several factors have decimated what was once the sixth-largest lake in the world, the Lake Chad. Over the past four decades, the lake's surface has shrunk significantly in size. These problems are expected to worsen in the coming years as population and water demands increase. If this trend in the shrinking of the Lake Chad continues unabated, economic activities such as fishing, livestock rearing and farming will be adversely affected. This paper examines the dynamics in the Lake Chad, major causes of the shrinkage of its water, current situation, threats to its sustainability, and, opportunities offered by the Lake Chad Basin.

### Key words:

Lake Chad; Water Scarcity Environmental Sustainability

## An Evaluation of 5 Kinds Water Indexes for Land Surface Water Extraction with Landsat-8 OLI Imagery

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### Abstract

The automatic water extraction index (AWEI) and the normalized difference water indices (NDWIs) were successfully used in map land surface water extraction (LSWE) from Landsat 8 multispectral images in the Yellow River Basin River Basin. This paper evaluates the potential of Landsat-8 Operational Land Imager (OLI) multispectral images for LSWE using two AWEI modes and three NDWI water indexes models. We tested the accuracy and robustness of the five OLI AWEI models in the Yellow River Basin River Basin in China. The results demonstrate that the five water indexes models achieve an overall accuracy of more than 95%, a kappa coefficient of 0.89 and a producer's accuracy of 95% for LSWM. The results also demonstrate that the AWEI model using the green band (Band 3) and the SWIR1 band (Band 6) (referred to as NDWIO6,3) of the OLI sensor has a higher LSWM accuracy than the other two NDWI models.

### Key words:

water index; Water extraction; AWEI

## Application of DPSIR-PLS to Assess Water Poverty in China

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### Abstract

Aiming at shortcomings of existing methods of water poverty problem, this paper combines DPSIR model and PLS structure equation model, from the "driving force -pressure- state -impact -response" five dimensions to build the evaluation index system of water scarcity poverty, builds water poverty evaluation framework, with testing index system and structure model from structural equation model software verification index system and structure model, finally estimates water scarcity score and cluster of 31 provinces in our country . The results reveal some conclusions : (1) DPSIR-PLS model can make up for lack of existing water poverty research methods and suitable for evaluation of water poverty in China; (2) the path relationship the poor situation of water in China shows relatively stable situation of China's water poverty, but greater pressure; (3) overall, eastern water poverty status is better than that of the central region, western water poverty most serious;(4) in the eastern region, water poverty problem is often five subsystems, "short board" system,while the western region water poverty is a serious problem, which is generally five subsystems development levels low. This paper measures the water poverty in China from a new angle, which aims at improving the theoretical reference for the development of water resources management policies in the provinces of China.

### Key words:

water scarcity; DPSIR-PLS model; Water resources management

## Comparison of Six Normalized Difference Water Indexes Focus On Turbid River

### Mapping in Yellow River Basin

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#### Abstract

Land water mapping is of great significant for remote sensing. Scholars have proposed several water indexes using Landsat imagery. Two-band indexes is one of optimum method to distinguish water from the earth's surface. It is difficult to extract turbid water for its high turbidity especially in yellow river basin. The maximum of reflectance removed to red band in turbid water body in yellow river basin. Building on this variation, this paper used three normalized difference water indexes (NDWI<sub>o54</sub>, NDWI<sub>o64</sub>, NDWI<sub>o74</sub>) focus on turbid water mapping using Landsat-8 OLI that acquired higher accuracy. Furthermore, we evaluated the result of NDWI<sub>o53</sub>, NDWI<sub>o54</sub>, NDWI<sub>o63</sub>, NDWI<sub>o64</sub>, NDWI<sub>o73</sub> and NDWI<sub>o74</sub> in yellow river basin in China. We defined NDWI<sub>o53</sub>, NDWI<sub>o63</sub> and NDWI<sub>o73</sub> as NDWI<sub>green</sub>, meanwhile, we defined NDWI<sub>o54</sub>, NDWI<sub>o64</sub> and NDWI<sub>o74</sub> as NDWI<sub>red</sub>. This paper used zero as threshold to segment water from surface feature. The test demonstrated that NDWI<sub>o64</sub>((red-SWIR1)/(red+SWIR1)) based on red, SWIR1 were more suitable for turbid water mapping in three study sites, except the area where the main background is urban. NDWI<sub>o63</sub>(MNDWI) also was the optimum index for turbid water mapping where the dominant background is urban which accord with xu' result. On the contrary, NDWI<sub>green</sub> could obtain higher accuracy compared with NDWI<sub>red</sub> in clear water mapping. The overall accuracy performed by NDWI<sub>red</sub> exceeded 86.4350%, while NDWI<sub>green</sub> just reach 81.9507% in turbid water mapping. On the contrary, the overall accuracy performed by NDWI<sub>green</sub> exceeded 95.5644%, while NDWI<sub>red</sub> reach 93.4315% in clear water mapping. Therefore, NDWI<sub>red</sub> can be used for turbid water mapping successfully.

#### Key words:

normalized difference water indexes; turbid river mapping; Landsat 8 OLI imagery

## **Contribution of the 3D Geological Model to the Study of the Sahel-Abda Aquifers Structure (Coastal Meseta, Morocco)**

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### **Abstract**

The Sahel-Abda, which is part of the Coastal Meseta, contains Mesozoic aquifers. The information sheets are still fragmentary and insufficient. In order to improve the knowledge of these aquifers and the determination of the structure of aquifers, a 3D geological model was developed in this study.

It was constructed from information provided by 265 mechanical soundings and geological maps, which were analyzed, coded and integrated in the specific software. For doing this, three lithostratigraphic units were considered: The Plioquaternary, the Lower Cretaceous and the Upper Jurassic. The operation of the 3D stratigraphic model allowed making it closer to the geometry of Lower Cretaceous aquifers.

The modeling process includes the following steps: inventory of available boreholes; analysis of boreholes data; realization of a database containing the details on the information (x, y, z) of drilling, geological units and Z coordinate encoding horizons and lithological structure.

The elaborated three-dimensional model, based on the available geological data permitted us to visualize the architecture of the Sahel-Abda area, to realize out geological sections in all directions and at any location of the model and to monitor changes in depth of Lower Cretaceous aquifers. This 3D geological model has the advantage of being based on a number of exploratory boreholes. It allows to specify the geometry and structure of the area.

### **Key words**

Coastal Meseta; Sahel-Abda; Mesozoic Aquifers; 3D Stratigraphic Model; Morocco

## Distribution of Vegetation Types and Their Influences on the Hydrological Processes in Dongling Mountain in Beijing

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### Abstract

To clarify the vertical zonality on mountain vegetation types and the influence on the hydrological processes, Qingshui river watershed in the Dongling Mountain which is the highest peak in Beijing was selected as the research area, on the basis of using the land use data and combined with field survey, analysis the distribution of vegetation types, the WEPL hydrological model was used to simulate hydrological effect of different vegetation types, and analyze the different contour with different vegetation types impact to the hydrological processes of the region in the Qingshui river upstream. Results showed that the distribution of vegetation in Dongling Mountain was obvious, subalpine meadow at an altitude of 1700~2300m, at an altitude of 1200~1700m was deciduous conifers birches, and deciduous broad-leaved forest Liaodong oak forest at an altitude of 800~1200m. Vegetation types at different altitudes which influence on the hydrological processes, the difference is more apparent, runoff in unit area from the high order of subalpine meadow, birches and Liaodong oak forest. At the same time, the processes of energy of different vegetation types are also quite different. The research is of a significant value for us to understand the hydrological processes of different vegetation types in mountain regions and effective utilization of water resources.

### Key words:

Dongling Mountain; vegetation types; hydrological processes; WEPL

## Long Time Series Remote Sensing Monitoring of Evapotranspiration in Xilin River

### Basin and related factors

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#### Abstract

Our study area is the Xilin River basin. Remote sensing approach was used to retrieve instantaneous evapotranspiration based on the estimation of land surface fluxes by using MODIS images from July 2000 to July 2014 and from Apr. to Sept. of 2000、2007、2010 to 2014, and using auxiliary environmental data from the same time periods. Daily evapotranspiration was estimated by scaling. Monthly evapotranspiration were weighted by the number of days. Results were verified by the product of reference crop evapotranspiration and crop coefficients provided by FAO. This level of uncertainty was acceptable; therefore, the method that we concluded was applicable.

In the time distribution, the evapotranspiration of fifteen years from 2000 to 2014 was no fixed trend. The trend of evapotranspiration was consistent with precipitation. There is enough water for evaporation and transpiration in the abundant water year (2012-2014). June and July are the peak season for plant growth and leaf area index is the largest. So the largest area is available for transpiration. The maximum evapotranspiration of a year appeared in June to July. There is less precipitation in the dry year. Water is the main limiting factor of evapotranspiration. Therefore, the time of the maximum evapotranspiration is consistent with the time of maximum precipitation. The single factor correlation analysis of the monthly evapotranspiration and monthly average temperature, wind speed, relative air humidity, vapor pressure, and monthly precipitation showed that the most relevant meteorological factor with evapotranspiration is precipitation. So precipitation is the main limiting factor of evapotranspiration. Air temperature is also an important factor because of its obvious seasonal changes. But air temperature is not the main factor when it does not change obviously such as in July from 2000 to 2014.

#### Key words:

Xilin River basin; evapotranspiration; remote sensing; related factors

## Monthly and Seasonal Dynamics of ET in Xilingol Grassland and Related Factors

### Analysis

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### Abstract

Spatiotemporal dynamic of evapotranspiration (ET) plays an important role in understanding the impact on vegetation of water and heat. In the present study, MODIS MOD16A2 and MOD13A3 monthly data and meteorological data were employed to analyze the spatiotemporal dynamics of monthly and seasonal ET in different types of grassland in recent 15 years (from 2000 to 2014) in Xilingol steppe and the correlation between ET and related factors by means of regression analysis and correlation analysis. From March to October and in spring, summer and autumn, ET decreased from east to west in Xilingol steppe and meadow steppe > typical steppe and sandy vegetation > desert steppe. In contrast, ET increased from east to west in Xilingol steppe and meadow steppe < typical steppe and sandy vegetation < desert steppe during January, February, November, December and in winter. The max ET appeared in November and winter in desert steppe, but it reached the maximum value in July and summer in other types of grassland. The min ET all appeared in May in different types of grassland. In all types of grassland, ET had a trend of decrease from March to May, and October and in spring and autumn, but in January, June, July and December and in summer and winter, it had a trend of increase, but all the changes were not significant. Pearson correlation analysis indicated that there was significant positive correlation ( $P < 0.05$ ) between ET and NDVI, precipitation, vapor pressure and relative humidity from March to October and in spring, summer and autumn. On the contrary, during January, February, November, December and in winter, there were no significant negative correlation between ET and precipitation and relative humidity, but appeared significant positive correlation ( $P < 0.05$ ) between ET and mean temperature.

### Key words:

Xilingol grassland; ET; NDVI; Meteorological factors; Correlation analysis.

## Temporal-spatial Characteristics of Drought Based on the Vegetation Health Index in Longdong, Gansu Province, China

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### Abstract

Longdong belongs to the important rain fed agricultural region of Gansu province, which is often influenced by drought disasters. In this paper, the Vegetation Health Index was calculated using Land Surface Temperature and NDVI data at Vegetation growing seasons from 2002 to 2013. Meantime, we calculated the Palmer Drought Severity Index in Huanxian, Kongtong, and Xifeng sites, and the PDSI was used to inspect the applicability of the VHI for drought monitoring. Lastly, the drought temporal-spatial characteristics were analyzed using the VHI in Longdong from 2002 to 2013. The results show that the VHI has quite similar fluctuation trends with the PDSI, especially when water deficit is severe. There are many severe drought events in the vegetation growing seasons in Longdong from 2004 to 2009, especially the continuous and severe drought event occurred at vegetation growing seasons in 2007 and 2008. After 2009, there was an alleviation for the drought condition. The vegetation growing season in 2012 was wetter than other years'. When it comes to the spatial characteristics, the northwest of Longdong region was affected more seriously by drought compared with other regions. The drought usually evolved from southeast to northwest at vegetation growing season.

### Key words:

Drought; Temporal-spatial Characteristics; Vegetation Health Index; PDSI; Longdong

## The Moderate Intensive Utilization of Cultivated Land under the Restriction of Water Resources on Agro-pasture Zigzag Zone

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### Abstract

Based on the 2014-2015 194 ordinary farmers and 45 scale famers survey data and statistics, analyzed land intensive utilization under the restriction of the cultivated land water resources. Through the analysis of ordinary farmers non-irrigated land, ordinary farmers irrigated land, scale farmers irrigated cultivated land, this article get the following conclusion: the scale of the stage of cultivated land extensive use is not restricted by water resources; The scale of intensive stage is in  $37.79 \times 10^4 \text{hm}^2$ -- $41.99 \times 10^4 \text{hm}^2$  under strong water resources constraints, is in  $41.9 \times 10^4 \text{hm}^2$ - $46.60 \times 10^4 \text{hm}^2$  under weak water resources constraints, is in  $35.65 \times 10^4 \text{hm}^2$ - $32.09 \times 10^4 \text{hm}^2$  under medium water resources constraints; The scale of scale stage is in  $8.91 \times 10^4 \text{hm}^2$ - $9.90 \times 10^4 \text{hm}^2$  under strong water resources constraints, is in  $13.62 \times 10^4 \text{hm}^2$ - $15.13 \times 10^4 \text{hm}^2$  under weak water resources constraints, is in  $10.42 \times 10^4 \text{hm}^2$  - $11.57 \times 10^4 \text{hm}^2$  under medium water resources constraints. The excessive utilization of resources on the regional ecological environment and farmers' life has had a notable effect. Because planting large circle of sprinkler irrigation makes the local underground water level continues to decline, the average annual decline in more than 2 m. In Inner Mongolia patterns in the ecological fragile district, its far-reaching impact of land use, therefore, how to develop a more reasonable more deliberate policy to guide the intensive utilization of cultivated land moderate, promote regional sustainable development is facing an important task of local policy.

### Key words:

water resource; cultivated land; intensive utilization; Ulanqab

## C12.02 Arid Lands, Human Kind and Environment

### Sand Dunes and Sand Encroachment



Home

#### Oral

1. [Characteristics of Quaternary Red and Brown Earth deposits in North Western province of Sri Lanka](#)  
Ashvin Wickramasooriya (Department of Geography, University of Peradeniya, Peradeniya, Sri Lanka, Sri Lanka)
2. [Sand Mining and Its Impact to River Water Environment in Benthera River in Southern Sri Lanka](#)  
Ranjana Piyadasa (Colombo University of Sri Lanka, Sri Lanka)
3. [Spatial-Temporal Characteristics and LMDI-Based Impact Factor Decomposition of Agricultural Carbon Emissions in Hotan Prefecture, China](#)  
Chuanhe Xiong, Degang Yang, Jinwei Huo (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
4. [The Influence of Exponential Parameters Selection on the Exponent and Profiles Precision in Neutral Wind Tunnel Test](#)  
QI Honggang (South China Normal University, China)
5. [The Research on Spatial Difference of Urban Human Settlements Environment in Inner Mongolia](#)  
Ning Xiaoli (Baotou Teachers college, China), Yin Dongxu (Inner Mongolia Normal University, China)

#### Poster

1. [Effects of Snowfall on Physiological and Biochemical Characteristics of Lichen Distributed in Desert Biological Soil Crusts](#)  
Min Xie (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)
2. [Plant-Soil-Water Dynamics of Canagana Ecosystems in Ecological Restoration Areas in Alpine Sandy Land, Qinghai-Tibet Plateau](#)  
Lihui Tian (China, Lanzhou University); Dengshan Zhang; Wangyang Wu (China, Beijing Normal University)
3. [Scientific Investigations and Research Progress of the Badain Jaran Desert](#)  
Nai'ang Wang; Zhuolun Li (China, College of Earth and Environmental Sciences, Center for Desert and Arid Region, Lanzhou University)
4. [Soil Grain Size Characteristics in Blowouts in the Hulun Buir Sandy Grassland](#)



Xiwei Zhang; Yong Gao; Ji Wang (China, Inner Mongolia Agricultural University)

5. [Wave-like Motion of Transverse Dunefields along Rivers on the Xiliaohe Plain, Northeast China](#)

Guang Han (China, College of Resources and Environmental Sciences, Hunan Normal University)

## **Characteristics of Quaternary Red and Brown Earth deposits in North Western province of Sri Lanka**

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### **Abstract**

Red and Brown Earth deposits exist in North Western coastal regions in Sri Lanka were formed during Quaternary period. Ten representative samples were collected from Aruakkaru region in the Puttalam coastal region to identify the physical and chemical characteristics of the Red to Reddish Brown Earth deposits of the North Western province of Sri Lanka. After analyzing these samples, it was found that the average thickness of the Red and Reddish Brown Earth deposit in the region varies from 0.5 m upto about 10.5 m. General stratigraphic sequence of the samples include Reddish Brown clay, dark Brown clay, light Brown clay with rounded Quartz pebbles, clean Quartz sand followed by an unconformity surface. The top stratigraphic layer composed of well sorted Reddish Brown clay which is developed upto about 0.5 m upto about 7.50 m followed by moderately sorted dark Brown sandy clay with the thickness of about 0.35 m to 1.5 m. Poorly sorted light Brown clay with rounded Quartz pebbles appears below the Brown sandy clay with the thickness ranging from 0.25 m upto about 1.0 m. According to the texture of these stratified layers and the particle size distribution curves of them implies that these are fluvial deposits. There is no significant mineralogical variation in both Reddish clay layer and the dark Brown sandy clay layer. These two layers mainly composed of Hematite and Magnetite with Monazite, Garnet, Zircon and Rutile as accessories. In Red Earth Hematite is dominant while Brown Earth clayey fraction is dominant.

### **Key Words:**

Red Earth; Reddish clay; mineralogical; poorly sorted

## **Sand Mining and Its Impact to River Water Environment in Benthera River in Southern Sri Lanka**

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### **Abstract**

Sand mining and its impact on livelihood is one of the main problems in the most river basins in Sri Lanka. Due to salinity intrusion most of the coastal paddy lands along the river basins has been abounded our land degradation. The research objective was to assess saline water intrusion considering the surface runoff and tidal wave. Saline water intrusion impacted to the many paddy lands located in the left bank of the Benthera river in Southern Sri Lanka. Continuous monitoring was conducted over year period from January 2014. Twelve (12) sampling points along the river from sea to twenty-five kilometers (25 km) upstream were identified, based on two kilometers' interval in-between two sampling points. Further three water depth samples collected from three levels that is surface, mid-stream and deeper level were taken from each collecting point. Laboratory techniques were established to analyses the chemical water quality parameters on Na, Fe and presented in maps depicting salinity levels in the river using GIS software. Sea water intrusion is progressing in Benthara river basin in Kaluthara district due to anthropogenic impact such as river sand mining activities as well as natural reasons. Mainly this depends on the fluctuation of tides in the ocean. So two times per day, river will intake much salt water and saline water intrusion it in lands along with the river. The study revealed that the Saline water intrusion has been affected along with the river bed due to high density of the sea water.

### **Key words:**

GIS; salinity; pH; tidal water; electrical conductivity; chloride

## Spatial-Temporal Characteristics and LMDI-Based Impact Factor Decomposition of Agricultural Carbon Emissions in Hotan Prefecture, China

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### Abstract

In this study, based on the scientific calculation system of carbon emissions in agriculture, we calculated the carbon emissions of agriculture in the Hotan prefecture between 1999 and 2013 and analyzed their spatial-temporal characteristics; next, we used the LMDI model to study the driving factors of agricultural carbon emissions. The results demonstrated the following: (1) in time series, the agricultural carbon emissions showed three stages of change, i.e., “decline, continued to rise and decline”, during the period of 1999 to 2013 in the Hotan prefecture. (2) In space, the carbon emissions from agricultural land use, paddy fields, enteric fermentation and manure management were different due to different sizes of cities and counties. The intensity of agricultural carbon emissions was varied and high, but the agricultural production structure, agricultural carbon emissions structure and other aspects had a high degree of consistency and homogeneity in cities and counties of the Hotan prefecture. (3) Regarding the driving mechanism, the labor factor, agricultural labor productivity and planting-animal husbandry carbon intensity are the main factors that increase agricultural carbon emissions in the Hotan prefecture. Compared with 1999, three major factors cumulatively achieved a 199.68% carbon emission increment from 2000 to 2013, of which the labor factor cumulatively increased by 120.04%, the agricultural labor productivity factor cumulatively increased by 54.94% and the planting-animal husbandry carbon intensity factor cumulatively increased by 24.70%. The agricultural production structure factor largely inhibited agricultural carbon emissions of the Hotan prefecture, which cut 99.74% of the carbon emissions from 2000 to 2013.

### Key words:

Hotan prefecture; agricultural carbon emissions; spatial-temporal characteristics; driving mechanism; LMDI model

## The Influence of Exponential Parameters Selection on the Exponent and Profiles Precision in Neutral Wind Tunnel Test

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### Abstract

Based on the 3D model of Guangzhou main built-up area at 1:7000 horizontal scale, 1:500,1:1000,1:2000 vertical scale respectively,a wind tunnel simulation was carried out on the neutral flow of B atmospheric boundary layer.With wind velocities in more than 20 test points,15 heights of each prevailed wind of the northwest and southeast,the uncertainties generated by reference height  $z_{ref}$ , zero-plane displacement height  $d$  and sample thickness  $t$  to exponent  $\alpha$  and fitting precision were all discussed,which provide some guidance to raise fitting precision on power law applications later.It is founded that a reference height equal to maximum height of test points has a relatively smaller mean value and dispersion of  $\alpha$ ,and a better fitting precision than other  $z_{ref}$ ; $d$  can improve fitting precision and is correlated with  $\alpha$  negatively,not to consider  $d$  is more practical especially for the researches of inhomogeneous terrain and numerous test points;In differently rough terrain, $\alpha$  converges at 0.25-1H of the thickness of wind profiles,0.25-1H is the ideal sampling thickness.

### Key words:

power law; exponent  $\alpha$ ; zero-plane displacement height  $d$ ; sampling thickness  $t$ ; fitting precision

## The Research on Spatial Difference of Urban Human Settlements Environment in Inner Mongolia

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### Abstract

This research is from the regional level to study urban human settlements environment in Inner Mongolia which is according to the connotation of Urban Human Settlements and the considering of the original foundation of Inner Mongolia. The evaluation index system of urban human settlements environment was established from the urban ecological environment, urban infrastructure and urban social and economic environment three aspects. The quality of urban human settlements environment of 12 cities in Inner Mongolia was evaluated using the principal component analysis(pca). The Results showed that the urban human settlements environment level of Inner Mongolia is divided into three categories. The quality of urban human settlements environment of Ordos city, Hohhot is good. The quality of urban human settlements environment of Xilinhot City, Baotou City, Hulunbeier City and Ulanqab is better. The quality of urban human settlements environment of wuhai city, Chifeng City, Ulanhot City, BayanHot, Tongliao City and Bayan Nur City is poor.

### Key words:

urban human settlements; index system; spatial difference; principal component analysis; Inner Mongolia

## Effects of Snowfall on Physiological and Biochemical Characteristics of Lichen Distributed in Desert Biological Soil Crusts

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### Abstract

Biological soil crusts (BSCs) endure the most extreme habitats in the world. They grow on the soil surface in desert regions and withstand extreme temperature, drought and intense radiation. BSCs comprise many kinds of micro-organisms, such as bacteria, algae, lichen and moss. Winter snowfall is an important factor in the growth and development of BSCs in temperate desert regions of China. In this study, lichen was sampled from an artificial vegetation area of Gurbantunggut Desert. Five snowfall treatments were applied: snow removal (0S), snow decrease to half that of ambient conditions (1/2S), ambient snow (S), snow increase to 1.5 times that of ambient conditions (3/2S), and snow increase to twice that of ambient conditions (2S). A series of important physiological indexes were measured, including photosynthetic pigment content, proline content, water-soluble sugar content, water-soluble protein content and malondialdehyde (MDA) content, to evaluate the effects of snowfall on physiological and biochemical characteristics of lichen during the melt and at the end of the growing period. The results clearly showed differences in physiological indexes between snowfall manipulation treatments in March, and further found that the values of most of the physiological indexes were influenced by snow removal/reduction treatments in October, such as with an increase in snowfall, the content of photosynthetic pigment and water-soluble protein increased, while the content of MDA decreased. This study elucidates the physiological and biochemical activities of lichen under snowfall, and has academic and practical significance in maintaining the stability of desert ecosystem.

### Key words:

winter snowfall; lichen; physiological and biochemical characteristics

## Plant-Soil-Water Dynamics of Canagana Ecosystems in Ecological Restoration Areas in Alpine Sandy Land, Qinghai-Tibet Plateau

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### Abstract

Vegetation restoration as an effective measure that can take advantage of the function of soil-plant system to improve the local environmental quality. We choose Shazhuyu as a study site to study plant-soil-water dynamics of ecological restoration in alpine sandy land, which is the most serious wind erosion area of Gonghe basin in Qinghai-Tibet Plateau. The results show: Total vegetation coverage and shrub coverage are first increased and then decreased within fixed years' growth and the peak point was growing thirty years, while herb cover always showed an increasing trend as time flying. The more years old of artificial ecosystems, the higher community diversity was existed. The coarse particle size, the lower organic matter content was on dunes. NT 80 had the maximum organic matter mainly caused by the highest vegetation coverage. Soil moisture came into peak in July on the dunes planted Caranaga. More herbs, more water could be stored. In different month of plant growth, the vertical dynamics of soil moisture was different on dunes because of rainfall and evaporation.

### Key words:

Vegetation dynamics; Soil organic matter; Soil moisture; Caranaga; Shazhuyu

## Scientific Investigations and Research Progress of the Badain Jaran Desert

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### Abstract

Systematic scientific investigations of the Badain Jaran Desert were carried out by our research group that from Lanzhou University. The main achievements are as following: (1) Trans-Badain Jaran Desert expedition (from the north to the south). It was the first time all over the world for humankind to traverse the desert which has the highest sand dune (450 m) in the world by walking. (2) We measured the area of the Badain Jaran Desert by field investigation and remote sensing, and the result showed that it has an area of 52,100 km<sup>2</sup>, which could be the second largest desert in China. (3) There are 110 perennial lakes in the Badain Jaran Desert, and the evaporation from fresh water is about 1500 mm/yr, which is higher than saline water with different total dissolved solids (TDS), indicating the effect of salinity. (4) Lakes and shallow groundwater in the Badain Jaran Desert are recharged by exogenic deep groundwater, and they have a Lisse effect. (5) Remote sensing data and field observation shows, temperature of lake and its surrounding areas in the desert hinterland are higher than that of other regions in the desert and desert surrounding areas, suggesting the existence of “warm island effect” in the Badain Jaran Desert. (6) During the last glacial period, the landscape of Badain Jaran Desert is actually discontinuous permafrost. The mean annual temperature in the Badain Jaran Desert dropped by 12°C during the Younger Dryas event, which was recorded by the sand wedges and mirabilite deposition. (7) The paleo-lakes had high lake levels in MIS 3 on the Alxa Plateau. Moreover, Holocene High lake-levels and Pan-lake period were existed in the Badain Jaran Desert. (8) At the beginning of the Holocene, peat was widely developed in the Badain Jaran Desert. Furthermore, Holocene environmental evolution were reconstructed by the terminal lake records. (9) Total of more than 110 archaeological sites (from the mid-late Neolithic Age to Bronze Age) were distributed in the Badain Jaran Desert and Yabulai Mountains, suggesting that one of the origin centers for nomadic herding were located in the Badain Jaran Desert. (10) One of the two biodiversity centers in north China was located in Badain Jaran Desert.

### Key words:

Badain Jaran Desert; Scientific investigations; Field observation; Research progress; Symbolic achievements

## Soil Grain Size Characteristics in Blowouts in the Hulun Buir Sandy Grassland

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### Abstract

Blowouts environment as the research object in the wangong town of chenbaerhu county in the hulun buir sandy grassland northern sand strip, selecting different forms of typical blowouts, through the wild vegetation observation and blowouts shape measurement, and grain size characteristics on the blowouts surface analysis, studies soil grain size characteristics in the sandy grassland and its influencing factors. Results show that the blowouts sand material structure is given priority to with fine sand, the second is the medium sand, very fine sand and silt content rarely, and apart from wind erosion grassland topsoil contain extremely coarse sand, and does not contain all other sample. Because of the sand sediment grain size composition is uniform, different forms of blowouts soil grain-size frequency curve were unimodal symmetric or nearly symmetric; Response to wind erosion and accumulation, in all parameters of particle size, coarse sand and fine sand content, frequency curve modal particle size, and obvious changes have taken place in the average particle size, etc.

### Key words:

blowout; grain size characteristics; sandy grassland; Hulun Buir

## Wave-like Motion of Transverse Dunefields in the Korqin Sandy Land, Northeast

### China

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#### Abstract

There are noticeably transverse dunefields of variant spatial scales, composed of barchanoid chains, along major rivers on the extensive Xiliaohe Plain, Northeast China. With respect to their plan-forms, these dune chains are regularly spaced with nearly equal distance, whereas local longitudinal profiles show irregular curves, not standard trigonometric curves owing to the occurrence of slip-faces. Provided that the discontinued streamlines in windflow separation zone are not taken into account, and the streamlines between the brink on a dune and the reattachment point in interdunes are linked together, a quasi-regular trigonometric curve can be then acquired. By means of field observation and wind measurements, results show that a river valley is necessary and it acts as a disturbance for free windflow to produce wave-like motion in near-surface boundary layers, and barchanoid dune trains can, in turn, propagate downwind like real wave in water. Sufficient sand supply and the erodibility of the underlying loose late Quaternary sediments allow the wave-like motion under the circumstances of regular occurrence of high winds following the cold air outbreaks.

#### Key words:

wave-like motion; barchanoid chain; disturbance from river valley; erodibility of surface; high wind

## C12.02 Arid Lands, Human Kind and Environment

### Evidences of Paleo Climatic Changes in Arid Areas



Home

#### Oral

1. [Indication of Millennial-Scale Moisture Changes by The Temporal Distribution of Holocene Calcareous Root Tubes in The Deserts of the Alashan Plateau, Northwest China](#)  
Zhuolun Li, Nai'ang Wang, Ruolan Li, Kai Ning, Hongyi Cheng, Liqiang Zhao (College of Earth and Environmental Sciences, Center for Desert and Arid Region, Lanzhou University, China)
2. [Influence of Topography On Soil Formation and Its Implications for Holocene Paleoenvironmental Reconstruction in The Wulanmulun River Basin, Ordos, China](#)  
Weili Qiu, Weiwei Yao (School of Geography, Beijing Normal University, China), Jiafu Zhang (College of Urban and Environmental Sciences, Peking University, China), Qing Zeng (School of Geography, Beijing Normal University, China), Xue Rui (College of Urban and Environmental Sciences, Peking University, China)
3. [Late Quaternary Aeolian Activities in the Deserts of China: Insight from Dune Chronologies](#)  
Hongwei Li, Xiaoping Yang (Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing, 100029, P. R. China)
4. [Sedimentological Studies of Holocene Palaeoflood Slackwater Deposits Along the Middle Yiluohe River Valley, Middle Yellow River Basin, China](#)  
Xueru Zhao (Shaanxi Normal University, China)

#### Poster

1. [The Loess Provenance of the Chinese Loess Plateau Inferred from The U/Th Ratios and Rare Earth Elements of Detrital Zircon](#)  
Wang Zhixiang; Huang Chunju (China, Chinese University of Geoscience)

## Indication of Millennial-Scale Moisture Changes by The Temporal Distribution of Holocene Calcareous Root Tubes in The Deserts of the Alashan Plateau, Northwest China

Zhuolun Li, Nai'ang Wang, Ruolan Li, Kai Ning, Hongyi Cheng, Liqiang Zhao

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### Abstract

Calcareous root tubes or rhizoliths have strong potential for paleoenvironmental studies, especially in reconstructing paleoenvironmental conditions and paleovegetation. Previous studies suggested that the effectivity of the moisture level affects the formation of calcareous root tubes in the deserts of the Alashan Plateau, Northwest China. However, it remains unclear whether the temporal distribution of calcareous root tubes can be used to reconstruct paleo-effective moisture in this area. In this study, based on conventional  $^{14}\text{C}$  dating results of 34 Holocene calcareous root tube samples collected from the Badain Jaran Desert, the Tengger Desert and the Ulan Buh Desert in the Alashan Plateau of northwestern China, millennial-scale changes in paleo-effective moisture during the Holocene in this area were reconstructed. The frequency of the  $^{14}\text{C}$  dating results demonstrate that ~62% of the Holocene samples were dated to 7–5 cal kyr BP, and ~38% of the Holocene samples were dated to 4–2 cal kyr BP, indicating an arid period during the early Holocene (before 8.0 cal kyr BP), a humid period during the mid-Holocene (8.0–5.0 cal kyr BP) and a humid to arid period during the late Holocene (after 5.0 cal kyr BP). The reconstruction results were consistent with other previous reconstruction results from lake sediments and aeolian sand-lacustrine sequences, which indicated that temporal distribution of calcareous root tubes can reflect millennial-scale changes in paleo-effective moisture in this area. However, a single sample could indicate local environmental changes that may differ from the overall desert environmental changes. Hence, the relatively humid environmental record obtained from the presence of calcareous root tubes is a local signal or a regional signal that should be noted.

### Keywords:

Rhizoliths; Secondary carbonate; Paleo-effective moisture; Asian monsoon; Sand dune; Arid region

## **Influence of Topography On Soil Formation and Its Implications for Holocene Paleoenvironmental Reconstruction in The Wulanmulun River Basin, Ordos, China**

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### **Abstract**

Paleosols in desert areas are generally regarded as evidences of sand dune stabilization and indicators of rainfall increase or climatic change in the past. However, the influence of topography on soil formation in desert is often not considered. Since that water tends to concentrate in depressions, affording local conditions for soil formation, the climatic interpretation of paleosols in deserts may be complicated by topography. In the Wulanmulun River basin, located on the northern margin of the Mu Us desert, the formation ages and physical features of the buried Holocene soils have been found to vary with landscape positions. This provides a good case for studying the influence of topography on soil formation. Based on the investigation of eight outcrop sections in the basin and the results of  $^{14}\text{C}$  and OSL dating on twenty-three samples, we found that during dry and cold stages soil also formed with the occurrence of limnetic deposits in low areas, although its development was limited. In the wetter periods, well-developed soil formed widely on divide highlands and sand-dune-covered hill slopes. These results indicate that soil formation in desert areas can proceed in different climate conditions. Paleosols in depressions formed in dry climate mainly reflect the influence of topography and its change on soil formation. This kind of paleosols cannot provide valuable information about paleoclimatic conditions. Relatively, paleosols formed on highlands and sand dunes are more suitable for paleoclimate proxy. Thus, geomorphic analysis is very important when reconstructing paleoenvironments in the arid areas using paleosols.

### **Key words:**

Wulanmulun River; Mu Us desert; Holocene; buried soil; topographic Influence; climatic change

## Late Quaternary Aeolian Activities in the Deserts of China: Insight from Dune

### Chronologies

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#### Abstract

Progress in geochronology and fast growing chronological records have opened the possibility of exploring and synthesizing the Quaternary environmental changes in the Asian mid-latitudes dune fields directly from the on-site aeolian sand archives. This study synthesized the sand dune chronologies from northern China and their value in paleoenvironmental reconstruction had been assessed. The available ages are concentrated mainly in the last 20 ka and many are from the fields of stabilized dunes in the eastern portion of the desert belt in northern China. The number of records and the ratio between the records of stable state and the total records could act as a proxy for the palaeoenvironmental interpretation. The aeolian sand activities deciphered from the chronological data in the eastern portion of the desert belt in northern China show a reasonable correlation with the general global climatic curves at the glacial–interglacial timescales. On the other hand, discrepancies exist between dune activities and records from other archives. The limited aeolian sand records from the glacial period, however, hamper the understanding of the detailed features of the dune fields during glacial times. In the last two millennia, however, there has not been any meaningful correlation between aeolian dune activity and climatic variation at the centennial time scales, probably due to the complexity of the aeolian sand systems and human interventions.

#### Key words:

Quaternary; desert; dune; chronology; China

## **Sedimentological Studies of Holocene Palaeoflood Slackwater Deposits Along the Middle Yiluohe River Valley, Middle Yellow River Basin, China**

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### **Abstract**

Palaeohydrological investigations were carried out in the middle reaches of the Yiluohe River, a major tributary in the lower-middle Yellow River basin. Typical palaeoflood slackwater deposits (SWDs) were identified in the Holocene pedostratigraphy on the cliffy river banks. Analytical results, including magnetic susceptibility and grain-size distribution data, indicated that these SWDs were deposited from the suspended sediment load in flood water. A comparison study shows that these SWDs are different from the eolian loess, soils and aeolian sand in the valley. These SWDs recorded several episodes of extraordinary palaeoflood events. In the Longmenxia reaches of the Yihe River valley, these flood events were dated at 3100–3000 a, 1800–1700 a, 770–610 a, and 420–340 a using the optically stimulated luminescence method in combination with the pedostratigraphic correlations. In the Longhutan reaches of the Luohe River valley, the palaeoflood events were dated at 1975–1466 a, i.e., from the Han to Wei dynasty (AD 25–534), during which the capital city on the river banks was flooded many times, as recorded in the literature. These extraordinary flood events are well correlated chronologically with the known Holocene climatic events that occurred in the Northern Hemisphere. This suggests that the monsoonal climate was highly variable with both floods and droughts occurring frequently during these episodes. These results are important for understanding the response of river systems in eastern Asia to global changes.

### **Key words:**

Climate change; Palaeoflood event; Slackwater deposit; Holocene

## The Loess Provenance of the Chinese Loess Plateau Inferred from The U/Th Ratios and Rare Earth Elements of Detrital Zircon

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### Abstract

The loess deposits on the Chinese Loess Plateau (CLP) provide an excellent continental archive for reconstructing the history of Neogene climate changes. Deciphering the source areas of the CLP is very important for understanding the past East Asian atmosphere circulation patterns and transport mechanisms.

Nevertheless, there are still disagreements on whether the loess provenance contains spatial and temporal variations. Here, the U/Th ratios and rare earth elements of detrital zircons from the CLP and potential provenance have been firstly used to reveal the spatial characteristics of loess provenance. The discrepancies of the zircon REE patterns as well as the zircon U/Th ratios among different sites on the CLP indicate that the loess provenance is spatially variable, at least during the last glacial periods. Further statistical analyses of the zircon U/Th ratios and comparison with results from potential provenance demonstrates that the loess provenance has obviously proximal-deposited characteristics, from western CLP to eastern CLP with significant decrease of detrital materials from the western arid regions but remarkable increase from the northern deserts in China. In addition, the differences of the zircon U/Th ratios between the Northern Tibetan Plateau and the Western Mu Us deserts that are located in the downwind of the Yellow River alluviums and upwind of the CLP might be suggested that the Yellow River systems unlikely play a great role during the CLP forming.

### Key words:

Provenance; Chinese Loess Plateau; detrital zircon; U/Th; rare earth element

## C12.02 Arid Lands, Human Kind and Environment

### Compact of Climatic Changes in Arid Lands

#### Oral



Home

1. [Changes in Grain Production Potential of Western Jilin during 1976-2013](#)  
Li Fei (College of Urban and Environmental Sciences, Northwest University, China), Zhang Shuwen, Yang Jiuchun, Chang Liping (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China), Wang Qing (College of Earth Science, Jilin University, China)
2. [Climate Variability, Land-use Change and Crop Productivity in Pre- and Post-Apartheid South Africa](#)  
Marina Mastrorillo (Princeton University, United States)
3. [Dryness Temporal-Spatial Distribution Based on Precipitation in Mongolia Plateau](#)  
Jiyao Liu, Wenjun Liang, Xi Chun (Inner Mongolia Normal University, China), Bilige Siqin, Zhiwen Wu, Shixin Huang (Compact of Climatic Changes in Arid Lands, China)
4. [Interception and Rain Shadow Effects of Two Individual Shrubs at the Southeast Edge of the Tengger Desert, Northern China](#)  
LI Yang, Zhishan Zhang (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China)
5. [Characteristics of Populus euphoric's Radial Growth and its Delayed Effect on the River Runoff in the Upper and Middle Reaches of the Tarim River](#)  
Ye Mao (College of Geography Science and Tourism, Xinjiang Normal University, China), Xu hailiang (Xinjiang Institute of Ecology and Geography Research, Chinese Academic of Science, China), Zhang Yun (College of Geography Science and Tourism, Xinjiang Normal University, China)
6. [Summer and Winter Dust Blows toward Eastern Mediterranean: Are they Normal or New Phenomena?](#)  
Hussein Al Rimmawi (Birzeit University, Jordan)

#### Poster

1. [Evaluation of Risk of Access to Water Resources Regarding the Process of Late half Century in Arid and Semi- Arid area](#)  
Gholamreza Roshan; Esmaeil Shahkooeei (Iran, Golestan University, Department of Geography, Gorgan, Iran); Saeed Negahban (Iran, Department of Geography, Faculty of Human Science, Shiraz University, Shiraz, Iran)
2. [Saline Soils Arid Ecosystems of Baikal Region Russia](#)  
Olga Lopatovskaia (Irkutsk State University); Ekaterina Khadeeva (Russian Fed, Institute of



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Geography); Andrey Sorokovoy (Russian Fed, Institute of Geography)

## Changes in Grain Production Potential of Western Jilin during 1976-2013

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### Abstract

As an important strategic material related to the livelihood of the people, food security was an important component of national security. Grain production potential could reveal whether arable land pattern was reasonable. Therefore, the grain production potentials under different conditions in different years in Western Jilin were calculated by Global Agro Ecological Zone (GAEZ) model. Since 1976, the total grain production potential of western Jilin continues to increase; it increased about 4,516,700 tons between 1976 and 2013; the total grain production potential of western Jilin Province were 11,002,900 tons and 14,056,200 tons in 1976 and 2000; by 2013, the total grain production potential of western Jilin was 15,519,600 tons; the average grain production potential of western Jilin in 1976 were 2346.76 kg/hm<sup>2</sup>, it increased to 2997.99 kg/hm<sup>2</sup> in 2000; the total grain production potential of western Jilin increased by 1,463,400 tons and the average grain production potential of western Jilin increased 312.12 kg/hm<sup>2</sup> in 2000-2013; changes in grain production potential was mainly affected by climate, land use and irrigation rates.

### Key words:

grain production potential; land use; climate change; western Jilin

## Climate Variability, Land-use Change and Crop Productivity in Pre- and Post-Apartheid South Africa

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### Abstract

In this paper we study the impact of climatic factors on area planted and yield for the two main crops in South Africa, i.e. maize and wheat, in the period 1980-2007 using agricultural census data. In particular, we account for political and economic structural breaks occurred in South Africa after the end of apartheid, including the strong reduction of agricultural subsidies. We do so by running a set of panel data models at the level of magisterial districts, where in addition to climatic variables we feature a number of alternative specifications as to common vs. specific time trends and dummies. We find a consistent non-linear concave relationship between climatic variables (annual precipitation and annual average temperature) and maize/wheat area planted and yield. This relationship is more significant for maize than wheat. Our results also show that the political and economic reforms put in place in post-apartheid South Africa have contributed to reduce the crop area planted, but to increase crop yield. We suggest that this may be due to market forces selecting the most efficient farms, located in the most productive areas. Our results also hint at a reallocation of crop planting in marginal areas in favour of grazing.

### Key words:

South Africa; climate variability; land use change; crop yield; maize; wheat; livestock units; agricultural reforms; subsidies

## **Dryness Temporal-Spatial Distribution Based on Precipitation in Mongolia Plateau**

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### **Abstract**

In order to monitor the drought disaster variation in Mongolia plateau, based on climate data of Inner Mongolia and Mongolia, we analyzed the temporal-spatial distribution of the drought disaster using methods of linear regression and Standard Precipitation Index (SPI) in recent 40 years. In time series, the climate changed to dryness after 2000, while changed to wetness in Mongolia in the total period. In spatial pattern, the most significant dryness trend occurred in the southeast of Inner Mongolia and west of Mongolia, but weak wetness trend in west of Inner Mongolia and middle of Mongolia. SPI shows that, drought volatility and intensity enhance, the influencing sphere enlarges and move to east, which coincided with actual conditions of local area in Inner Mongolia, while move to east in Mongolia. So it is pretty important to predict the changes over Mongolia plateau in the future.

### **Key word:**

climate change; Precipitation; Mongolia plateau

## Interception and Rain Shadow Effects of Two Individual Shrubs at the Southeast Edge of the Tengger Desert, Northern China

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### Abstract

Rainfall interception and rain shadow effects of individual shrub during wind-driven rain event influences redistribution of rainfall, which is especially important in water-limited ecosystems. Two individual shrubs, *Caragana korshinskii* with inverted cone shape and big crown size and *Artemisia ordosica* with hemispheroidal shape and small crown size at the southeast edge of the Tengger Desert of northern China were selected. Throughfall at four positions with different distances from trunk and at three directions were measured during 210 rain events from 2004 to 2014 (except for 2007). The results showed that all of rain events are wind-driven and most of them are classified as light breeze. The relative interceptions of *C. korshinskii* and *A. ordosica* were 29.1% and 17.1%, respectively. Throughfall of *C. korshinskii* at near trunk and under crown, and those of *A. ordosica* at edge of crown and space between plants had higher variations than those in other positions. Rainfall properties have more contributions than crown characteristics to throughfall and interception of shrubs, and can be explained by gross rainfall amount and duration (GR and RD),  $RI_{60}$  (maximum rainfall intensities during 60 min) and rainless gap (RG) in decreasing importance. However, relative throughfall and interception of two shrubs have different responses to rainfall properties and crown characteristics, those of *C. korshinskii* merely tightly related to rainfall properties, while those of *A. ordosica* were more dependent on crown characteristics. The coefficient of variation of throughfall in distances from trunk ( $CV_{Distance}$ ) for *C. korshinskii* showed significant relationships with height and branch and leaf area index (BLAI), while  $CV_{Distance}$  for *A. ordosica* showed significant or marginally significant relationships with height, branch leaf area index, crown area and volume. We highlight that long-term monitor is very necessary to find the relationships between throughfall and interception with crown characteristics. Also, rain shadow effect of individual shrub were structured by interspecific crown shape rather than crown size and density of single plant, and embodied in throughfall variations in distances from trunk instead of those in directions.

### Keywords:

*Artemisia ordosica*; *Caragana korshinskii*; Crown size; rainfall intensity; Wind-driven rainfall

## Characteristics of *Populus euphratica*'s Radial Growth and its Delayed Effect on the River Runoff in the Upper and Middle Reaches of the Tarim River

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### Abstract

Based on the methods of dendrohydrology, this paper analyzes the temporal and spatial changes characteristics of radial growth of *Populus euphratica* in the upper and middle reaches of the Tarim River. The delayed variable model is applied to simulate the delayed effect of river runoff on radial growth of *Populus euphratica*. The results show that: (1) there are significant differences in radial growth of *Populus euphratica* in four transects in the upper and middle reaches of the Tarim River. The average annual ring width is respectively 3.7 mm (1970a-2010a) in Transect Xiaojiake, 1.75 mm (1947a-2010a) in Transect Xinquman, 3.44 mm (1986 a -2010a) in Transect Shazihekou and 2.38mm (1969a-2010a) in Transect Aqike. (2) From the change trends of ring width and ring index of *Populus euphratica*, the ring width changes have declining trends in Transects Xiaojiake and Shazihekou, while the changing trends of ring width are not significant in Transects Xinqiman and Aqike. The ring index of *Populus euphratica* has a significant declining trend in Transects Xinqiman and Aqike. However, the changing trends of ring index are not significant in Transects Xiaojiake and Shazihekou. (3) The delayed effect of river runoff change on the radial growth of *Populus euphratica* is obvious. The simulated result from delayed variable model shows that the delayed duration is different in four transects. The lagged duration is respectively seven years in Transect Xiaojiake, five years in Transect Xinquman, three years in the Transects Shazihekou and Aqike. The year of the greatest impact of river runoff on radial growth is also different in the four transects. The year of the greatest impact is the fourth year in Transects Xiaojiake and Xinqiman, the first year in Transect Shazihekou, and the third year in Transect Aqike respectively.

### Key words:

The radial growth of *Populus euphratica*; Ring index; River runoff; Delayed variable model; The upper and middle reaches of Tarim River

## Summer and Winter Dust Blows Toward Eastern Mediterranean: Are They Normal or New Phenomena?

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### Abstract

Throughout the last few years, the region of Eastern Mediterranean has witnessed severe winter and summer dust blows. Such a phenomenon raised many questions regarding its causes and effects. This paper tries to answer such questions. In fact, dust blows toward Eastern Mediterranean have been occurring during winter and summer seasons for a long time and people who resided in this region have been familiar too with this phenomenon. They gave loaded winds with dust several names such as “poisoning winds” in which they believed that such winds poison plants. People residing in Eastern Mediterranean used to think that winds with dust usually poison flowers of olive trees if it blows in Early May of each year. However, they were aware to these blows every year either during summer or winter. It has been observed that blowing winds toward Eastern Mediterranean region are loaded with great amounts of dust and satellites has taken images which shows that these winds were loaded with great amounts of dust. Researcher will tackle physical causes of winter and summer dust blows and their impacts on human health, fauna and flora. Finally, author is certain that these blows will remain blowing. However, author will present solutions to minimize physical and human consequences of such phenomena.

### Key words:

Dust blows; Mediterranean; Phenomenon; Physical Causes and Effects

## Evaluation of Risk of Access to Water Resources Regarding the Process of Late half Century in Arid and Semi- Arid area

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### Abstract

One of the main apprehensions of the arid and semi- arid areas is the accessibility of water resources out of droughts. Iran is known as a country that its main section is located in dry areas and the experience of drought is known as one of the obvious characteristics of these areas. So this study decides, by monitoring and pursuing of late half century droughts (1965 to 2014), to present the first step in controlling the accessibility to water resources in sixteen arid and semi- arid stations of Iran. One of the new factors of estimating drought is the reconnaissance drought index (RDI) which estimates drought on the basis of two variables, say, rainfall, evaporation and potential perspiration and its estimating process including calculating primary amount, normalized RDI that its high ability of this index in monitoring droughts caused them to be used in this study. In the present research, in order to investigate the process of changing rainfalls and droughts, the nonmetric Mann Kendall has been applied. The result of this research shows that the maximum excess level of RDI index belong to normal territory that this situation is more obvious especially for winter, autumn and spring seasons. On the other hand, the least amount of RDI index was about hot summer season. The research finding show that the maximum vulnerability of droughts with respect to the procedure changes relates to Zahedan, Yazd and Bam in the hot summer season respectively; and in a sense the most vulnerable stations is in terms of getting access to water resources of the above mentioned stations, panorama of global warming effect upon getting drier in arid and semi- arid regions of the middle east, water crisis for all future decades, these regions lead to a major environmental challenge. Thus, as a solution, the use of virtual water for disparate financial and agricultural sections is suggested; thereby the pressure of exploitation from restricted water resources is diminished.

### Key words:

risk management; reconnaissance drought index (RDI); Mann Kendall test; water requirement; Iran arid and semi- arid regions

## Saline Soils Arid Ecosystems of Baikal Region Russia

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### Abstract

On the basis of remote sensing and GIS technologies studied saline soils of arid ecosystems of the Baikal region. Saline soils are formed on the lower parts of the relief around the salt lakes. Lakes are located in the north-east direction, the length above 7 km, at an altitude of 185 m above the Lake Baikal level. In the configuration of the lakes is marked cyclic: increase-decrease. The dynamics of the flooding – drying associated with climatic and hydrogeological conditions. The processes of drying lakes with close saline groundwater lead to the formation of saline soils – solonchak. Salts from groundwater accumulated on the soil surface and formed a salt crust. Satellite were analyzed by MapInfoProfessional of interpretations and combinations of data channels Landsat TM/ETM+. The contours of lakes shore lines, shallow water, saline soils. Integrated analysis of remote sensing data and soil research materials to help solve complex scientific monitoring task. The shoreline of lakes and configuration of saline soils around them are in direct dependence. After drying of the lake increases the area of saline soils, so easy soluble salts transported by the wind. It is the reason the salinity of soils are not saline. We offer three main groups of salinity: alkaline carbonate, alkaline and neutral. The main part of the soil - 52% have neutral chemistry salinity; with alkaline carbonate - 25%; alkaline - 23%. GIS mapping provides long-term use of the information on basic physical and chemical properties of soil and other properties of soils.

### Key words:

Saline Soils; Baikal Region; GIS technology; monitoring

## C12.02 Arid Lands, Human Kind and Environment

### Hazards and Risks in Arid Environments



Home

#### Oral

1. [Effect of Restoration Vegetation on the Stochasticity of Runoff and Sediment Generation in A Semi-Arid Environment](#)  
Ji Zhou, Bojie Fu, Guangyao Gao, Yihe Lü, Shuai Wang (Research Center for Eco Environmental Science, Chinese Academy of Science, China)
2. [Rainfall Anomalies and Their Impacts on Crop Production in Thar Desert \(Western Rajasthan, India\)](#)  
Mahabir Singh Jaglan (Kurukshetra University, India)
3. [Remote Sensing and GIS Contribution to the Detection of Areas Susceptible to Natural Hazards in W-Morocco \(Sahel of Abda-Doukkala\)](#)  
Elbchari Fatima (Cadi Ayyad University, Morocco)
4. [Research on the Effects of Snow Disaster on Herdsmen'S Livelihood Capital](#)  
Zhao Shuang (Institute of Mountain Hazards and Environment, CAS, China); Fang Yiping (Institute of Mountain Hazards and Environment, CAS, China)
5. [Road Erosion and Its Environmental Influence Caused by Mining in Trans-Boundary Area of China and Mongolia](#)  
Davaadorj Davaasuren (National University of Mongolia, Mongolia); Wang Juanle (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China); Uyangaa Udaanjargal (National University of Mongolia, Mongolia); Khongor Gankhuyag (National University of Mongolia, Mongolia)
6. [The Nile Delta Is Going Underwater, It Is A Disaster.](#)  
Mahmoud Ashour (Professor, Ain Shams University, Cairo, Egypt, Egypt)

#### Poster

1. [Characteristics and Analysis of Soil Salt in Xarxili of China](#)  
Wang Yonghui (Xinjiang Narmal University)
2. [Characteristics of Agricultural Drought Disaster in Northern China](#)  
Xueli AN; Jianjun Wu (China, Beijing Normal University)
3. [Greater Impacts of Collembola On Mineralization of Soil Organic Matter Compared with Leave Litter](#)  
Xu Guoliang

4. [Space Diffusion Effect of NIMBY Facilities -A Case Study of Funeral Home in Nanjing, China](#)  
Yunqing WU (China, Nanjing Tech University); Guofang ZHAI (China, Nanjing University);  
Liangliang ZHAN (China, Nanjing Tech University)
5. [Spatiotemporal Variability of Two Precipitation-Based Drought Indices in Xinjiang, China](#)  
Yi Li; Ning Yao (China, Northwest A&F University)
6. [The Partition of Fragile Eco-Environment Based on the Landscape Pattern](#)  
Meimei Wang (Lanzhou University)

## Effect of Restoration Vegetation on the Stochasticity of Runoff and Sediment Generation in A Semi-Arid Environment

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### Abstract

Exploring the interactions between vegetation and soil erosion in semi-arid environment is critical for understanding feedback mechanism between ecological function of plants and corresponding hydrological processes. Based on five years' runoff-plot monitoring, we employed binomial and Poisson distribution functions to describe the randomness property of runoff and sediment generation in three typical restoration vegetation types (*Armeniaca sibirica* (AS), *Spiraea pubescens* (SP) and *Artemisia copria* (AC)) of Loess Plateau. The results indicated that, triggered by 134 precipitation random events, the obvious canopy structure with largest crown could cause AS have strongest precipitation interception capacity, with lowest average probability of runoff (18.3%) and sediment (5.6%) generation; Meanwhile, the thicker litter layer and denser root system lead SP to have relative stronger throughfall interception and overland flow reinfiltration, with low mean risk of runoff (approximately 20%) and soil loess (about 8.7%) occurrence; However, due to the morphological structure in AS with lower capacity for water interception and infiltration, the average probability of runoff (24.0%) and sediment generation (15.8%) was highest in all vegetation types. With the increasing of rainfall duration, the effect of morphological properties of plant on stochasticity of soil erosion was weakened. Moreover, the parameter analysis implied that Poisson probability distribution is more suitable for describing the sensitivity of erosion occurrence than binomial distribution over long-term monitoring. This study confirmed the effect of restoration vegetation on stochasticity of runoff and sediment, which could be meaningful to apply more effectively restoration on protecting the soil and water resources in water-limited environment.

### Key words:

stochasticity; restoration vegetation; probability distribution; the Loess Plateau

## Rainfall Anomalies and Their Impacts on Crop Production in Thar Desert (Western Rajasthan, India)

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### Abstract

The western most part of Rajasthan state in India is covered by Thar Desert and its expanses spread eastward in the province up to its boundary with Haryana. The land of Western Rajasthan has often suffered from vagaries of weather and in particular frequent dry spells and droughts. Having arid and semi-arid climatic conditions this region is often frequented by droughts resulting in crop failures, un-replenished ground and surface water resources and scarcity of food and fodder. Consequently, the region experiences perpetual soil moisture deficiency and fluctuations in rainfall affect agricultural production systems and area and yield of crops and animal husbandry. The study aims to assess the magnitude and frequency of drought occurrence in Western Rajasthan over the period 1960 to 2010. It also analyses districtwise distribution pattern of rainfall during last 50 years. Temporal variations in annual rainfall and rainy days have been depicted with the help of trend graphs. Correlation and regression analysis has been done to assess the degree of association and impact of annual rainfall and rainy days on area and yield of main rainfed crops cultivated in the region. The study reveals that on an average western Rajasthan experienced drought every third year. The frequency of droughts occurrence is found to be higher in western districts of the region. There is not a significant change in the amount of annual rainfall received over the period of study. It is also evident from the study that annual rainfall and number of rainy days have positive influence on area, production and yield of most rainfed crops. It shows that weather anomalies in terms of rainfall fluctuations continue affecting the people's livelihood and agricultural economy in the region.

### Key words:

Drought; annual rainfall; rainy days; agriculture; crop area and yield

## Remote Sensing and GIS Contribution to the Detection of Areas Susceptible to Natural Hazards in W- Morocco (Sahel of Abda-Doukkala)

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### Abstract

When catastrophic hazards happen and affect cities, settlements and infrastructure, immediate and efficient actions are required which ensure the minimization of the damage and loss of human life. Proper mitigation of damages following disastrous events highly depends on the available information and the quick and proper assessment of the situation.

Morocco is facing miscellaneous natural hazards presenting all serious risk. The demographic growth, the economic development, urban expansion and the vulnerable infrastructure increase more this risk and make difficult any classical disaster mitigation.

Responding local and national authorities should be provided in advance with information and maps where the highest damages due to unfavourable, local site conditions in case of extreme natural events such as stronger earthquakes and earthquake-related secondary effects (landslides, liquefaction, soil amplifications or compaction) can be assumed.

The aim of this contribution is to develop adaptation strategies by presenting an approach in which Geographic Information Systems (GIS), used together with remote sensing data, contribute to the analysis and presentation of information, especially required for the increasing geo-hazards in Morocco. The ability to undertake the assessment, monitoring and modelling can be improved to a considerable extent through the current advances in remote sensing and GIS technology. Causal or critical environmental factors influencing the disposition of settlements, industrial and infrastructural facilities to be affected by natural hazards and the potential damage intensity can be analysed interactively in a GIS database. The interactions and dependencies between different causal and preparatory factors can be visualized and weighted step by step in this GIS environment.

### Key words:

GIS; Remote Sensing; Natural Hazard; Morocco; Sahel of Abda-Doukkala

## Research on the Effects of Snow Disaster on Herdsmen'S Livelihood Capital

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### Abstract

Grass animal husbandry is an essential part of Guoluo State's economy system and the proportion of the local herdsmen reached 90%. In recent years, the increasing number of snow disasters has brought great loss to the herdsmen's livelihood. Therefore, this paper takes advantage of the natural and social data in 2010 and 2012 in Guoluo State to analyze the effects of snow disaster on the herdsmen's livelihood capital including natural capital, material capital, financial capital, social capital and human capital. The indicators to describe snow disaster include the largest snow depth, snow-cover area, snow last days and the frequency of disaster. According to correlation analysis of snow disaster and herdsmen's livelihood capital, it is concluded that (1) in 2010, the snow disaster has weak relationship with pastoral livelihood capital; (2) In 2012, the pastoral livelihood capital is mainly affected by the frequency and the negatively correlation between financial capital with the frequency of snow disaster is significant.

### Key words:

snow disaster; herdsmen; livelihood capital; effects

## Road Erosion and Its Environmental Influence Caused by Mining in Trans-Boundary Area of China and Mongolia

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### Abstract

The off-road from vehicle is one of the dominant impacts of environmental degradation in Mongolia. Off-road vehicles also main resources of the gully erosion, dust emission and land degradation. Nowadays 50000 km roads have been used for transportation of Mongolia. Most of road has been used for coal transporting in southern boundary of Mongolia. Therefore, strongly degradation occurred in trans-boundary area.

This study has been focused by to estimate soil losses from vehicle effects in soils and to develop methodology to calculate the erosion from off-road vehicle. The result has indicated an average soil losses are 1.40 kg/m<sup>2</sup> in study area. Soil loss was 29 tn/ha from studied 24.0 ha areas on central Mongolia. Also road erosion has been affected the soil properties and bulk density has increased 12.1gr/cm<sup>3</sup> and organic content has decreased 0.1% in off-road vehicle.

Steppe area soil in established on arid condition by influence from vehicle truck which has been change the physic characteristic and soil particles flapping to air from impacts of car wheels thus get down to near the road through the area. Which is create the accuracy parts covering impact to land surface other else, arise swelling along the road depend on hydrous, density, particle composition as well as cause of technical destruction.

### Key words:

Off-Road Vehicle; vehicle track; soil erosion

## The Nile Delta Is Going Underwater, It Is A Disaster.

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### Abstract

The Nile Delta which supported one of the most ancient and fascinating civilizations and the most heavily populated areas in Egypt and the world, is facing in the last few centuries the piece-meal encroachment of the sea water. The process is now accelerated for reasons we all know. It is estimated that by the end of the 21st century, a rise of the sea by one to three meters: one third of the Delta will be lost to the sea, approximately one million acres of arable land would be submerged, about 15 millions of inhabitants will be homeless, major port cities like Alexandria, Damietta, and Port Said would be reduced to small protected islets, many factories and other hundreds of other settlements will be washed out along with many arche.

This flooding is mainly attributed to: 1- Natural agents and 2- Anthropogenic Agents.

We believe that works confronting such disaster should be planed among concerned agencies and academics without delay. Any work plan should contain the following subjects:

1-Establishment a new integrated centers with new policies upholding the major theme of understanding the compound relations among the physical setting, cultural heritage and land use plans.

2- Plans should be drawn to compensate lost lands by reclaiming suitable desert lands and/or helping people to create other activities, e.g., industry and services.

3-Cnstructing efficient barriers at the coastal tips of the Delta.

### Key words:

Nile Delta; Sea-Water encroachment; confronting the disaster

## Characteristics and Analysis of Soil Salt in Xarxili of China

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### Abstract

Xarxili Nature Reserve is located in the southern piedmont of the Alataw Mountain in Xinjiang, its western part borders on the Republic of Kazakhstan, and its area is 314 km<sup>2</sup>, the Xarxili Nature Reserve returned to China in 1999. Due to its nature of less artificial interference, Xarxili Nature Reserve is seen as an ideal place to study environmental background. In this study, the soil in Xarxili was chosen as the object of interest, of which the contents of eight ions (Cl<sup>-</sup>、K<sup>+</sup>+Na<sup>+</sup>、CO<sub>3</sub><sup>2-</sup>、HCO<sub>3</sub><sup>-</sup>、SO<sub>4</sub><sup>2-</sup>、Ca<sup>2+</sup>、Mg<sup>2+</sup>) and total salt were determined. The results show that the contents of total salt content is 2.29 g/kg - 9.45 g/kg in the desert, 6.11 g/kg - 8.41 g/kg in the mountain, 2.32 g/kg - 7.83 g/kg t in the oasis region. According to the classification standard of soil salinization in xinjiang, the three regions belong to moderate soil salinization. The variation coefficient of soil total salt and eight ions in three regions of Xarxili show moderate variability. The spatial distribution show that the contents of eight ions and total salt were in the following order :total salt in the desert > mountain > oasis; Cl<sup>-</sup>、HCO<sub>3</sub><sup>-</sup>、K<sup>+</sup>+Na<sup>+</sup> in the mountain > oasis > desert; CO<sub>3</sub><sup>2-</sup>、Mg<sup>2+</sup> in the desert > mountain > oasis; SO<sub>4</sub><sup>2-</sup> in the oasis > mountain > desert; Ca<sup>2+</sup> in the desert > oasis > mountain。 By correlation analysis, a significant positive correlation was found between such pairs as total salt and Cl<sup>-</sup>、HCO<sub>3</sub><sup>-</sup>、SO<sub>4</sub><sup>2-</sup>、Ca<sup>2+</sup>、K<sup>+</sup>+Na<sup>+</sup>; In addition, Xarxili is maintained a good ecological environment in the absence of disturbance conditions, the salt characteristics has a good reference value for the related study to the arid area.

### Key words:

soil; salt; Xarxili; arid area

## Characteristics of Agricultural Drought Disaster in Northern China

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### Abstract

This paper analyzed the variation characteristics of drought disaster in Northern China from 1949 to 2000 based on two indicators extracted from the disaster statistical data, one is the agricultural drought rate, and the other is drought frequency using county as spatial study unit. Results showed that there was an increasing trend of the agricultural drought rate in the latter half of 20<sup>th</sup> century. After the year 1980, the frequency of moderate drought and above increased significantly. The North-East of Henan Province, the North and the South-West of Shanxi Province, and Jinzhong Area showed the highest drought frequency. The drought frequency increased in most area of Henan Province and Qingdao City in Shandong Province. This study recognized the areas where drought disaster occurred frequently and the years when the agricultural drought was severe. We believe that the results above can provide theoretical support for risk prevention of drought and national disaster prevention and mitigation.

### Key words:

agricultural drought disaster; agricultural drought rate; drought frequency

## Greater Impacts of Collembola On Mineralization of Soil Organic Matter Compared with Leave Litter

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### Abstract

Soil Collembola played an important role on soil carbon (C) cycling, but their contributions to the mineralization of C with different bioavailability such as soil organic matter (SOM) and leave litter are not clear. Here,  $^{13}\text{C}$ -labeled litter was used to investigate the effect of the Collembola (*Folsomia Candida*) on the transformations of both SOM and litter C in laboratory microcosms. Three treatments were set up: control soil (S); soil and labeled litter (SL); soil, labeled litter and Collembola (SLC). The  $\text{CO}_2$  evolved from each microcosm was measured every two weeks during the experiment. In addition, microcosms were destructively sampled on days 7, 21, 63 after the experiment initiation. The litter mass, Collembola number, microbial biomass (indicated by PLFAs), and the  $\delta^{13}\text{C}$  values of  $\text{CO}_2$  were determined. We found that the presence of either Collembola or litter did not significantly affect soil microbial biomass PLFAs and the loss of litter mass. Furthermore, collembola showed limited contribution to the total C mineralization within the first weeks during which litter-derived  $\text{CO}_2$  dominated. However, collembola increased the emission of SOM-derived  $\text{CO}_2$  considerably at later stage of the incubation when litter-derived labile C being depleted. These results suggested that collembola impacts on C mineralization was regulated by C availability.

## Space Diffusion Effect of NIMBY Facilities: A Case Study of Funeral Home in Nanjing, China

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### Abstract

With the acceleration of urban development in China, public facilities have been improved, but meanwhile, it is inevitable to encounter the problem of NIMBY facility layout. Because of the negative externality of NIMBY facilities, they may form some spatial effect around them. As a special Chinese Traditional Geomantic Omen culture, people pay more attention to death, and then form a kind of cemetery culture. In order to measure the space diffusion effect of the funeral home, a massive official data survey was conducted around the funeral home in Nanjing. Hedonic price model was used to measure the correlation between the variable- “the distance to NIMBY facilities” and house prices. On this basis, Kriging interpolation method was used to display the spatial effect intuitively. The conclusion is that the spatial effect of funeral NIMBY facilities changes with the distance to NIMBY facilities as “concentric circles – irregular areas” variation. Hopefully the study will provide some technical support and scientific basis for the siting and planning of funeral NIMBY facilities and compensation for surrounding residents in China.

### Key words:

Funeral NIMBY facilities, spatial effects, hedonic price method, Kriging, Nanjing

## Spatiotemporal Variability of Two Precipitation-Based Drought Indices in Xinjiang, China

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2.Global Institute for Water Security, University of Saskatchewan, Saskatoon, S7N 3H5, Canada

### Abstract

Global increases in duration and prevalence of droughts require detailed drought characterization at various spatial and temporal scales. In this study, we investigated drought intensity in Xinjiang, China, from 1961 to 2012. Using meteorological data from 57 weather stations, we calculated Erinç's Aridity Index ( $I_m$ ) and Sahin's Aridity Index ( $I_{sh}$ ) at the monthly and annual scale and looked at their spatiotemporal variability for north, south, and entire Xinjiang. At the monthly time scale,  $I_m$  for entire Xinjiang had moderate variability (as determined by the coefficient of variation  $C_v$ ) from April to September, while  $I_{sh}$  had moderate to strong variability from January to December.  $I_m$  could not be calculated at 53 stations in winter as  $T_{max}$  was below zero. Annual  $I_{m, MYM}$  and  $I_{sh, MYM}$  showed strong spatial variability.  $I_m$  and  $I_{sh}$  dynamics correlated with the drought dynamics calculated in earlier work from the more complex dryness index (DI). Trends in precipitation, maximal temperature, relative humidity and specific humidity were all increasing, only that in air pressure decreasing, which resulted in increases of the three drought indices. This indicated a decrease in drought severity of Xinjiang with the local climate becoming warmer, but also wetter. Both indices  $I_m$  and  $I_{sh}$  were easier to calculate than  $ET_o$  based indices. However, due to its successful applicability at both the monthly and the annual timescales, we recommend  $I_{sh}$  as the better drought index for Xinjiang.

Abbreviations: CMA-China Meteorological Administration; DI-dryness index;  $e_a$ -vapor pressure of air;  $I_m$ -Erinç's Aridity Index;  $I_{sh}$ -Sahin's Aridity Index;  $_{MYM}$ -multi-year mean;  $P$ -Precipitation;  $PR$ -Air pressure;  $RE$ -Relative error;  $RH$ -Relative humidity;  $S_h$ -Specific humidity; SPI-Standardized Precipitation Index; SPEI-Standardized Precipitation Evapotranspiration Index;  $T_{max}$ -maximum air temperature;  $T_o$ -mean air temperature;  $C_v$ -Variability coefficient;  $C_{v, t}$ -Temporal  $C_v$ ;  $C_{v, s}$ -Spatial  $C_v$ .

### Key words:

Spatiotemporal variability; Drought index; Specific humidity; Xinjiang; China

## The Partition of Fragile Eco-Environment Based on the Landscape Pattern

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### Abstract

YanChi county, TongXin county and HongSibu region of the middle arid belt of Ningxia are located in the transition zone of the loess plateau and drought, the ecological environment in this area obviously fragile. The villages and towns are choose as the study units in this paper, based on the principle of availability and practicability, scientific research methods such as combining theory with practice, integrating qualitative analysis with quantitative analysis are used in research, based on natural factors, via GIS platform, the ecological fragile degree classification of Space in study area is gotten: YanChi county, TongXin county and HongSibu region of the middle arid belt of Ningxia is divided into 4 parts: highly fragile area, moderate fragile area, mild fragile area and not fragile area. After that, ecological characteristics and corresponding countermeasures of each partition are put forward.

### Key words:

The middle arid belt of Ningxia; YanChi county; TongXin county and HongSibu region of Ningxia; Fragile Eco-environment; Landscape pattern; Partition

## C12.02 Arid Lands, Human Kind and Environment

### Geoarchaeology in Desert Areas

#### Poster



Home

1. [The Remote Sensing of Vegetation Coverage Change in Mu Us Sandland: A Case Study in Inner Wushen](#)

Qian Xue (China, Chongqing Jiaotong University)

## The Remote Sensing of Vegetation Coverage Change in Mu Us Sandland: A Case Study in Inner Wushen

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### Abstract

With the development of social economy and the speeding up of urbanization in arid areas, makes the land degradation problems such as desertification increasingly serious. Taking hinterland of Mu, us desert Wushenqi for the study, research and analysis of remote sensing data of 2000, 2007 and 2014, secondly, based on Vegetation Index and pixel dichotomy model of vegetation coverage study in Wushenqi, and finally, analyze the driving factors vegetation coverage change in Wushenqi. The results show that: the vegetation coverage of Wushenqi area is very low in 2000, 86.54% of regional vegetation coverage is only 20% or less; Since 2007 the whole vegetation coverage in the region increased, 18.82 percent area vegetation coverage reaches 20% - 40%; In 2014, the vegetation coverage has significantly increased, 72.37% area vegetation coverage has reached 20 to 40%; the main factors according to the study is policies

### Key words:

Maowusu; Remote sensing image; Vegetation coverage; Pixel dichotomy model; Driving force

## C12.02 Arid Lands, Human Kind and Environment

### Political Problems in Arid Areas



Home

#### Oral

1. [Governments' interference and farmers' adaptive responses against drought: a case study in the North China Plain](#)  
Xiaoyun Li (Institute of geographic sciences and natural resources research, China)
2. [Temporal and Spatial Distribution Pattern Evolution of British Colony based on Temporal Model](#)  
Liu HongJian (Information Engineering University, China)
3. [Vulnerability of Smallholder Farmers to Drought in Drylands Zone of North-Western Nigeria](#)  
Abdullahi Umar (Department of Geography, Federal University, Birnin Kebbi, Nigeria, Nigeria),  
Salisu Muhammed (Department of Geography, Bayero University, Kano, Nigeria, Nigeria), Ismail  
Adamu (Department of Geography, Usmanu Danfodiyo University, Sokoto, Nigeria, Nigeria)

## **Governments' interference and farmers' adaptive responses against drought: a case study in the North China Plain**

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### **Abstract**

Agricultural production will be confronted with more serious challenges under climate change. Understanding households' adaptive behaviors and the influence of government policies on it is the fundamental step to improve further relevant policies for enhancing farmers' ability of adaptation against drought. The overall goals of this study are to evaluate the farmers' adaptive behaviors and its influencing factors, especially the interfering of government policy, like early-warning and policy supports. The analyses are based on a household and village survey in three provinces of Northern China Plain (NCP), and the econometrics method will be used. The results show that: (1) Most of households are apt to take adaptation measures when facing drought, and more serious droughts, more adaptation measures will be taken. (2) The adaptation behaviors of farmers affected by interfering of government policy. The enthusiasm to take adaptations of households can be promoted obviously by the governments' early- warning information and relevant policy supports, especially when the warning information released by multiple channels and the subsidies or multiple supports provided by the township government and the village. However, most of the households haven't got any support by any government. Besides, TV as the present main channel has very little effect. (3) Adaptive behaviors vary along with different households' characteristics. Farmers those who possess larger cultivated land block acreage and live in irrigated areas as well as lower levels of social capital are more inclined to take adaptive measures. The finding can provide policy reference for government to make household adaptation measures under drought.

### **Key words:**

drought; interfering of government policy; household; adaptation

## Temporal and Spatial Distribution Pattern Evolution of British Colony based on

### Temporal Model

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#### Abstract

Colony is one of the main factors that influence the development of British sea power, which has a great influence on the rise and fall of the British sea power. This paper to GIS spatial analysis technology as the support around Britain in different historical periods of colonial distribution, spatial pattern, development strategy, guiding ideology is studied, in order to reveal the geographical environment of the deep influence of the British colonial expansion.

#### Key words:

Temporal and Spatial Distribution Pattern; Evolution of British Colony

## Vulnerability of Smallholder Farmers to Drought in the Drylands Zone of North-

### Western Nigeria

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#### Abstract

Significant studies on drought have been conducted in the study area. However, holistic vulnerability assessment of drought remains an emerging issue as it has been relegated by previous works. In this paper, we aimed to assess smallholder farmers' vulnerability to drought in Bungudu, Dange, Dawakin-Tofa and Rimi, Northwestern Nigeria. A sixty one year (1952-2013) rainfall data of four stations was subjected to analyses to obtain rainfall trends and Standardized Precipitation Index was generated to compute intensities and duration. Also eighty (80) smallholder farmers were interviewed to determine their sensitivity and adaptive capacity to drought. Vulnerability Model was employed to assess communities' vulnerability to drought. The result reveals that in the study area, vulnerability ranges from 0.0 to 0.2 an indication that the communities are moderately vulnerable to drought. It is concluded that adaptive strategies of the communities such as adjusting feeding habit may probably be their sources of resilience. It is recommended that those strategies should be enhanced and be blended with other strategies not common in the communities such as getting weather information and community based storage facility of farm produce.

#### Key words:

Drought; smallholder farmers; drylands; vulnerability assessment; sensitivity; adaptive capacity; ecological degradation

## C12.03 Biogeography and Biodiversity

### Response of Mountain Ecosystems to Climate Change



Home

#### Oral

1. [A Study On the Spatial and Temporal Variations of Land Surface Phenology in Northeast China and Its Responses to Climate Change Over the Past Three Decades](#)  
Jianjun Zhao, Hongyan Zhang, Zhengxiang Zhang, Xiaoyi Guo (Northeast Normal University, China)
2. [Altitudinal Zonation of Vegetation and Its Response to Climate Change in Taihang Mountain, North China](#)  
Chesheng Zhan, Feiyu Wang, Shi Hu (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
3. [Climate Change and The Vegetation Response in Qinling Mountains](#)  
Hongying Bai (Northwest University, China)
4. [Deteriorating Physical Environment and Transformation of Socio-economic Status: A critical analysis of Western Indian Himalayan Communities, India](#)  
Virendra Singh Negi (University of Delhi, India, India)
5. [Extreme Events Assessment for Disaster Risk Reduction in High Altitude Region of Mountain Ecosystem: Alaknanda River Basin, Uttarakhand, India](#)  
Bindhy Wasini Pandey, Abhay Shankar Prasad (Department of Geography, Delhi School of Economics, University of Delhi, Delhi, India)
6. [Extreme Events, Vulnerability and Himalayan Geosystem: A Case Study of Alaknanda River Basin, Uttarakhand, India](#)  
Abhay Shankar Prasad, Bindhy Wasini Pandey (Department of Geography, Delhi School of Economics, University of Delhi, India)
7. [Geospatial Strategy for Environment Impact Assessment of Urban Heat Island in Mountain Areas Using Landsat ETM+ Sensors](#)  
Amit Kumar (National Institute of Technology, Kurukshetra, India, India), Vandana Tomar (Haryana Institute of Public Administration, Gurgaon, India, India)
8. [Heterogeneity in The Spatio-Temporal Patterns of Phytoplankton Distribution and Biodiversity in A Large Subtropical Lake of SW China](#)  
Li Chen, Yineng Jiang, Tao Zhang, Rui Li, Guangjie Chen (Yunnan Normal University, China)
9. [Linking Microbial Community Structure to Phosphorus Fractions Along the Altitudinal Gradient at Gongga Mountain, SW China](#)

Hongyang Sun , Yanhong WU (Key Laboratory of Mountain Surface Processes and Ecological Regulation, Institute of Mountain Hazards and Environment, Chinese Academy of Sciences and Ministry of Water Resources, China), Na LI (Chengdu Institute of Biology, Chinese Academy of Sciences, China ), Jun ZHOU , Haijiang BING (Key Laboratory of Mountain Surface Processes and Ecological Regulation, Institute of Mountain Hazards and Environment, Chinese Academy of Sciences and Ministry of Water Resources, China )

10. [Predicting The Responses of Forest Distribution and Aboveground Biomass to Climate Change Under Rcps Scenarios In Southern China](#)

Zhuo WU, Erfu DAI, Quansheng GE (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Weimin XI (Department of Biological and Health Sciences, Texas A&M University, Kingsville, Texas, USA, United States), Xiaofan WANG (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

11. [Recession and Fragmentation of Large Glaciers in Bhilangana River Basin, Uttarakhand Himalaya, India](#)

Suraj Mal (Department of Geography, Shaheed Bhagat Singh College, University of Delhi, India., India), Christopher Scott (School of Geography & Development and Udall Center for Studies in Public Policy, University of Arizona, USA, United States), RB Singh (Department of Geography, Delhi School of Economics, University of Delhi, India., India), Udo Schickhoff (CEN Center for Earth System Research and Sustainability, Institute of Geography, University of Hamburg, KlimaCampus Hamburg, Germany., Germany)

12. [Temporal and Spatial Variations of Temperature Rate Lapse in Mt.Taibai in central Qinling Mountains, China](#)

Danping Zhai (northwest university, China)

13. [The Ecosystem Classification of the Peruvian North Andes and the Influence of the Climate Change in Plant Distribution and Ecosystem Classification](#)

Ana Sabogal (Pontificia Universidad Católica Del Perú, Peru)

14. [Treeline Responsiveness to Climate Warming: Insights from a Central Himalayan Treeline Ecotone](#)

Niels Schwab, Schickhoff Udo, Birgit Bürzle (Physical Geography, Center for Earth System Research and Sustainability (CEN), University of Hamburg, Hamburg, Germany, Germany), Lars Gerlitz (Department of Hydrology, GFZ German Research Centre for Geosciences, Germany), Michael Müller

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## Poster

1. [Estimates of Surface Energy in Qinling Mountains Area by Remote Sensing Methods](#)  
Xiaolin Cui (China, Xi'an University of Science and Technology)
2. [Modeling the Effects of Climate Change and CO<sub>2</sub> Elevation on Productivity of Temperate Forest in North China](#)  
Peng Junjie (China, Henan Academy of Social Sciences)
3. [Permafrost Carbon Loss and Chemical Changes Associated with Thaw Slumps in Northern Tibetan Plateau](#)  
Cuicui Mu (Lanzhou University)
4. [Response of Runoff to Climate Change and Human Activities in The Southern Humid Area River Basin: A Case Study of Ning Jiang](#)  
Yang Chuanxun; zhang zhengdong (South China Normal University)
5. [Spatiotemporal Variation of Vegetation Coverage and Attribution Analysis in Qinling Mountains](#)  
Deng Chenhui (China, Northwest University)
6. [The Distribution Response of 8 Representative Endemic Species in Jiangxi Province to Different Climate Scenarios of the Future](#)  
Zhongjun Hu; Shulan Jin; Huahua Pan (China, Shangrao Normal University)
7. [The Responses of NDVI-based Vegetation During the Green-up Period to Temperature in the Headwater Region of the Yellow River](#)  
Dandan Shi (China, Yunnan University)
8. [Variability in Soil Hydraulic Conductivity and Soil Hydrological Response under Different Land Covers in the Mountainous Area of the Heihe River Watershed, Northwest China](#)  
Jie Tian; Baoqing Zhang; Chansheng He (China, Key Laboratory of West China's Environmental System (Ministry of Education), College of Earth and Environmental Sciences, Lanzhou University, Lanzhou, 730000, China)

## **A Study on the Spatial and Temporal Variations of Land Surface Phenology in Northeast China and Its Responses to Climate Change over the Past Three Decades**

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### **Abstract**

Northeast China is located at high latitudes in the Northern Hemisphere, and it is a typical region with relatively high sensitivity to global climate change. The present study inverted land surface phenological parameters from the Global Inventory Modeling and Mapping Studies (GIMMS) normalized difference vegetation index (NDVI) 3g dataset collected from 1982 to 2013, analyzed the variation pattern of the land surface phenology in Northeast China on multiple scales, and discussed the internal relationship between phenology and climate change from multiple angles. The results show that the start of season (SOS) did not exhibit an obvious variation trend, whereas the end of season (EOS) exhibited a significant delaying trend over the entire study area for the past 32 years (0.128 day/year,  $P < 0.05$ ). The SOS in the forest areas exhibited a significant advancing trend, whereas the SOS in the grassland areas exhibited an insignificant variation trend. The EOS in the study area exhibited a predominantly delaying trend, and the pixels showing this trend accounted for 39.11% of the total pixels. Spring temperature had the largest impact on the SOS, and spring temperature increases resulted in an advancing of the SOS. Precipitation had an insignificant impact on the SOS in the forest areas but a relatively large impact on the SOS in the grassland areas. The EOS were jointly affected by temperature and precipitation. Fall temperature and precipitation increases both promoted the delaying of EOS. The lag effect of temperature on the SOS produced an insignificant delay.

### **Key words:**

Land Surface Phenology; GIMMS 3g; NDVI; Climate Change; Northeast of China

## **Altitudinal Zonation of Vegetation and Its Response to Climate Change in Taihang Mountain, North China**

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### **Abstract**

Understanding of vegetation growth in response to environmental change is helpful to manage forest resources and promote sustainable development especially sensitive ecosystems such as mountainous ecosystems. In this paper, we use long-term NDVI data to analyze the relationship between vegetation growth and different climate factors in the Taihang Mountain during the period of 2000-2014, with the consideration of topographic condition. The results showed that: 1) NDVI has a significant increasing trend in this area over the last few years(Fig. 1); 2) the highest NDVI values mainly occurred from 1800 to 2500m in elevation(Fig. 2); 3) the area of increasing NDVI generally reached maximum from 5 to 10° on slope(Fig. 3); 4) the response of NDVI change to aspect was not notable expect for deciduous broad-leaf forests and mixed broadleaf-conifer forests(Fig. 4); 5) contribution analysis indicated that vegetation growth was mainly influenced by atmospheric CO<sub>2</sub> concentration rather than other environmental factors in lower elevations and on lower slopes, while by hydrothermal conditions in higher elevations and on higher slope. Spatiotemporal variation of different vegetation types displayed different characteristics along the vertical direction, which suggested that vegetation growth is generally controlled by climate change, while in mountainous areas, the moisture and thermal conditions could change rapidly with elevation, consequently leads to variance of vegetation gradient.

### **Key words:**

Altitudinal zonation; vegetation; topography; Taihang Mountain

## Climate Change and the Vegetation Response in Qinling Mountains

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### Abstract

Qinling Mountains is located in warm temperate and subtropical ecological transition zone, which is an important natural ecological barrier suitable for the regional climate change research. Based on field investigation, this study integrated RS and GIS technology as well as the methods of dendrochronology, using GIMMS NDVI data and the SPOT/NDVI data, collecting the natural and social background to explore the distribution features of the ecological factors and the changing trend of air temperature, precipitation, and runoff and vegetation response to climate change. Results showed that, the average temperatures began to rise in recent 25 years, especially for the annual average temperature in north aspect was rising at the speed of 1.79 °C per year. In recent 15 years, the climate change in Qinling has the trend of warmer humidification, which is more obvious than that of the southern aspect. In recent 50 years, Qinling mountains 0°C isotherm in January vertical average ascended 143.7m obviously; On the other hand, NDVI are falling at both aspects of Qinling Mountains and the falling speed is higher in the north than the south in the past 30 years. The sensitivity of the vegetation response to temperature of northern slope in Taibai Mountain is more sensitive than the southern slope, temperature variation are more likely to cause the change of the vegetation at North Slope. In recent 46 years, the beginning period of phenology showed an early trend while the end of phenology lates back on the whole and the change of beginning period of phenological phase is more evident than the ending period. Global warming caused the invasion of Taibai sequoia bush meadow to the top of the mountain, but based on different habitats, different location of niche and rising extension degree all makes the line shape complicated. With comprehensive method of multivariate data, which verified that Qinling has become a climate change sensitive district and existed obvious vegetation response to climate change.

### Key words:

Qinling; Climate change; NDVI; Vegetation response

## **Deteriorating Physical Environment and Transformation of Socio-economic Status: A critical analysis of Western Indian Himalayan Communities, India**

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### **Abstract**

The changing global climate and increasing warming affects the fragility of high mountain systems, their sensitivity to even small disturbances and tendency of such disturbances to irreversible have attracted social, scientific and developmental attention onto the deteriorating physical environment in the mountain areas. With the induction of various developmental efforts now these populations inhabiting the high mountain areas of Himalaya present days have either undergone or undergoing a major transformation of socio-economic status. A survey conducted by an NGO, GERES-India indicates that between 1973 and 2013, there was a rising trend in mean temperatures by 1° C in winter and 0.5° C during summer. These trends raise several concerns for the region, particularly for the livelihood and environmental front. The words development and progress were unknown to the people of Ladakh, the northern most part of India which lies in the heart of Himalayas until the influx of tourism increased in the area from 1974. Despite rapid development and socio-economic change occurring throughout Ladakh in the past four decades, the people or communities from backward regions still remain in a state of relative disadvantage. Present paper attempts to highlight the various issues related to the phenomenon of climate change and its impact on the livelihood and other socio-economic aspects of the people in the remotely located societies in this part of Himalaya. The study has focused on improving, expanding or rethinking existing and future academic and policy approaches to shared sacred landscapes of religion and ecology among Himalayan communities.

### **Key words:**

Climate Change, High Mountain, Physical Environment, Livelihood, Socio-economic Aspect

## **Extreme Events Assessment for Disaster Risk Reduction in High Altitude Region of Mountain Ecosystem: Alaknanda River Basin, Uttarakhand, India**

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### **Abstract**

Anthropogenic activities are continuously disturbing the natural system of the Garhwal Himalaya and its impact on hydrological behaviour of river. Factors causing these changes have been attempted to be understood through the use of GIS and LANDSAT TM. Geospatial technique is used to find out the land use/cover change detection for three time periods. Human interference, unscientific developmental activities, agriculture extension, tourism activity and road construction are anthropogenic factors creating the hydrological imbalances in the Alaknanda River Basin. Soil erosion and landslide have been recognised as major hazards in the high altitude. This Paper has analyses the Climate and Livelihood Vulnerability and its adaptation for the near district headquarter (NDH) & away district headquarter (ADH) determined mainly by a weighted matrix index value in the Alaknanda river basin, Uttarakhand. Qualitative research methods included participatory methods (PRA) involving focus group discussions and key informants at village level through workshops and direct observations among others. Analysis of the survey findings shows further scope for generation of livelihood options, in agricultural inputs and practices, phasing out of high risk land use practices, dissemination of knowledge on climate impacts and adaptation, etc. This paper also discusses identifies Landslide Hazard Zonation and other vulnerable issues and suggests the adaptation method for disaster risk reduction. The present study attempts to formulate sustainable development strategy and disaster risk reduction techniques/method in Alaknanda river basin. Efforts has been done to overcome the impacts of these natural calamities, traditionally of the local people adopted various techniques and approaches.

### **Key words:**

Extreme Climatic Events; Landslides; Livelihood Vulnerability; Disaster Risk Reduction

## **Extreme Events, Vulnerability and Himalayan Geosystem: A Case Study of Alaknanda River Basin, Uttarakhand, India**

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### **Abstract**

Extreme events are sudden calamities, which involve loss of life, property and livelihood. Anthropogenic activities are continuously disturbing the natural system and its impact on hydrological behavior of river. Alaknanda river basin is located in the eastern part of the Garhwal Himalaya and represents one of the most acutely hazard-prone regions in India. The important factor causing the flood and also accelerate several hydrological hazards during monsoon periods are heavy rainfall, cloud burst, GLOF, landslides, Slope failure, earthquakes, deforestation, poor drainage. These hydrological hazards are mainly responsible for several socio-economic consequences (cultivated land degradation, infrastructure loss, human casualties, loss of transmission lines, and so on) in the Alaknanda river basin, Uttarakhand. Factors causing these changes have been attempted to be understood through the use of GIS and LANDSAT TM. The Geospatial technique is use to find out the land use/cover change detection and secondary data is taken for to carry the analysis work. Primary data from each hotspot has been collected through a questionnaire survey and a Participatory Research Approach (PRA) procedure that is based on the LIFE approach. The LIFE Approach is based on Livelihood options, Institutional participation in adaptation policy design and implementation, Food security and Empowerment parameters like health and education. This parameter are important in building resilience capacity and ensuring sustainable development pathways and provides the various mitigation processes. This paper focuses on the techniques to characterize and monitor hazards in high mountain areas and sustainable development in the Alaknanda river basin Uttarakhand, India.

### **Key words:**

Extreme events; Sustainable Development; Livelihood Security; Vulnerability and Adaptation

## Geospatial Strategy for Environment Impact Assessment of Urban Heat Island in Mountain Areas Using Landsat ETM+ Sensors

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### Abstract

We are living in the age of rapidly growing population and changing environmental conditions with advance technical capacity. This has been resulting in wide spread land cover change. Urban Heat Islands exist in many large cities especially metropolitan cities and can significantly affect the quality of life in affected areas. The Urban Heat Island (UHI) for the temporal period is estimated using geospatial techniques which are then utilized for the impact assessment on climate of the surrounding regions. Rapid growth of industries in peri-urban areas results in excessive warming and variations in weather conditions. Remotely sensed data of thermal infrared band in the region of 10.4-12.5  $\mu\text{m}$  of EMR spectrum, available from LANDSAT-7 Thematic Mapper and Enhanced Thematic Mapper (TM and ETM+) with 60 m resolution is proved to be very helpful to identify urban heat islands using surface topography. The present paper describes the methodology and resolution dynamic urban heat island change on climate using geospatial approach for Haridwar district of Uttrakhand. NDVI were generated using day time LANDSAT ETM+ image of 1990, 2000 and 2005. Temperature of various land use and land cover categories was estimated. In Haridwar district the temperature is inversely related and negatively correlated with NDVI value. The present study has showed that heat island effect need not be limited to a particular temperature epoch which signals towards the increasing dominance of anthropogenic heat emissions in rapidly developing cities such as Haridwar District in Uttrakhand, India.

### Key words:

Environment Impact Assessment; Urban Heat Island; Geospatial; Climate

## Heterogeneity in the Spatio-Temporal Patterns of Phytoplankton Distribution and Biodiversity in a Large Subtropical Lake of SW China

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### Abstract

Fuxian Lake, an oligotrophic and subtropical lake from southwest China, is a biodiversity hotspot due to its high diversity of endemic species. As the second deepest lake in China with long geological history, it is home to ~9% of the strategic freshwater resources of the country. However, the lake-water nutrient level is increasing in recent years and has led to the deterioration of water quality in Fuxian Lake. It is urgently needed to evaluate the spatio-temporal pattern in the changes of lake water quality and ecosystem health. As the key primary producer in lake food webs, Phytoplankton can be used reliably to monitor ecosystem health through assessing species distribution and biodiversity. We aim to uncover the spatio-temporal pattern of phytoplankton distribution and biodiversity through monthly surveys of 16 sampling sites in 2015. Our result showed Chlorophyta was generally predominant, followed by Bacillariophyta, Cyanophyta, Cryptophyta, Pyrrophyta and Chrysophyta. The phytoplankton community showed strong temporal and spatial heterogeneity in this large lake, and the degree of temporal turnover was generally greater than the difference between the south and north parts of the lake basin. Redundancy and variation partitioning analyses further indicated that water temperature and nutrient status were among the main environmental factors in driving phytoplankton community structure and biodiversity. Therefore, in the context of continued regional warming, large and oligotrophic lakes such as Fuxian Lake are vulnerable to anthropogenic disturbances through community reorganization and biodiversity changes over space and time, leading to the strong heterogeneity of ecosystem structure and functioning that needs to be considered in lake management and climate mitigation.

### Key words:

Fuxian Lake; phytoplankton; species distribution; biodiversity; heterogeneity

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## **Linking Microbial Community Structure to Phosphorus Fractions along the Altitudinal Gradient at Gongga Mountain, SW China**

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### **Abstract**

Many environmental factors vary significantly with elevation on a relatively small scale in subalpine and alpine environments. It has been proved that carbon and nitrogen markedly affect microbial community composition and function, but the relationship between microbes and phosphorus is poorly understood in alpine environments. In this study, we analysed phospholipid fatty acid (PLFA) profiles and phosphorus fractions in soils from 9 sites along an elevation gradient (2000 m – 4300 m) at Gongga Mountain in southwest China. Although the total PLFA concentration displayed no regular trend with elevation, many biomarker PLFAs indicated that there were the microbial distribution patterns for some soil microorganisms, which were most often parabolic distribution along the elevation gradient. HCl-P and residua-P were the main phosphorus fractions and were likely derived from primary soil minerals, while the proportion of NaOH-P indicating high weathering soil was small. A redundancy analysis (RDA) and correlations revealed that  $\text{NaHCO}_3\text{-Po}$  and HCl-Pi are as important as soil moisture, pH and total nitrogen for influencing the distribution of microbial PLFAs across the elevation gradient. Also, our results suggested that the effect of pH on the microbial community can be partially explained by soil nutrient status (e.g., phosphorus fractions). In addition, our results showed that phosphorus is released from primary soil minerals by microorganism, which plays an important role in maintaining the phosphorus supply in the mountain ecosystem.

### **Key words:**

Phosphorus fraction; Microbial PLFAs; Elevational pattern; Mountain Environment

## Predicting the Responses of Forest Distribution and Aboveground Biomass to Climate Change under Rcps Scenarios in Southern China

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### Abstract

In the past three decades, our global climate has been experiencing unprecedented warming. This warming has and will continue to significantly influence the structure and function of forest ecosystems. While studies have been conducted to explore the possible responses of forest landscapes to future climate change, the Representative Concentration Pathways (RCPs) scenarios under the framework of the Coupled Model Intercomparison Project Phase 5 (CMIP5) have not been widely used in quantitative modeling research of forest landscapes. We used LANDIS-II, a forest dynamic landscape model, coupled with a forest ecosystem progress model (PnET-II), to simulate spatial interactions and ecological succession processes under RCPs scenarios, RCP2.6, RCP4.5 and RCP8.5 respectively. We also modelled a control scenario of extrapolating current climate conditions to examine changes in distribution and aboveground biomass (AGB) among five different forest types for the period of 2010-2100 in Taihe County in southern China, where subtropical coniferous plantations dominate. Our results show that climate change will significantly influence forest distribution and AGB. Evergreen broad-leaved forests will expand into Chinese fir and Chinese weeping cypress forests. The results also demonstrate that forest total AGB increases rapidly first and then decrease slowly on the temporal dimension. The results suggest that, even though the fluctuation patterns of total AGB will remain consistent under various future climatic scenarios, there will be certain responsive differences among various forest types. By the year 2100, the total AGB in Taihe County under RCP4.5 will reach its highest level.

### Key words:

CMIP5; RCPs; subtropical plantation; forest distribution and aboveground biomass; LANDIS-II; PnET-II; Taihe County; southern China

## Recession and Fragmentation of Large Glaciers in Bhilangana River Basin, Uttarakhand Himalaya, India

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### Abstract

Glaciers respond to climate by shrinking or growing, therefore they are best sources of climate studies in remote Himalayan regions. The Himalayan glaciers serve as an important source of water supply downstream e.g. to hydropower projects (HPP) and irrigated agriculture. Their shrinkage poses a significant threat to HPP in future and further to irrigation and regional economy. In the Uttarakhand Himalaya, about 450 HPP are under construction or planned for construction and a large number have already been completed. Therefore, it is imperative to assess glacier change of recent decades so that its future impacts on regional water supply to HPP can be adequately understood and estimated. The study therefore analysed Corona images (1968), Landsat 5 TM (1992), Landsat 7 ETM+ (2000) and Landsat 8 OLI (2013) to estimate glacier shrinkage, fragmentation, and recession over the 1968-2013 period. The results reveal that Khatling and Phating glaciers retreated by about 45.9 m yr<sup>-1</sup> and 37 m yr<sup>-1</sup> respectively during 1968-2013. In 1968, both the glaciers were joined in a single glacier ice body, which was found to be fragmented in 1992. During 1968-1992, 1992-2000 and 2000-2013, the Khatling glacier retreated by about 23, 20.8 and 66.6 m yr<sup>-1</sup> and Phating by 15.7, 80.9 and 33.9 m yr<sup>-1</sup>, respectively. Many of the tributary glaciers have fragmented from the main glacier by a few hundred meters. The glacier de-buttressing at higher elevation has also led to the formation of many glacial lakes, which are another potential threat to HPP due to the risk of outburst floods.

### Key words:

Glacier recession; disintegration; fragmentation; morphological changes; Himalaya; India

## Temporal and Spatial Variations of Temperature Rate Lapse in Mt.Taibai in central Qinling Mountains, China

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### Abstract

In this paper, based on 25m resolution DEM and the records of daily average temperature in the period of 2012-2014 from 11 standard meteorological stations which are located at different altitude areas and on the northern and southern slopes of Mt.Taibai, we analyzed the variation of temperature lapse rate on different time scales and spatial distribution characteristics. Results showed that annual temperature lapse rate on the northern slope is greater than that of southern slope in 2013a, 2014a and 2015a. The average of temperature lapse rates in 2013-2015a are  $0.513^{\circ}\text{C}/100\text{m}$  on the northern slope and  $0.499^{\circ}\text{C}/100\text{m}$  on the southern slope, and it exists some differences in different altitude regions along the northern aspect. In the seasonal scale, the maximum of temperature lapse rate on the northern slope was summer, while it appeared in spring on the southern slope. In contrary to winter, the temperature lapse rate on the northern slope is greater than that on the southern slopes in spring and summer. The temperature lapse rate in the monthly scale also showed significantly temporal difference, even double among monthly values. The trends of temperature lapse rates are inconsistent on the northern slope and northern slope, especially in July which has obvious difference. The temperature lapse rate obtained in this paper can reflect the generalizations of temperature change with elevation about 57 years at Mt.Taibai and its average state of under climate warming.

### Key words:

Qinling Mountains; Mt.Taibai; temperature rate lapse; mountainous climate

## The Ecosystem Classification of the Peruvian North Andes and the Influence of the Climate Change in Plant Distribution and Ecosystem Classification

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### Abstract

The Andes are characterized by a huge ecological diversity. There is no uniformity between the worldwide ecosystem classification and the local mountain ecosystem classification. In addition to this, the local classification changed with the climate change. The eco-diversity has been transformed through the climate change, now it is necessary to work in a new ecological classification, which includes the worldwide ecosystem classification, and the modifications due to the climate change. A biogeographical revision will be made for the nor-Peruvian ecosystem, where the Andean Huncabamba depression has an influence and has divided the ecosystems. The selected evaluation zone is influenced by the Amazonas and the Pacific basin, and is characterized by a huge biodiversity and endemism.

The research revises the biogeographical characteristics from the studied ecosystems and proposes a new ecological classification. For the new proposed classification the geographical theories and hypotheses in each ecosystem, and then the present plant distribution will be revised. The changes of plant distribution will be discussed, in the light of the consequences of climate changes and a new classification will be proposed.

### Key words:

Ecological classification; Climate change; Huancabamba; Plant Biodiversity; spatiotemporal analysis and mapping; self-organization map; isosurface

## Treeline Responsiveness to Climate Warming: Insights from a Central Himalayan Treeline Ecotone

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### Abstract

Climate warming is expected to induce treelines to advance to higher elevations. Empirical studies in diverse mountain ranges, however, give evidence of both advancing alpine treelines as well as rather insignificant responses, pointing to an evident research deficit. We aim at investigating the sensitivity and response of the near-natural treeline ecotone in Rolwaling Himal, Nepal, to climate warming. Treeline response is analyzed focusing on the modulation of climate change effects by spatially differentiated patterns and processes. We implement an integrated landscape approach focusing on topography, climate, soils and vegetation on randomly selected forest stands along elevational transects (3700-4200 m) across the ecotone. Objectives of this paper are to identify environmental variables which influence the complex species specific tree density of the treeline ecotone and assess the parameter's relevance in particular with regard to climate change effects on stand structures. Our methods comprise extensive field sampling, modelling of vegetation, soil and climate data and a dendroecological approach. Results indicate that treeline trees in the ecotone show species-specific responses to the influence of environmental parameters, and that juvenile and adult tree responses are modulated by different variables.

### Key words:

*Abies spectabilis*; *Betula utilis*; Climate change; Multivariate analyses; Regeneration; *Rhododendron campanulatum*; Rolwaling Himal; *Sorbus microphylla*; Species composition; Treeline dynamics

## Estimates of Surface Energy in Qinling Mountains Area by Remote Sensing Methods

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### Abstract

The variation characteristics of surface energy in the region reflects the energy and the evolution trend of the land air process, and affect the regional climate change further. With the developing and maturity of remote sensing technology, it is more convenient to study the surface energy of large scale range. The study of surface energy budget in Qinling Mountains area is an important guarantee for the study of the change of the surface cover in Qinling Mountains area. Therefore, it is of great significance and value of research to monitor the surface energy of Qinling Mountains area by remote sensing methods. In this paper, MODIS, DEM and meteorological data were used to estimate the surface energy budget. Firstly, it estimates of surface energy budget in Qinling area, and carries on the analysis to the surface characteristic parameters affecting the degree of surface energy size,; In terms of the influence of net radiation flux albedo rate greater than surface temperature greater than surface emissivity; In terms of the influence of soil heat flux, surface temperature greater than surface albedo rate greater than surface emissivity; In terms of the influence of soil heat flux, surface albedo rate greater than surface temperature greater than surface emissivity.

### Key words:

Surface energy; Qinling Mountains area

## Modeling the Effects of Climate Change and CO<sub>2</sub> Elevation on Productivity of Temperate Forest in North China

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### Abstract

A warmer climate induced by greenhouse gas emissions could significantly alter the rate of forest productivity. Responses of forest ecosystems in China to climate change and CO<sub>2</sub> elevation are still unclear. Based on BIOME-BGC model and tree-ring data, a modeling study was conducted to estimate the inter-annual variations of temperate forest ecosystem net primary productivity (NPP) in North China in 1952-2008, and explore the responses of radial growth and NPP to regional climate warming. The simulation results indicated that the annual NPP of the *Larix principis-rupprechtii* ecosystem in 1952-2008 varied between 268.18 g C m<sup>-2</sup> year<sup>-1</sup> and 667.01 g C m<sup>-2</sup> year<sup>-1</sup> with a mean value of 428.09 g C m<sup>-2</sup> year<sup>-1</sup>. The annual NPP of the *Pinus tabulaeformis* ecosystem varied between 244.12 g C m<sup>-2</sup> year<sup>-1</sup> and 645.31 g C m<sup>-2</sup> year<sup>-1</sup> with a mean value of 418.60 g C m<sup>-2</sup> year<sup>-1</sup>. The mean temperature in May-June and precipitation from prior August to current July are the main factors limiting the radial growth and ecosystem NPP in North China. In recent decades, both the radial growth and NPP presented a decreasing trend due to regional warming and drying climate condition. In the future climate scenarios, NPP had positive responses to precipitation increase, temperature increase and combination of precipitation and temperature increases. The accumulation of NPP was enhanced by elevated CO<sub>2</sub> and the *Larix principis-rupprechtii* and *Pinus tabulaeformis* ecosystem NPP were increased by 9.1% and 16.1% due to CO<sub>2</sub> fertilization effect. In addition, the tree-ring data is an ideal proxy predicting the ecosystem dynamics at both ecosystem and regional scale, and can be used to calibrate process-based ecosystem models such as BIOME-BGC.

### Key words:

Temperate forest ecosystem; net primary productivity; climate change; elevated CO<sub>2</sub>; tree-ring; BIOME-BGC

## **Permafrost Carbon Loss and Chemical Changes Associated with Thaw Slumps in Northern Tibetan Plateau**

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### **Abstract**

Permafrost thaw causes ground subsidence or thermokarst. Thermokarst terrain on hilly slopes can lead to the formation of thaw slumps, which dramatically alter soil properties and carbon emissions, but little is known regarding the effects of thaw slumps on the biogeochemical processes of soil carbon. In the present study, we measured soil carbon contents and physiochemical properties in different thaw slump stages (no slump, slumping and slumped) in the upper reach of Heihe River Basin in northeastern Tibetan Plateau. With these samples, the carbon mineralization rates were measured using laboratory incubations. Meanwhile, the chemistry changes of organic matter were examined using Fourier transform infrared (FTIR) spectroscopy analyzer before and after the incubation. The results showed that there was a significant decrease in soil carbon and nitrogen stocks in the slumping and slumped stages. The loss of organic carbon and total nitrogen was  $29.6 \pm 5.9\%$  and  $31.1 \pm 8.8\%$  in the upper 0-10 cm layer of the slumping soil compared to the no slump soil. The slumped soil had a significantly lower loss of carbon and nitrogen content than the slumping soil (*t*-test,  $p < 0.05$ ). The incubation results implied that slumped soil has significantly higher cumulative CO<sub>2</sub> production than that of slumping soil (*t*-test,  $p < 0.05$ ). In addition, the slumped soils had a higher intensity of hydrocarbons and lignin/phenol backbone composition than that of no slump and slumping soil for the 0-10 cm layer. This study demonstrates that abundant carbon and nitrogen loss occurs during the process of thaw slumps. Slumped soils can accumulate some organic matter, accompanied by substantial changes in its carbon chemical structure and characteristics. These results demonstrate that thaw slump plays an important role in the impact of permafrost thaw on chemical characteristics of organic matter and merits greater attention.

### **Key words:**

Permafrost, thaw slump, thermokarst, carbon chemistry, incubation

## Response of Runoff to Climate Change and Human Activities in the Southern Humid Area River Basin: A Case Study of Ning Jiang

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### Abstract

Based on six meteorological stations of Ning Jiang river and hydrological data gathered from Hekou station from 1953—2013, landscape pattern metrics with land use and land cover data derived from the Landsat TM imagery acquired in 1986, 1995, 2005 and 2013. We apply the methods of Mann-Kendall trend analysis, Wavelet analysis and SCRAQ method aiming to analyze the contribution ratio of precipitation and human activities on the runoff in the Ning Jiang river. Results show that: (1) the temperature and runoff had significantly increasing and decreasing trend, the precipitation appeared weakly increasing trend. (2) The temperature and precipitation have 27a multiple time-scale, the runoff has significantly regular 27a multiple time scale from 1953—1990, while was destroyed since 1990s. The significant correlation coefficients between precipitation and runoff at the scale of 11a. (3) With the development of economy and soil and water conservation from 1980s, woodland area increased 26.2%, grassland area land reduced 41.6% and cultivated area reduced 61.2%. The large area of land use change occurred in the northern Xing Ning. (4) No considering the effect of temperature, taken 1953—1963 as the base period, the contribution rate of the precipitation and human activities to the decreased runoff was 79.3% and 21.7% in 1964-1983; 36.5% and 63.5% in 1984-2013.

### Key words:

Ning Jiang; Runoff; Climate Change; Human Activities

## Spatiotemporal Variation of Vegetation Coverage and Attribution Analysis in Qinling Mountains

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### Abstract

Vegetation change is generally caused by the combined effects of various climate variables, which is further complicated by the impacts of human activities. Based on MODIS-NDVI products, DEM and meteorological observation data, the current study investigated the patterns of spatiotemporal variation of vegetation coverage in the Qinling Mountains during 2000-2015a. The method of Sen+Mann-Kendall model, partial correlation analysis, Hurst index, partial least squares, residual analysis were used to analyze the data and the reasons. The results of the study showed that (1) the vegetation coverage of the study area revealed a significant increase nearly 16 years. (2) The structure characteristics of the Vegetation coverage have significant difference, the area covered with  $FC < 10\%$  in the slowly rising,  $10\% < FC < 70\%$  in decreased significantly,  $FC > 70\%$  in increased significantly. (3) In terms of spatiotemporal variation, vegetation cover showed a "high in the middle and low in surroundings, high in South slope and low in North Slope" pattern, North Slope does not change significantly year by year, and the southern slope increased significantly. Significant difference was found in different altitude about vegetation coverage change, showed increase significantly under 1500m, fluctuational falling in 1500-2600m, and slow decline more than 2600m. (4) The reverse characteristics of vegetation coverage change were stronger than the same characteristic. (5) The climate change is the important factors that affects vegetation coverage. (6) In addition, human activities were also important causes resulting in vegetation cover change, that are dominant on vegetation degradation area and vegetation improvement area.

### Key words:

Vegetation coverage; spatiotemporal variation; Climate stress; man-made interference; attribution analysis; Qinling Mountains

## The Distribution Response of 8 Representative Endemic Species in Jiangxi Province to Different Climate Scenarios of the Future

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### Abstract

Jiangxi province is rich in biological resource in China, a large number of endemic plants are distributed in this province because of its good hydrothermal condition, the methods of MaxEnt and the least cost path law (LCP) are used in this research to model the niche drift and area changes of 8 endemic species of Jiangxi province in current and 6 future hypothetical climate change scenarios, the result shows that when the temperature and rainfall increases, distribution range and niche core of most endemic species drift toward regions of high height and high latitude, and the effect of rainfall changes is more apparent than temperature on the niche drift of most endemic species, As for the endemic species with large ecological amplitude, such as *Rhododendron kiangsiense* Fang, *Acer kiangsiense* Fang et Fang f, *Acer leptophyllum* Fang and *Berberis jiangxiensis*, their migratory extent of niche core is less than endemic species with smaller ecological amplitude, such as *Pteris obtusiloba*, *Lysimachia jiangxiensis*, *Gyrtomium confertifolium* and *Pseudotaxus chienii*; and changes in core area of the endemic species also shows the same tendency. The response of endemic species with narrow habitat range to the climate change is more significant than endemic species with wide range of habitat, because species with wide range of habitat has certain regulating function and less sensitive to the climate change. The research on the distribution changes and ecological drift of endemic species of Jiangxi province in different climate change scenarios of the future can help us adopt correct countermeasures to protect and manage the resource of endemic species in Jiangxi province better in condition of climate deterioration.

### Key words:

Endemic species; distribution pattern; potential distribution; niche drift; climatic changes.

## The Responses of NDVI-based Vegetation during the Green-up Period to Temperature in the Headwater Region of the Yellow River

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### Abstract

In this study, by using two definition methods of phenological-growing season and climatic-growing season, we analyzed the correlation between the NDVI during the green-up period and mean temperature the same time as well as that of about 3 months before the growing season at the temporal span of 16 days. NDVI was averaged over multiple-spatial-scale (1km×1km, 5km×5km, 10km×10km) areas centered on each meteorological station. The results were shown as follows: (1) the best correlated spatial scale of each meteorological station is various (36% is 5km×5km, 64% is 10km×10km) and discrepancy exists in most cases (55%) even in the same meteorological station between the two kind of growing seasons. (2) The responses of NDVI to temperature during the green-up period of phenological-growing season presented good consistence, the 82% correlation coefficients are significant or highly significant. That of climate-growing season is rather complex, and 9% correlation coefficients are actually significant, but it remained identical for the areas with similar warmth and coldness. (3) In the phenological-growing season, and 82% of stations presented significant correlation at green-up period and about 3 months before the growing season, whereas it demonstrated consistency with that of climate-growing season in the same temperature areas. This study highlighted the impacts of temperature on vegetation in the green-up period, but further research is needed to understand the vegetation-temperature interaction profoundly because of the different results of phenological-growing season and climate-growing season.

### Key words:

The headwater region of the Yellow River; green-up; NDVI; temperature

## Variability in soil hydraulic conductivity and soil hydrological response under different land covers in the mountainous area of the Heihe River Watershed, Northwest China

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### Abstract

Understanding of the variability in soil hydraulic conductivity in the mountain headwaters of river basin is critical to the hydrological modelling of mountainous runoff and the water resources management in the middle and lower reaches of the river basin, especially in the arid and semiarid areas. In this study, a total of 32 soil profiles with 5 layers within 0-70 cm (0-10, 10-20, 20-30, 30-50, 50-70 cm) were sampled under different land cover types: forest, meadow, high coverage grassland (HCG), medium coverage grassland (MCG) and barren land in the upper stream of the Heihe river watershed, Northwest China, saturated hydraulic conductivity ( $K_s$ ) was measured for each sample. The vertical variation of  $K_s$  and soil hydrological response under different land covers were analyzed. Results showed that  $K_s$  value in layer 5 (50-70 cm) was significant lower than the values of above 4 layers (0-50 cm);  $K_s$  decreased in the order of forest, meadow, MCG, HCG, and barren land, corresponding to the degree of vegetation degradation; The  $K_s$  decreased with depth under forest, HCG and barren land, but increased first and then decreased under meadow and MCG; The dominant stormflow paths (DSP) for different land covers were different: forest was dominated by deep percolation (DP), HCG was dominated by subsurface flow (SSF), meadow was prevailed by Hortonian overland flow (HOF) and had no SSF, while MCG and barren land were also dominated by HOF, but still formed SSF. The large-scale field sampling of the hydraulic conductivity under different land covers in the Qilian Mountain can improve the accuracy of hydrologic simulation and provide decision support information for the water resources management and ecological environment in the Hexi Corridor and Alashan Plateau.

### Key words:

Saturated hydraulic conductivity; soil hydrological response; The Heihe River Watershed

## C12.03 Biogeography and Biodiversity

### Conservation of Biodiversity



Home

### Oral

1. [A Multi-Scale Perspective on Diatom Biogeography and Biodiversity Dynamics in SW China](#)  
Guangjie Chen; Xiaolin Chen; Li Chen; Rui Li; Yinen Jiang; Tao Zhang; Yuanyuan Liu; Jianshuang Tao; Kui Hu; Wengang Kang; Jiaoyuan Wang (Yunnan Normal University, China)
2. [Biogeographical Basis for Ecosystem Monitoring and Biodiversity Conservation in Palearctic](#)  
Tatiana Dikareva, Elena Koroleva, Alexey Romanov (Lomonosov Moscow State University, Russian Fed)
3. [Community Structure and Its Relationship with Environmental Factors in Zooplankton in The North Luo River System in Northwest China](#)  
Haifeng Ba; Jinxi Song; Xuwang Yin (College of Fisheries and Life Science, Dalian Ocean University, China); Zongxue Xu (Academy of Water Sciences, Beijing Normal University, China)
4. [Conservation of Sunderban's Biodiversity: A Case study of World's largest Mangrove Ecosystem in West Bengal](#)  
Syed Imran Hussain; Pankaj Kumar (Department of Geography, Delhi School of Economics, Delhi University, India)
5. [Conserving Habitat Corridors in China: Risk Assessment Under Rapid Land Use Changes](#)  
Huirong Yu (China Agricultural University; Vrije Universiteit Amsterdam, China), Liming Liu (China Agricultural University), Peter Verburg (Vrije Universiteit Amsterdam)
6. [Decades of Changes in Biodiversity Under the Pressure of Environmental Degradation in Plateau Lakes in Yunnan, China](#)  
Sihai Wang; Juan WANG; Yuming YANG (Yunnan Academy of Forstry, China)
7. [Geo-Spatial Techniques for Identification of Sustainable Tiger-Corridor and Biodiversity Revjumention in Rajasthan, India](#)  
Bhanwar Vishvendra Raj Singh, Anjan Sen (Department of Geography, Delhi School of Economics, University of Delhi, Delhi, India)
8. [Impact of Clean Development Mechanism \(CDM\) Projects On Environment: A Case Study of Chamba District of Himachal Pradesh](#)  
Prashant Kumar, Monica Ahalawat (University of Delhi, India)
9. [Impact of Climate Change and Human Encroachment On Wetlands: A Case Study of Unnao District](#)

[of Uttar Pradesh, India](#)

kashif imdad (PPN PG College, CSJM University, Kanpur, India)

10. [Landscape Changes of Abha Urban Area, KSA, Using Remote Sensing Techniques](#)  
adel mohammad (king khalid univ., Saudi Arabia)
11. [Mangrove Ecosystem of Sundarban in West Bengal, India - Plant Biodiversity and Its Conservation](#)  
Sankar Narayan Sinha (University of Kalyani, India), Karabi Biswas (University of Kalyani, India),  
Dipak Paul (University of Kalyani, India)
12. [Mapping of Invasive Species \(Arenga obtusifolia\) in Javan Rhinos Habitat, Ujung Kulon West Java, Based On Landsat-8 Image Analysis and Geographical Information Systems](#)  
Projo Danoedoro (PUSPICS Faculty of Geography, Universitas Gadjah Mada, Indonesia), Dimar  
Anggara (PUSPICS Faculty of Geography, Universitas Gadjah Mada, Indonesia), Muhammad Hafizt  
(PUSPICS Faculty of Geography, Universitas Gadjah Mada, Indonesia), Ichsan Wicaksono (PUSPICS  
Faculty of Geography, Universitas Gadjah Mada, Indonesia), Hernandea Forestriko (PUSPICS Faculty  
of Geography, Universitas Gadjah Mada, Indonesia), Rahadian H J Kuncara (PUSPICS Faculty of  
Geography, Universitas Gadjah Mada, Indonesia), Mahmud Rois (WWF Indonesia, Indonesia)
13. [Moroccan Forest Ecosystem Services and Local Populations](#)  
Mohammed Sghir TALEB (Institut Scientifique, Université Mohammed V, Rabat, Morocco)
14. [Mount Abu Wildlife Sanctuary Rajasthan India: A Socio-Ecological Dilemma](#)  
Kumar Kartikeya (M.L. V Govt.College Bhilwara Rajasthan India, India)
15. [Rethinking Community Conservation in South Africa: What Shapes Local-Level Decision-Making in The Hluhluwe-Imfolozi Park, Kwazulu-Natal, South Africa?](#)  
Sakhile Nsukwini (University of Mpumalanga, South Africa), Urmilla Bob (University of KwaZulu  
Natal, South Africa)
16. [Studies of Biofabricated Nanoparticles in Bioremediation of Arsenic from Assenic Contaminated Aquenvironment](#)  
Tapan Kumar Das, Triparna Mukherjee (University of Kalyani, India)
17. [The Functional Analysis of Landscape Connectivity at The Landscape, Component and Patch Level: A Case Study of Minqing County, Fuzhou City, China](#)  
Ke Qi (Fudan University, China), Yujing Xie (Fudan University, China)
18. [The Impact of Climate Change On the Migration of Birds and Biodiversity in The Bharatpur Bird Sanctuary, Rajasthan, India](#)

Vipin Chandra Lal (Department of Geography, Delhi School of Economics, University of Delhi, India, India)

19. [Wildlife Damage in Wolong Natural Reserve: A Systematic Analysis and Typical Characteristic Identification](#)

Jianning XU (College of Resource, Environment and Tourism, Capital Normal University)

20. [Women Participation in Sustainable Livelihood and Development through Community Forest Management: A Case Study of Jim Corbett National Park](#)

Bindhy Wasini Pandey, Jagriti Kalwar (Department of Geography, Delhi School of Economics, University of Delhi, India)

## Poster

1. [Analysis of The Environmental Consequences of the Geography of Hamoun Lake\(Iran\)](#)

Ali Ghasemi (Islamic Azad University)

2. [Anthropogenic Activity and Its impact on Hydrological Hazards, Mountain Biodiversity and Sustainable Development: A Case Study of Alaknanda River Basin, Uttarakhand, India](#)

Abhay Shankar Prasad; Bindhy Wasini Pandey (India, Department of Geography, Delhi School of Economics, University of Delhi, India)

3. [Assessment of Effectiveness of Nature Reserves on the Tibetan Plateau Based on Net Primary Production and the Large Sample Comparison Method \(LSCM\)](#)

Yili Zhang; Wei Qi; Xue Wu (China, IGSNRR, CAS)

4. [Biodiversity of Todgarh Raoli Wildlife Sanctuary Rajasthan India](#)

Vijay Kumar Loyal (India, M.L. V Govt.College Bhilwara Rajasthan India)

5. [Classification and ecological restoration measures for the littoral zone of Lake Taihu](#)

Geng Rongmei; Xu Qiujin; Hu Xiaozhen (China, Chinese Research Academy of Environmental Sciences)

6. [Distribution and Diversity of Nitrite-Dependent Methane-Oxidizing Bacteria in Sediments of the Miyun Reservoir, Beijing, China](#)

Yang Liu; Yongjuan Chen; Xiaoyan Wang (China, Capital Normal University)

7. [Does Agroforestry Protect Tree Species Diversity and Reduce Soil Erosion Risk? A Comparative Study from The Mid-Hills of Nepal](#)

Niels Schwab; Schickhoff Udo (Germany, Physical Geography, Center for Earth System Research and Sustainability (CEN), University of Hamburg, Hamburg, Germany)

8. [Effect of Salt On Photosynthetic Characteristics of Bamboo Willow Introduced to North Xinjiang](#)  
Xiaojing Dou; Wei Han; Shengli Wu (China, The School of Geographic Sciences and Tourism, Xinjiang Normal University)
9. [Estimating Relative Abundance of Tree Species for Heavy Metal Assessment in A Semi-Arid Context](#)  
Ndiye M. Kebonye; Felicia O. Akinyemi (Botswana, Botswana International University of Science and Technology (BIUST))
10. [Fluvial Morphology Diversity in Relation to Fish Species Diversity in the Yellow River Source Zone](#)  
Huan Hong; Jinming Hu (China, Institute of International Rivers and Eco-security, Yunnan University)
11. [Impact of Tourist Activities on the Wintering habitat of Black-necked Cranes](#)  
Jinliang Wang (China, Yunnan Normal University); Xingyao Zhong; Meibiao Dao (Zhaotong Black-necked Crane National Nature Reserve Bureau)
12. [Impacts of Yong River Sluice Gate Construction on the Hydrological Regime and Freshwater Fish Habitats of the Upstream Basin](#)  
Zhang wenhai (China, China Institute of Water Resources and Hydropower Research)
13. [Integrating The Landscape Connectivity into The Mapping of Soil Conservation Service Hotspots and Coldspots](#)  
Yingjie Lee; Liwei Zhang; Junping Yan (China, Department of Geography, Tourism and Environment College of Shaanxi Normal University)
14. [Monsoon-Driven Hydrographic Features Affect Euphausiid Distribution in The Taiwanese Waters, Western North Pacific Ocean](#)  
Wen-Tseng Lo; Ren-Jye Hsieh; Hung-Yen Hsieh (China Taiwan , Dong Hwa University)
15. [Morphological Plasticity of Carex to Hummocks Micro-topography in an Alpine Swamp Meadow](#)  
Lili Li (China, Lanzhou University); Tingjun Zhang (United States, Lanzhou University)
16. [Phytogeographical Distribution of Sida Alba in Shekhawati Region, Rajasthan](#)  
Dharmender Chauhan (India, Department of Geography, University of Rajasthan, Jaipur, Rajasthan, India)
17. [Preliminary Study on Vegetation Index of Biotic Integrity \(V-IBI\) Assessment for Poyang Lake](#)  
Xu Liting (China, Ministry of Education Key Laboratory of Poyang Lake Wetland and Watershed Research, Jiangxi Normal University)
18. [Quantitative Classification and Ordination of natural colonized plant communities of the Bayinhua mining area in Inner Mongolia](#)

Chunfeng Ning (China, Geography department of Inner Mongolia Normal University)

19. [Status of Biodiversity and Change in Biomass in and around Bassi Wildlife Sanctuary \(Chittorgarh\) Rajasthan \(India\)](#)

Jaideep Singh (India, H.O.D., Department of Geography, S.R.L.S. Government PG College, Kaladera (Jaipur), Rajasthan, India)

20. [The Changing wetland birds and waterbird migration flyway issue on the Southwest plateau China](#)

Haotian Bai (China, Institute of Ecology and Geobotany, Yunnan University)

21. [The Characteristic of Soil Macrofauna Community in The No-Till Stover Mulch Under Different Frequency in The Black Soil Region of Northeast China](#)

Jiang Yunfeng (China, Jilin Normal University)

22. [The Contribution of Neogene Plateau Uplift and Quaternary Climate Fluctuations to Endemic Species Diversity in The Tibetan Plateau](#)

Haibin Yu; Xinghua Sui (Sun Yat-sen University)

23. [The Formation Mechanism of Ecosystem Services: A Preliminary Review](#)

Luyi Liu (China, Henan University)

24. [The Species Diversity Study Among Different Forest Types of Water Conservation Forest in Banchengzi Basin](#)

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## A Multi-Scale Perspective on Diatom Biogeography and Biodiversity Dynamics in SW China

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### Abstract

Accelerating anthropogenic disturbances have altered species distribution over local to global scales, posing severe challenges for the maintenance of biodiversity and ecosystem functioning. Biogeographical studies in China have long focused on terrestrial ecosystems, with freshwater data predominantly derived from short-term surveys. Here, we combined lake sediment records with modern surveys from SW China to examine the productivity-diversity relationship (PDR) over multiple temporal (i.e. from seasonal to centennial ones) and spatial scales. Firstly, we conducted monthly limnological surveys of a large lake in providing a short-term and local perspective on the PDR. For a long-term perspective (i.e. > 100 yrs), we reconstructed the changes of lake productivity and community structure based on sedimentary pigment concentrations (i.e. Chl-a) and diatom assemblages for lakes with contrasting trophic status, as well as through a top-bottom comparison of diatom communities for > 20 lakes. Principal Component Analysis (PCA) of diatom community data showed that lake productivity was among the most significant environmental gradients in driving diatom community reorganization over both time and space. Diatom diversity indices generally showed unimodal changes in response to lake productivity over space, while over time they showed a positive relationship in oligotrophic systems but an opposite trend in nutrient-enriched lakes. Our results collectively suggested that disturbance-associated changes (i.e. lake productivity) could lead to the long-term homogenization of regional species pools, despite that local biodiversity could change towards either of the two opposite directions over time.

### Key words:

SW China; Yunnan lakes; diatoms; productivity; biodiversity; temporal scale; sediments

## Biogeographical Basis for Ecosystem Monitoring and Biodiversity Conservation in Paelearctic

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### Abstract

Analysis of biodiversity is the actively developing method of the Earth biota state control. The input of biodiversity in the Northern Eurasia and on Russian territory into the whole planetary biodiversity is exclusively big. Biogeographical approaches contribute a lot into the study and conservation of biodiversity. Practical ecological monitoring, its mapping and visualization could be made through biodiversity analysis in different ways. One of the ways in the strategy of biodiversity conservation is based on its quantitative and comparative estimates in the natural ecosystems on different levels (monitoring of various territorial groups within the areal). On the next stage – cartographic – the series of biogeographical maps are produced. They are made on various levels of spatial-temporal integration of different types of information. The aim of this work is to generalize the many years' authors experience of working out and applying the biogeographical approaches in monitoring and mapping of biodiversity on various spatial scales and levels. As the elementary units of biodiversity the protected plant and animal species in various parts of Paelearctic are considered. Those parts chosen basing on the biogeographical division into regions are: The Russian Subarctic, the Central Kazakhstan and the Baltic region of Russia. Biogeography analyses of biodiversity distribution and monitoring of endangered species are discussed and effective strategies of wildlife conservation in different regions are proposed.

### Key words:

biodiversity; conservation; Paelearctic; biogeographical approaches

## Community Structure and Its Relationship with Environmental Factors in

### Zooplankton in The North Luo River System in Northwest China

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#### Abstract

The community structure of zooplankton and characteristics of environment were investigated in 13 sampling sites in the North Luo River system, as the second largest tributary of the Weihe River basin, Northwest China, in autumn of 2012, and analyzed by canonical correspondence analysis using Canoco 4.5 software. It was found that there were 49 zooplankton species belonging to 26 genera, with dominant rotifers accounting for 83.67% in the species composition, followed by protozoa (8.16%). The zooplankton had a density with an average value of 57.7 ind. L<sup>-1</sup>, and biomass with an average value of 0.070 mg L<sup>-1</sup>. There were six dominant species of zooplankton in the North Luo River system, including *Brachionus angularis*, *Accomorpha saltans*, *Proales sordida*, *Brachionus calyciflorus*, *Asplanchna priodonta*, *Polyarthra dolichopteria*, with average Shannon-Weiner species diversity index ( $H'$ ) of 2.67, Evenness index ( $J$ ) of 0.89 and Richness index ( $M$ ) of 1.68. Clustering analysis based on zooplankton density revealed that the zooplankton in every section of the North Luo River system was divided into four groups. The canonical correspondence analysis indicated that the community structure of zooplankton in the North Luo River system was primarily affected by the water environment including phytoplankton and nitrite. Water quality evaluation based on the community structure of zooplankton indicated that the water in the North Luo River system belonged to  $\beta$ -middle pollution and a simple zooplankton community structure according to the species diversity index. Thus, it is necessary to strengthen the ecological management and to reduce the nonpoint source pollution in the North Luo River system.

#### Key words:

North Luo River system; zooplankton; community structure; canonical correspondence analysis

## Conservation of Sunderban's Biodiversity: A Case study of World's largest Mangrove Ecosystem in West Bengal

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### Abstract

The Sundarbans covering some 10,000 km<sup>2</sup> of land and water are part of the world's greatest deltas formed by sediments deposited by the three rivers namely the Ganga, Brahmaputra and Meghna. Indian Sundarbans which is around 38% of the whole are located between 21° 32'-22° 40' north and between 88° 85'- 89° east, and the rest lies in Bangladesh. This reserve forest is bounded by the 'Dampier-Hodges Line on the North, Bay of Bengal on the South, Ichhamati-Kalindi-Raimongal on the East and the river Hooghly on the West including 4264 km<sup>2</sup> of mangrove forests, accounting for more than 60% of India's total mangrove forests. Few areas exist in the world with such diversities in animal species that live in a complex physical, chemical, mechanical and animate environment. Sundarbans play an important role in the lives of the people in the neighbouring communities who depend on the forest for subsistence and protection from natural calamities. But for the past few decades its biodiversity is continuously threatened by rising pollution, increasing human population which puts a lot of pressure on its biological resources, as well as impacts the freshwater inflows from upstream areas. New emerging threats are from oil exploration in coastal areas and global climate change leading to for e.g. sea level rise. Urgent steps are needed to stop and reverse the present trend of deforestation and loss of biodiversity in the Sundarbans, which is under immense pressure from a growing number of issues.

### Key words:

Mangrove; hydrology; climate change; biodiversity; sea level rise; oil spill

## Conserving Habitat Corridors in China: Risk Assessment Under Rapid Land Use Changes

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### Abstract

The establishment of habitat corridors has been recognized as a key strategy to conserve landscape connectivity and protect biodiversity in front of the pressing environmental challenges caused by unprecedented widespread land transformation in China. The objectives of this paper are to meet this challenge by delineating corridors that are essential for functional connectivity at national level and assess their risks under rapid land use changes. Main corridors and habitat concentration areas (HCAs) across China were delineated based on a landscape ‘naturalness’ approach, which mainly consisted of 5 small models (land cover modification, land use intensity, roads influence, resource extraction affects and slope). We compared the spatial differences between HCAs corridors and corridors of current protected sites to facilitate further reserve networks development. Risks to land use changes were assessed based on observed recent land use change and land use simulations by CLUE-S model for 3 scenarios (business as usual scenario, planned scenario, and optimum scenario) up to 2030. The risk assessment reveals that threatened hotspots are mainly located along the ‘Hu’ Line and East China, areas where rapid land use changes are highly expected. This delineation of habitat corridors provides directions for the recent ecological ‘redline’ policy on the construction of ecological corridors and the assessment has significant implications for national conservation planning.

### Key words:

Habitat corridor; biodiversity conservation; least-cost model; naturalness; landscape connectivity; land use changes; spatial conflicts

## Decades of Changes in Biodiversity Under the Pressure of Environmental Degradation in Plateau Lakes in Yunnan, China

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### Abstract

Yunnan Province, China has more than 37 plateau lakes over 1 km<sup>2</sup> in size, with a total area of 1,164 km<sup>2</sup>, which are associated with six major rivers, four being international rivers. These lakes are rich in biodiversity. These lakes have experienced different magnitudes of biodiversity deterioration over recent decades.

We reviewed primary literature reporting the occurrence of such hydrophyte and fish species between the 1950s and 2000s. During this period, 46.3% of native hydrophytes and 84.0% of native fish species in Dianchi Lake had gone locally extinct, compared to 21.4% and 58.8% in Erhai, and 11.8% and 41.7% in Fuxian, respectively. In Dianchi alien species comprised 15.4% of total hydrophytes and 87.5% of total fish species, compared to 5.7% and 70.8% in Erhai, and 11.8% and 65.0% in Fuxian, respectively. The extinction of endemic fish species was particularly serious. The proportion of endemic fish species extinct was 90.0% in Dianchi, 75.0% in Erhai and 63.6% in Fuxian. Homogenization of fish assemblages (calculated Jaccard indices) across the lakes increased during the study period in parallel with the extinction of endemics and introduction of alien species. Results showed that lacustrine conditions determined the observed changes of hydrophytes and fish species. It is likely that pollution and introduction of alien species largely attributable to human activities were the primary factors causing the degradation of species diversity. In developing regions like Yunnan, it is crucial to better balance economic development with the protection of its important lacustrine habitats.

### Key words:

Yunnan; plateau lake; hydrophyte; fish; biodiversity conservation

## Geo-Spatial Techniques for Identification of Sustainable Tiger-Corridor and Biodiversity Revjumention in Rajasthan, India

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### Abstract

Our future depends on carrying capacity of ecosystem services although now-days biodiversity resource depletion is very rapidly to increasing all over the globe. In the biodiversity Tiger is icon of wildlife which is considered as vital factor for maintaining Universal Food Chain System, in the present on research “geo-spatial techniques for identification of sustainable tiger-corridor and biodiversity rejuvenation for Rajasthan, it’s a micro level Study based on Primary and secondary data through GIS mapping of Socio-Economic & Physical factors to inter-connect all Tiger habitats. The slope and relief has been derived from Cartosat-image and obtained from BHUVAN portal. NDVI, type of forest and LULC have been obtained from the Multispectral images from ETM and ETM+ sensors of Landsat and LISS-III and AWiFS sensors of Resourcesat-satellites. The data for month-wise surface water resources has been collected form BHUVAN portal. The socio-economic data has been collected from Village directory of Census of India, 2011. The data analysis process involves digitization and village directory data was attached with the digitized map and raster maps have been created using those demographic attributes. The physical indicators are obtained in raster formats. Using all the raster maps the final delineation of corridor has been done through spatial analysis using the raster calculator tool in ArcGIS and Erdas. The study come out with physical and Socio economic corridor for tiger conservation in Rajasthan. The research also describes Human Encroachment, Impact on Colonization, Breeding, Inter-breeding and Migration on integration of all subjected Tiger Reserves in biogeography of Rajasthan.

### Key words:

Geo-spatial technique; Tiger corridor; Digitization; Biodiversity

## Impact of Clean Development Mechanism (CDM) Projects On Environment: A Case Study of Chamba District of Himachal Pradesh

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### Abstract

In the era of modernization and Industrialization, population and pollution is major area of Concern. Here, when the entire world is out to tackle pollution coupled with other environmental problems, initiatives like Clean Development Mechanism (CDM) can provide a viable solution. CDM allows emission-reduction projects in developing countries to earn certified emission reduction (CER) credits. It stimulates sustainable development and emission reductions in developing countries also giving developed countries some flexibility in how they meet their emission reduction targets. Presently there are 12 CDM hydropower projects of different magnitude in Chamba and they are in different stage of completion. Simple random sampling was used as a tool for conducting primary survey of 300 households to take the opinion of local population about these projects. This hydropower project served the purpose of reducing carbon emission but in matters of improving local environmental conditions things did not look good. It was concluded that, most of the villagers were not satisfied with the contribution of CDM projects towards the preservation of local environment and biodiversity. Forests were cleared for making the dams for hydropower projects and locals were also not given electricity which compounds the problem as it increases their dependency on fuel wood. Lack of sensitivity towards local environment is a major area of concern and can be tackled by involving local population in decision making.

### Key words:

clean development mechanism; carbon emission reduction; biodiversity; environment

## **Impact of Climate Change and Human Encroachment On Wetlands: A Case Study of Unnao District of Uttar Pradesh, India**

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### **Abstract**

Wetlands are one of most productive environments and provide a wide variety of benefits. They are important repositories of biodiversity and play a critical role in the health, livelihood and economic prospects for the nearby rural population. Wetlands are under imminent threat by nature in form of global warming and by civilization in form of encroachments and reclamation of wetlands for farming and settlement. Along Indo-Gangetic plain wetlands have receded more than half of its size in last 50 years. Present paper attempts quantitative segregation of all factors responsible for receding wetland including climate change and encroachment by humans. Study is based on wetlands of Unnao district of Uttar Pradesh, India. Methodology included analysis of temporal mapping of wetlands, climatic data of area and ground verification for encroachment impacts. Results indicate that climate change is not the only responsible factor for diminishing wetlands but encroachment by human is also largely responsible.

### **Key word:**

Wetland; Climate Change; Encroachment; Biodiversity and Rural Population.

## Landscape Changes of Abha Urban Area, KSA, Using Remote Sensing Techniques

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### Abstract

Abha urban area is a part of Aseer area. Aseer area is located at southwest of Saudi Arabia. Aseer area is considered an ecological exception in Saudi Arabia, because it contains biotic components, such as flora and fauna. Therefore, Aseer area can be considered an area does not dominated by the desert features, while the most of Saudi Arabia lands are. This study investigated Abha urban area which stretching between latitudes  $17^{\circ} 57' 18.9''$  N, and longitudes  $42^{\circ} 16' 39.8''$ . This study aimed to detecting the land use/ land cover changes that occurred in Abha urban area between 1980-2015 depending on the satellite images. Interpretation of the satellite images were used mainly to recognize types of changes that happened throughout of the study area during past 35 years, between 1980 and 2015, in each of the vegetation cover and urban buildup area.

### Key words:

Abha urban area; landscape changes; satellite images

## **Mangrove Ecosystem of Sundarban in West Bengal, India - Plant Biodiversity and Its Conservation**

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### **Abstract**

The Indian part of Sundarban region is situated in West Bengal, India covering the lowest part of the Gangetic delta which has been fragmented by several distributaries. This littoral tract, which is under tidal waves from the Bay of Bengal at regular interval, has provided congenial hydrogeomorphologic conditions for the development of wild mangrove ecosystem with a great diversity of flora and fauna. The sundarban region of India is famous for a combination of estuarine and mangrove forest ecosystem dotted with freshwater bodies. It is sandwiched between shallow marine water bodies in the south and agricultural landscape in the north. As a result, it is exposed to natural hazards like cyclone, tidal surge and tsunamies while suffer from excess utilization of natural products in the forest-society interface; hence all ecosystems are fragile in nature. For the last few decades' diversity is at the climax of decline in sundarban ecosystem, particularly in Indian Sundarban. In this area river delta principally facing the hazard of sea level rise and climate change. These fragile ecosystems in this area is being swallowed everyday by gradual rise in sea level, coastal erosions and tropical cyclones. Apart from the global cause of rise in sea level that is thermal expansion of sea water, anthropogenic pressures are also found to be responsible for the gradual degradation of such ecosystem. This paper focuses the conservation of mangrove biodiversity which controls the climatic extremes in these areas.

### **Key words:**

Sundarban; Mangrove ecosystem; Biodiversity; Conservation

## Mapping of Invasive Species (*Arenga obtusifolia*) in Javan Rhinos Habitat, Ujung Kulon West Java, Based On Landsat8 Image Analysis and Geographical Information Systems

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### Abstract

Javan rhino (*Rhinoceros sondaicus sondaicus*) is a unique, endangered species with a single horn that could only be found in the west tip of Java Island, Indonesia. There are only about 50 individuals surviving in their natural habitat, i.e. Ujung Kulon National Park. Amongst many problems identified, the increasing distribution of an 'invasive' species called langkap palm (*Arenga obtusifolia*) becomes prominent in relation with the decrease of natural vegetations that serve as rhinos' food. The langkap palm has been spreading out over the past 30 years, and its distribution needs to be mapped efficiently and accurately, since the palm's spatial distribution may help habitat management policies. This study tried to map the *A. obtusifolia*'s spatial distribution using two approaches, i.e. landscape-ecological and spectral approaches. The landscape ecological approach was carried out by collecting field data of the langkap palm frequency in relation with several terrain characteristics. Spatial interpolation techniques were explored to map the spatial distribution of the terrain characteristics, and the results were correlated with the species frequency distribution. The spectral approach made use of multispectral classification. This study found that the multispectral classification method could map the *A. obtusifolia* spatial distribution accurately, i.e. 91%. The classes were grouped into open langkap palm, langkap palm under other vegetation canopy, mangrove, and other vegetation structure. The other method did not successful due to the number and distribution of samples, as well as the characteristics of the invasive species, which are not highly correlated to the terrain characteristics in the study area.

### Key words:

*Arenga obtusifolia*; invasive species; Ujung Kulon; javan rhino; multispectral classification

## Moroccan Forest Ecosystem Services and Local Populations

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### Abstract

Located at the northwest corner of the African continent between 21 ° and 36 ° north latitude and between the 1st and the 17th degree of west longitude, Morocco with a total area of 715,000 km<sup>2</sup> enjoys a privileged position with a coastline of 3 446 km long opening to the Mediterranean and the Atlantic Ocean.

Its privileged location with a double coastline and its diverse mountain with four major mountain ranges: The Rif, Middle Atlas, High Atlas and Anti Atlas with altitudes exceeding 2000 m in the Rif, 3000 m in the Middle Atlas and 4000 m in the High Atlas.

Morocco is characterized by an important forest genetic diversity represented by a rich and varied flora and many ecosystems: forest, preforest, presteppe, steppe, Sahara that spans a range of bioclimatic zones: arid, semiarid, subhumid, and humid.

The vascular flora of Morocco has 3913 species and subspecies in 1298 (including 426 sub-species types), distributed among 155 families and 981 genera. The number of endemic species amounted to 640 (16%) and 280 subspecies (32%). The rare or endangered flora species is estimated to be 463 and 1284 subspecies.

Forest species and ecosystems provide important services to populations represented by grazing, timber harvest, harvesting of medicinal and aromatic plants...

This presentation will be focused on the Moroccan flora and forest ecosystem services and on the interaction between local populations and ecosystems.

### Key words:

Morocco; forest; flora; ecosystem; services; population

## Mount Abu Wildlife Sanctuary Rajasthan India: A Socio-Ecological Dilemma

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### Abstract

Mount Abu wildlife sanctuary of Rajasthan is situated in the southern part of the state in Sirohi district. It is situated between 24° 30' and 24° 43' North and 72°38 ' and 72°53` east co-ordinates. Flora and Fauna of the sanctuary were studied and analysed through regular visits in different seasons. The dominance of teak, dhok and Tendu tree indicates the tropical moist and humid climate. This sanctuary has some rare and endangered species which needs conservation and Mount Abu hills have a number of medicinal plants, ferns and bryophytes which have considerable importance. For assessment of socio-ecological impacts a Survey of sample villages was conducted in core and buffer areas.

Today, the Sanctuary is under heavy pressure due to increasing populations. The Town and villages in and around Mount Abu wildlife Sanctuary puts tremendous pressure on existing resources. The main problems include illicit felling, illicit grazing, pressure due to encroachment of land, deliberate forest fires, poaching activities, and pressure due to fuel wood, fodder and herb collection. These activities lead to rapid deforestation in buffer areas of the Sanctuary and are constantly building heavy biotic pressure in core area. A proper environmental management plan for the Sanctuary is needed to bring out useful association of those conditions needed by species to reproduce and survive.

### Keywords:

Endangered Species; Socio-Ecological Impacts; Illicit Felling and Grazing; Biotic Pressure; Environmental Management

## Rethinking Community Conservation in South Africa: What Shapes Local-Level Decision-Making in The Hluhluwe-Imfolozi Park, Kwazulu-Natal, South Africa?

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### Abstract

The article reports on a study that critically examined community conservation in post-apartheid South Africa. Based on literature review and a case study of a community living adjacent to the Hluhluwe-iMfolozi Park (HiP) in northern KwaZulu-Natal, South Africa, the article examines the processes that shape local-level decision-making in the study area. The study employed the triangulation method to examine the extent and the nature of interaction between the park management and the communities adjacent to the park, to examine attitudes and perceptions of the communities towards HiP, including resources within the Park that are likely to impact on the lives of Nompondo community as well as the role of communities in the development and promotion of tourism in HiP. The study of the Nompondo community adjacent to HiP indicates that this community benefits in various ways but not to their level of satisfaction. The study indicates that members of the Nompondo community are allowed access to resources such as venison, thatching grass, firewood and water. Participation in the operation and management of HiP was yet another benefit that was identified. However, this was limited, with a few households and community leaders generally participating. Furthermore, the results show that a range of opportunities for positive interactions with the Park's management include job opportunities through the expanded public works programme.

### Key words:

community conservation; Hluhluwe-iMfolozi Park; post-apartheid; communities; expanded public works

## **Studies of Biofabricated Nanoparticles in Bioremediation of Arsenic from Assenic Contaminated Aquenvironment**

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### **Abstract**

The present study involves the development of adsorbent containing silver nanoparticles for arsenate removal using silver reducing property of a novel fungal strain *Aspergillus foetidus* MTCC8876. Biological reduction of silver by the isolate has been deduced at various time intervals. The fungal biomass after biological silver reduction were harvested and subjected to carbonization and its properties were analyzed using Fourier Transform Infra-Red spectroscopy, X-ray diffraction, scanning electron microscope attached with energy dispersive spectroscopy, BET surface area analysis, field emission scanning electron microscope and transmission electron microscope. The average size of the silver nanoparticles presents on the surface of the carbonized silver containing fungal cell (CSF) was 35 nm. The carbonized control fungal cells (CCF) did not contain any particles on its surface. As (V) adsorption efficiency of CCF and CSF was deduced in batch mode by varying parameters like contact time, initial concentration, and pH. Desorption studies were also carried out by varying the pH. The CSF was proved to be exceptionally efficient in arsenate removal when compared to CCF.

### **Key words:**

Biofabrication; Bioremediation; Arsenic; *Aspergillus* sp

## The Functional Analysis of Landscape Connectivity at The Landscape, Component and Patch Level: A Case Study of Mingqing County, Fuzhou City, China

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### Abstract

Maintaining forest landscape connectivity is one of the effective ways to alleviate the natural forest fragmentation and biodiversity loss problems. Recently, graph theory based metrics are often used as powerful tools in the assessment of landscape connectivity. However, the functional features of the landscape units according to different structure levels, by which the outcomes could be enriched and advices could be given for the practical application, are overlooked. In this study, a series of graph-based connectivity indices were implemented to 1) evaluate the optimal threshold distance; 2) identify the key landscape units in component level and patch level; 3) classify the functional types of components and patches, and analyze the functional patterns in different structure levels. The argument about the relation between the patch importance and patch area was discussed and explained depending on functional types. With a natural forest area in Mingqing County of China as the study area, advices about forest conversation and connectivity enhancement were given referring to the research conclusions. The study would provide a way to comprehensively analyze habitat fragmentation and functional pattern for the local forest conservation.

### Key words:

landscape connectivity; graph theory; functional analysis; threshold distance; component

## The Impact of Climate Change On the Migration of Birds and Biodiversity in The Bharatpur Bird Sanctuary, Rajasthan, India

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### Abstract

The induced human interference has led to many unprecedented changes in landuse/landcover of biosphere which is home to all the species. During the last century, bird populations have been affected by different kinds of disturbances and impacts due to man-made structures such as highways, television, radio and cell phone towers, wind farms, glass windows, and also due to human activities such as fishing and illegal shooting. The increasing mortality of birds by human cause has generated an important literature evaluating the impact of these elements on bird populations and developing the application of protective measures. The present study highlights the problem associated with the migration of birds in the Bharatpur bird sanctuary and is home to many foreign birds during winter for breeding and other purposes. The main causes in Bharatpur sanctuary is related to shrinking water bodies which are essential for habitat development. The study aims to highlight the nature of effective ecotonal imbalances and also to measure its rate towards future prospects. Bharatpur is on a major migration route between the Southern regions (particularly South Asia occupied by birds during winter, and the North where more than 30 species of raptors come to breed in Western India. Because of the position of the Arabian sea, the Indian ocean and the Arawali range, Bharatpur is one of the points where the birds concentrate during these complex migration paths. Although known as the 'Semi arid zone', it hosts major migratory bird gliders concentrations during the spring, winters and the autumn

### Key words:

Bharatpur; sanctuary; Land use / land cover change; Migration; Ecotonal

## Wildlife Damage in Wolong Natural Reserve: A Systematic Analysis and Typical Characteristic Identification

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### Abstract

Wildlife damage is a universal phenomenon in and around natural reserve, which leads to human-wildlife conflict and seriously affects the effectiveness of biodiversity conservation. The paper gave a systematic investigation about wildlife damage in Wolong Natural Reserve and identified typical characteristics of farmland suffered wildlife damage. The results showed that local human-wildlife conflict has increased rapidly in recent years due to ecological restoration and relocation policies. Local spontaneous preventive measures were unsustainable and less effective. For damage mitigation, we identified typical characteristics of shared landscape between wildlife and local people, i.e. farmland, by Binary Logistic Regression model and Akaike Information Criterion (AIC). The results found significant correlation between wildlife damage and the following farmland characteristics: crop types planted on the farmland, distance from farmland, distance from farmland road, and whether use of fences or no (with values of P less than 0.01). What's more, the reasons and affecting mechanisms were discussed subsequently. Finally, wildlife damage mitigation measures were put forward. Integrative compensation and development plans should be undertaken to resolve and mediate human-wildlife conflict. Local people should adjust or change their crop structure and grow some unpalatable crops. Local manager should plan and manage damaged farmland in a unified way to increase effectiveness of mitigation measures. In the long term, it is necessary to alleviate local dependence on agriculture and transform their focus to alternative economic activities, such as tourism or nonfarm activities.

### Key words:

Human-wildlife conflict; farmland characteristics; Wildlife damage; Wolong Natural Reserve

## **Women Participation in Sustainable Livelihood and Development through Community Forest Management: A Case Study of Jim Corbett National Park**

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### **Abstract**

In many developing countries women are responsible for the collection and management of forest products essential to the daily lives of their household sustainability. Despite they have stronger interests than men in ensuring the availability of these products; women are often neglected from the decision-making process that sets out the rules to access and collect forest products within a Community Forest. The study area is located in Foothills of Nainital district of Uttarakhand, India. This paper analyses the women's Participation in Community Forest Management and examines women's involvement in community forestry management, especially, in implementing programs, making decision, sharing, managing community forest resources and livelihood. The study is based on both the primary and secondary data sources. The primary data were collected through household survey with a set of questionnaires prepared, tested and used for interviewing along with PRA approach. Women users from each household selected randomly and treated as a unit of analysis. The paper focuses the active and interactive participation of women, secures women's rights to control and access over the forest resources and provides many opportunities to lead in the community forest and various activities related to Forest Management, Livelihoods, Drinking Water and Sanitation, Health Care, Women's Development and Education. By adopting JFM (Joint Forest Management) programme, Community Forest management, Social Forestry, Van Panchayat, ensure the socio-economic status of villagers particularly the people of weaker section of the society who are more dependent on it.

### **Key words:**

Community Forest Management; Livelihood; Women and Decision Making Policy

## **Analysis of The Environmental Consequences of the Geography of Hamoun Lake(Iran)**

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### **Abstract**

Hamoun is the largest Iranian freshwater lake, located in the eastern part of Iran which plays an important role for livelihood of the local people. During last decade, however, due to the reasons including low rainfall, construction of multiple dams on Hirmand River which is regarded as the main source of feeding for Hamoun lake, transfer of contaminated water of industrial, mining and domestic factories into the lake, entering agricultural sewages contaminated with chemical composts, throwing cane eater fish called Amour into the lake and as a result destruction of canebrakes, we are observing bio-environmental contaminations along with serious economic damages to agriculture, horticulture, animal husbandry and fishery (because of drought) which the important ones are as follow: immigration of villagers and Flat settlers, extinction of marines and emigrant birds, destruction of farm lands surrounding lake .

### **Key words:**

Hamoun Lake; Takhtak settlers; Hirmand; Drought; Ecology; Sistan; Economic Consequences

## **Anthropogenic Activity and Its impact on Hydrological Hazards, Mountain Biodiversity and Sustainable Development: A Case Study of Alaknanda River Basin, Uttarakhand, India**

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### **Abstract**

Anthropogenic activities are continuously disturbing the natural system and its impact on the hydrological behavior of river. The important factor causing a flood and also accelerate several hydrological hazards during monsoon periods are heavy rainfall, cloud burst, GLOF, landslides, Slope failure, deforestation, drainage congestion due to urbanization. Natural hazards have had significant impacts on life, livelihood and property in areas with high population density and land use intensity. These hydrological hazards are mainly responsible for several socio-economic consequences (cultivated land degradation, infrastructure loss, human casualties, loss of transmission lines, and so on). Factors causing these changes have been attempted to be understood through the use of GIS. Geospatial technique is used to find out the land use/cover change detection for three time periods. Secondary data has been taken for to carry the analysis work. Preliminary studies conducted on this subject indicate that human interference, unscientific developmental activities, agriculture extension and road construction are some of the activities which are creating the hydrological imbalances. The mountains biodiversity provides important values of agriculture, medicine, food security, and industry, besides spiritual, cultural and aesthetic and recreational values. In order to meet the present and future challenges meeting sustainability criteria, the traditional systems need to be adapted in ways which enhance crop yields but not at the environmental and social costs. This paper has identified to Vulnerability issues and suggested to adaptation method for sustainable development strategy for the development.

### **Key words:**

Anthropogenic Activity; Mountain Biodiversity; Geo-hydrological Hazards; Sustainable Development

## Assessment of Effectiveness of Nature Reserves on the Tibetan Plateau Based on Net Primary Production and the Large Sample Comparison Method (LSCM)

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### Abstract

Twenty-one typical coupled large samples were chosen from areas within and surrounding nature reserves on the Tibetan Plateau using the large sample comparison method (LSCM). To evaluate the effectiveness of the nature reserves in protecting the ecological environment, the alpine grassland net primary production (NPP) of these coupled samples were compared and the differences between them before and after their establishment as protected areas were analyzed. The results showed that: (1) Of the 11 typical nature reserves selected, the positive trend in the NPP for Manzetang was the most significant, whereas there was no obvious trend in Taxkorgan. (2) There were notable findings in 21 typical coupled samples: (a) After the establishment of the nature reserves, the annual rate of increase in the NPP in 76% of samples inside nature reserves and 82% of samples inside national nature reserves was higher than that of the corresponding samples outside nature reserves. (b) The effectiveness of ecological protection of the Mid-Kunlun, Changshagongma, Ruoergai and Selincuo nature reserves was significant; whereas in south-east Manzetang and north Taxkorgan the protection effectiveness was not obvious. (c) The ecological protection effectiveness was significant in nature reserves consisting of alpine meadow, but was weak in nature reserves covered by alpine steppe. This study also shows that the advantages of LSCM in evaluating regional ecology change. Careful design of the samples used, to ensure comparability between the samples, is crucial to the success of this LSCM. (This paper has been published in J Geogr Sci, Jan. 2016)

### Keywords:

nature reserves; protection effectiveness; large sample comparison method (LSCM); net primary production; Tibetan Plateau

## Biodiversity of Todgarh Raoli Wildlife Sanctuary Rajasthan India

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### Abstract

Conserving biodiversity is especially crucial in developing countries where people's livelihoods are directly dependent on natural resources such as forests, fisheries and wildlife. With the increasing pressure and demand for land and unplanned land use of various landscapes, for majority of the biodiversity, protected areas have become the main abode for survival. Assessment of local biodiversity incorporates two related issues. The **first** concerns the intrinsic diversity of an area i.e. the area with higher diversity may be deemed more important than the one with lower diversity. The **second** concern is the assessment of the contribution of any given area to the overall diversity of a larger geographic region such as district, state, country, continent or ultimately, the world overall. From this perspective some areas with lower intrinsic diversity may be more important than others with high diversity.

Todgarh Raoli wildlife sanctuary located on the northern part of Rajsamnad, in addition to forming an Ecotone between hilly forests of Aravallis and Thar Desert, is the southernmost limits for teak and home for threatened and rare flora and fauna. The hills of this Protected Area are catchment for many rivers and nullahs that provides service to the human and bovine population in addition to irrigating the agriculture land in the Ajmer and Pali district. Further, with its diverse habitat and highly undulating terrain, is comparatively less disturbed that ensures better setting for the biodiversity surviving in it.

This Protected Area is unique as it forms the distribution limit for many of species that has moved from Himalayas, Indo-Malayan and African regions, in addition to the elements from Western Ghats. All these necessitates an in depth biodiversity assessment that could lead to preparing a comprehensive conservation plan for Todgarh Raoli, which is presently not available. With the increasing pressure for exploiting all sorts of natural resources and land for development, it is very imperative to collate/gain knowledge on the biodiversity and its distribution within this ecologically important and sensitive area, unique with its respective landscape diversity and location in the Aravallis. This prompted to carry out an intensive field based biodiversity assessment of this Sanctuary.

### Keywords:

Local Biodiversity; Ecotone; Intrinsic diversity; Catchment; Conservation Plan

## Classification and Ecological Restoration Measures for the Littoral Zone of Lake Taihu

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### Abstract

Present situation of littoral zone of Lake Taihu were investigated according to administrative area on April, 2015. According to the survey, about 60% length of littoral zone of Lake Taihu was restored currently, in contrast to this, unrepaired section were mainly in mountain areas of Zhushan Bay and Meiliang Bay, aquaculture areas of East Taihu and upright embankment area of Yixing. According to whether restored, the littoral zone of Lake Taihu is classified. Based on ecological function, the restored littoral zone of lake classified as near-natural wetland type, landscape type, habitat-improved type and mountainous type. While based on the existing land use types and topography, the unrepaired littoral zone of lake classified as aquaculture-type, dike-type, estuary-type and steep-hill-type. According to the above classification, several ecological restoration measures are proposed, which may have some implications for the ecological restoration of other lake littoral zone.

### Key words:

Ecological restoration; littoral zone; Lake Taihu; classification; restoration measures

## Distribution and Diversity of Nitrite-Dependent Methane-Oxidizing Bacteria in Sediments of the Miyun Reservoir, Beijing, China

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### Abstract

Nitrite-dependent anaerobic methane oxidation (n-damo) is performed by “*Candidatus Methylomirabilis oxyfera*” (*M. oxyfera*), which connects the global carbon and nitrogen cycles. However, the distribution and diversity of n-damo bacterial in reservoir and its influential factors is not well understood. In this paper, both 16S rRNA and *pmoA* gene-based PCR primers were employed successfully to study the distribution and diversity of *M. oxyfera* bacteria in sediments of Miyun Reservoir, Beijing, China. Results suggested that the structure and diversity of sediment *M. oxyfera-like* bacteria showed a profound spatial variation. Based on 16S rRNA, Community structures of the *M. oxyfera-like* bacteria in middle and rim of reservoir were similar to those of freshwater or wetlands. In contrast, structures in middle of the reservoir *M. oxyfera-like* bacteria based on *pmoA* gene group with freshwater ones were clearly distinguished from those near rim of Reservoir. *M. oxyfera-like* bacteria sequences analysis based on 16S rRNA gene revealed greater diversity compared with the *pmoA* gene. And the diversity of *M. oxyfera-like* bacteria in reservoir area to Chaohe River was greater than that in Baihe River. A correlation analysis showed that nitrate (NO<sub>3</sub><sup>-</sup>-N), nitrite (NO<sub>2</sub><sup>-</sup>-N), total phosphorus (TP) and pH had influence on the distribution and community structures of *M. oxyfera-like* bacteria in the Miyun Reservoir. These findings will aid in understanding the *M. oxyfera-like* bacteria pattern as well as their correlation with surrounding environmental factors in reservoir ecosystem.

### Key words:

*M. oxyfera-like* bacteria; 16S rRNA; *pmoA*; Distribution; Diversity; Miyun Reservoir

## Does Agroforestry Protect Tree Species Diversity and Reduce Soil Erosion Risk? A Comparative Study from The Mid-Hills of Nepal

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### Abstract

In order to quantify and assess effects of the transition to agroforestry practices we studied three agrosystems: (i) a mature, fully developed agroforestry system (AF); (ii) the predominant conventional system (CS) characterized by monocropping; and (iii) a system that has been in transition to AF for two years (TS). We compared species numbers, abundances and vegetation cover between agrosystems. We found significantly higher species numbers, abundances and vegetation cover in the AF and TS compared to the CS. There were also more fodder tree species in the AF and TS compared to the CS. The higher vegetation covers of AF and TS point to substantial smaller erosion risks in the modernized agrosystem. Reduced erosion contributes to the more fertile soil status of the AF and TS systems. Considering that the Nepalese agro-biodiversity is seriously threatened and that the mid hills are not sufficiently represented by the protected areas of Nepal the modernized land management practice comprises a rewarding potential to contribute to efficient in-situ biodiversity conservation. Moreover, the increased diversity diversifies food options of the farmer families and improves their self-sufficiency and food security. From both perspectives, socio-economic and ecological, the AF exhibited more favourable vegetation related properties than the CS.

### Key words:

fodder trees; food security; in-situ biodiversity conservation; mountain agriculture; phytodiversity; species richness; splash erosion; sustainable land use; trees on farmland

## Effect of Salt On Photosynthetic Characteristics of Bamboo Willow Introduced to North Xinjiang

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### Abstract

In order to ascertain the physiological responses to salinity, we measured the photosynthetic characteristics of Bamboo willow in different salinity gradients, which was introduced to Urho District of City Karamay in north Xinjiang. We chose some healthy Bamboo willow one-year seedlings in one sample area salinity by four salinity gradients, nothing (as CK),  $0\text{g}\cdot\text{L}^{-1}$  (S1),  $5\text{g}\cdot\text{L}^{-1}$  (S2) and  $10\text{g}\cdot\text{L}^{-1}$  (S3) and measured by Li-6400XT, a portable photosynthesis system. The results indicated that the diurnal variation curve of net photosynthetic rate showed a "bimodal curve" and had obvious "midday depression" In each four of salt concentration; The net photosynthetic rate of Bamboo willow with the salinity concentration by  $5\text{g}\cdot\text{L}^{-1}$  (S2) was the highest one ( $19.9\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$ ) among all the four gradient conditions, higher than the second one,  $17.8\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  (S1), the last one  $17.6\mu\text{mol}\cdot\text{m}^{-2}\cdot\text{s}^{-1}$  (S3). And water use efficiency (WUE) of the Bamboo willow was 4.7%, still the highest one in four conditions. Bamboo willow has a good adaptability, and the optimal salinity concentration was  $5\text{g}\cdot\text{L}^{-1}$  (S2). According to this test, it can provide a theoretical basis for cultivation techniques of Bamboo willow in Urho District.

### Key words:

introduced Bamboo willow; photosynthetic characteristics; salinity gradient; eco-tourism; arid region

## Estimating Relative Abundance of Tree Species for Heavy Metal Assessment in A Semi-Arid Context

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### Abstract

Plants, water, soils are widely used as bio-indicators of heavy metal contamination. Tree species abundance for Palapye, a coal-mining town in Eastern Botswana was estimated for assessing heavy metal concentration. The biophysical settings was assessed for three sites selected based on the presence of anthropogenic activities such as mining, waste water treatment plant, highway and brick manufacturing as potential sources of heavy metal pollution. Most recurring tree species observed at the sites included *Acacia tortilis*, *Terminalia sericea*, *Acacia erioloba*, *Colophospermum mopane*, *Dichrostachys cinerea* and *Grewia flava*. 27 sample points were selected for data collection based on soil type units (Leptosols, Arenosols, Lixisols and Luvisols), proximal distance, land use type (Bare land, rock outcrop, scrubland) and accessibility. A vegetation quadrant of 30m × 30m was delineated per sample point and the relative abundance of the six tree species was visually estimated using a Likert scale from 1 to 5, i.e. 1-very rare, 2-rare, 3-occasional, 4-frequent and 5-abundant. Description of each quadrant was made and photographs were taken for laboratory use in estimating relative tree species abundance. Kruskal-Wallis analysis shows significant differences in mean ranks between the species, with mopane having the highest rank, signifying it as the most relatively abundant species. This agrees with the literature as Palapye falls within the range of Mopane distribution in Southern Africa. Following in ranking are *Acacia tortilis* and *Dichrostachys cinerea* found mostly in disturbed areas. Why these species follow after *C. mopane* can be attributed partly to disturbances from anthropogenic activities at the sites.

### Key words:

Bio-indicators; Species; Abundance; Heavy metals; Pollution; Palapye

## Fluvial Morphology Diversity in Relation to Fish Species Diversity in the Yellow River

### Source Zone

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#### Abstract

Fluvial morphology diversity which reflects habitat diversity in one respect, is the basis of the diversity of species in a river basin. But research on the relationship between fluvial morphology diversity and fish species diversity in the Yellow River source zone (YRSZ) remains blank. Based on river patterns, the mainstream of the YRSZ between the Longyangxia and Huangheyuan reservoirs was divided into 14 sections. The fluvial morphology diversity of each section is quantitatively analyzed through GIS analysis and field survey in channel gradient, sinuosity, river width and inter-channel lands which are tied directly to fish habitat. The spatial distribution of fish species in the study area is presented via literature search and data organization. Results show that within these 14 sections, the section which stretches from Awancang Yellow River Bridge to Longka (near Mengtang Town) has the highest sinuosity, from Xierousang to Gebolonggeqia (near the Gangnagemacuo Lake) has greatest variation in river width, and from Qiaonangonggabu to Awancang Yellow River Bridge (near Awancang) has much more inter-channel lands. Overall greater morphology diversity is evident in the section from Xierousang to Gebolonggeqia, followed by the section from Requ to Huangheyuan Reservoir. However, the reach which has the highest fish species is from Yangqu to Jungong. Our results indicated that there is no significant relevance between fluvial morphology diversity and fish species diversity in the YRSZ. As fish diversity is influenced by many factors, the impact of fluvial morphology on fish diversity would be discussed more in the future.

#### Key words:

Yellow River source zone; fish species; fluvial morphology; diversity

## Impact of Tourist Activities on the Wintering habitat of Black-necked Cranes

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### Abstract

Black-necked cranes (*Grus nigricollis* Przevalski) are known as the "Giant Panda" of bird, is an endangered species in the world, the national level protected animal of China. It is a breeding, overwintering species was found at the latest and unique in the Qinghai-Tibet plateau and the Yunnan-Guizhou plateau. It has important protection and scientific value.

In order to better protect the black-necked crane, first of all to protect their habitat. Take the Zhaotong Black-necked Crane National Nature Reserve as study, two typical habitat Marsh and alpine meadows as object of study, gradient plot, trample experiment, continuous observation, and physical and chemical analysis 4 methods have been used to analyze and value of the impact of tourism activities on the soil properties of black-necked cranes wintering Habitat based on 4 sites, 26 sample plots data. Results show that when the trampling number of tourists from 0 to 1000, the trampling number of horses from 0 to 210, the distance between plots and touring trails from 5 meters to 1 meters, soil properties have changed regularly. It is specifically manifested in the following areas:

(1) Soil water content. The water content of the sub alpine meadow soil and swamp soil decreased from 32.14% and 35.85% to 21.12% and 22.67% respectively, under tourists trampling. The water content of two soils decreased from 30.52% and 34.60% to 21.25% and 25.12% respectively under horses trampling. Two soil water contents where 1-meter distance from touring trails is 19.21% and 25.12%, respectively, 4.64% and 9.48% lower than that of the control plot, and when the distance from touring trails is 4 meter, soil water rate is almost the same as the control plot.

(2) Soil bulk density. The soil bulk density of the sub alpine meadow soil and swamp soil increased from 1.08g/cm<sup>3</sup> and 1.128g/cm<sup>3</sup> to 1.15g/cm<sup>3</sup> and 1.163g/cm<sup>3</sup>, respectively, increased 0.17 g/cm<sup>3</sup> and 0.083 g/cm<sup>3</sup> compare to that of the control plot(0.98 g/cm<sup>3</sup> and 1.08 g/cm<sup>3</sup>),under tourists trampling. The soil bulk density increased 0.167 g/cm<sup>3</sup> and 0.177 g/cm<sup>3</sup> compare to that of the control plots, under horses trampling. Two soil water bulk densities where 1 meter distance from touring trails is 1.231 g/cm<sup>3</sup> and 1.237 g/cm<sup>3</sup>, 0.314 g/cm<sup>3</sup> and 0.165g/cm<sup>3</sup> higher than that of the control plots, respectively.

(3) Soil porosity. Capillary porosity of two soil decreased from 0.114 and 0.075 to 0.080 and 0.026, decreased 0.045 and 0.058, compare to that of the control plots (0.120 and 0.0840) respectively, under tourists trampling. Capillary porosities of two soil are 0.018 and 0.012, decreased 0.066 and 0.069 respectively under horse trampling, compare to that of the control plots. From the point of view of space, the closer to the tour road, the lower capillary porosity is. Variation of total soil porosity is similar.

(4) Soil structure and soil compactness. With the increase of trampling intensity, soil structure changed from aggregate structure to small structure and block structure, the compactness become much tighter, exposed soil area become higher, plant root contents in soil become less and less. There is the similar variation of soil structure and soil compactness with the decrease of distance from tour road,

(5) PH value. The pH value of the soil increased by 0.3 and 0.4 respectively, under tourists trampling. Soil pH values were 5.4 and 5.3, respectively, increased by 0.3 and 0.2 respectively, compare to that of the control plots. The shorter the distance from touring trails, the lower the pH values is.

In order to protect the habitat, we should reasonably plan the tour route, reasonably clear the peak passenger flow, improve the management system, improve the propaganda, build the observation platform, and set up the warning sign and so on.

**Key Words:**

Tourism activities; Crane habitat; Trampling disturbance; Soil properties

## Impacts of Yong River Sluice Gate Construction on the Hydrological Regime and Freshwater Fish Habitats of the Upstream Basin

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### Abstract

Construction of a sluice gate near a river estuary may alter the hydrological regime of the river, and thus may cause profound and accumulative impacts on the river ecosystem. Therefore, it has received an increasing attention to maintain the ecological habitat quality of a river upstream when construct a sluice gate to extend enough storage space for resisting sea tide and saving fresh water, and to improve the navigation conditions. In this study, we analyse impacts of various conditions of natural flow, gate locations at the river and gate opening degrees on the upstream Silver Carp habitat quality by taking the river section from the Feng Hua river to the Yong river estuary as a case, taking an indigenous cyprinid fish Silver Carp as a target species for fish habitat index, and using MIKE 21 to simulate two-dimensional flow fields. The study results show: 1) the sluice gate construction will reduce the mean velocity of the upstream flood and ebb, make the Silver Carp spawning physiological signal become weak to some extent, and the strength of its influence is related to the locations of the gate near the estuary; 2) different gate locations and gate opening degrees also have different effects on the quality of upstream spawning habitat of Silver Carp. The research conclusions may provide suggestions for the gate construction strategy and the ecological management schemes of the Yong river basin under the new situation.

### Key words:

sluice gate; fish habitat; river water quality; MIKE21; ecological management

## Integrating The Landscape Connectivity into The Mapping of Soil Conservation Service Hotspots and Coldspots

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### Abstract

Soil conservation service (SC) is a critical regulating services supplied by terrestrial ecosystems. The spatially explicit identifying of hotspots or coldspots is the vital process in priority setting. However, few researchers integrated the landscape connectivity indicator into their prioritization process, which can weaken the protection efficiency of the reservation. In this study, the RUSLE model is used to mapping SC, and the Getis-Ord  $G_i^*$  statistics-based hotspot analysis method is tactfully used to improve the spatial connectivity in the hotspots and coldspots of SC in Shaanxi, China. The results indicate: 1) the Guanzhong basin and sand-windy plateau had low SC, while the Qinling-Daba Mountains zone held the highest SC; 2) the SC showed a significant increasing tendency at the rate of  $0.47 \text{ t}\cdot\text{hm}^{-2}\cdot\text{a}^{-1}$  from 2000 to 2013; 3) the most significantly increasing area of SC was intensively distributed in the west of Qinling-Daba Mountains and sporadically distributed north of the loess plateau zone; and 4) the hotspots ( $P < 0.05$ ) had the highest capacity of providing SC, with 29.6% of the area providing 59.7% of the total service of Shaanxi; whereas the coldspots occupied nearly 46.3% of the area of Shaanxi, but only provided 17.2% of the total SC.

### Key words:

ecosystem services; hotspots and coldspots; soil conservation; landscape connectivity; Shaanxi Province

## Monsoon-Driven Hydrographic Features Affect Euphausiid Distribution in The Taiwanese Waters, Western North Pacific Ocean

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### Abstract

The mesoscale distribution of euphausiids associated with hydrographic conditions in the waters around Taiwan was investigated during two different monsoon seasons in 2004 to elucidate possible influences of hydrological conditions driven by seasonal monsoons on distribution patterns of euphausiids. In total, 35 euphausiid species, belonging to 6 genera and one family, were recognized. *Pseudeuphausia lalifrons*, *Stylocheiron* sp, *Stylocheiron suhmii*, *Euphausia pacifica* and *Stylocheiron carinatum*, were the five predominant species and contributed 55% to the total euphausiid count. Euphausiid abundance, species number and species diversity were significantly higher in summer than in winter. Cluster analysis revealed two station groups in both seasons. Higher abundance and lower species richness generally were observed in waters west of Taiwan where the lower-salinity and nutrient-rich China Coastal Current prevails, and a reverse trend was found in the waters east of Taiwan where the warm and highly saline Kuroshio Current dominates. The distribution patterns of euphausiid assemblages were closely correlated with hydrographic conditions, and well linked with zooplankton abundance and Chl a concentration. This study showed that the succession of water masses driven by monsoons affects seasonal and spatial distributions patterns of euphausiids in this study area.

### Key words:

euphausiids; biodiversity; distribution, monsoon, hydrography, Taiwan

## Morphological Plasticity of *Carex* to Hummocks Micro-topography in an Alpine Swamp Meadow

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### Abstract

Hummock micro-topography is common in alpine swamp meadow of the Qinghai–Tibetan Plateau; the physical environment of hummocks plays an important role in vegetation distribution and species pattern. There also, *Carex*, a Sedge species broadly distributed on the plateau inhabiting both hummocks and hollows, is one of major plant species that has caused great damage to the stability of grassland ecosystem and changed the structure and function of grassland community, induced grassland degeneration. In order to examine how the morphological features of *Carex* population respond to environmental variations of hummocks variation, leaf and stem traits were investigated in alpine meadow along the northern slope of Qilian Mountains, northwestern China. The preliminary results showed that 1) at a given slope aspect, the ratio of leaf number to leaf mass were larger, leaf area to leaf mass, leaf volume to leaf mass were smaller; 2) leaf number, leaf mass and leaf volume on the south-facing slopes of hummocks were larger than those on the north-facing aspect; 3) The grassland community coverage, height, aboveground biomass and soil moisture were larger on north-facing slopes than on north-facing slopes. The cooperation within leaves number, mass, area and volume produced a complex components system that provides greater facility for wide phenotypic plasticity of *Carex*. The varied allometric growth in the leaf traits among environmental gradients is related to many other components of plant life history strategy, including the well established plant branch growth trade-off between architecture geared towards rapid height-gain and one promoting lateral spread, which can be explained with reference to the different selective pressures in each environment.

### Key words:

*Carex*; leaf; allometry; slope aspect; alpine swamp meadow

## Phytogeographical Distribution of *Sida Alba* in Shekhawati Region, Rajasthan

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### Abstract

The present paper discusses the potentiality of natural vegetation *Sida alba* in Shekhawati regions, located in the north-eastern part of Rajasthan state. The region is covered by arid and semi-arid bio-conditions. The study area has 15 tehsils in total with its total 15343 sq. km. geographical area which makes 5.6% of the state's total. Shekhawati region comprise of Churu (29%), Jhunjhunu (31%) and Sikar (40%) respectively. The Shekhawati natural ecosystem has great variety of climates (semi-arid and arid) due to biotic and edaphic conditions, physiography and diversity of natural vegetation.

The plant has wide range of phytogeographical distribution at global level. It covers tropical and subtropical regions of both hemispheres. In India, it is found throughout in hot areas especially in waste places, it is found as a common weed, in open and scrub forest areas.

This plant belongs to Malvaceae Family. It is a small and grass 1 to 2 meters in height. Many minute star-shaped hairs are present all over the plant, the base of plant usually woody.

Being a phytogeographer, the best efforts have been made in this research paper to consume & analyze of decrease of natural vegetation and associated factors in Shekhawati region. Some efforts made by Department of Forest & Public awareness in aspect in enhancement of the land under green coverage through implementations of success

The results suggest to take up immediate steps to adopt the improved forest management technologies with people's participation to lack of effects of decrease of natural vegetation in the region unit. It is not possible to conserve completely.

### Key Words:

*Sida alba*; diversity; ecosystem; green coverage; phytogeographical

## Preliminary Study on Vegetation Index of Biotic Integrity (V-IBI) Assessment for Poyang Lake

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### Abstract

Assessing the ecological health of wetlands would provide resource managers and decision-makers with the critical information based on which strategic wetland protection and restoration policies were made. An index of biotic integrity (IBI) is a widely and frequently used approach for assessing ecological integrity of wetland. Fish and macroinvertebrates are mostly commonly used indicator taxa; Vegetation has been less commonly applied to wetland in China. Vegetation has the advantages including easy to identification, immobility and relatively inexpensive and easy to sample. Poyang Lake, as the Wetland Nature Reserve of Jiangxi Province, plays an important role in biodiversity protection by offering habitat for vegetation, fish, birds and macrophytes. In order to evaluate the health status of Poyang Lake Wetland. A preliminary vegetation based index of biotic integrity (V-IBI) was developed to evaluate the ecosystem health of Poyang Lake by means of data that was collected from 30 sites in Poyang Lake wetland between September 17 to October 15, 2015. To establish the V-IBI calculation, 48 candidate vegetation metrics based on species richness, abundance, ecological affinity and species tolerance were tested for their ability to discriminate between the least disturbed condition and impaired condition. 10 metrics were eventually selected based on the strength of their correlation with the human disturbance gradient. Including Number of vine species, exotic species, sensitive species and tolerant species. Percentage of phalaris species, aquatic guild species and annual, Coverage degree of perennial, sensitive species, tolerant species. They were selected with range test, box-and whisker analysis and pearson correlation analysis. These metrics were transformed into uniform scores using the ratio score method. The total V-IBI score was obtained by summing the scores from the 10 metrics. Based on the 95% percentile of value in all sites, the criteria of health ranking is determined. The distribution range below 95% percentile is divided into 4 quarters. According to the V-IBI assessment, 7 reference sites included 6 healthy sites, and 1 subhealthy site. 1 of 23 impaired sites were healthy, 5 were subhealthy, 6 were good-to-fair, 6 were fair and the other 3 sites were poor. The V-IBI value is related to water quality and habitat quality. The result suggested that the V-IBI approach was feasible for assessing the health of Poyang Lake Wetland.

### Keywords:

wetland; ecological health assessment; V-IBI

## Quantitative Classification and Ordination of natural colonized plant communities of the Bayinhua mining area in Inner Mongolia

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### Abstract

Through field investigation, two-way indicator species analysis (TWINSpan) and distended correspondence analysis (DCA) were used for quantity distribution of natural plant community in Bayinhua mining area. According to the results of TWINSpan and in combination with the ecological characteristics of region, 18 quadrats were divided into 6 associations, and their community characteristics were described. The result of TWINSpan reflects the relation between natural plant community types and environment gradient in Bayinhua mining and was tested and verified in DCA. DCA ordination indicated the distribution pattern of natural plant community was closely related to soil nutrient and soil water.

### Key words:

mining area; natural plant community; TWINSpan classification; DCA ordination

## **Studies of Biofabricated Nanoparticles in Bioremediation of Arsenic from Assenic Contaminated Aquenvironment**

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### **Abstract**

The present study involves the development of adsorbent containing silver nanoparticles for arsenate removal using silver reducing property of a novel fungal strain *Aspergillus foetidus* MTCC8876. Biological reduction of silver by the isolate has been deduced at various time intervals. The fungal biomass after biological silver reduction were harvested and subjected to carbonization and its properties were analyzed using Fourier Transform Infra-Red spectroscopy, X-ray diffraction, scanning electron microscope attached with energy dispersive spectroscopy, BET surface area analysis, field emission scanning electron microscope and transmission electron microscope. The average size of the silver nanoparticles present on the surface of the carbonized silver containing fungal cell (CSF) was 35 nm. The carbonized control fungal cells (CCF) did not contain any particles on its surface. As (V) adsorption efficiency of CCF and CSF was deduced in batch mode by varying parameters like contact time, initial concentration, and pH. Desorption studies were also carried out by varying the pH. The CSF was proved to be exceptionally efficient in arsenate removal when compared to CCF.

### **Key words:**

Biofabrication; Bioremediation; Arsenic; *Aspergillus* sp

## The Changing Wetland Birds and Waterbird Migration Flyway Issue on the Southwest Plateau China

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### Abstract

Wetland birds are significantly impact by global change and human disturbance. But there's little concerning on the wetland bird on the southwest plateau China.

More than 30 species of new recorded waterbirds appear on the plateau in the past 20 years. The reason may be the "chaos fly" led by global change, or the existence of good wetland. Asian Open-bill Stork (*Anastomus oscitans*), which used to distribute in south Myanmar and Thailand, occurred in southwest China since 2006; In Yuanjiang River (Red River) valley, more species and quantity of migrant birds found in southeast part than northwest; Black-necked Crane's (*Grus nigricollis*) wintering area shrink to northeast and northwest Yunnan; Black-headed Gulls (*Larus ridibundus*), wintering in Yunnan, fly to Bosten Lake and Baikal Lake through east foot of Tibetan Plateau. Black-headed Gulls banded in Kunming were found in Australia; Birds banded at Ailao Mountain were founded in Myanmar and Bangladesh; Some new Charadriiformes records appeared, which was used to thinking to travel along east coast.

Such phenomena implied a centralized shorebirds flyway across this region. Shorebirds fly from Siberia to middle Yungui Plateau though east foot of Tibetan Plateau, then travel to Beibu Gulf to the east though Red River, or travel to Bay of Bengal to the west across Ailao Mountain. That is to say, the plateau wetlands in southwest China plays an important role of global wetland bird's survival and breeding. It maybe the wintering region for some north Eurasia waterbirds, the spread region for some waterbirds of south Asia and southeast Asia.

### Key words:

Wetland bird; southwest China; plateau; global change; flyway; human disturbance

## The Characteristic of Soil Macrofauna Community in The No-Till Stover Mulch Under Different Frequency in The Black Soil Region of Northeast China

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### Abstract

No-till stover mulch has been paid more attention for seeking the balance of farmland productivity and environmental safety in recent years. To study the response of soil macrofauna to the no-till stover mulch, a survey of the soil macrofauna community was carried out in the Lishu site of Chinese Academy of Sciences in April, July and October of 2015. On each sampling visit, soil macrofauna were collected by hand sorting at no-till 3 years without stover mulch plot (NT-0), with 1 year stover mulch plot (NT-1/3), with 2 years stover mulch plot (NT-2/3), with 3 years stover mulch plot (NT-3/3) and a conventional tillage plot. The results showed that the dominant groups were Enchytraeidae in the all treatment plots. Soil macrofauna individual density, taxa richness and diversity index were higher in the no-till stover mulch plots than those in conventional tillage plots. The highest of soil macrofauna community individual density appeared in October for all study plots, whereas the highest of taxa and species diversity were in July. As the stover mulching frequency increasing, differences types of individual density change for different soil macrofauna groups. Compared with conventional tillage, no tillage stover mulch could increase the density of individuals Saprophagous, predatory and omnivorous species, but no obvious influence on herbivorous groups. In short, no tillage stover mulch can affect the farmland soil macrofauna community, but the response of different soil macrofauna groups to stover mulching frequency was not consistent.

### Key words:

No tillage; stover mulch frequency; soil macrofauna; community characteristics

## The Contribution of Neogene Plateau Uplift and Quaternary Climate Fluctuations to Endemic Species Diversity in The Tibetan Plateau

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### Abstract

According to the historical biogeographic and phylogeographic studies of several genus and species, there is a comprehensive conclusion that the extensive and rapid plateau uplift in the Neogene and subsequent Quaternary climate fluctuations are the major two drivers triggering the divergence and diversification of most species in the Tibetan Plateau. However, how much do the both factors contribute to the present species diversity of the Tibetan Plateau, we still unknown. In order to quantify the two factors, in this study we firstly identified seven sub-variables/hypothesis containing paleoclimate conditions, topographic complexity, geographic isolation, climate stability, glaciation refugia, disturbance-vicariance and dispersal corridor that closely related to the two factors. Next, we constructed large-scale patterns of species richness and phylogenetic diversity based on the distributions of 3783 endemic seed plants, and further explored the correlations between the diversity patterns and seven related variables. The results showed that most endemic species were located in the southeastern part of the plateau. From the southeast to northwest, species richness and phylogenetic diversity were reduced gradually; the seven variables showed strong correlations with diversity patterns, and the plateau uplift explained more variance. Above all, we concluded that compare to climate fluctuations in the Quaternary, the uplift of plateau made more contribution to the species diversity in the Tibetan Plateau. This conclusion would provide new insights for explaining why the formation of most species mainly occurred in the Neogene period.

### Keywords:

endemism; biodiversity; phylogeography; vicariance; dispersal; alpine plants; Tibetan Plateau

## The Formation Mechanism of Ecosystem Services: A Preliminary Review

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### Abstract

As one hot topic of ecology in decades, the research on ecosystem services (ES) has been brought to a climax by Millennium Ecosystem Assessment (MA) in 2005. Pertinent studies such as ES classification, valuation, trade-offs and coordination, ES flow etc. have increased rapidly, which make ES research has entered a new phase. However, to know ES better and explore much deeper, it is essential to disentangle the formation mechanism of ES. From the statistical results of published papers, it can be found that although many researchers have already realized the importance of knowing the formation mechanism of ES, few papers documented their thoughts directly. Here, we suggested two types of mechanisms, which are theoretical mechanisms and executive mechanisms, and filled their contents by reviewing previous literatures after 2005. Moreover, there are also some problems need to be solved in further studies, like, the scale-dependence and hierarchy in the formation of ES, and how can we get the experimental evidence of these problems. We hope this article could attract more valuable systematic research efforts on the formation mechanism of ES, and thus forming a research paradigm of this area in the future.

### Key words:

ecosystem services; formation mechanism; ecosystem function; functional trait; human activity

## The Species Diversity Study Among Different Forest Types of Water Conservation Forest in Banchengzi Basin

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### Abstract

With the four different forest type of water conservation forests located in the Banchengzi Basin in Miyun County of Beijing as the object of study, by field survey we analyzed the characters of the forest vegetation communities. The results show that:(1)The main types of water conservation forest in the study area are Pinus forest, Quercus mongolica forest, Platycladus orientalis forest and Populus davidiana forest.(2) There are 98 species of undergrowth vegetation grow in the shade of four forest types in water conservation forests, the number of species of shrub layer is 29 and the herbaceous is 71.(3) The species richness of herb layer is higher than shrub, indicates that the herb layer of the four forest types is more developed. The trend of richness between shrub layer and herb layer are consistent. (4) The tendency of diverse indexes in shrub layer is similar with species richness, while the tendency of diverse indexes in herb layer has marked difference compared with species richness. The species richness and diversity index in coniferous forests are higher broad-leaved forests, and the diversity index of herb layer is opposite to shrub layer.

### Key words:

species richness; water conservation forests; species composition; diversity index

## C12.03 Biogeography and Biodiversity

### Recent Developments and Expansions in Biogeography



Home

#### Oral

1. [Increased Stem Density and Competition May Diminish the Positive Effects of Warming at Alpine Treeline](#)  
Yafeng Wang (Key Laboratory of Alpine Ecology and Biodiversity, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, China), Neil Pederson (Harvard Forest, Harvard University, United States), Aaron M. Ellison (Harvard Forest, Harvard University)
2. [Recent Developments and Expansions in Global and Mexican Local Biogeography of Soil Fungi](#)  
Luis Villarreal Ruiz (Laboratorio de Recursos Genéticos Microbianos & Biotecnología (LARGEMBIO), PREGEP Genética, Colegio de Postgraduados, Campus Montecillo, Mexico), Leho Tedersoo (Natural History Museum, University of Tartu, Estonia), Cecilia Neri Luna
3. [Relevant Source Area of Pollen and Relative Pollen Productivity Estimates in The Guancenshan Mountain Area](#)  
Yuecong Li, Yawen Ge (College of Resources and Environment Sciences and Hebei Key Laboratory of Environmental Change and Ecological Construction, Hebei Normal University, China)
4. [Rice Cropping Density and Intensity Lessened in Southeast China During The 21st Century](#)  
Bingwen Qiu (Fuzhou University, China)
5. [Sensitivity of The Forest-Steppe Ecotone to Postglacial Climate Change](#)  
Hongyan Liu (Peking University, China)
6. [Similarity of Landscape Structure and Floras of Landscape Microregions in Heterogeneous Catchments \(Altai Krai, Russia\)](#)  
Dmitry Vladimirovich Zolotov, Dmitry Vladimirovich Chernykh (Institute for Water and Environmental Problems of Siberian Branch of the Russian Academy of Sciences (IWEP SB RAS), Russian Fed)
7. [To The Study of Influence of the Enhanced Surface Infrared Radiation On Ecosystems in Southern Baikal Region \(Eastern Siberia\)](#)  
Mikhail Vilor (The V.B. Sochava Institute of Geography SB RAS, Russian Fed), Nikolai Vilor (A.P. Vinogradov Institute of Geochemistry SB RAS, Russian Fed), Victor Chepinoga (The V.B. Sochava Institute of Geography SB RAS, Russian Fed)
8. [Trends in Terrestrial Biota of the Russian Arctic as the Effects of the “Greening” of Tundra](#)  
Arkadiy Tishkov, Elena Belonovskaia (Institute of Geography, Russian Academy of Sciences, Russian

Fed)

9. [Typological Classification and Mapping of Terrestrial Landscapes at Global and Regional Scales](#)

Nina Alekseeva, Emma Romanova, Marina Arshinova, Julia Greenfeldt (Lomonosov Moscow State University, Russia)

## Poster

1. [Amorpha Fruticosa \(Mill.\) Invasive Plant Species in Comana Natural Park \(Romania\). Environmental Conditions and Potential Distribution](#)

Monica Stefania Dumitrascu; Gheorghe Kucsicsa; Ines Grigorescu (Romania, Institute of Geography, Romanian Academy)

2. [Biodiversity in Chinese Loess Plateau during late Cenozoic](#)

Yiyin Li; Fei He (China, Peking University)

3. [Biological Weathering on the First Gallery Wall of Angkor Wat Temple, Cambodia](#)

Wonsuh Song (Japan, JSPS Foreign Researcher, Saitama University); Tetsuya Waragai (Japan, Nihon University); Chiaki T Oguchi (Japan, Saitama University)

4. [Changing Pattern of Crop Fraction in Late Blight Induced Potato Crops in Potato Bowl of West Bengal by using Multi-temporal Time Series AWiFs Data](#)

Ramprasad Kundu; Abhisek Chakrabarty (India, Vidyasagar University - Midnapore)

5. [Distribution of Bacterial and Archaeal Communities in the Sediment of a Drinking Water Reservoir](#)

Yongjuan Chen; Xiaoyan Wang; Yang Liu (China, Capital Normal University)

6. [Preliminary Evaluation on The Use of Homing Pigeons as a Biomonitor of Affects of Atmospheric Metal Exposure](#)

Jia Cui; Shuying Zang (China, Harbin Normal University); Richard Halbrook (China, Southern Illinois University (Emeritus))

7. [Spatially-explicit Quantifying of the Trade-offs Among Multiple Ecosystem Services](#)

Yingjie Lee; Liwei Zhang (China, Department of Geography, Tourism and Environment College of Shaanxi Normal University)

8. [The Combined Effect of Enzymolysis and Aeration on Controlling Vertical flow Constructed Wetland Clogging](#)

Lixiao Ni; Danye Li (China, A Key Laboratory of Integrated Regulation and Resource Development on Shallow Lakes, MOE, School of Environment, Hohai University, Nanjing, 210098, P. R. China); Shiyin Li (China, School of Environment, Nanjing Normal University, Nanjing, 210097, P. R. China)

## Increased Stem Density and Competition May Diminish the Positive Effects of Warming at Alpine Treeline

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### Abstract

The most widespread response to global warming among alpine treeline ecotones is not an upward shift, but an increase in tree density. However, the impact of increasing density on interactions among trees at treeline is not well understood. Here, we test if treeline densification induced by climatic warming leads to increasing intraspecific competition. We mapped and measured the size and age of Smith fir trees growing in two treelines located in the southeastern Tibetan Plateau. We used spatial point-pattern and codispersion analyses to describe the spatial association and covariation among seedlings, juveniles, and adults grouped in 30-year age classes from the 1860s to the present. Effects of competition on tree height and regeneration were inferred from bivariate mark-correlations. Since the 1950s, a rapid densification occurred at both sites in response to climatic warming. Competition between adults and juveniles or seedlings at small scales intensified as density increased. Encroachment negatively affected height growth and further reduced recruitment around mature trees. We infer that tree recruitment at the study treelines was more cold-limited prior to 1950 and shifted to a less temperature-constrained regime in response to climatic warming. Therefore, the ongoing densification and encroachment of alpine treelines could alter the way climate drives their transitions towards subalpine forests.

### Key words:

climatic warming; codispersion; dendroecology; facilitation; long-term ecological process; paleoecology; plant interactions; point-pattern analysis; timberline.

## Recent Developments and Expansions in Global and Mexican Local Biogeography of Soil Fungi

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### Abstract

Soil fungi are an overlooked hyper-diverse group of microorganisms considered as the main drivers of forest ecosystem processes and with historical bonds with human culture, health and economy. In this 4 year study ~15,000 soil samples from 365 sites (4 from climate contrasting and geographically distant Neotropical forests of Mexico) around the world were obtained. We use 454 pyrosequencing and multiple regression- and structural equations models to unravel the roles of biotic and abiotic parameters and the effect of the geography and climate on soil chemistry, vegetation and fungal communities. Phylogenetic and functional fungal groups were related with global terrestrial biomes using a network approach and an area-based clustering. A total of 45,000 fungal (nonsingleton OTUs) soil inhabitants were revealed, representing half of the described species worldwide. In Mexico, a total of 10,014 fungal species were discovered. Globally and locally climate was the best predictor with direct effects on plants, fungi and indirectly altered soil conditions. These findings challenge the paradigm supporting the notion that plant richness shapes fungal diversity and community assemblage, because it was found that the plant to-fungi richness ratio declined towards the poles. Furthermore, soil fungi inhabitants complied with Rapoport's rule as stated in animals, plants and marine bacteria. Fungal functional groups richness peaked in tropical forest and exhibit strong trends of endemism although it was observed that multiple fungal taxa are cosmopolitan. The impact of this global metadataset can be useful as a base line at local-national-and transnational-level monitoring strategies, and relevant for better decision-making.

### Key words:

Soil fungi biogeography; Mexican fungi; global fungal metabarcoding; fungal macroecology

## Relevant Source Area of Pollen and Relative Pollen Productivity Estimates in The Guancenshan Mountain Area

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### Abstract

Relative pollen productivity (RPPE) and relevant source area of pollen (RSAP) are very important parameters in quantitative vegetation reconstructions. RPPE and RSAP are estimated in the Guancenshan Mountains Area were done with 3 ERV models using ERV-Analysis.v1.2.3 Program. Pollen sampling was performed at 30 random sampling sites. The results show that *Artemisia*, *Asteraceae*, *Poaceae*, *Pinus*, *Picea*, *Quercus*, *Betula*, *Hippophae* dominate the pollen assemblages. The RSAP is about 600m based on ERV sub-model 3 with Prentice's distance-weighting method. The results of RPPE suggest that the values of *Pinus*, *Hippophae* are 10 times higher than *Poaceae* and the RPPE of *Picea* and *Betula* are about 5 times higher than *Poaceae*. But the RPPE of *Artemisia* is only about 3-4 times higher than that of *Poaceae*, which is much lower than that in the steppe area. The RPPE of *Quercus* is about half of *Poaceae*. After that we quantitative reconstruct the vegetation cover with REVEAL model, and the results show that correlation coefficient between observed values and reconstructed values is more than 0.8, indicating that the reconstructed results is basically reliable.

### Key words:

RSAP; RPPE; Guancenshan Mountains; vegetation quantitative reconstruction

## Rice Cropping Density and Intensity Lessened in Southeast China During The 21st Century

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### Abstract

Accurate and updated time series maps of paddy rice distribution and planting intensity will greatly improve our knowledge. Unfortunately, spatiotemporal explicit information on rice fields is relatively limited and considerable uncertainties still exist as regards to its inter-annual variations in China. In this study, an improved rice mapping methodology was proposed through combined consideration of vegetation phenology and surface moisture variations from different seasonal rice. This method was applied to Southeast China based on 500 m 8-day composite Moderate Resolution Imaging Spectroradiometer (MODIS) Enhance Vegetation Indices with two bands (EVI2) during the period 2001-2013. Its efficiency was validated with 763 ground survey sites, with an overall accuracy of 95.02% and the kappa index of 0.9217. Spatiotemporal analysis indicated that rice cropping density and intensity lessened in Southeast China during the period 2001-2013. Particularly, the paddy rice planted areas reduced by 30.09%, changing from 231,005 km<sup>2</sup> to 161,484 km<sup>2</sup>. Among them, the planted areas of double rice decreased by 49.34%, changing from 34,215 km<sup>2</sup> to 17,335 km<sup>2</sup>. Therefore, averaged rice cropping intensity Southeast China decreased from 1.148 to 1.107. The primary dynamic patterns were from single rice or a rotation of rice plus other crops to non-rice (93,386 km<sup>2</sup>) and double rice to non-double rice (24,132 km<sup>2</sup>). When analyzed at provincial and altitudinal gradient levels, it was obvious that areas with greater rice cropping density or intensity were associated with more remarkable reductions.

### Key words:

Rice cropping intensity; rice cropping density; spatiotemporal variations; MODIS EVI2; Southeast China

## Sensitivity of The Forest-Steppe Ecotone to Postglacial Climate Change

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### Abstract

Estimating vegetation sensitivity to past climate change will improve the predictions of future vegetation dynamics. We first reconstructed the LGM refugee of main tree genera (*Pinus*, *Quercus* and *Betula*) in the current forest-steppe ecotone in China through combining palaeoecological, phylogeographical and ecological methods. Our results suggest that northern China was very likely LGM refugia for these tree genera. We further compiled 52 pollen sequences from the monsoon-influenced northern China to reconstruct the Holocene dynamics of three forest types, as well as steppe and desert indicated respectively by *Artemisia* and *Chenopodiaceae*. Our results show that the Holocene vegetation dynamics differed across vegetation types, with *Pinus* and *Quercus* at lower elevations more sensitive to monsoon-induced precipitation changes and *Betula* at higher elevations more sensitive to temperature changes at the beginning of the Holocene. We also found an increasing sensitivity for forests and steppe within different groups following evident reduction in monsoon intensity since 5 ka BP, caused most probably by climate drying in this drought-determined forest-steppe in northern China. Besides regional scale forest migration caused by climate change, elevational movement as well as site expansion and decline are also suggested and tested by our palynological works within the current forest-steppe ecotone. Our study provides insights into the mechanisms of individualistic responses of plant taxa as well as the asymmetrical response of ecotonal vegetation to the Holocene monsoon development in China.

### Key words:

Vegetation sensitivity; forest-steppe ecotone; monsoon; Holocene; LGM

## Similarity of Landscape Structure and Floras of Landscape Microregions in Heterogeneous Catchments (Altai Krai, Russia)

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### Abstract

The landscape map of the Kasmalinsky ( $K=6624 \text{ km}^2$ ) and the Barnaulka river ( $B=5863$ ) adjacent basins-twins was constructed at the level of types of terrain groups. The catchments inherit the ancient flow gullies crossing droughty steppe (I), temperate-droughty steppe (II) and southern forest-steppe (III) subzones of the Ob plateau. With allowance for zonal-climatic, morpholithological and basin organization, the landscape microregions representing the fragments of natural subzones within the catchments were defined: KI=1875, KII=1467, KIII=3281; BI=1727, BII=1209, BIII=2927. The similarity of landscape structure (quantitative) and flora of higher vascular plants (qualitative) of these microregions were calculated using the Czekanowski measure. The sets of specific types of terrain groups were used for comparison of two adjacent microregions of the same subzone, but belonging to different catchments. For comparison of contiguous microregions of the same catchment but from different subzones we used landscapes-analogues, i.e. morpholithologically similar types of terrain groups. It is shown that the catchments, and the pairs of their adjacent microregions demonstrate high similarity:  $K, B=0.79$ ;  $KI, BI=0.78$ ;  $KII, BII=0.70$ ;  $KIII, BIII=0.83$ . Within the basins the situation is different:  $KI, KII=0.73$ ;  $KI, KIII=0.70$ ;  $KII, KIII=0.52$ ;  $BI, BII=0.78$ ;  $BI, BIII=0.65$ ;  $BII, BIII=0.58$ . Steppe ( $I+II=6278$ ) and forest-steppe ( $III=6208$ ) zones show high similarity:  $I+II, III=0.78$ ;  $KI+II, KIII=0.78$ ;  $BI+II, BIII=0.73$ . The similarity of the native flora of higher vascular plants (F) in the Barnaulka river basin is presented as follows:  $BFI, BFII=0.86$ ;  $BFI, BFIII=0.75$ ;  $BFII, BFIII=0.78$ ;  $BFI+II, BFIII=0.80$ . It is evident that floristic diversity varies more smoothly and regular than the landscape one: the distant microregions ( $BFI, BFIII$ ) are weaker connected than the adjacent ones. *The work is supported by the RFBR 15-05-01760-a.*

### Key words:

types of terrain groups; higher vascular plants; Czekanowski similarity measure

## To The Study of Influence of the Enhanced Surface Infrared Radiation On Ecosystems in Southern Baikal Region (Eastern Siberia)

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### Abstract

In south of the Baikal region, mainly along the seismic active faults, are known linear and broader ranges with enhanced surface infrared (IR) radiation (Vilor et al. 2015). To study genesis and dynamics of outgoing IR radiation, we used different remote sensing methods, i.e. the brightness temperature estimation, the heat flux density and capacity, the chlorophyll distribution, and NDVI estimation. The brightness temperature and NDVI estimation methods are found to be the most effective ones. The selected study area (model polygon) is located in foothills of Khamar-Daban Ridge along the margin part of South Baikal rift. For estimation we used night images of September and December 2012–2013 from radiometer MODIS. For verification of the analysis results, we used also information from field investigations (data sampled every 5" on seven profiles) as well as averaged IR satellite NOAA data from 1996–2006 in 8–11 $\mu$ m bands. Within the model polygon we revealed the large positive extrema of the brightness temperature values along the depression and local thermal lows along margins of the fault. The integral correlation of NDVI with brightness temperature and outgoing heat flux density is not available in the late autumn and early winter. This reflects endogenous genesis of the IR radiation. But on some profiles the correlation is revealed. The area of outgoing IR radiation coincides with center of nemoral refugium along foothills of Khamar-Daban Ridge (Chepinoga et al. 2015). The reported study was partly funded by RFBR according to the research project № 16-05-00783-a.

### Key words:

Surface infrared radiation; MODIS; Lake Baikal; NDVI; brightness temperature; NOAA

## Trends in Terrestrial Biota of the Russian Arctic as the Effects of “the Greening” of Tundra

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### Abstract

The results of remote sensing and terrestrial investigation in 2000 and 2014 in Russian Arctic are presented. A progressive expansion of the forest vegetation at the northern limit due to the climatic changes (permafrost melting, changes in rainfall and snow accumulation) was revealed.

According to the analysis of satellite images the trend of growth of productivity (more than 25-30%) and increasing of herbaceous plants' share in the tundra communities were observed. Over the past decade the average value of the NDVI index increased, which reflected the degree of "greening" of the territory, due to an increase in the number and length of the growing period.

As for the structure of arctic vegetation communities the transformation of the life forms spectrum was observed. First of all, this process concerns the increasing of shrubs (biomass, abundance and cover). Then the reducing of lichens and mosses, and increasing of grasses coverage were recorded. The so called "greening" of tundra was also associated with fires and overgrazing of domestic reindeer.

Identified current trends in arctic vegetation coincided with the changes of distribution and abundance of indicators in terrestrial fauna of Russian Arctic (geese, sandpipers, reindeer, lemmings, polar fox), which could be interpreted as the effects of tundra habitat's "greening": for example, the increasing in the abundance and changes in migration routes for geese, stopping 3-4 years oscillates of the lemmings' population in some regions, the transformation of continuous distribution of reindeer. The obtained results are important for the Arctic biodiversity conservation.

### Key words:

biodiversity; tundra communities; biota changes; productivity; remote sensing

## Typological Classification and Mapping of Terrestrial Landscapes at Global and Regional Scales

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### Abstract

Russian physical geography has wide experience of the global mapping of terrestrial landscapes based on holistic approach. Typological classification and the concept of the zonal taxonomy of terrestrial landscapes of the Earth became the basis for the series of maps. In 1960s maps of zonal types of landscapes were compiled for Physical-Geographical Atlas of the World. In 1980-1990 both natural and natural-anthropogenic landscapes were mapped at small scales for teaching purposes and for the digital atlas "Resources and Environment. World Atlas" (1998). Recent decades saw further development of the concept of "zone- sector-belt" pattern of landscapes which includes several hierarchically subordinated spatial strata. New theoretical studies and various global datasets allowed starting the elaboration of a new (third-generation) map of terrestrial landscapes at the scales of 1:15 Mln to 1:5 Mln. A new classification of landscape units was suggested based on the analysis of principal landscape-forming factors (climate, relief, lithology and biota including natural vegetation and soil groups). A new cartographical model was developed specifying the following hierarchical levels: geographical belts, sectors, natural zones and sub-zones, classes and subclasses of landscapes. Classification criteria used for landscape systematization and mapping include both natural parameters (heat and moisture supply, the vegetative period pattern, biological productivity, etc.) and anthropogenic indicators (land cover, population density, etc.) thus providing for the evaluation of the geocological state of landscapes. Refined boundaries of geographical belts and natural zones are reflected at the generalized model of zonal pattern of the Earth's terrestrial landscapes known as an "Ideal continent".

### Key words:

terrestrial landscapes; typological classification; landscape-forming factors; natural zones

## **Amorpha Fruticosa (Mill.) Invasive Plant Species in Comana Natural Park (Romania).**

### **Environmental Conditions and Potential Distribution**

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#### **Abstract**

Invasive species are acknowledged as economic and environmental threats, becoming key components of global change through their high adaptive capacity which enables them to spread over wide territories. As a result, the assessment of invasive species in protected areas has become an important research direction due to their negative impacts on native species and ecosystems.

Understanding the relationships with their environmental conditions had led to the development of various approaches and methodologies able to assess different aspects related to the occurrence, dynamics, current and potential distribution, potential impact on the environment and economy, etc.

The current study proposes a geographical GIS-based quantitative and qualitative analysis of one of the most invasive species in Europe (*Amorpha fruticosa* Mill.) in a Romanian protected area, i.e. Comana Natural Park (VIUCN category, Natura 2000 site, as well as wetland of International Importance – Ramsar) which was carried out in the framework of the EU FP7 – Building Capacity for Black Sea Catchment Observation and Assessment System supporting Sustainable Development (EnviroGRIDS).

The authors focused on the current state and potential distribution of this species in relation to its main natural (e.g. relief, soils, hydrology) and anthropogenic (e.g. transport network, agriculture) driving factors based on field surveys and geospatial data. The current approach is an important step in spotting areas with potential occurrence of this invasive plant species as a tool for decision-makers in biodiversity conservation and invasive species monitoring.

#### **Key words:**

invasive plant species; *Amorpha fruticosa* (Mill.); Comana Natural Park; environmental conditions; potential distribution; Romania

## Biodiversity in Chinese Loess Plateau during late Cenozoic

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### Abstract

To explore the development history of biodiversity in Chinese Loess Plateau and provide a unique perspective on biodiversity conservation, two late Cenozoic loess profiles (Fugu, FG and Tanyugou, TYG) were selected to extract pollen. Rich pollen with diverse taxa was present. The main pollen types contain Artemisia, Chenopodiaceae, Typha, Urticaceae, Pinus, Betula, Quercus and Ulmus. Palynological richness analysis shows that biodiversity of TYG was higher than FG. However, biodiversity present variable patterns in different periods. FG has a decreasing trend during 8.5-2.9 Ma, but it changed with time: increased during 8.5-8.2 and 3.7-3.5 Ma, decreased during 8.2-7.3 and 3.5-2.9 Ma, and fluctuated during 7.3-3.7 Ma. Biodiversity of TYG present an increasing trend during 6.7-2.2 Ma, with an increase during 6.7-6.0 and 3.5-2.5 Ma, a decrease during 6.0-5.2 and 2.5-2.2 Ma, and frequent changes during 5.2-3.5 Ma. By comparing palynological richness curves of the FG and TYG profiles, we found that they have common peaks and share the same trend during 6.7-5.2 Ma. Whereas, when palynological richness of FG decreased during 3.5-2.9 Ma, that of TYG increased. Such a difference is likely due to geomorphology of these two places: TYG profile is located in the valley, which provides a suitable habitat for plant growth.

### Key words:

biodiversity; pollen; Loess Plateau; Cenozoic

## Biological Weathering on the First Gallery Wall of Angkor Wat Temple, Cambodia

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### Abstract

The Angkor complex is mainly constructed in the 9<sup>th</sup>~13<sup>th</sup> century by Khmer dynasty and was designated as a world cultural heritage by UNESCO in 1992. Angkor Wat temple, constructed of sandstone and laterite, is one of the most popular temples in the complex. The French School of Asian Studies (Ecole française d'Extrême-Orient, EFEO) had performed conservation work in early 20<sup>th</sup> century. However, it was in poor condition after the Cambodian civil war. During the period of 1986 to 1993, Archaeological Survey of India (ASI) contributed to the Angkor Wat's conservation including reconstruction of the building itself, replacement of blocks, and removal of vegetation. After completion of the cleaning procedures by ASI, the original color, gray to yellowish brown, of the Angkor Wat sandstone was restored. However, after two years, cyanobacteria have colonized large portions of the surface of Angkor Wat temple. We categorized surface of the first gallery wall into four types: 1) area covered by cyanobacteria; 2) un-covered area; 3) erosion from surface peeling; and 4) re-covered area after peeling off. We measure the hardness of the first gallery wall by Schmidt rock hammer.

The hardness of the surface is in the order of Re-covered, Exfoliated, Uncovered and Covered. Cyanobacterial colony may play a surface hardening in the earlier stage, however, it lowers the rock surface hardness in longer period (ca. 20 years). Average rebound value of exfoliated area is 3.7 times higher than cyanobacteria covered area. In Un-covered area, it is 3.6 times harder than covered one.

### Key words:

Angkor Wat temple; Biological weathering; Cyanobacteria; Stone cultural heritage

## Changing Pattern of Crop Fraction in Late Blight Induced Potato Crops in West Bengal by using Multi-Temporal Satellite Data

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### Abstract

Crop fraction is the ratio of crop occupying a unit area in ground pixel, is very important for monitoring crop growth. One of the most important variables in crop growth monitoring is the fraction of available solar radiation intercepted by foliage. Late blight of potato (*Solanum tuberosum*), caused by the oomycete pathogen *Phytophthora infestans*, is considered to be the most destructive crop diseases of potato worldwide. In this study different crop fraction estimation method like linear spectral un-mixing, Normalized difference vegetation index (NDVI) based DPM model, Ratio vegetation index based DPM model, improved Pixel Dichotomy Model were evaluated using multi-temporal IRS AWiFs data in two successive potato growing season of 2012-13 and 2013-14 over the study area and compared with measured crop fraction. The comparative study based on measured healthy and late blight affected potato crop fraction showed that improved Pixel Dichotomy Model maintain the high coefficient of determination ( $R^2= 0.835$ ) with low root mean square error (RMSE=0.21) whereas the correlation values of NDVI based DPM model and RVI based DPM model is 0.763 and 0.694 respectively. It showed that the healthy potato crop fraction profile maintained the normal phenological trend whereas the late blight affected potato crop fraction profile suddenly fallen after late blight disease attack. Therefore, it can be concluded that based on the result of this study the improved Pixel Dichotomy Model is the most convenient method for crop fraction estimation for this region with satisfactory accuracy.

### Key words:

Potato Late blight; AWiFs Data; Crop Fraction; Pixel Dichotomy Model

## **Distribution of Bacterial and Archaeal Communities in the Sediment of a Drinking Water Reservoir**

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### **Abstract**

Sediment microbial communities play important roles in biogeochemical cycles of aquatic system. However, few studies have been performed to investigate the composition and variability of the bacterial and archaeal community in the sediment of a drinking reservoir. In this paper, we investigated the bacterial and archaeal community in the Minyun reservoir, Beijing, China by using quantitative PCR and Illumina MiSeq sequencing techniques. The results illustrated that the abundance of bacteria was much higher than that of the archaeal community and the abundance of microorganism was regulated by nitrite-nitrogen, pH and water depth. Bacterial diversity in most of the sediments outnumbered archaeal diversity and nitrate-nitrogen was suggested as an important determinant of bacterial diversity. Phylogenetic analysis revealed that the dominant bacterial phyla across all sediments were Proteobacteria, Bacteroidetes, Chloroflexi, Nitrospirae, Acidobacteria and Verrucomicrobia. Particularly, proteobacteria predominated in all the sediment samples, is mainly consisting of classes Betaproteobacteria, Deltaproteobacteria and Gammaproteobacteria. While, Euryarchaeota was the dominant archaeal phyla across all of the samples, but its percentage had a large variation. Methanomicrobia was the largest euryarchaeal class across all the summer samples. Halobacteria dominated in the autumn and spring samples. Redundancy analysis (RDA) and Canonical correspondence analysis (CCA) was further carried out to determine the relationships between environmental variables and bacterial and archaeal community structure, respectively. Nitrite-nitrogen, nitrate-nitrogen, ammonia-nitrogen and water depth were considered to be the key factors of driving the changes in the composition of bacterial and archaeal communities.

### **Key words:**

Archaea; Bacteria; Reservoir sediment; Microbial community structure; Microbial abundance; Microbial diversity

## Preliminary Evaluation on The Use of Homing Pigeons as a Biomonitor of Affects of Atmospheric Metal Exposure

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### Abstract

Biomonitoring provides direct evidence of the bioavailability and accumulation of toxic elements in the environment and in the current study, homing pigeons were used as a biomonitor of atmospheric pollution in Beijing and Guangzhou, China. And 1-2, 5-6, and 9-10+ year old homing pigeons collected from Beijing. Cadmium, lead, and mercury concentrations were measured in lung, kidney, and liver tissues of homing pigeons. There were differences of metals concentrations in lung tissues among age groups and Gray/black lung margins observed in lungs of monitored pigeons are thought to result from chronic exposure to particulate matter. Cadmium concentrations in all tissue and lung Pb concentrations were significantly greater in pigeons collected from Guangzhou compared to those from Beijing. Lung Cd and Pb concentrations corresponded to differences in ambient air concentrations between the two cities, suggesting that homing pigeons are valuable biomonitors of atmospheric metal contamination. Liver and kidney Hg concentrations were significantly greater in pigeons collected from Beijing compared to those collected from Guangzhou, while Hg concentrations in lung tissue were not significantly different. Results of the current study support a conclusion that homing pigeons provide valuable data for evaluating exposure and potential effects to environmental metal concentrations.

### Key words:

heavy metals; homing pigeons; atmospheric pollution; biomonitor

## **Spatially-explicit Quantifying of the Trade-offs Among Multiple Ecosystem Services**

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### **Abstract**

Natural ecosystems are increasingly dominated by humans, whose demand preference have tremendously aggravated the imbalance of our dependent ecosystem. Traditionally, worldwide attention has been drawn to focus on the amelioration of deteriorating eco-environment, and remarkable achievements has been done for the sustainable development. However, with the rapid changes of climate, population, and land use, a lacking in clarity of the interaction among multiple ecosystem services (ESS) will intensify the current environmental problems. Thus, based on remote sensing data and ecosystem services modeling, we propose a model for spatial-explicitly assessing of trade-offs and synergies among multiple ESS. Three special important ESS for Shaanxi Province of China are selected: soil conservation (SC), Net Primary Productivity (NPP), water yield (WY). The results show that: (1) The spatial patterns of SC, NPP and WY are all approximately increase from north to south; (2) All three ESS increased in northern Shaanxi, but the spatial concordances in our framework revealed that synergies only exist in SC-NPP and SC-WY, but NPP-WY presents trade-offs. (3) Besides, the significant trade-offs presented among all three ESS in the middle Shaanxi. Therefore, after the spatially explicit mapping of the relationships between these three ESS, we suggest that the insightful forest-water interaction should integrate both climatic conditions and physical geography, especially land use changes, into detailed analysis. The framework proposed will facilitate the interpretation of spatial-explicit ESS trade-offs and synergies for regional scale and help in targeted policy-making.

### **Key words:**

ecosystem service; trade-off; synergy; climate change; LULC; forestation; partial correlation

## The Combined Effect of Enzymolysis and Aeration on Controlling Vertical Flow Constructed Wetland Clogging

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### Abstract

Because of its ability to removing excess nutrients and certain pollutants from wastewater, vertical flow constructed wetlands have been applied to domestic and industrial wastewater treatment for many decades. The biggest drawback of VFCWs is clogging. This study mainly focuses on the effects of polysaccharide hydrolase and oxidation on clogging conditions. At the same time, this study also investigates the microstructure and characteristic of extracellular polymeric substances (EPS) and the removal rates of different pollutions when oxygen and enzyme were added into reactors. The results show that enzymolysis had no significant effect on micro organic environment. Aeration can promote the removal efficiency and improve microorganism environment. Hence, the content distribution and total quantity of upper and lower matrix layer was kept stable. Furthermore, aeration induced the quantity of many anaerobiont and fungus. After enzymolysis, the reactors run well and removal rate of pollutions kept stable or higher. In a word, adding  $\beta$ -glucanase and aeration can effectively improve the wetland environment and keep it's running more persistent.

### Key words:

enzymolysis; aeration; constructed wetland; clogging

## C12.04 Climatology

### Climate Change and Variability in Different Scales



Home

#### Oral

1. [A Climatic Regionalization of The Balkan Peninsula Under Conditions of Climate Change](#)  
Peter Nojarov (National Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences, Bulgaria)
2. [A New Method for Generating the Thermal Growing Degree Days and Season in China during the Last Century](#)  
Yin Yunhe, Haoyu Deng, Shaohong Wu (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
3. [Atmospheric Teleconnection for Ice Cover Phenology on Lake Ladoga](#)  
Mikhail Naumenko, Sergey Karetnikov, Vadim Guzivaty (Limnology Institute of Russian Academy of Sciences, Russian Fed)
4. [Changes of Glaciers and Glacial Lakes Implying the Corridor-Barrier Effects and Climate Warming in Hengduan Mountains, Southeast Tibetan Plateau](#)  
Kaiguo Chai (Hunan University of Science and Technology, China)
5. [Climate Change and Water Resources: Impacts and Responses within River Kaduna Basin](#)  
Christiana Egbinola (University of Ibadan, Nigeria)
6. [Climate Change Effects on Rice Yield in Zhejiang, China](#)  
Yahui GUO (IGSNRR, China)
7. [Climate Change in La Paz, Bolivia during the 20th Century Based on the Jesuit Meteorological Records.](#)  
ZAIKI Masumi (Seikei University, Japan), Kazuharu MIZUNO (Kyoto University, Japan), Togo TSUKAHARA (Kobe University, Japan)
8. [Climatic Variability and Food Grain Production in Satara District](#)  
Parag Khadke (Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, 431606, India)
9. [Comparison of Improved Empirical Models and Artificial Neural Network Model for Global Solar Radiation Estimating in China](#)  
Ling Zou Aiwon Lin, Zhenzhen Zhao, Hongji Zhu, Qian Yang (Wuhan University, China),
10. [Enhanced or Weakened Western North Pacific Subtropical High under global warming?](#)

He Chao (Institute of Tropical and Marine Meteorology, China), Tianjun Zhou (Institute of Atmospheric Physics, China), Ailan Lin (Institute of Tropical and Marine Meteorology, China), Bo Wu, Dejun GU (Institute of Atmospheric Physics, China)

11. [Environment Variability Archived by Color of the Drill Core Beihuqiao in Hangjiahu Plain During the Early-Mid Holocene, China](#)  
Yunxia Zhang, Wei Ye (College of Geography and Environmental Sciences, Zhejiang Normal University, China)
12. [Extreme Summer Climates in Japan after Large Volcanic Eruptions during Historical Times](#)  
Takehiko Mikami (Teikyo University, Japan)
13. [Frost and Ice Days in Turkey](#)  
Gönengil Barbaros (İstanbul University, Turkey), Zahide Acar Deniz, Burcu Mestav (Canakkale Onsekiz Mart University, Turkey)
14. [Gendered Analysis of Climate Change Impacts on Water](#)  
Shouraseni Roy (University of Miami, United States)
15. [Impacts of Climatic Tendency, Fluctuation and Extreme Events on Rice Yield: A Site Scale Research in Wulin, Changde, Hunan Province, China](#)  
Zhu Wang, Peijun Shi, Yongchang Meng, Zhao Zhang (Beijing Normal University, China)
16. [Indigenous Knowledge of Climate Change Adaptation in Desert Prone Front States in Northern Nigeria](#)  
Salisu Lawal Halliru (Federal College of Education Kano Nigeria, Nigeria), KASSIM B. SEKABIRA (Kampala Internationa University, Uganda)
17. [Issues of Land Degradation in The Darhad Depression, Mongolia](#)  
Bayarjargal Enebish (National University of Mongolia, Mongolia)
18. [Linking Inter-annual Streamflow Variability to Southern Annular Mode, Regional Climate and Weather Regimes in New Zealand, 1979-2011](#)  
Glenn McGregor (Durham University, United Kingdom), Ning Li (University of Auckland, New Zealand)
19. [Modeled Responses of Summer Climate to Realistic Land Use/Cover Changes from The 1980s to The 2000s Over Eastern China](#)  
Yang Hu (Institute of Heavy Rain, CMA, Wuhan, China), Xuezheng Zhang (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographical Sciences and Natural Resources Research, CAS), Rui Mao

20. [Persisting Climatic Warming at High Elevation Sites Across the Globe in The Post-1998 Period](#)  
Mengben Wang, Qixiang Wang, Xiaohui Fan (Shanxi University, China)
21. [Precipitation Changes Over the Past 110 Years in Central Asia](#)  
Zengyun Hu (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
22. [Prediction of The Twenty-First Century's Climate of Extreme Wind Speed Regime in The Arctic Region](#)  
Larisa Sokolova, Galina Surkova (Lomonosov Moscow State University, Russian Fed)
23. [Pre-Instrumental Weather Record from Personal Diaries: Precipitation Distributions in Response of El Nino Events](#)  
Wenjing Xie, Shu Gao (Nanjing University, China)
24. [Projection of IPCC AR5 Coupled Climate Models for Multitimescale Temperature Variation in Red river basin \(China\) from 1960 to 2050](#)  
LI Shaojuan, YIN Fangli, LI Mengchun (School of Urban and Environment, Yunnan University of Finance and Economics, China, China)
25. [Sensitivity of Tree Growth to Temperature in The Southeastern China and The Potential for Spatial Temperature Reconstruction](#)  
Jiangfeng Shi Shiyuan Shi Yesi Zhao (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing, 210023, P.R. China),
26. [Simulating climate change impacts on rice yields using Oryza v3.0 model in the Sichuan Basin, China](#)  
Chenchen Xu (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
27. [Spatial Pattern of Recent Rainfall Trends in Serbia \(1961–2009\)](#)  
Jelena Lukovic, Branislav Bajat, Dragan Blagojevic, Milan Kilibarda (University of Belgrade, Serbia)
28. [Tree-Ring Recorded Drought Variability on the Tibetan Plateau Over the Last Millennium](#)  
Gou Xiaohua, Yang Deng (Lanzhou University, China)
29. [Unusual Heavy Rainfall in 1868 Observed by J.C. Hepburn At Yokohama](#)  
Junpei Hirano (Teikyo University, Japan), Takehiko Mikami (Teikyo University, Japan), Masumi Zaiki (Seikei University, Japan), Junji Nishina (Meijigakuin University, Japan)
30. [Wet Stages Indicated by the High Levels of the Daihai Lake in Inner Mongolia over the Past 2000 Years](#)  
Fang Xiuqi, Lian Pengling, Ye Yu, Wei Xueqiong (School of Geography, Beijing Normal University, China)

## Poster

276

Shaping Our Harmonious Worlds

构建我们的和谐世界

1. [A Review of Rapid Climate Change in China Around 5500 Years Before Present](#)  
Hou Mei (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
2. [Advances in the Study of Radiative Forcing Due to Black Carbon from Land Use and Land Cover Changes in Kenya](#)  
Daniel Mbithi (Kenya, University of Nairobi)
3. [An EEMD and BP Neural Network Hybrid Approach for Modeling Regional Sea Level Change](#)  
Lei He (China, Ministry of Education Key Laboratory of Poyang Lake Wetland and Watershed Research/School of Geography and Environment, Jiangxi Normal University)
4. [Analysis of Future Climate Scenarios Over the Central Uganda Cattle Corridor](#)  
Alex Nimusiima (Uganda, Makerere University)
5. [Analysis of the Temporal and Spatial Variation Characteristic of Precipitation in the Lancang River Basin over the Past 55 Years](#)  
Chen sujing; Li lijuan; Li jiuyi (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
6. [Assessment of Impacts of Climate Change on the Water Resources of the Transboundary Jhelum River Basin, Pakistan And India](#)  
Rashid Mahmood; Shafeng JIA (China, Institute of Geographic Science and Natural Resources Research, CAS)
7. [Changes in Rainfall Distribution in the State of São Paulo, Brazil](#)  
Guilherme Gabriel; Lucí Hidalgo Nunes (Brazil, UNICAMP - University of Campinas); José Antonio Marengo (Brazil, CEMADEM - Centro Nacional de Monitoramento e Alerta de Desastres Naturais)
8. [Changes in Storminess in the Northeastern Baltic Sea Region During the Holecene: a Case Study from Coastal Areas of Estonia](#)  
Tiit Vaasma; Egert Vandel; Shinya Sugita (Estonia, Institute of Ecology, Tallinn University)
9. [Climate Significance of Tree-ring Stable Carbon Isotope of Pinus massoniana in Southeastern China](#)  
Yesi Zhao (China, School of Geography Science, Nanjing Normal University)
10. [Climate Variability in the Iberian Peninsula Since 1700 AD Inferred from Tree-ring Records and Documentary Sources](#)  
Ernesto Tejedor; José María Cuadrat (Spain, University of Zaragoza)
11. [Climate Warming in Southern Romania in the Past Half Century. Spatio-temporal Analysis and Assessment of Some Economic and Ecological Consequences](#)

Remus Prăvălie; Georgeta Bandoc; Elena Dragomir (Romania, University of Bucharest, Faculty of Geography)

12. [Climatic Characteristics of Dry and Wet Season in the Southeast Side of the Tibetan Plateau Under Southwest Water Vapor Channel and Its Causes](#)  
DUAN 4137307; DUAN Xu (China, Yunnan Institute of Meteorological Sciences)
13. [Estimation Dynamics Change of Temperature of Atmospheric Air in Context of Climate Change in Syunik Region of the Armenian Republic](#)  
Varduhi Margaryan (Armenia, Yerevan State University)
14. [Exploring Spatio-temporal Patterns of Rainfall Using Co-clustering Algorithm](#)  
Shulin DENG; Manchun Li; Yanming Chen (China, Nanjing University)
15. [Impact of Climate Change and Extremes on Ecosystem in Hubei Province, China during 1951-2015](#)  
Dongmei Li; Chunju Huang; Lunche Wang (China, China University of Geosciences)
16. [Issues of land degradation in the Darhad Depression, Mongolia](#)  
Bayarjargal Enebish (Mongolia, National University of Mongolia)
17. [Mineralogical Evidence of the Existence of Two Mass Sources Along a Traverse Route From Zhongshan Station to Dome A, Antarctica](#)  
Liya Zhou (China, Nanjing University)
18. [Modeling Hydrometeorology Drying Effect Maharloo Lake on the Severity of Aridity Shiraz Semi-arid Station in the Southern Half of the Iran](#)  
Gholamreza Roshan (Iran, Golestan university, Department of Geography, Gorgan,Iran); Saeed Negahban (Iran, Department of Geography, Faculty of Human Science, Shiraz University, Shiraz, Iran); Vahid Mohammadnejad (Iran, Assistance Professor, Department of Geomorphology, Faculty of Literature and Humanities, University of Urmia, Urmia, Iran)
19. [Perturbation Characteris of the Carbon Flux Change in the Poyang Lake Wetland](#)  
Tao Yang (China, Key Laboratory of Poyang Lake Wetland and Watershed Research, Ministry of Education (Jiangxi Normal University)); Lili Wang (China, School of Geography and Environment, Jiangxi Normal University)
20. [Remote Response on the two Types of El Niño in Coupled Model Intercomparison Project Phase 5 models](#)  
Irina Zheleznova; Daria Gushchina; Tatiana Matveeva (Russian Fed, Lomonosov Moscow State University)

21. [Research on Ecological Environment Stress Effect of the Urbanization Process in Xianning, Hubei Province, China](#)  
Lixue Tian (China, South China Normal University)
22. [Spatial Interpolation and the Spatiotemporal Change Analysis of Precipitation from 1981 to 2010 of the Loess Plateau Region in China based on GWR](#)  
Wang Chun; Mingwei Zhao (China, Anhui Center for Collaborative Innovation in Geographical Information Integration and Application, Chuzhou University); Na Zhao (China, State Key Laboratory of Resources and Environment Information System, Institute of Geographical Science and Natural Resources Research, CAS)
23. [Spatial Variability of Potential Evapotranspiration and its Climatic Drivers in the Northern Loess Plateau of China](#)  
Tingting Ning (China, Institute of Soil and Water Conservation, Chinese Academy of Sciences and Ministry of Water Resources); Wenzhao Liu (China, Northwest A&F University)
24. [The Research on  \$\delta^{18}O\$  Change of Precipitation in Different Time Scales in Honghe Hani Rice Terraces](#)  
Xiaojing Yan (China, Yunnan Normal University)
25. [Tree-ring based December-February Temperature Reconstruction since 1718 for the Hengduan Mountains, southwestern China](#)  
Shiyuan Shi (China, School of Geographic and Oceanographic Sciences, Nanjing University); Jinbao Li (China, Department of Geography, University of Hong Kong); Jiangfeng Shi (China, School of Geographic and Oceanographic Sciences, Nanjing University)
26. [Trends in Temperature and Precipitation in the Pyrenees Range over the Period 1950-2010](#)  
José M. Cuadrat; Roberto Serrano-Notivoli; Miguel A. Saz (Spain, University of Zaragoza)

## A Climatic Regionalization of The Balkan Peninsula Under Conditions of Climate Change

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### Abstract

Sea Level Pressure (SLP) data for the period 1950 - 2012 at 61 stations located in or around the Balkan Peninsula was used in this study. The main concept is that intra-annual course of SLP represents the best different air masses that are situated over the Balkan Peninsula during the year. The method for differentiation of climatic zones is cluster analysis. A hierarchical clustering technique - average linkage between groups with Pearson correlation for measurement of intervals was employed. The climate of the Balkan Peninsula is transitional between oceanic and continental and also between subtropical and temperate climates. The main research period 1950 - 2012 was divided into two sub-periods: 1950 - 1986 and 1987 – 2012. The goal was to see changes in position of the borders between different climatic zones. The first sub-period can be defined as generally cold, the second - as generally warm. Several major changes in atmospheric circulation over the Balkan Peninsula have happened over the period 1950 - 2012. There is a serious increase of the influence of the Azores High in the period January - March, which leads to an increase of SLP and enhances oceanic influence. There is an increase of the influence of the north-west extension of the monsoonal low in the period June - September. This leads to more continental climate, but also to more tropical air masses over the Balkan Peninsula. Accordingly, the extent of subtropical climate widens in northern direction. There is an increase of the influence of the Siberian High in the period October - December. This influence covers central and eastern part of the peninsula in October and November, and it reaches western parts in December. Thus, the climate becomes more continental.

### Key words:

Climatic regionalization; Balkan Peninsula

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## **A New Method for Generating the Thermal Growing Degree Days and Season in China during the Last Century**

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### **Abstract**

Changes in the thermal variables of growing degree-days and season have substantial effects on vegetation growth and distribution. The magnitude and spatial distribution of changes in growing degree-days and season in China during the past century are still uncertain, mainly due to limited daily observations before 1950. In this study, a site-specific multiple linear regression method is developed based on the homogenized daily temperature data of 536 meteorological stations in China for 1960–2010, in order to estimate the annual variables of growing degree-days and season with only monthly temperature. The method is robust for all stations and interannual variability. Since it could accurately simulate the observed values in 2011, with relative errors of  $-0.02\%$  and  $0.96\%$  for growing degree days and growing season, respectively. We simulated the thermal variables based on this method using gridded monthly temperature data for 1901–2010. The interannual variations of simulated growing degree days and growing season matched well with that of observed values from 1960 to 2010, with high correlation coefficients of 0.99 and 0.92 respectively. Overall, the growing degree-days and season showed significant ( $p < 0.01$ ) increasing trends of  $11.88\text{ }^{\circ}\text{C}\cdot\text{d}/10\text{yr}$  and  $0.69\text{ d}/10\text{yr}$ , respectively, in China as a whole, with the trends increasing from 1991 to 2010. Moreover, all eco-geographical zones showed positive trends during 1901-2010. The growing season was more prolonged in northern zones, and degree-days was more increased in north-subtropical, south-subtropical, and tropical zones. However, both the growing degree-days and season have decreased in part of Southwest China in the mid-subtropical zone over the past century.

### **Key words:**

thermal growing degree-days; growing season; climate change; twentieth century; eco-geographical zones; China

## Atmospheric Teleconnection for Ice Cover Phenology on Lake Ladoga

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### Abstract

The Northern Hemisphere's upper air general circulation pattern, which controls the origin, frequency, and duration of winter air mass movements over Lake Ladoga, largest lake in Europe - Lake Ladoga ( $S = 17670$  sq.km,  $V = 848$  cu.km), situated at  $60^\circ$  N latitude is an important global factor affecting the lake ice cover, as evidenced by teleconnections. Winter conditions play an important role for the lake and serve as a climate change indicator. The ice cover lasts for  $171 \pm 3$  days on average from the early November until the mid-May. The study focuses on interannual variability from 1943 to 2014 of Lake Ladoga ice cover and relationship to atmospheric teleconnection indices. More than 1,300 surveys of the lake's ice cover were collected by using aircraft surveys and satellite images for winters of different types of severity. Since ice phenology records show considerable year-to-year variation we have used six teleconnection indices (NAO, AO, SCAND, EA, EA-WR, POL) for the period from October to May for understanding the drivers influencing the change in Lake Ladoga ice condition. We selected representative parameters for further detection of climate change. We believe that nonlinear relationships take place between teleconnection indices, which resulted in Lake Ladoga ice condition. We have developed multi-regression models to estimate the Relative Ice Cover Index (RICI) for overall winter condition and other ice characteristics as dates of first and last ice and maximum of accumulated freezing degree days (AFDDs).

### Key words:

Atmospheric teleconnection; ice cover phenology; Lake Ladoga

## Changes of Glaciers and Glacial Lakes Implying the Corridor-Barrier Effects and Climate Warming in Hengduan Mountains, Southeast Tibetan Plateau

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### Abstract

The changes and implications of glacier and glacial lake were discussed in Hengduan Mountains based on the remote sensing images of LandsatTM/ETM+/OLI during 1990-2014 in this paper. The area of glaciers decreased greatly at an average rate of  $-0.40\%/a$  while the glacial lakes expanded slowly at an average rate of  $+0.12\%/a$  during the past 24 years resulted from a observably temperature rising and slightly precipitation increasing in Hengduan mountains. The decade changing differences of glacier-fed lake and non-glacier-fed lake were the direct signals on inter-decadal fluctuations of temperatures (responded by glacier melting) and precipitation over Hengduan Mountains. The special corridor-barrier effect formed by range-gorge terrain in longitudinal has significant impacts on the distributions and changes of glacier and glacial lake. Mainly due to the barrier effect of the ridges for southwest oriented moisture, Ningjingshan-Yunling where glacier and glacial lake were sparsely distributed was found as an important geographical boundary in Hengduan Mountains. In the mountains of west side of the geographical boundary, the glaciers and glacial lakes were well developed with the widely rapid expansion of glacial lakes, while the glaciers and glacial lakes were scattered in the east mountains of geographical boundary where the glacial lakes were dominantly shrinking. On the other hand, insignificant differences were found with respects to the distribution and change of glacier and glacial lake due to the north-south corridor effect for water and heat transport and diffusion through the longitudinal gorges in Hengduan Mountains.

### Key words:

Changes of glacier and glacial lake; corridor-barrier effect; climate warming; Hengduan Mountains

## Climate Change and Water Resources: Impacts and Responses within River Kaduna Basin

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### Abstract

The study here reported was carried out in the Kaduna drainage basin within the northern Guinea Savanna ecological zone of northern Nigeria. The aim was to examine temporal trend in climatic and its impact on water resources. Daily rainfall, maximum and minimum air temperature data for five weather stations within the study area for the period between 1974 and 2013 were analysed. Linear trends were generated from regression equation, and the Mann-Kendall non-parametric test was used to detect significance of trend. Several measures of rainfall change including number of events over time in the accumulation of rainfall of different thresholds at a weather station in a 24-hour period; change in top one per cent of 24-hour precipitation and changes in the number of rain-days for two equal study periods was used. Information on perceived impacts of climate change on water resources and the adaptation methods in communities was got through analysis of questionnaires administered in fifteen local communities within the drainage basin. Results revealed a 0.92% and 1.2% increase in maximum and minimum temperature. There were also rising trend in occurrence of 'heavy rainfall' and a falling trend in numbers of rain-days. Questionnaire analysis revealed increased flooding, increased rate of drying up and pollution of water sources as well as increase in water borne diseases as the main impact of climate change as perceived by respondents. The study therefore called for improved water resources management in Nigeria to stem the effects of climate change on water resources.

### Key words:

Drainage basin; climate change; water resources; communities; adaptation methods

## Climate Change Effects on Rice Yield in Zhejiang, China

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### Abstract

Recent years, the climate change have been much more obvious than ever before, influencing the human society in many aspects. Rice is a staple and important food in China, it is also believed that the rice is far more sensitive to the climate change than other crops. It has the significance of the regional and national to study the inner connection between the climate change and rice yield. The study area of this study is selected as Zhejiang province, for the large area of rice cultivation in China. Here we simulate the rice yield on the newest released Crop Estimation through Resource and Environment Synthesis software with CERES-rice model, besides the observation sites are carefully selected for the simulation. The data we use are obtained from Chinese agro-meteorological experimental stations and the data are perfect recorded by professional workers. The results of our simulation indicate the continuing decrease of the rice yield and CO<sub>2</sub> fertilization effect could relieve the effect to some degree but CO<sub>2</sub> fertilization couldn't offset it. Due to this situation, we provide three adaptive measures: 1) advance the planting data 2) breed new rice type 3) change the planting area to the high altitude.

### Key words:

Climate change; rice yield; simulate; ceres-rice model

## Climate Change in La Paz, Bolivia during the 20<sup>th</sup> Century Based on the Jesuit Meteorological Records.

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### Abstract

The city of La Paz has developed by population growth and industrial modernization through the 20<sup>th</sup> century. We examined characteristics of climate change in La Paz based on the long meteorological records taken by the Society of Jesus covering the periods 1918-1948 and 1962-1979.

Mean temperature has increased 0.29 degrees Celsius per decade for the whole data period in La Paz, besides 0.10-0.11 degrees Celsius per decade (1939-1988) in the tropical Andes region. The warming trend in the latter period was especially remarkable. Although significant long-term trend was not detected in the annual rainfall series, a periodical variation was observed with some dry periods in the middle 1920s, the later 1930s and 1960s-1970s. Comparison of hythergraphs for 1918-1948 and 1962-1979 revealed that dry season (May, June, July and August) has become warmer and slightly drier, and wet season (December, January, February and March) has become warmer and wetter. As the other analysis based on the modern records (1976-2013) in La Paz has also reported a drying trend in the dry season, the trend has been continuing since the early 20<sup>th</sup> century.

### Key words:

Climate change; Bolivia; 20<sup>th</sup> century; the Society of Jesus; data rescue

## Climatic Variability and Food Grain Production in Satara District

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### Abstract

The Indian agriculture is the gamble of monsoon. The rainfall and temperature variability and drought have been historically major causes of low agriculture production in India. The agriculture is the major primary activity of Satara district. The extreme changes of climatic phenomena increased of food insecurity. In the Satara district is observed many of the fluctuation of climate parameter on spatial and temporal scale. The heaviest rainfall received in the western part, highest temperature recorded in the western part. The occurrence of deferent climatic season in the district is created specified pocket of climate. The agriculture of Satara district has classified into two main seasons Kharif and Rabi. The Kharif agriculture season is from Jun to mid of October during the period of southwest monsoon season and the Rabi agriculture season is from mid-October to February during the post monsoon and cold season. Some parts of district grow crops during summer season. The climatic variability of the district affected the agriculture production. The high frequency of drought is increased in the eastern part of the district (Khandala, Phaltan, Man, Khatav and Koregon) during the last few decades. The rainfall distribution during crop sowing period has also become responsible for the reduction of agriculture production. The year 2003 has a good example to show the agriculture production mainly depending on the annual rainfall. This study analyzed the climatic variability and food grain crops (production, area and productivity) of Kharif, Rabi and annual of the Satara District During 1983-2012. Karl Pearson's method of correlation is used for the analyze of correlation of the food grain. The annual food grain production and area shows decline trend. The average annual area under food grain is 473890 hectares and production is 445790 tones.

### Key word:

Climatic Variability; Food Grain; Seasonal Change; Rainfall and Temperature

## Comparison of Improved Empirical Models and Artificial Neural Network Model for Global Solar Radiation Estimating in China

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### Abstract

Solar radiation plays an important role in climate change, energy balance and energy applications. In this work, two improved empirical models (the expanded Bristow-Campbell model (E-IBC) and improved Yang Hybrid Model (IYHM)) and an artificial neural network (ANN) are proposed to predict global solar radiation (Hg). Meteorological data such as :daily sunshine duration (SSD), air pressure (AP), precipitation (Pre), relative humidity (Rh), daily mean temperature (T), daily maximum/minimum temperature (Tmax/Tmin) and solar radiation data from 1992 to 2011 are used in this study. The model performances were evaluated through root mean square errors (RMSE), mean absolute errors (MAE) and determination coefficient ( $R^2$ ). The results showed that all improved empirical models provide better modeling accuracy than basic ones in estimating daily global solar radiation, for example, the average RMSE values of E-IBC, IBC, IYHM and YHM model are 3.78, 4.55, 3.31 and 4.37 MJ m<sup>-2</sup> day<sup>-1</sup>, the MAE are 2.67, 3.41, 2.52 and 3.51 MJ m<sup>-2</sup> day<sup>-1</sup>, and  $R^2$  are 0.78, 0.66, 0.84 and 0.77. We also find that improved empirical models and ANN model can estimate Hg with satisfactory accuracy at three stations, the ANN model provides better accuracy than empirical models, for example, average RMSE between monthly Hg are 1.86, 1.71 and 1.44 MJ m<sup>-2</sup>day<sup>-1</sup> for E-IBC, IYHM and ANN model, MAE are 1.43, 1.23 and 1.04 MJ m<sup>-2</sup> day<sup>-1</sup> and  $R^2$  are 0.88, 0.86 and 0.91 for E-IBC, IYHM and ANN model, respectively.

### Key words:

Artificial neural network; the Bristow-Campbell model; the Yang hybrid model; global solar radiation; China

## **Enhanced or Weakened Western North Pacific Subtropical High Under Global Warming?**

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### **Abstract**

The Western North Pacific Subtropical High (WNPSH) is a large scale high pressure system over the subtropical western North Pacific, which greatly regulates the East Asian climate in summer. The future change of WNPSH in response to global warming is concerned by Asian people. Although previous studies claimed enhanced WNPSH in a warmer climate, we show evidences that WNPSH weakens in the mid troposphere but changes little in the lower troposphere under global warming scenarios, based on 31 models from the Coupled Model Intercomparison Project Phase 5 (CMIP5). The weakened meridional temperature gradient on the northern flank of WNPSH is responsible for the weakened WNPSH in the mid troposphere. In the lower troposphere, the future intensity change of WNPSH is regulated by the zonal gradient of Sea Surface Temperature between tropical Indian Ocean (TIO) and tropical Pacific Ocean (TPO). Greater warming of TIO than TPO favors enhanced WNPSH and vice versa. The discrepancy between our results and previous studies originates from how to measure WNPSH. Traditional metrics on the WNPSH based on geopotential height is not suitable in a warming climate, since the systematic increase of global geopotential height misleads people on the intensity of WNPSH.

### **Key words:**

Western north Pacific subtropical high; global warming

## Environment Variability Archived by Color of the Drill Core Beihuqiao in Hangjiahu Plain during the Early-Mid Holocene, China

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### Abstract

An improved predicting of future climate variability and change relies on high-quality data sets from the past. Hangjiahu Plain, which is located in the eastern coastal areas of China, is sensitive to climate changes. A drill core was obtained from the BeiHuQiao (BHQ, 30°22.443'N, 119°56.237'E) in the Hangjiahu Plain, Zhejiang Province. Based on color, granularity and total organic carbon (TOC) of 535 samples, climate and environment of the Hangjiahu Plain region during Early-mid Holocene was reconstructed. The color results were compared with clay and TOC, which shows that yellow degree index ( $b^*$ ) is negative correlating with clay and TOC, so higher  $b^*$  indicates the lower effective humidity. In addition, in the water environment, higher brightness index ( $L^*$ ) infers drier and colder environment. Results of color analysis show that, the study area has undergone significant environmental changes. During 11400-8700cal aBP, in the early of this stage the climate was a bit of cold and dry. In the late it gradually turned to warm and wet. During 8700-8400cal aBP, the climate turned to dry and cold, which lasted about three hundred years. During 8400-7900cal aBP, the climate was warm and moisture, indicating that the study area entered the Holocene Megathermal about 8400cal aBP. During 7900-4200cal aBP, in the early of this stage (7900-5700cal aBP), the climate become warmer and wetter, indicating that this period is the warmest period in the Holocene Megathermal. What is more, a cold event appeared approximately 5500cal aBP and it lasted about two hundred years.

### Key words:

Lacustrine and paludal sediment; color; Early-mid Holocene; environment variability

## Extreme Summer Climates in Japan after Large Volcanic Eruptions during Historical Times

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### Abstract

We have often had extreme weather events in Japan, such as cool summers and severe floods, after large volcanic eruptions in the world. For example, extremely severe famine occurred in 1783 and 1786, during which we had unusually cool summers particularly in northern Japan. In 1783, Mt.Laki in Iceland and Mt.Asama in Japan made explosive eruptions which might have related to the unusual weather events in Japan. It should be noted that summer climates of European countries in 1783 were rather hot and muggy. On the other hand, in 1816, which was just one year after the extremely large eruption of Mt.Tambora in Indonesia, opposite climate anomalies appeared in Northern Hemisphere. This year is well-known as “The Year without a summer” in Europe and the eastern part of Canada and USA, whereas we had a hot summer climate in Japan. Also in Indonesia, an extremely explosive eruption of Samalas volcano in 1257 have been noticed among climatologists. We have found some evidence for extreme weathers, such as cold summers and severe floods in Japan during 1257-1258, by examining several historical disaster records and documents. We plan to analyse more in detail the relationship between large volcanic eruptions and their climatic impacts in global scale.

### Key words:

Extreme weather; volcanic eruption; Indonesia

## Frost and Ice Days in Turkey

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### Abstract

The study area is located within 36°N to 42°N latitudes and longitudinally lies between 26°E and 45°E. Daily maximum and minimum temperature data of Turkey meteorological stations were used in the period of 1966-2014 in this study. The numbers of frost and ice day have determined with daily maximum and minimum temperature data in winter season. Criteria were defined the temperature indices, which referred to the frost day and ice day reaching <0°C in minimum and maximum temperature in winter, respectively. *Mann-Kendall rank test* is applied to determine any possible trend in the annual numbers of both frost and ice days. Cluster analysis is applied to classify the time series to find out the similarities in the stations.

The analysis demonstrates a decrease in frequency of frost and ice days in Turkey. Especially in 2010, it is the warmest year in Turkey from the records of the stations. In 2010, at the very least frost days have been during the past 50 years. The very least ice day events have been experienced in 1999, 1984, 2010, 2011, during the past decade.

In this study, we represent geographical distribution of frost and ice day indices, each index computed for each station. The aim of this study is to analyze long-term variability and trends of temperature indices.

This study is supported by the Turkish Scientific and Technical Research Institute (Project number: 114Y417).

### Key words:

Frost Days; Ice Days; Turkey; Climate Change; long-term variability

## Gendered Analysis of Climate Change Impacts on Water

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### Abstract

*The right to safe, clean drinking water and adequate sanitation is a human right, essential to the full enjoyment of life and all other human rights, as recognized by the UN General Assembly in July 2010 (resolution 64/292).*

However, this essential human right is in jeopardy from the impending impacts of climate change. Specifically, the impact of climate change will be greater on the more vulnerable sections of the population, which include people living in poverty, children, and the elderly. 70% of the people living in poverty are women, who also are the main caregivers at home for children and the elderly. In addition due to restrictive social and cultural norms, women often are less educated and have limited access to resources and decision-making powers. The present study examines the relationship between vulnerability to climate change and gender inequality/inequity at the global scale, with particular focus on water. The two regions that stood out in terms of both vulnerability to climate change and gender gap, include the Sub Saharan Africa and South Asia. Both of these regions also had the highest proportion of unimproved sources of drinking water and sanitation. In view of the predicted disproportionate impacts of climate change on water resources, women and girls are at greater risk due to climate change in these regions.

### Key words:

Climate Change; Water; Sanitation; Gender; Spatial Analysis

## Impacts of Climatic Tendency, Fluctuation and Extreme Events on Rice Yield: A Site Scale Research in Wulin, Changde, Hunan Province, China

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### Abstract

The impact of climate change can be divided into three parts: climatic tendency, fluctuation and extreme events. It is benefit to put forward targeted policies and strategies on adaptation, resilience and mitigation of the impact of climate change if we try to understand this issue at different spatial-temporal scale. This paper studies the impact of the tendency, fluctuation and extreme events of mainly climatic factors (temperature, precipitation and radiation) on early rice yield in Wulin, Changde, Hunan Province, and China during 1981-2012. This is a site scale research and DSSAT cropping system model has been used to get quantitative effects from each part of climate change. The results indicate that the impact of climatic extremes include high temperature events, heavy rain events and drought events which are sorted by influence level from high to low. Moreover, the trend of temperature has negative impact on early rice yield. On the contrary, the trend of precipitation and radiation have positive impact. However, the total effects of climatic tendency is adverse on early rice yield. In addition, the influence from climatic fluctuation which surpass the “variability threshold” has negative impact on early rice yield and the largest impact factor is precipitation, then it is followed by radiation and temperature. At last, the yearly impacts of climatic tendency, fluctuation and extreme events on early rice yield are -81.75kg/ha、 -120.00kg/ha and -49.41kg/ha.

### Key words:

Climate change; tendency; fluctuation; climatic extremes; rice yield

## Indigenous Knowledge of Climate Change Adaptation in Desert Prone Front States in Northern Nigeria

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### Abstract

Adaptation to climate change which is the adjustments in the practices, processes, or structures in response to projected or actual changes in climate is a contemporary issue in today climate and its changes. At the local level, some farmers have come up with strategies such as conservation of carbon through zero tillage practices, using mulches to reduce soil temperatures and conserve soil moisture and use of organic manure to increase the ever decreasing soil fertility. This paper presents the indigenous knowledge related to the climate change adaptation strategies in desert prone front line states in Nigeria. Mixed method of research (Qualitative and quantitative) was adopted in the study. The instruments used; includes interviews guide, a questionnaire survey, observations and photography. The analysis was based on a sample of 384 respondents. The qualitative data was analyzed by means of coding using matrix form, descriptions, and visual presentations. On the hand, the quantitative data was analyzed through the statistical package for social sciences (SPSS) 16.0 for windows and complimented by Microsoft Excel to generate frequencies and percentages. The findings revealed that others adapted differently while others migrated to other places as an adaptation strategies. In conclusion the results revealed that communities in the desert prone front line states in Nigeria have low adaptation strategies related to climate change.

### Key words:

Knowledge; Adaptation; Desert; Climate Change; Nigeria

## Issues of Land Degradation in the Darhad Depression, Mongolia

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### Abstract

The paper describes multi-year trend of climatic factors such as mean air temperature, precipitation amount, evaporation and aridity index which highly affect to land degradation in the Darhad Depression. Also, changes of a number of livestock and its composition were discussed. Air temperature during the warm season (May-September) increased by 1.70C with a rate of 0.040C per year in the Darhad Depression between 1974 and 2014. This increase has been occurred more intensively since 1994. As seen this result, global warming is occurred in the Darhad Depression clearly. The maximum temperature was recorded as 34.90C in the air and 62.00C at surface. Annual total surface evaporation is increased by 85 mm with a rate of 2.1 mm per year in the Darhad Depression.

Khuvsgul forest area is rich by larch and willow. In the last years, soil degradation has been increasing due to warming and aridity. Furthermore, major reasons of land degradation are extending sand area, and degenerate new sand area. Pasture carrying capacity exceeds since a number of livestock increased and composition of herds escaped and it is one of the main causes for land degradation.

### Key words:

Climate change; Darhad Depression; land degradation; pasture carrying capacity

## **Linking Inter-annual Streamflow Variability to Southern Annular Mode, Regional Climate and Weather Regimes in New Zealand, 1979-2011**

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### **Abstract**

River flow across New Zealand demonstrates considerable inter-annual and geographical variability. While large scale modes of atmospheric circulation such as ENSO are known to influence hydroclimate variability little is known about the influence of the Southern Annular Mode (SAM) on climate and river flow across New Zealand. The purpose of this paper is to present results from an analysis of SAM river flow associations across with the influence of ENSO and river flow trend removed for the period 1979 – 2011. A river flow regionalization is presented as a spatial framework for the analysis of river flow SAM associations. Results demonstrate considerable seasonal and geographical dependency of river flow on SAM; some cases the association reverses with season. Large scale climate based explanations are presented in order to explain SAM river flow associations.

### **Key words:**

Hydroclimatology; climatic variability; riverflow; Southern Annular Mode; New Zealand

## Modeled Responses of Summer Climate to Realistic Land Use/Cover Changes from the 1980s to the 2000s over Eastern China

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### Abstract

Eastern China has experienced substantial agricultural expansion and deforestation in recent decades. We modeled the influence of land use/cover changes (LUCCs) over eastern China on the regional climate using the Weather Research and Forecasting model with the Noah-multiparameterization land surface scheme. Two 21 year (1980–2000) experiments were performed using the same settings, except for the land use/cover data for the 1980s and the 2000s. The results showed that in northern China, decreases in the surface air temperature of approximately 0.3–0.5°C and decreases (increases) in rainfall over the lower reaches of the Yangtze River valley (southern China, northeastern China, and the Korean Peninsula) of approximately 3% (6–7%) in the summer were associated with LUCCs in eastern China from the 1980s to the 2000s. The cooling effect in northern China, which was primarily attributable to an increase in the surface latent heat flux of approximately 7.3–9.6Wm<sup>2</sup>, weakened the land-ocean thermal contrast, suggesting the presence of a weaker summer monsoon over eastern China. As a result, rainfall over the lower reaches of the Yangtze River valley (southern China) tended to decrease (increase). In addition, the cooling effect may have produced an anomalous cyclonic circulation from the surface to the midtroposphere over northeastern China and the Korean Peninsula, resulting in increased rainfall over this area.

### Key words:

Land use/cover changes; eastern China; regional climate model;

## Persisting Climatic Warming at High Elevation Sites across the Globe in the Post-1998 Period

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### Abstract

Although the 2000s are by far the warmest decade on record, the rate of increase of global mean temperature since 1999 has slowed. Here, based on a dataset of mean temperature series (1961-2010) from 2104 global stations (majority of the data are from the GHCN, and each of the station series has at least 40 years of records during the period 1961-2010), we examine the temperature trends for all the 2104 stations as a whole as well as for the 1219 low-elevation stations ( $\leq 500\text{m}$  above sea level) and the 225 high-elevation stations ( $>1500\text{m}$  above sea level), respectively. Our results show that the warming is slowdown for all the stations and for the low-elevation stations as well in the post-1998 period and the pause is particularly evident in winter; consistent with the global-warming hiatus observed in the previous studies. Despite this fact, however, a persistent warming in annual mean temperature is found for the high-elevation stations during the recent period. The high-elevation stations also show continued warming in spring (MAM), summer (JJA) and autumn (SON) during the recent period. Given that the hiatus in global mean temperature rise has been strongly influenced by the negative phase of the Pacific Decadal Oscillation (PDO) since 1999, our findings indicate that the warming in the high-elevation sites deviates from the PDO pattern to a great extent, especially in the spring, summer and autumn seasons. The important physical mechanisms for why the warming trends appear in this way remain to be investigated.

### Key words:

Surface warming; low-elevation; high-elevation; Pacific Decadal Oscillation; persistent warming

## Precipitation Changes over the Past 110 Years in Central Asia

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### Abstract

As one of the largest arid regions in the world, the ecosystem in Central Asia is vulnerable and sensitive to the arid and semi-arid climate. However, the spatial-temporal variations of the long term precipitation over this region are still unclear because of lack rain gauge observations. This study examines the temporal variations and spatial distributions of the precipitation over Central Asia during 1901-2010 by using the three recent gridded datasets: the Climatic Research Unit (CRU) datasets, the Global Precipitation Climatology Centre (GPCC) datasets and the dataset developed by Willmott and Matsuura (WM) by University of Delaware. Major results show that similar variations of the annual precipitation of the three datasets were found over Central Asia during 1901-2010. CRU and GPCC have a positive trend for the annual precipitation with the rate of 1.42mm/decade and 0.57mm/10a over Central Asia, respectively. However, the linear trend of the WM dataset is negative trend. Further, these tendencies may be continuous into the future. The annual precipitation has a 3-years and 6-7 years multi-periods which displayed the nonlinear characteristics of the precipitation during the past 110 years. All the three datasets have the similar spatial patterns of the annual precipitation trend with the high center in mountainous areas which is consistent with EOF-1 results. However, the northern Kazakhstan experienced the largest decreasing of the precipitation. Moreover, the precipitation is negatively correlated with the global land precipitation and positively correlated with the 30N-60N areas of the Northern Hemisphere. At last, the Pacific Decadal Oscillation (PDO) has a positive influence on the annual precipitation significantly ( $p < 0.01$ ) over this region.

### Keywords:

Central Asia; precipitation; spatial-temporal change; gridded precipitation dataset

## Prediction of the Twenty-First Century's Climate of Extreme Wind Speed Regime in the Arctic Region

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### Abstract

Extreme surface wind events over the Arctic (60-90N, 0-360 E) are studied for the modern climate and for its future possible changes on the base of ERA-Interim reanalysis data and CMIP5 scenario RCP8.5. Horizontal surface wind speed (10 m) probability distribution functions in every grid point of reanalysis and models data over the Arctic were evaluated as well as wind speed for 50, 95, 99, 99.9 percentiles (V0.50, V0.95, V0.99, V0.999). At first, changes of V0.50, V0.95, V0.99, and V0.999 were studied on the base of ERA-Interim reanalysis for 1981-2010. Results showed regional inhomogeneity of wind speed trend intensity. Also, analysis was made for zonal means and separate sectors of the Arctic. To study climate projection of high wind speed there were taken u, v values from CMIP5 numerical experiments for 1961-1990 (Historical) and 2081-2100 (RCP8.5). RCP8.5 scenario was chosen as having the most pronounced response in the climate system, which gave more statistical significance to the calculated trends. Modeled extreme wind speeds for the total Arctic and zonal means show rather good agreement with reanalysis data (compared for decades 1981-1990, 1991-2000). At the same time regional intermodel variability of wind speed is revealed. Trend of extreme surface wind speed in 21 century and for 2081-2100 over the Arctic are analysed for each model.

### Key words:

Climate; prediction; extreme wind speed; Arctic region

## Pre-Instrumental Weather Record from Personal Diaries: Precipitation Distributions in Response of El Nino Events

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### Abstract

Ancient climate patterns could be recovered from many types of human records. In this contribution, a detailed and continuous time series of daily weather records between 1870 and 1890 are recovered from the diary of Zeng Jize, an official in the Qing Dynasty. The time series of precipitation and cloud cover within the space and time extensions of the diary are derived and analyzed on the basis of semi-quantitative coding. The results reveal different rainfall and cloud cover patterns among the regions of Beijing, Changsha and Nanjing. Further, the climate events as identified for Beijing and Changsha indicate that these two regions had responded differently to El Nino events. This case study demonstrates that it is feasible to obtain detailed and continuous time series of pre-instrumental ancient weather records from personal diaries; a synthesis of the diaries scattered over the world would provide a high quality data set for ancient climate change studies.

### Key words:

Weather record; descriptive data coding; climate change; personal diary synthesis

## Projection of IPCC AR5 Coupled Climate Models for Multitimescale Temperature Variation in Red river basin (China) from 1960 to 2050

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### Abstract

As an important international river in the Southwest Asia, the climate in most of the Red River (China) basin is mainly influenced by the unique monsoon, stereoscopic climate background and the effect of the special corridorbarrier function in Yunnan, which make synchronization between precipitation and temperature and the annual average precipitation unevenly distributed. Especially influenced by global climate change, the uneven distribution of annual climatic elements in different parts of Red river basin has become greater than ever before and has resulted in a higher frequency of extreme meteorological disasters, which threatened the harmony between humankind and nature around this region. With the recent fast development of the important regional cooperations in economy and scientific technology between China and Vietnam, the development tendency and effects of extreme climate events in the basin have received remarkable attention under the background of global change.

Based on gridded data of daily mean (highest, lowest) temperature record with  $0.25^{\circ} \times 0.25^{\circ}$  from 1961 to 2005 in Red River basin (China), and the surface temperature simulated by the World Climate Research Programme's (WCRP's) Coupled Model Intercomparison Project phase 5 (CMIP5) multi-model dataset and four IPCC AR5 climate Models (BCC\_CSM, GISS2, Inmcm4, MIROC5), a quantitative examination was undertaken into the characteristics of multi-timescale temperature (annual mean temperature (AMT), dry season mean temperature (DMT) and wetseason mean temperature (WMT), annual highest temperature (AHT), dry season highest temperature (DHT) and wetseason highest temperature (WHT), annual lowest temperature (ALT), dry season lowest temperature (DLT) and wetseason lowest temperature (WLT)) variation in Red River basin (China). The simulation abilities of the models were evaluated with the normalized root mean square error (NRMSE), Mann-Kendal test statistic methods and correlation analysis. The results showed that as for AMT, the projected result (anomalies) variations of MIROC5 climate model are more similar to observed ones than other models in the basin. GISS2 model has better simulating effect on anomaly WMT in most area of Red river basin (China), except in the west part of midstream and downstream where MIROC5 model shows better

simulating effect. As for anomaly DMT, inmcm4 model has better simulating effect on in most area of the basin, except for MIROC5 model shows better simulating effect in the upstream basin. As for anomaly variations of AHT and WHT, MIROC5 and GISSE2 models have better simulating effects in the area. And MIROC5 and BCC\_CSM models show better simulating effects on the anomaly variations of ALT, WLT, and DLT in the region. The variations trends of AMT, DMT, WMT, AHT, DHT, WHT, ALT, DLT, and WLT over the next 40 years in the region were predicted and the reason of different simulating effects on those characteristics temperature variations were also discussed.

**Key Words:**

Red river basin (China); multi-timescale temperature; normalized root mean square error; projection of IPCC AR5 Coupled Climate Models

## Sensitivity of Tree Growth to Temperature in the Southeastern China and the Potential for Spatial Temperature Reconstruction

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### Abstract

Tree-rings play an important role in reconstructing past temperature in high-latitude and high-elevation regions where they are stressed by the growing season temperature. However, little tree-ring research has been done in the subtropical southeastern China, an East Asian monsoon region with high temperature and precipitation in the growing season. Recent studies show that coniferous tree growth in the region is limited by temperatures in prior winter and the current growing season (i.e., prior November to current July) at high elevation sites. Higher temperature in the dormant season means less damage to leaves and roots, and less consumption of previously stored carbohydrates and starches that can be used for tree growth in the coming year. The mechanism of positive relationships with the growing season is the same as that in high-latitude and high-elevation regions. The new temperature reconstructions match each other very well at decadal to multi-decadal scales during the past 150 years at a large spatial scale, that is, of 700 km, even though there are some discrepancies in the early part of the comparisons. Possible reasons for the discrepancies include local temperature differences, small sample depth in the early part of the reconstructions, and/or juvenile effects. Regardless, the agreements among reconstructions indicate the potential to develop a large tree-ring network to reconstruct temperature over the southeastern China. However, generally weak temperature signals in tree-ring chronologies at small spatial scales mean that special data analyses methods might be needed.

### Key words:

Palaeoclimatology; tree rings; temperature; Southeastern China

## Simulating Climate Change Impacts on Rice Yields Using Oryza v3.0 Model in the Sichuan Basin, China

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### Abstract

The crop model is a suitable tool for assessing the climate change impacts on crop production. In this study, the Oryza v3.0 crop model was used to evaluate the impact of elevated temperature and carbon dioxide (CO<sub>2</sub>) on rice (Oryza) yields and several adaptation measures effectiveness during future periods (2020s (2011-2040), 2050s (2041-2070), 2080s (2071-2099)) under the newly released Representative Concentration Pathway (RCP) 4.5 scenario in the Sichuan Basin, China. For calibrating and validating this crop model precisely, high-quality meteorological, soil and agricultural experimental data were evaluated.

The modeling results indicated a continuing rice yield reduction (6.5% in 2020s, 7.0% in 2050s and 14.5% in 2080s) in the future periods due to increased temperature. When considering the CO<sub>2</sub> concentration increases, rice yields decreased by 4.3% in 2020s, 5.2% in 2050s and 13.2% in 2080s, respectively, indicating that CO<sub>2</sub> fertilizer effect could mitigate but still not totally offset the negative impacts of climate change on rice yields. Moreover, it appears that the negative impacts on rice yields may be mediated by appropriate adaptive measures such as adjusting planting dates, switching rice varieties and breeding new rice varieties. Our results presented yield increases with various degrees for those adaptive measures. The experient findings presented here contribute to gain insight into the mechanism of rice yields to climate change and inform appropriate adaptive strategies.

### Key words:

Climate change; Oryza v3.0 model; adaptive measures; rice production; Sichuan Basin

## Spatial Pattern of Recent Rainfall Trends in Serbia (1961–2009)

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### Abstract

This study examines a spatial pattern of annual, seasonal and monthly rainfall trends in Serbia. The study used data from 63 weather stations between the periods of 1961–2009. The rainfall series was examined by applying the nonparametric method of the Mann–Kendall test and Sen’s method to determine the significance and magnitude of the trends. Significant trends have not been detected for the whole country at an annual scale. Seasonal trends at the confidence level of 97.5 %, however, indicate a slight decrease in winter and spring precipitation and an increase in autumn precipitation. Results for monthly rainfall trends also generally showed a nonsignificant trend with the exception of a negative trend in May and positive trend for October. To visualize rainfall trends web mapping techniques were in terms of *plotGoogleMap* package. Further spatial analysis has incorporated a spatial autocorrelation statistic (Moran’s I) that indicated a random spatial pattern of rainfall trends on annual, seasonal and monthly timescales with exceptions for March, June and November. Overall, results suggest that only weak, mostly nonsignificant trends are present in Serbia in the period 1961–2009. In addition to this, the spatial pattern of relationships between rainfall in Serbia, and the North Atlantic Oscillation (NAO) for the has been examined too, suggesting a strong impact of a large scale atmospheric mode throughout a wet season in Serbia. Moran’s I indicated significant clustering at all temporal scales.

### Key words:

Rainfall; trend; NAO; Serbia; spatiotemporal analysis and web mapping

## Tree-Ring Recorded Drought Variability on the Tibetan Plateau over the Last Millennium

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### Abstract

Tibetan Plateau is the headwater region of Asia major rivers, knowledge about its hydroclimate variability is very important for ecological conservation, water resource management and social development. Radial growth of trees in this region is generally limited by moisture, especially that at May and June, which is supported by correlation analysis, model simulation and Intra-annual radial growth monitor. Thus, tree-ring data in this region have the potential to provide information on hydroclimate variation. Tree-ring data were used to reconstruct the streamflow variation of the Upper Yellow River over the last 1234 years, and the drought variation of the Eastern Qilian Mountains during the last millennium. These reconstructions are generally synchrony with other millennium-long moisture sensitive tree-ring chronologies and other type of proxy data from the northeastern Tibetan Plateau. The latter 15th century drought is the most prominent feature in these reconstructions, and was prevalent in the northeastern Tibetan Plateau and nearby regions. The leading mode of drought variation for the eastern and western part of the high Asia have been reconstructed, and asynchronism in drought variation were found between these two regions. The point-by-point reconstruction method is also applied to reconstruct the May–July drought variation at each grid point in the eastern Tibetan Plateau, which has well captured the spatial and temporal feature of regional drought variation. The drought variation in the south and north of 32.5°N shown notability difference, and with the drought variation in the northeastern Tibetan Plateau may have been influenced by the solar activity.

### Key words:

Tree-ring; drought variability; Tibetan Plateau; last millennium

## Unusual Heavy Rainfall in 1868 Observed by J.C. Hepburn at Yokohama

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### Abstract

Reliable meteorological data in the past is essential to investigate features and mechanism on long-term climate variations in detail. In Japan, official meteorological observation by the Japan Meteorological Agency (JMA) has been started in the 1870s. Recent climate data rescue activities in Japan have recovered several old pressure and temperature instrumental series prior to the JMA observation. However, a few precipitation series have been recovered until recently. We have newly found out monthly precipitation data series 1863-1869 observed at Yokohama city, near Tokyo. This series was observed by an American Christian missionary, J.C. Hepburn. A table of meteorological data is presented in bulletin of the Asiatic Society of Japan entitled "The transactions of the Asiatic Society of Japan". This series includes monthly maximum, mean, minimum temperature, monthly precipitation, and number of rain days for each month. By investigating monthly precipitation series, we have detected unusual heavy rainfall during May to September of 1868. We consider that this unusual rainfall was reliable because frequent heavy rainfall during warm season of 1868 were reported in several historical weather documents around Tokyo. We consider further studies are needed to clarify possible cause and spatial extent of this unusual heavy rainfall.

### Key words:

Early meteorological data; Japan; Precipitation; J.C.Hepburn

## **Wet Stages Indicated by the High Levels of the Daihai Lake in Inner Mongolia over the Past 2000 Years**

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### **Abstract**

The Daihai Lake in Inner Mongolia is an inland lake located in the semiarid area as well as the margin of summer monsoon climate. Based on the ancient shorelines of the Daihai Lake identified out in the field and dated by calibrated  $^{14}\text{C}$  age, 13 steady high lake level stages during the past 2000 years were reconstructed. The high level stages were compared with wet/dry periods of the sub-regions of monsoon climate in eastern China. The main conclusions are as follows. (1) The heights of the high lake levels decreased in general with fluctuations during the past 2000 years. There are 2 high lake level periods around cal. 2027—2055aBP and 689—1173aBP, and 2 low lake level periods around 1294—1709aBP and since cal. 689aBP in the Daihai Lake. (2) The high level stages in the Daihai Lake indicated the wet climate, when were the warm or relative warm periods in China on centennial scale. It means that precipitation increased in warm period in the marginal zone of summer monsoon on centennial scale over past 2000 years. (3) The high lake level stages in the Daihai Lake were basically the periods when the East Asian summer monsoon was relatively strong and stable.

### **Key Words:**

The Daihai Lake; Past 2000 years; climate change; high lake level

## A Review of Rapid Climate Change in China Around 5500 Years before Present

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### Abstract

We present an extensive review of the eye-catching “5.5 ka” event identified in different parts of China based on multi-proxies record from lacustrine sediment, speleothems, ice core, peat core, giving deeper sight into this abrupt climate event. The majority of records show an abrupt shift to cold and dry climatic conditions superimposed on the slow trends attributable to orbital forcing, however a wetter environment is recorded in several westerlies-dominated sites. Its onset and duration are slightly different from site to site due to local climate system responding to regional climate variations and the resolution of proxy under examination. The abrupt environmental shift is significantly interest of researching, as accompanied by abandonment of nomadic lifestyles and rapid development of the world’ s first civilization of large, complex, organized societies forming. This abrupt climate event is globally widespread rather than regional phenomenon, consistent with the minor variations in solar radiation reaching the Earth. But it is likely that small solar radiation variations lead to changes in atmospheric or oceanic circulation that amplify this initial input affecting summer monsoon in China. The climate mechanism and further understanding of this abrupt climate change still need the development of high-resolution palaeoclimate studies and climate modelling.

### Key words:

China; “5.5 ka” event; solar forcing; summer monsoon

## Advances in the Study of Radiative Forcing Due to Black Carbon from Land Use and Land Cover Changes in Kenya

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### Abstract

The study aims to review studies about radiative forcing due to black carbon (BC) associated with land use land cover (LULC) activities over Kenya. Black carbon aerosols can strongly absorb solar radiation in very broad spectral wavebands, from the visible to the infrared. As a potential factor contributing to global warming, BC aerosols not only directly change the radiation balance of the earth-atmosphere system, but also indirectly affect global or regional climate by acting as cloud condensation nuclei or ice nuclei to alter cloud microphysical properties. Here, recent progresses in the studies of radiative forcing due to BC and its climate effects over Kenya are reviewed. Current methods of estimating BC and corresponding radiative forcing are also investigated.

### Key words:

Radiative Forcing; Black Carbon; Aerosols; Climate Change; Land Use land Cover

## An EEMD and BP Neural Network Hybrid Approach for Modeling Regional Sea Level Change

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### Abstract

Sea level prediction is essential and complicated in the context of climate change. Conventional methods developed for the prediction are still considered insufficient due to the complexity of the nonstationary and nonlinear sea level change. To improve the prediction accuracy of the sea level, this paper proposed a methodology combining the ensemble empirical mode decomposition (EEMD) and the back propagation (BP) neural network. The results show that the EEMD can extract the signals with physical meanings according to their unique frequencies. The inputs of the BP, defined by the preprocessing of the original time series, turn out to be smoother and more regular, influencing the prediction in a positive way. The good performance of the hybrid method, with higher correlation coefficient ( $R=0.89$ ) and lower root square mean error ( $RMSE=28.16\text{mm}$ ), suggest an improved accuracy on sea level prediction than using the BP directly (with  $R=0.76$  and  $RMSE=36.74\text{mm}$ ). This hybrid method can be further applied to sea level prediction in other region. The results of the study also suggest that the preprocessing of the original time series such as smoothing and denoising is significantly improving the prediction.

### Key words:

Sea level change; ensemble empirical mode decomposition (EEMD); back propagation (BP) neural network; modeling

## Analysis of Future Climate Scenarios over Central Uganda Cattle Corridor

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### Abstract

The study employed a Regional Climate Model (RCM), Providing Regional Climates for Impact Studies (PRECIS), to examine the future climate scenarios over the central Uganda cattle corridor districts. The study was guided by two questions (1) what are the projected temperature and rainfall values for the central Uganda cattle corridor in relation to IPCC SRES A2 and A1B for the near future (2021-2050) and far future (2051-2080)? (2) How do these projections compare with the Representative Concentration Pathways (RCPs) in the same area for the same period? RESULTS: SRES A2 and A1B project annual temperature increase of 2.5 to 4.4 °C in the near future and 4.5 to 6.0 °C in the far future relative to the 1981-2010 respectively. The same trend is observed for RCP 4.5 and RCP 8.5 but the increments are lower. Projections for rainfall show a slight increase in annual rainfall in both SRES and RCPs. However more rainfall is projected for the second rainfall season of September to November compared to the usual known season of March to May (MAM). The projections also show a shift in rainfall with the usual dry season of December to February (DJF) now becoming wetter than the 1980-2010 average

### Key words:

Climate change; PRECIS; Uganda cattle corridor; Projections

## Analysis of the Temporal and Spatial Variation Characteristic of Precipitation in the Lancang River Basin over the Past 55 Years

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### Abstract

Based on the monthly precipitation data of 30 meteorological stations in and surrounding the Lancang River basin, we analyzed the temporal and spatial characteristics of precipitation from 1960 to 2014 using the climate tendency rate and Mann Kendall trend test, Morlet wavelet analysis, interpolation co-Kriging, and the gravity center model methods. The results showed that (1) in the analysis period, the precipitation in region, northern and central showed rising trend, but decreasing trend in southern precipitation occurred. The region, northern, central and southern precipitation showed an increasing trend in spring, while in summer showed a decreasing trend. In autumn, there was a decreasing trend of precipitation in the region and in the south. The northern and central parts of the region were increasing. The precipitation in the region, the middle and the southern showed a downward trend in the winter except the northern. (2) There were 29 years, 22 years and 5~10 years cycles in the region including northern, central and southern precipitation in the past 55 years. The three cycles in the analyzed period performance was very stable, with a domain-wide. There were still significant period of about 13 years in the region, north and south. Before the middle of 1975, and after 1995 there was also a period of about 13 years in the central area. In the north area before 1975 and 1995 years later, there was a 7~10 year cycle. The first main period of precipitation was 29 years, and the second main cycle was 22 years. (3) The average annual precipitation decreased in the Lancang River basin from the south to the north. The precipitation in the southern basin was most, with average precipitation in more than 1200mm. The average annual precipitation in the middle was 800~1100mm, while the average annual precipitation in northern part was usually less than 800mm, mostly in 400~800mm; the annual and monthly precipitation gravity center of the Lancang River Basin were concentrated in the central region. The precipitation gravity center of November had the largest migration distance, which migrated to southeast with 131.82km. From the seasonal point of view, spring, summer and autumn precipitation gravity center migrated to the southeast, while, migrated to the northwest in winter. The precipitation gravity center in rainy season relatively concentrated, the situation in dry season was relatively dispersed.

**Key words:** Lancang River; precipitation; M-K test; Morlet wavelet; gravity center model

## Assessment of Impacts of Climate Change on the Water Resources of the Transboundary Jhelum River Basin, Pakistan and India

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### Abstract

Pakistan's economy is significantly reliant on agriculture. However, Pakistan is included in the most water-stressed countries in the world and its water resources are considerably vulnerable to climate variability and climate change. Therefore, in the present study, the water resources of the Jhelum River basin, which provides water for 6 million hectares of land of Pakistan and hydropower production, were assessed under the scenarios of HadCM3 (A2 and B2). The HEC-HMS (Hydrologic Engineering Center-Hydrologic Modeling System), a hydrological model, was developed for the Jhelum basin and streamflow was simulated for the period of 2011–2040, 2041–2070 and 2071–2099 and compared with baseline (1971–2000) to find out the changes in different indicators i.e., mean flow, low flow, median flow, high flow, temporal shift in peaks, and center-of-volume dates (CVDs). An average annual flow of 34–37% was projected to rise in the basin under both scenarios. Summer and autumn showed noticeable increase in streamflow, but spring and winter showed decrease at most of the sites. Autumn showed more than 100% increase in the basin. Low and median flows would increase in the basin, but high flow was likely to decline in future under both scenarios. Peak flows were projected to shift from Jun to July in the future, and CVDs showed delay about 9–17 days in the basin, under both A2 and B2. On the whole, the Jhelum basin would face great temporal and magnitudinal variations in high, low and mean flows. This shows that without consideration of climate change impacts, it will be relatively more difficult for proper water resources' utilization and management in the basin.

### Key words:

Climate change; Water Resources

## Changes in Rainfall Distribution in the State of São Paulo, Brazil

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### Abstract

Part of an international consortium (Metropole, Belmont Forum, Fapesp Proc. 2012/51876-0 and 2015/11035-5), the study aimed to identify recent changes in the rainfall pattern in the state of São Paulo. One of the 26 Brazilian states, São Paulo alone concentrates 22% of the population and accounts for 32.1% of the Brazilian GDP, so that any change in the precipitation pattern might impact not only the state, but the whole country. Rainfall in the area presents high natural variability and contrasts due to the complex arrangements of physical features, atmospheric and oceanic dynamics and geographical position. Summer precipitation is highly convective and modulated by the South Atlantic Convergence Zone, while during winter precipitation occurs as a result of outbreaks of cold polar air interacting with the warm air associated with the permanent Tropical South Atlantic High.

Parametric statistics and percentile analyses were combined to evaluate changes of precipitation distribution along 40 years at annual and seasonal bases, considering 79 rain gauges spread over the state. Spatial distribution of the shape and the scale parameters of the gamma distribution and the 95<sup>th</sup> percentile were applied for two periods compared between them: 1973 to 1992 and 1993 to 2012. Results indicated consisted changes in both the rainfall distribution and in the values of extreme events, with an increase in the irregularity of rainfall distribution and a raise in the number of extreme events, patterns which might be related to remote teleconnections beyond the local and regional scales.

### Key words:

Rainfall variability; Climate Change; Extreme Events; Gamma Distribution

## Changes in Storminess in the Northeastern Baltic Sea Region During the Holocene: a Case Study from Coastal Areas of Estonia

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### Abstract

This project aims to reconstruct the late-Holocene changes in storm regimes and evaluate their effects on the coastal evolution, vegetation and land use in Estonia. We present preliminary results of the changes in mineal matter contents, especially aeolian sand, preserved in coastal bog sediments as an indicator of the past storminess in the region. Four peat bogs were cored along the coastal areas of Hiiumaa and Saaremaa islands in the west and at Juminda Peninsula in the north. The sediment chronologies are established with >70 AMS dates in total. In the west, (1) high peaks of aeolian sand occurred at ca. 3500, 3000 and 2500 cal yrs BP at Hiiumaa, and 2100, 1600 and 1000 cal yrs BP at Saaremaa, indicating strong storm events, (2) mineal matter contents declined gradually and consistently from the beginning of the bog formation until 1500 cal yrs BP, suggesting the increased distance from the shoreline due to the isostatic land uplift, and (3) concentration of aeolian sand was relatively high over the last 500-700 years, indicating the period stormier than the previous millennia. In the north, the mineral matter contents are consistently low (< 2% in weight) over the last 8000 years, and significant peaks of aeolian sand are rare. The dissimilarities in the results reflecting past storminess among sites suggest that site-specific characteristics, such as the exposure to open sea, and changes in the directions and magnitude of storm winds are the main factors affecting the coastal environments.

### Key words:

past storminess; aeolian sand in bog sediments; coastal environment dynamics

## Climate Significance of Tree-ring Stable Carbon Isotope of *Pinus massoniana* in Southeastern China

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### Abstract

There is still lack of knowledge about the climate significance of stable carbon isotope ( $\delta^{13}\text{C}$ ) of tree-rings in southeastern China. In this study,  $\delta^{13}\text{C}$  of tree-rings obtained from *Pinus massoniana* in Jiuling Mountain of Jiangxi Province, southeastern China, were analyzed with instrumental meteorological data for the period of 1964-1983. The results indicate that: (1) the first principle of  $\delta^{13}\text{C}$  ( $\delta^{13}\text{C}_{\text{PC1}}$ ) can effectively represent the common signal of regional tree-ring  $\delta^{13}\text{C}$  variation; (2) Correlation analysis shows that  $\delta^{13}\text{C}_{\text{PC1}}$  is significantly negatively correlated with the August-September precipitation and SPEI index and positively correlated with the August temperature; (3) The transfer function for August-September precipitation based on  $\delta^{13}\text{C}_{\text{PC1}}$  reaches the significant level and can represent the large part of the middle-lower reaches of Yangtze River; (4) The impact on the regional August-September precipitation posed by sea surface temperature and Pacific Decadal Oscillation can also be reflected in the  $\delta^{13}\text{C}_{\text{PC1}}$  series; (5) The  $\delta^{13}\text{C}_{\text{PC1}}$  is well correspond to the regional mean drought index during the summer-autumn with a significant positive correlation. In all, it is capable to reconstruct and analysis the past information of summer-autumn drought based on the tree ring  $\delta^{13}\text{C}$  of *Pinus Massoniana* growing in Jiuling Mountain of Jiangxi province.

### Key words:

Stable carbon isotope; tree ring; climate; southeastern China

## Climate Variability in the Iberian Peninsula Since 1700 AD Inferred from Tree-ring Records and Documentary Sources

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### Abstract

The IPCC report (IPCC, 2013) highlighted a likely increase of average global temperatures in upcoming decades, and pointed particularly to the Mediterranean basin, and therefore in the Iberian Peninsula (IP), as a region of substantial modelled temperature changes. Therefore, it is particularly important to study the evolution of the climate to be able to predict the future climate with greater accuracy. In this communication, we present a new climatic database for the northeast of the Iberian Peninsula based on tree-ring records, documentary sources and instrumental data. On the one hand almost 800 tree-ring width series from oldest trees in the study area (*Pinus uncinata*, *Pinus sylvestris* and *Pinus nigra*) have been analysed extended back to 1510 AD. We generate a new standardization method which maximizes the inter-annual to multicentennial tree-ring width variability and develop a new maximum temperature reconstruction for the Iberian Peninsula. On the other hand, the documentary records of 16 locations within the Ebro Valley have been carefully examined to identify the so called 'rogations'. In continue periods of severe droughts or wet event rogations were made to ask God for rain or to stop it. We identified 3 levels depending on the importance of religious acts which, in turn, identified the severity of the drought or wet event. A drought index has been developed within these documentary sources and for the first time tree-ring records, documentary sources and instrumental data have been combined to study the evolution and trends of the northeaster Iberian Peninsula since 1700 AD.

### Key words:

Dendroclimatology; global change; Iberian Peninsula

## Climate Warming in Southern Romania in the Past Half Century. Spatio-temporal Analysis and Assessment of Some Economic and Ecological Consequences

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### Abstract

Climate changes, especially global warming, currently represent a critical global environmental issue. This study's first phase covers the temporal analysis (between 1961 and 2009) of the air mean temperatures ( $T - ^\circ\text{C}$ ) recorded by 23 meteorological stations located in southern Romania, the country's region which is at present the most drastically affected by climate change. Thus, by using well established statistical instruments,  $T$  trends were analyzed on annual and seasonal scales, and for the main agricultural crops' growing seasons (maize and wheat). The second phase was based on the impact analysis of  $T$  dynamics on economic (agricultural) systems, considering the case study of maize yields (t/ha/yr) recorded in the 1991-2000 decade. The paper's last phase covers the analysis of certain ecological consequences, and consists of the case study analysis of the ecosystems' phenological changes. The climatic results indicated a general progressive climate warming on all analyzed temporal scales, especially over the past three decades (maximal  $T$  increase rates were recorded in summer, i.e.  $0.09\text{ }^\circ\text{C/yr}$ , or  $2.5\text{--}3\text{ }^\circ\text{C}$  net warming). The agro-climatic analysis indicated that, in 83% of the study area (which totals  $> 60000\text{ km}^2$ ), a  $1\text{ }^\circ\text{C}$   $T$  increase determined maize productivity losses of up to  $1.7\text{ t/ha/yr}$ . Ecologically, considering the example of the 1991-2009 interval in relation to the climatic setting of 1961-1990, it was noticed that climate warming is responsible for significant disparities (even more than 50%) between the various phenophases' periods, especially for flowering, fruit development, and fruit ripening.

### Key words:

Climate warming; Romania; impact; agricultural crops; phenological changes

## Climatic Characteristics of Dry and Wet Season in the Southeast Side of the Tibetan Plateau under Southwest Water Vapor Channel and Its Causes

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### Abstract

Based on the monthly precipitation and evaporation data from 139 meteorological stations in the southeast side of the Tibetan Plateau and NCEP reanalysis data with  $2.5^{\circ} \times 2.5^{\circ}$  spatial resolution, the characteristics of dry and wet season and its causes in the southeast side of the Tibetan Plateau were analyzed by diagnosing the seasonal water vapor flux, distribution of total atmospheric precipitable water and water vapor divergence. The results showed that there were the southwest water vapor transports in four seasons in the southeast side of the Tibetan Plateau, and that in winter and spring were still strong. However, the water vapor divergence existed over the southeast side of the Tibetan Plateau in four seasons, which wasn't conducive to the occurrence and sustaining of precipitation, especially were stronger and broader in winter and spring. Meanwhile, the atmospheric column in the southeast side of the Tibetan Plateau was shorter than the surrounding area under the influence of plateau topography, which leded to the total atmospheric precipitable water less than the surrounding area, and the seasonal variation of total atmospheric precipitable water was obvious, that in winter and spring was only  $1/3$  to  $1/2$  of the summer. Therefore, the seasonal drought in the southeast side of the Tibetan Plateau was subject to the less total atmospheric precipitable water and stronger and boarder water vapor divergence in winter and spring.

### Key words:

Dry season; wet season; water vapor transport; total atmospheric precipitable water; water vapor divergence

## Estimation Dynamics Change of Temperature of Atmospheric Air in Context of Climate Change in Syunik Region of the Armenian Republic

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### Abstract

The goal of this work is to clarify and analyze the dynamics change of annual air temperature, estimate the vulnerability and risk of studying territory. For solving of these problems as a theoretical base are conformable studies, especially, work about climate change. As a methodological base has been used in the work: general scientific, characteristic, analyses, statistical analyses, mathematic, extrapolation and correlation methods. As a basic material have been used actual data of air temperature (1935-2014) of meteorological station of Syunik, which are kept in the Armstatehydromrt.

Researchers showed that during last 80 years in studying area observed an increase of average annual values of air temperature, which is 0,2-1,2 °C. Maximum value of variation of air temperature observed in 2010 and was 1, 9-2, 5 °C. This year is the hottest year during all period of observation in the republic, and in Syunik also. In this region was observed absolutemaximum temperature of Armenia (43, 7 °C, Meghri), which observed in 31 of July in 2011. It is on 0, 7 °C exceeds to observed values in past.

In study area predicts an increasing of average annual temperature to norm: in 2030 - 0,04-0,17 °C (or 0,58-6,18 %), in 2050 - 0,09-0,36 °C (1,32-13,1 %), in 2070 - 0,14-0,54 °C (2,05-19,6 %) and 2100 - 0,21-0,82 °C (3,07-29,8 %). Vorotan pass and Kapan regions are more vulnerable and risky to air temperature.

So, in Syunik will observe continuous increasing of average annual values of air temperature. Is necessary to work out and realize complex arrangements for softening of effects.

### Key words:

Air temperature; dynamics change; increase; realize complex arrangements; softening of effects; Syunik; the Republic of Armenia

## Exploring Spatio-temporal Patterns of Rainfall Using Co-clustering Algorithm

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### Abstract

Exploring the spatio-temporal patterns of rainfall is important for understanding of water cycle and evaluation of flood and drought risk. Currently, many researches mainly focus on using statistics and interpolation methods to analyze the spatio-temporal patterns of rainfall. However, these methods can just separately analyze spatial or temporal patterns of rainfall. In this study, the method of integrating a co-clustering algorithm, Bregman block average co-clustering algorithm with I-divergence (BBAC\_I), which can analyze the spatial and temporal patterns of station based rainfall data simultaneously, and two geo-visualization technologies (Heatmap and Small multiples) was proposed to explore and visualize the spatio-temporal patterns of rainfall. A case study of analyzing the spatio-temporal patterns of rainfall in Guangxi of China, which is based on daily rainfall data collected at 77 rain gauges from 1981 to 2010, was carried out to testify the validity of this proposed method. The results show that (1) stations categorized into each station cluster are geographically adjacent and years/months with different rainfall patterns can also be classified automatically using BBAC\_I algorithm, (2) Heatmap and Small multiples can visualize co-clustering results of rainfall successfully. This study proves that may be BBAC\_I algorithm is another effective method for analyzing spatio-temporal patterns of rainfall.

### Key words:

Co-clustering; rainfall; geo-referenced time series; spatio-temporal patterns

## Impact of Climate Change and Extremes on Ecosystem in Hubei Province, China during 1951-2015

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### Abstract

Terrestrial ecosystems and the climate system are closely coupled. As an essential component of terrestrial ecosystems, vegetation plays an important role in global change, net primary productivity (NPP) is most widely used ecological indicators to understand the carbon cycle and to evaluate the sustainable development of terrestrial ecosystems. In this paper we use meteorological data at 35 stations in Hubei province, China during 1951-2015 to investigate the climate change, and the result shows that temperature is increased  $1.2^{\circ}\text{C}$  at a rate of  $0.13^{\circ}\text{C}/\text{decade}$ , while the precipitation shows a fluctuating trend. Here, we based on improved CASA (Carnegie-Ames-Stanford Approach) model, using MODIS as remote sensing data to establish the model to estimate the NPP in Hubei province, China during 2000-2015, it's discovered that NPP is increase at the rate at  $1 \text{ TgC}/\text{y}$  per year. In order to reveal the ecological response to the climate in Hubei province and find the dominant factors that driving NPP change, we analyses the correlation between climatic parameters and ecological indicators, the result indicate that air temperature and precipitation are the main factors to drive the NPP change, while the precipitation shows a stronger effect on the NPP than air temperature in Hubei province. And we also compare the NPP between the period of extreme climate events and normal year to analysis the impact of extreme climate events on NPP in Hubei province.

### Key words:

Climate change; ecological response; CASA model; NPP; correlation analyses; extreme climate events

## Issues of land degradation in the Darhad Depression, Mongolia

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### Abstract

The paper describes multi-year trend of climatic factors such as mean air temperature, precipitation amount, evaporation and aridity index which highly affect to land degradation in the Darhad Depression. Also, changes of a number of livestock and its composition were discussed. Air temperature during the warm season (May-September) increased by 1.70C with a rate of 0.040C per year in the Darhad Depression between 1974 and 2014. This increase has been occurred more intensively since 1994. As seen this result, global warming is occurred in the Darhad Depression clearly. The maximum temperature was recorded as 34.90C in the air and 62.00C at surface. Annual total surface evaporation is increased by 85 mm with a rate of 2.1 mm per year in the Darhad Depression.

Khuvsgul forest area is rich by larch and willow. In the last years, soil degradation has been increasing due to warming and aridity. Furthermore, major reasons of land degradation are extending sand area, and degenerate new sand area. Pasture carrying capacity exceeds since a number of livestock increased and composition of herds escaped and it is one of the main causes for land degradation.

### Key words:

Climate change; Darhad Depression; land degradation; pasture carrying capacity

## Mineralogical Evidence of the Existence of Two Mass Sources along a Traverse Route from Zhongshan Station to Dome a, Antarctica

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### Abstract

In the Antarctic summer of 1998/1999, the third Chinese Trans-Antarctic inland scientific expedition successfully entered Dome A area and extended its research to the site of 79°16'S, 77°00'E, 3,931 m.a.s.l., 1,128km away from Zhongshan station. In former studies, we have presented the results of chemical analysis of surface snow samples collected from the traverse route. These results provide an evident transitional site (DT263, 76°32.5'S, 77°1.5'E, and 2800 m.a.s.l.) approximately located at 820km away from Zhongshan Station with the elevation of 2800m. Meanwhile, climatic record study of an 80 meter ice core drilled at this site also suggests the site is influenced by interaction of maritime and continental climates.

By using scanning electron microscopy equipped with energy dispersive X-ray detector, analyses the individual particle characteristics and mineral composition of insoluble particles in surface snow along the same traverse route. It is revealed that the insoluble particles are mainly composed of "Si-rich" particles with the irregular shape. The content of "Si-rich" particles in surface snow collected from high altitude region is high, but that in surface snow collected from low altitude region is relatively low. This difference is due to atmospheric circulation. The high altitude region is affected by large-scale circulation with longitude-direction, and that insoluble particles in surface snow come from faraway sources. The low altitude region is mainly affected by strong cyclones at peripheral region of the ice sheet, and insoluble particles mainly come from coastal area. The demarcation area is approximately equivalent to the transitional site discovered by our former studies. This further confirms the existence of the transitional site.

### Key words:

Antarctica; Dome A; Mineralogy; Particles

## Modeling Hydrometeorology Drying Effect Maharloo Lake on the Severity of Aridity Shiraz Semi-arid Station in the Southern Half of the Iran

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### Abstract

Maharloo Lake as one of the great lakes located at southwestern Iran near Shiraz station is currently facing the threat of drought. It is worth noting that the lake dryness could affect the surrounding areas including the changes in Aridity Index (AI) component and indirectly affect the quality of access to water resources over the region. In this study, TAPM software was used to simulate, high-water scenario (the real condition of the lake) and drying lake scenario. In addition, the aridity index for Shiraz city which is located in the vicinity of the lake was changed. Actual daily data (1965-2014), monthly aridity index trend of the city was collected and analyzed for verification purposes. According to the long-term observations, it was shown that there is a declining trend for the aridity index among different months. Significant increase of about  $r = 0.26$  can be seen during November only. Based on dry scenario, it was found that at most months with increasing temperature and decreasing precipitation will come from the other side. During summer, the lake experienced a significant decrease in rainfall. The Simulation showed an increasing AI values for both scenarios during all months of the year. More significant increase was seen during cold season. Increasing AI value implies wetter conditions in the region. Global warming and its opposite effects on arid and semi-dry areas like Lake Maharloo and Shiraz station, it is expected that Maharloo Lake will experience a drying condition, decrease precipitation and increase in temperature.

### Keywords:

Regional climate model; Mesoclimatic Models; global warming; aridity index; TAPM; Maharlu Lake.

## **Perturbation Characteris of the Carbon Flux Change in the Poyang Lake Wetland**

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### **Abstract**

Location as well as the tight river-lake bond contribute the unique lake wetland ecosystem. Based the Flux data observed in southern rim of Poyang lake (April to August in 2015). These are founded: 1) Sunny and windless days with shallow water are the best CO<sub>2</sub> flux observation time, which is July 9th to 15th during the stuy period. On the contrary, Bad weather and the low amount may cause bad signal strength of the flux observing equipment, which is August 9th to 31th. 2) During April to August, from midnight to 3 o'clock, signal strength shows better than other time in a day. Before sun rises and after sun falls always be the low CO<sub>2</sub> flux signal strength. Air humid might be the cause of this phenomenon.

### **Key words:**

Poyang Lake Wetland; Flux Observation; Signal Strength

## Remote Response on the two Types of El Niño in Coupled Model Intercomparison

### Project Phase 5 models

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#### Abstract

El Niño - Southern Oscillation is one of the most drastic climate anomalies occurring in tropical regions of our planet. Researches of the last decade revealed that there are two different types of El Niño (Central Pacific and Eastern Pacific), and the effect of these two phenomena on meteorological anomalies differs significantly. The impact of El Niño is primarily manifested in the anomalies of temperature and precipitation, whereas disturbances in the circulation of the major atmospheric circulation cells are considered in less detail. These cells form the so-called “atmospheric bridges” providing a conduit for the transport of heat and moisture anomalies induced by El Niño outside the tropical Pacific.

The increase in global temperature determines the importance of studying the changes in the remote response mechanism on the two types of El Niño in the 21st century. However, not all climate models reproduce the correct structure of the El Niño teleconnections. The present study was carried out the validation of 20 models included in the project CMIP5. Validation allowed to define best models, which can be used for estimation changes of the El Niño teleconnections to various scenarios of climate warming in the 21st century. The study was supported by the Russian foundation for basic research (projects № 15-05-06693, 16-35-00394).

#### Key words:

El Niño - Southern Oscillation; El Niño teleconnections; climate change; CMIP5

## Research on Ecological Environment Stress Effect of the Urbanization Process in Xianning, Hubei Province, China

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### Abstract

With the rapid development of urban economy and the rapid increase of city population, the ecological environment stress effect of the urbanization process is increasingly prominent. The article is based on 2007-2012 statistical yearbook of Xianning City, Hubei Province, China, and two subsystems of urbanization development and ecological environment are established respectively. The principal components analysis (PAC) is taken to determine the comprehensive level of both systems, and to determine the relative changes during these years by comparing the comprehensive level of them. Regression analysis method is used to calculate the related indices between urbanization rate and ecological environment, such as discharge amount of sewage, production of solid waste and amount of exhaust emission, and to explore the urbanization concrete stress effect on the ecological environment, namely the concrete stress effect of urbanization development on the water environment, soil environment and atmospheric environment. Results show that there is linear correlation between urbanization rate and ecological environment. The increase of urbanization rate brings seriously negative impact on ecological environment. And based on this, the article makes some scientific suggestions for the coordinate development between urbanization process and ecological environment.

### Key words:

Xianning City; Urbanization; Ecological Environment; Stress Effect

## Spatial Interpolation and the Spatiotemporal Change Analysis of Precipitation from 1981 to 2010 of the Loess Plateau Region in China based on GWR

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### Abstract

This paper presents a precipitation interpolation method for the Loess Plateau using geographically weighted regression (GWR) and incorporating elevation and terrain roughness as variables. The method was applied to observation data collected at meteorological stations across the Loess Plateau. The mean annual precipitation in the Loess Plateau has varied between 125 and 760 mm in the last three decades. The assessment of the spatial distribution of precipitation revealed a general increase from northwest to southeast. The validation results for the four seasons suggested that the GWR-based interpolation method was more accurate than other methods. The mean absolute error of the GWR results was 36.4 mm, which was significantly lower than the classical and global regression interpolation methods. Additionally, we analyzed the spatiotemporal variation of annual and seasonal precipitation from 1981 to 2010. The results show precipitation in the second decade (1991–2000) was lower than in the first decade (1981–1990), but precipitation in the third decade (2001–2010) increased slightly. In general, precipitation in 1980s and 1990s was more variable, with an alternating occurrence of high and low precipitation years. The annual precipitation became stable in the 2000s with the exception of a high precipitation year in 2003.

### Key words:

Spatial interpolation; GWR; Precipitation; Loess Plateau

## Spatial Variability of Potential Evapotranspiration and its Climatic Drivers in the Northern Loess Plateau of China

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### Abstract

Potential evapotranspiration ( $ET_0$ ) is an indicator of atmospheric evaporative demand, it is necessary to investigate the spatiotemporal variation in  $ET_0$  to explain the changes in hydrological cycle. However, the quantitative attribution of spatial variability of  $ET_0$  is still a gap. Focused on the northern Loess Plateau of China, the spatial layers of  $ET_0$  and four climatic factors (wind speed,  $U_2$ ; solar radiation,  $R_s$ ; mean temperature,  $T_{mean}$ ; actual vapour pressure,  $e_a$ ) were firstly generated using data from 34 stations; Then 30 points of each maps were sampled with an interval of 10 km along three transects to represent the spatial variation in  $ET_0$  and four variables along the transects. Finally, using distance as an independent variable, the contributions of four climatic factors to the spatial variation in  $ET_0$  were calculated by a differentiating method. The results illustrate that: In the direction of  $110^\circ$  E,  $ET_0$  gradually decreased—then increased—and decreased again from north to south, and the dominant factors controlled the  $ET_0$  variability were  $T_{mean}$  in first stage and  $U_2$  in the other two stages; In the direction of  $39^\circ$  N,  $ET_0$  gradually decreased—then increased from west to east, which were all controlled by  $U_2$ ; From Wushen Banner of Inner Mongolia to Xi County of Shanxi Province,  $ET_0$  showed a downward trend and the dominant factor was  $R_s$ . The above results implied that the dominant factor for the spatial variations in  $ET_0$  differed for different areas.

### Key words:

Potential evapotranspiration; spatial variability; climatic factors; attribution analysis; Loess Plateau

## The Research on $\delta^{18}\text{O}$ Change of Precipitation in Different Time Scales in Honghe Hani Rice Terraces

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### Abstract

Based on the 161 precipitation samples collecting from the field trips in Honghe Hani Rice Terraces during July 2014 and December 2015, analysis  $\delta^{18}\text{O}$  change of them from Malizhai River Basin in different time scales. The results showed that: under the day scale,  $\delta^{18}\text{O}$  had the obvious amount effect and altitude effect; in the same rainfall, the more rainfall increased abidingly and the more amount increased, the less  $\delta^{18}\text{O}$  changed; for a certain time one day, the entire day and several days,  $\delta^{18}\text{O}$  values of precipitation showed a significant negative correlation to altitude, that was to say  $\delta^{18}\text{O}$  values decreased with altitude increasing; under seasonal scale, during the rainy season,  $\delta^{18}\text{O}$  values had a significant amount effect and temperature effect with no abnormal values; during the dry season,  $\delta^{18}\text{O}$  value had no connection to amount of precipitation ;at the same time, it was no change in the law with the temperature increasing, and  $\delta^{18}\text{O}$  values were at a higher value.

### Key words:

Honghe Hani Rice Terraces;  $\delta^{18}\text{O}$  of precipitation; in different scale

## Tree-ring based December-February Temperature Reconstruction since 1718 for the Hengduan Mountains, southwestern China

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### Abstract

Long and high-resolution proxy records containing cold season temperature signal are still scarce in southwestern China, limiting our understanding of the climate variability and its potential driving forces. In this study, we developed a 296-year tree-ring width chronology of *Pinus yunnanensis* Franch from two high altitude sites in Shangri-La, a hinterland of the Hengduan Mountains, southwestern China. The chronology showed a significantly positive response to winter (December-February) mean temperature during 1959-1998, however, the temperature sensitivity decreased afterwards. Hence, we reconstructed the December-February mean temperature for the period 1718-2013 based on the calibration period 1959-1998, during which the reconstruction accounted for 59.22% of the instrumental temperature variance. Spatial correlation analyses showed that our reconstruction represents large-scale regional temperature variations in southwestern China and eastern Tibetan Plateau (TP). The reliability of the reconstruction was confirmed by the comparison with other temperature reconstructions of nearby regions based on tree-ring or historical documents. Our reconstructed December-February mean temperature also showed a close association with the Atlantic Multidecadal Oscillation (AMO) over the past 3 centuries, indicating that AMO may be an important forcing of winter temperature variations over southwestern China.

### Key words:

Palaeoclimatology; tree ring; winter temperature; Atlantic Multidecadal Oscillation (AMO); southwestern China

## Trends in Temperature and Precipitation in the Pyrenees Range over the Period 1950-2010

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### Abstract

The aim of this study is to detect climate trends and variability from temperature and precipitation observations in Pyrenees range for the period 1950–2010 at seasonal and annual time scale. Within the framework of the Pyrenean Climate Change Observatory, OPCC, a cross-border database was created to obtain a global climatic diagnosis on the Pyrenees common to both sides of the mountain range. Sixty six long series of minimum and maximum monthly temperatures and one hundred thirty nine series of monthly precipitations were selected then homogenized by means of one single statistical tool HOMER (Action COST-ES0601).

Results showed a solid description of climate dynamics over the past six decades and provide an insight into the variability and climate change in the Pyrenees. Thus, an increase in temperatures of 0,2° C per decade on the whole mountain area was detected, with a significant rise during the last three decades. A more pronounced warming in summer than winter was detected since the 1950s. These results are largely consistent with those observed in neighbouring regions and the general trend of the climate in Western Europe. The analysis of precipitation trends indicates a high spatial and temporal variability. Small negative trends were found in annual and summer rainfall, but changes in precipitation are less consistent and the trends are generally weak.

### Key words:

Temperature; precipitation; trends; variability; mountain climatology; Pyrenees

## C12.04 Climatology

### Weather and Climate Extremes



Home

#### Oral

1. [An Assessment of Impact of Climate Change on Rice Production in Raigarh District, Chhattisgarh, India](#)  
Agnisha Chakraborty (PT. Ravishankar Shukla University, India), Toplal Verma (Govt. J. Yoganandan Chhattisgarh College, India), Naresh Baghmar (PT. Ravishankar Shukla University, India)
2. [Chennai Floods and Efforts to Prevent Outbreak of Disease](#)  
Dr. S. Sanjeevi Prasad (University of Madras, India)
3. [Heat waves in South China: Synoptic Characteristics and Long-term Changes](#)  
Luo Ming (The Chinese University of Hong Kong, HongKong SAR, China)
4. [Modeling of extreme wind velocities in the Western sector of the Russian Arctic.](#)  
Vladimir Platonov, Alexander Kislov (Lomonosov Moscow State University, Faculty of Geography, Russian Fed)
5. [On the Observed Trends in Temperature and Rainfall Extremes over Southern India](#)  
Amit Dhorde (Department of Geography, Savitribai Phule Pune University, Pune, 411007, India, India)
6. [Projections of Temperature and Rainfall Extremes over Southern Pakistan Using Peaks-Over-Threshold Approach](#)  
Maida Zahid (Meteorological Institute, University of Hamburg, Germany), Valerio Lucarini (Meteorological Institute, University of Hamburg and Department of Mathematics and Statistics, University of Reading UK, Germany)
7. [Research on Climate Change and Extreme Aridity Index in The Loess Plateau](#)  
Ming Wen (Northwest University, China), Jinxi Song (Northwest University, China)
8. [Spatiotemporal Characteristics of the Urban Extreme Climate in China's Instant City, Shenzhen](#)  
Yucong Tang (China University of Geosciences, China)
9. [Temporal and Spatial Analysis of Extreme Temperature and Precipitation Events in Hanjiang River Basin During the Past 50 Years](#)  
luwen wan, zhengdong zhang (South China Normal University, China)

#### Poster

1. [A Study on Characteristics of Drought-Flood Based on Precipitation Data in Yunnan Province over](#)

## the Past 61 Years

Jiaxu LIU; Sujing CHEN; Lijuan LI (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

2. Agricultural Perspectives for Steppe Area of Ukraine in a Changing Arid Climate

Inna Semenova (Ukraine, Odessa State Environmental University)

3. Change Features of Precipitation Events in Hainan Island from 1959 to 2013

Rui Sun; Zhixiang Wu; Bangqian Chen (China, Rubber Research Institute, Chinese Academy of Tropical Agriculture Sciences)

4. Diurnal Cycles of Precipitation in Observed Data and Regional Climate Model Simulations

Jan Kysely; Romana Beranova; Martin Hanel (Czech Republic, Faculty of Environmental Sciences, Czech University of Life Sciences, Prague)

5. Identifying and Qualifying Past Extreme Hydrological Events Based on Documentary Proxy Records in the UK

Marie-Jeanne S. Royer; Sarah Davies; Cerys A. Jones (United Kingdom, Aberystwyth University)

6. Luminescence Chronology and Palaeoclimate Implication of Palaeoflood Deposits in the Middle Reach of Yongding River, China

Xiaohong Zhao (China, Capital Normal University)

7. The Four Giant Planets Convergence in the Winter Causing the Climate Cold

Ouyang Chuntao; Yi Qingchuan (China, Yichun University)

8. The Three-dimensional Joint Distributions of Rainstorm Factors in Kuandian County Based on Copula Function

Li Ying; Wang Cailin; Ren Xuehui (China, Liaoning Normal University)

9. Variational Merged of Hourly Gauge-Satellite Precipitation in China: Benefits to Data-sparse Regions and to Heavy Rainfall Events

Huan Li (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

## An Assessment of Impact of Climate Change on Rice Production in Raigarh District, Chhattisgarh, India

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### Abstract

Climate is one of the most significant determinants of agriculture. Being a climate sensitive sector agriculture is extremely vulnerable to unfavorable climatic conditions. Climate change is an issue of great concern to an agrarian state like Chhattisgarh, where agriculture is the main source of livelihood for more than 60% of its population. The purpose of the study is to assess the impact of climate change on rice production in Raigarh district of Chhattisgarh, located between 21°09' N to 21°54'N latitude and 83° 4'E to 83° 24'E longitude. Agro – climatically it is the part Chhattisgarh Plain Region. Agriculture is mainly rain fed here. Only 28.5% area is irrigated. About 83% farmers belong to small and marginal categories, they are mainly dependent on monsoon rainfall for the agriculture. For the present study meteorological parameters such as rainfall, temperature for the last 30 years have been collected from Indian Meteorological Department and non- meteorological components like crop area, production, availability of irrigation facilities, fertilizers etc have been taken from Directorate of Economics and Statistics. The study has been analyzed by using running mean, least square technique and regression model. The study reveals that variation in temperature and rainfall pattern would affect the crop yield adversely and specially the effects of climatic variability is more vulnerable in case of majority of farmers belong to small and marginal categories.

### Key words:

Climate change; rain fed; rainfall; temperature; irrigation; crop yield

## Chennai Floods and Efforts to Prevent Outbreak of Diseases

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### Abstract

Chennai, formerly known as Madras is the fourth largest metropolitan area of India and the capital city of the Indian state of Tamil Nadu. The 2015 South Indian floods resulted from heavy rainfall generated by the annual northeast monsoon between 8th November to 14th December 2015. The monsoon affected the Coromandel Coast region of the South Indian states of Tamil Nadu and Andhra Pradesh, and the union territory of Puducherry. The city of Chennai particularly devastated by the flood. More than 421 people were reportedly lost their lives and over 18 lakh (1.8 million) people were displaced. With estimates of damages and losses ranging from ₹50000 crore (US\$7 billion) to ₹100000 crore (US\$15 billion), the floods were the costliest to have occurred in 2015, and were among the costliest natural disasters of the year. The flooding has been attributed to the El Niño phenomenon. Natural and complex disasters dramatically increase the morbidity and mortality due to communicable diseases. The present paper indicates the efforts taken to prevent the outbreak of diseases. Several measures were taken and the main objectives were management of population displacement, provision of temporary relief camps, provision of safe drinking water and sanitation, and health services for the population. These objectives were carried out by various methods like organizing Medical Camps, Chlorination of Drinking water, Solid Waste Disposal, prevention of sewer overflow besides control measures to prevent outbreak and spread of water borne and vector borne diseases. A native herbal decoction was provided to all the flood affected people to enhance their immunity against seasonal diseases.

### Key words:

Natural Disaster; El Nino; Flood Disease Outbreak; Natural Herbal Immunization

## Heat waves in South China: Synoptic Characteristics and Long-term Changes

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### Abstract

The characteristics of summertime heat waves (HWs) in South China were studied by using both observational and reanalysis datasets. We found that HW characteristics exhibit substantial increases throughout the study period (i.e., 1979-2010) in terms of the frequency of HW occurrence (0.34 per decade), number of HW days (2.81 days per decade), and severity (0.067 °C per decade). HWs derived from observational dataset exhibit even more substantial increases than that from reanalysis dataset. These increases in HW characteristics are more prominent in Pearl River Delta (PRD), i.e., the center and the most densely urbanized area of South China, and urbanization contributes no less than 25% in average to the increasing HWs frequency in PRD.

Synoptic characteristics and the associated atmospheric circulation patterns responsible for HWs in South China were also revealed. It is found that the westward movement of the western North Pacific subtropical high (WNPSH) should be responsible for HWs occurring in South China. When HW occurs, the region is covered by hot and dry atmospheric column. HWs are accompanied by anomalous high pressure and anticyclone, which blows northwesterly winds from the land to the sea, thus reducing the moisture transportation from ocean to the land and drying the atmosphere over the land. The evolution of the strengths of positive pressure center and high temperatures is reminiscent of the westward displacement of WNPSH, with a prominent positive anomaly in 500-mb height movement from east to west. We also showed that HW is linked to a planetary-scale wave train and the successive downstream development of this wave train is likely an indicative of Rossby wave dispersion. These features associated with HWs in South China also characterize the high temperature extremes in the whole region of South China and parts of Indochina Peninsula.

### Key words:

Extreme weather events; Heat waves; Climate change; South China; Urbanization

## Modeling of Extreme Wind Velocities in The Western Sector of the Russian Arctic.

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### Abstract

Extreme winds in coastal areas has fine structure and are strongly depend on shoreline configuration and local land surface properties, especially in the Arctic. Therefore, correct simulation of these wind patterns is possible using high-resolution modeling only. It allows detailed reproduction of low-troposphere atmospheric flows and taking into account many boundary layer properties.

In this study, the climate version of COSMO model (COSMO-CLM) was used. It is well-known non-hydrostatic regional atmospheric model developed by German Weather Service (DWD) and CLM-Community. The COSMO-CLM model was applied for many case-studies simulation of the most extreme winds observed over the Russian Arctic basin during the last 15 years. These extreme cases were sorted out previously from observations samples, based on the 0.99 quantiles of Weibull and Pareto distributions, i.e. the wind speed exceeded 20 – 25 m/s. Three cases were presented for further modeling: 29 – 30.10.2000, 26.01.2002 and 12.12.2013.

Model runs were performed for the unified 'large' domain with spatial resolution of  $0.12^{\circ}$ , covered the Barents Sea, part of Kara Sea, northern European territory of Russia and the surrounding water areas. Driving conditions came from ERA-Interim reanalysis ( $\sim 0.75^{\circ}$  resolution). After that, the downscaling technology was performed for the different 'small' domains (resolution of  $\sim 2.8$  km), inside the 'large' domain. Standard configuration of COSMO-CLM model (version 5.0) was applied: Runge-Kutta integration scheme with 5th advection order; 50 vertical levels for more detailed reproduction of boundary layer; prognostic TKE-based scheme for turbulence; standard Tiedtke convection scheme, etc. Runs continued for a week for the most cases including extreme situations observed near the middle of the period.

Analyze has shown that model reproduces the synoptic-scale dynamics and general wind velocity patterns well as both with the  $0.12^{\circ}$  km, and 2 – 3 km resolutions. However, model with  $0.12^{\circ}$  resolution has captured the fine structure of wind velocity pattern poorly, while model with 2.8 km succeed to reproduce detailed spotty wind pattern, caused by local orography or/and dynamic factors. On the one hand, the model underestimates observed mean values and wind gusts over seashores up to 4 – 5 m/s systematically. On the other hand, it could be interpreted as follow: such extreme speeds of air particles (15 – 20 m/s and more) does

not make much physical sense for wind velocity at a certain point. Therefore, we can consider wind velocity values for some area, according to the distance, corresponding to wind velocities.

Taking into account these reasons, we can ascertain, that COSMO-CLM model reproduces wind velocity pattern quite adequately, but using the resolution 5 km and less, only.

**Key words:**

extreme wind velocity; Arctic basin; COSMO-CLM model

## On the Observed Trends in Temperature and Rainfall Extremes over Southern India

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### Abstract

This research attempts to investigate changes in the indices of climate extremes, on the basis of daily maximum and minimum temperature at 62, and precipitation at 61 meteorological stations over southern India, during the period 1969–2006. Thirteen indices of extreme temperature and six indices of extreme precipitation were examined. Indices for extreme temperature depicted a warming trend, statistically significant at number of stations. The regional occurrence of extreme cool days (night) decreased by  $-1.24$  days ( $-0.8$  nights) per decade. Over 71% of the stations showed a decrease in the annual occurrence of cold nights and an increase in the annual occurrence of warm nights. Regional occurrence of extreme warm days (nights) increased by 1.79 days (0.98 nights) per decade. Maximum temperature extremes had widened the range through increase in maximum in maximum and decrease in minimum in maximum temperature. Whereas, decrease in extreme range was observed in minimum temperature by increase in minimum in minimum and decrease in maximum in minimum temperature extremes. Overall diurnal temperature range has increased slightly during study period. Low precipitation events have decreased whereas high precipitation events showed increasing trends. But total annual rainfall showed decreasing trend over the region. In contrast to the temperature indices, very few significant changes have been observed in the precipitation indices. On an average, regional maximum 1-day precipitation, annual total wet day precipitation, number of heavy precipitation days and consecutive dry days showed insignificant decrease.

### Key words:

Climate extremes; cool days; cold nights; warm days; warm nights; southern India; precipitation indices

## Projections of Temperature and Rainfall Extremes over Southern Pakistan Using Peaks-Over-Threshold Approach

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### Abstract

Recently, temperature and rainfall extremes are more evident in southern Pakistan (Sindh), particularly during summer season damaging property, crops, infrastructure and human lives almost every year. This region has become 'hot spot' of climate extremes in South Asia. Therefore, it is very important now to study these extremes and provide reliable future predictions for improved rural and urban planning. In order to investigate and manage the risks of extremes, the extreme value theory (EVT) is a quite popular and most relevant approach in the climate science. But this is not yet been applied in Pakistan to predict the extremes. In this study, we used daily maximum temperature and rainfall data of nine meteorological stations of Pakistan Meteorological Department from 1981 to 2013. The summer season is preferred for the analysis as both temperature and rainfall extremes cause most of the casualties during this period. We apply peak over threshold (POT) method of extreme value theory to model both temperature and rainfall above a selected threshold for each station. Then, we estimate the return levels (RLS) of maximum temperature and precipitation for the next 5, 10, 25 and 50 years. The RLs for maximum temperature are expected to increase by 2°C in Mohenjo-daro (MJD), Nawabshah (NWB), Karachi (KHI), and by 1°C in the rest of the stations. In case of rainfall, the return levels (RLs) show rainfall events greater than 150 mm are likely in Karachi, Badin, Chhor, Hyderabad and Nawabshah.

### Key words:

Extreme temperature; return levels; peaks over threshold; extreme value theory and extreme rainfall

## Research on Climate Change and Extreme Aridity Index in The Loess Plateau

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### Abstract

The Loess Plateau is the transitional zone of the wet and dry land, with the global climate changes, the regional climate changes should have a significance influence on the regional hydrology cycle and the variation of the dry and wet land. Aridity index (AI), as a ratio of potential evapotranspiration and precipitation, can be regarded as a useful indicator to reflect the regional climate change, used to judge the dry and wet land. The minimum value of AI present the driest of the regional climate. In this study, based on 51 national meteorological stations data during 1961-2014, adopted the Penman-Monteith model to estimate the potential evapotranspiration, precipitation divided by potential evapotranspiration to reveal the AI changes. In the whole study area, the AI shows a downward trend in time. Adapted scenarios analysis to find out that the majority factor contributes to the AI extreme value happened is the temporal-spatial variations of precipitation. Detrended the evapotranspiration and precipitation of each station, revealed the extreme value of AI happened most probability relative with fluctuation of the tow factor of AI instead of the trend.

### Key Words:

Aridity index; Potential Evaporation; Penman-Monteith

## Spatiotemporal Characteristics of the Urban Extreme Climate in China's Instant City, Shenzhen

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### Abstract

An urban area has large population, resource consumption, and environmental pollution. Extreme climate can bring huge losses to an urban resident's productivity and life, and it is a serious threat to the survival of human beings. Shenzhen is a typical area witnessing rapid urbanization in China. Researching the extreme climate spatiotemporal characteristics in Shenzhen has important significance for disaster prevention and mitigation in urban areas. In this study, we summarized more than 60 years of meteorological data from Shenzhen with the software-based R language RCLimDex 1.0 to analyze climate extremes. We then calculated the spatial variation of the data using the meteorological interpolation software, ANUSPLIN. The results showed that the climate was warming in Shenzhen based on the extreme precipitation index, with obvious signal shock at an inter-annual scale. The extreme heat index had increased, while the extreme cold index had decreased. However, over the past 10 years, the local temperature warming trend has slowed, and the extreme climate index has developed obvious spatial heterogeneity.

### Key words:

extreme climate; spatiotemporal characteristics; urban; Shenzhen

## Temporal and Spatial Analysis of Extreme Temperature and Precipitation Events in Hanjiang River Basin During the Past 50 Years

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### Abstract

Based on daily data for temperature and precipitation from China Meteorological data service shared network and Guangdong Province Meteorological of 13 meteorological stations in Hanjiang River Basin, China from 1965 to 2014 and used extreme event defined method, linear tendencies estimated, Mann-kendall mutation test and IDW plug value to calculate spatio-temporal changes features of extreme temperatures and precipitation, which were related directly to vegetation growth of water hot conditions and cold dry disaster. Results showed that: ① High temperature event index, such as Summer days(SU25), warm days(TX90P) and warm nights(TN90P) are significant upward trend, while low temperature event index like Frost days(FD0), Cool days (TX10P), Cool nights(TN10P) in Hanjiang River Basin are significant downward trend, which reflect the climate warming trend; ② trends in extreme precipitation indices showed no significant change, apart from the average daily rainfall intensity SDII, the other extreme precipitation indices showed only weak upward trend; ③ Frost days (FD0) started mutation in 1977, other indices of extremes temperature and precipitation indices showed a trend of fluctuations during the past 50 years, no obvious mutation; ④ extreme high temperature event index and hot continuous index sustained upward trend as a whole, extreme low temperature index and cool continuous index showed downward trend on the overall, which showed a good consistency in the Hanjiang River Basin; ⑤ the spatial distribution of the extreme precipitation indices showed some differences, but the distribution pattern was "gradually decreasing from northeast to Southwest" on the whole.

### Key words:

extreme temperatures; extreme precipitation; change features; Hanjiang River Basin

## A Study on Characteristics of Drought-Flood Based on Precipitation Data in Yunnan Province over the Past 61 Years

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### Abstract

Based on monthly rainfall data from 1954 to 2014 collected from 32 meteorological sites in Yunnan province, the spatio-temporal variability and periodicity of drought-flood were analyzed using SPI, EOF, RBF spatial interpolation, wavelet analysis. The results show that there is a tendency of drying in Yunnan province during the last 61years (the slope of SPI is  $-0.0091/\text{year}$ ). General flood year, normal year and general drought year account for 88.52% in the 61 years, and great drought year, extreme drought year and great flood year account for 4.92%, 3.28%, and 3.28%, respectively. There are two regions that droughts come more often than other regions in Yunnan province. In addition, there are three regions where floods come frequently. The probability of drought and flood events have a good correspondence, but the probability of drought is slightly higher than flood. The first modal of EOF analysis reveals that Yunnan province present the consistency of flood or drought, moreover, this modal may be affected by the large-scale climate characteristics. The second modal may be controlled by topographical factor, and the third modal may result from comprehensive function of multiple factors, such as longitude, monsoon. Furthermore, the time coefficient of first three modals also confirm the trend of drought in Yunnan province. Finally, the periodic oscillation of SPI serious is concentrated in expectant 2 years, 6 years, 8 years, 18 years and 28 years, and especially in expectant 28 years which has the strongest energy.

### Key words:

Drought-Flood; Standard Precipitation Index; EOF Analysis; Wavelet Analysis; Yunnan Province

## Agricultural Perspectives for Steppe Area of Ukraine in a Changing Arid Climate

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### Abstract

The Steppe area is the main agricultural region in Ukraine with rich black soil, where grows the high grain yields and develops gardening. But almost every year this region is exposed the drought of different intensity and duration.

Distribution of droughts in modern and future climate periods was studied using the Standardized Precipitation Index (SPI), which correspond to anomalies of precipitation relative to the norm. Analysis of drought index SPI at different time scales during period 1950-2012 showed, that in the Western Steppe 2-3 drought cases were observed in the 1950's and the 1960's. In the Eastern Steppe a period of the 1950's to the mid 1970's was drier in comparison with the Western Steppe. After 1980's a long dry period began and extended till the present time. In current century the main drought events were observed from 2005 to 2012.

Using the multimodel CMIP5 data, was analyzed future spatiotemporal distribution of precipitation in the Steppe area. According to the climate scenarios RCP2.6 and RCP8.5 amount of precipitation will be slightly increased during some time slices of 2020-2050, but in full period will observe the negative anomalies.

Analysis of drought frequency during the vegetation period using SPI3 showed that expected an increasing of the total number of seasonal drought. The drought will be observed one per every 2-3 years in each season. In the Steppe is increased the probability of occurrence strong and extreme drought, that will result to deterioration of the conditions of growing crops.

### Keywords:

drought; Standardized Precipitation Index; climate scenario

## Change Features of Precipitation Events in Hainan Island from 1959 to 2013

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### Abstract

The features of precipitation days and intensity including climate characteristics, trends, contribution rate, variation field, abrupt change and periodicity were analyzed based on daily precipitation data of seven weather stations in Hainan Island from 1959 to 2013. The results indicated that annual precipitation intensity showed an obvious increasing trend with a significant decrease of annual precipitation days during the past 55 years. For heavy rainfall, the days increased while the intensity presented a decreasing trend. Both the days and intensity of extreme rainfall had become higher apparently. Heavy and extreme rainfall days on a small proportion, however contributed significantly to the annual precipitation. With relative steady heavy rainfall intensity, the heavy rainfall days as well as extreme rainfall days and intensity has a considerable inter-annual variability. The heavy rainfall intensity, extreme rainfall days and intensity mutated in 1984, 2004 and 1998 respectively. Heavy rainfall and extreme rainfall days had variation major periods of 12 years and 7 years respectively, and precipitation intensity of different grades had periods of 21 years and 7 years respectively. Furthermore, the days of annual precipitation, heavy rainfall and extreme rainfall were more in middle mountain area of the island than in the western part. Annual precipitation intensity presented evident zonal distribution and gradually decreased from southeast to northwest. Precipitation intensity of heavy rainfall in various places was more uniform, meanwhile extreme rainfall intensity was highest in the western part of the island.

### Key words:

precipitation days; precipitation intensity; spatial distribution; trend; Hainan Island

## Diurnal Cycles of Precipitation in Observed Data and Regional Climate Model Simulations

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### Abstract

The study compares characteristics of observed sub-daily precipitation extremes in the Czech Republic with those simulated by HadRM3 and RCA4 regional climate models (RCMs) driven by reanalyses, and examines diurnal cycles of hourly precipitation and their dependence on precipitation intensity and surface temperature. Warm season (May–September) maxima of 1h to 24h aggregations are analyzed. The observed maxima of short-duration events (1h, 2h and 3h amounts) show one diurnal peak in the afternoon, which is simulated reasonably well by RCA4, although the peak occurs too early in the model. HadRM3 provides an unrealistic diurnal cycle with a peak during the night-time and a minimum in the afternoon coinciding with the observed maximum for all 3 ensemble members, which suggests that convection is not captured realistically. Distorted relationships of the diurnal cycles of hourly precipitation to daily maximum temperature in HadRM3 provide further evidence that the underlying physical mechanisms are misrepresented in this RCM. The analysis of the GEV distribution for short-duration precipitation maxima shows that the RCMs are not able to capture the range of shape parameter estimates realistically, either leading to too many or too few grid boxes in which the shape parameter estimate corresponds to a heavy tail. This suggests that the distributions of maxima of sub-daily precipitation amounts are severely distorted in the RCM-simulated data and do not match reality well. Analyses of projected changes of sub-daily precipitation extremes in climate change scenarios based on RCMs may therefore be misleading and need to be interpreted with caution.

### Key words:

sub-daily precipitation; extremes; regional climate models; Central Europe

## Identifying and Qualifying Past Extreme Hydrological Events Based on Documentary Proxy Records in the UK

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### Abstract

Climate change research in the UK has put into sharp focus the need for a strong understanding of flood events and their impacts on communities and individuals. Long term data on the frequency, intensity and impacts of past extreme hydrological events can be used in conjunction with future climate change projections to develop targeted mitigation strategies. Past flood events are difficult to identify from instrumental data alone as daily precipitation (if available) can be an unreliable indicator of an extreme event. Using documentary proxy records to identify and qualify extreme hydrological events can give us more detailed information than could be gathered from instrumental data alone. Based on DEFRA's 2012 'Climate Change Risk Assessments' for the UK we have targeted five UK case study regions (i.e. Wales, East Anglia Coast, Northwest Scotland, Central England, Southwest England). For these regions, a systematic search through available archive records was conducted to identify flood proxy records. These records were then analysed and compared to known flood events. Preliminary results from text analysis indicate a link between benchmarking and the identification of extreme hydrological events. This approach also allows singling out events that instrumentally are less important but that had severe consequences on the impacted communities (e.g. death, destruction of property). The combination of documentary proxy data with instrumental data can deepen the understanding of extreme hydrological events and their impacts on an individual or community.

### Key words:

Flood; Documentary proxy records; Extreme events

## Luminescence Chronology and Palaeoclimate Implication of Palaeoflood Deposits in the Middle Reach of Yongding River, China

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### Abstract

Flood is a kind of natural hazard and usually associated with climate change. It records environmental history at event scale. Floods had happened frequently in Yongding River in history and had caused serious losses. This study presents investigation of palaeoflood deposits in the middle reach of Yongding River and identifies seven episodes of palaeoflood events at Tanmugou profile. Optically stimulated luminescence (OSL) dating method is applied to establish the chronology of palaeoflood deposits. Both the improved single-aliquot regenerative-dose (SAR) protocol and the standard growth curve (SGC) method were employed for equivalent dose ( $D_e$ ) determination. For each sample, comparison of  $D_e$ s determination and corresponding ages of large aliquot and small aliquot were also conducted. The dating results reveal that the SGC method is suitable for  $D_e$  determination of palaeoflood deposits in Yongding River. The results of large aliquot and small aliquot are basically consistent. The identified palaeoflood events mainly occurred in Holocene and were concentrated around 1 ka, 3 ka and 8.5 ka. According to some continuous high-resolution climate records in East Asian monsoon region, climate had changed around 1 ka, 3 ka and 8.5 ka. These palaeoflood events mainly occurred in the climate conversion period and were closely related with climate change.

### Key words:

palaeoflood; OSL dating; climate change; Holocene; Yongding River

## The Four Giant Planets Convergence in the Winter Causing the Climate Cold

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### Abstract

In three thousand years ago, there was a recording " Star like wind, star like rain ", "moon from the star, with the wind and rain" in China. The winter solstice index ( $k$ ) was calculated on the basis of the moment effect of four giant planets from 1000 AD to 2030 AD taking the earth as the center. The results are as follows: (1) when  $k > 2.1$ , 13 years; (2) there is a quasi period of 140-180 years; which indicates that there are very good relationship with the temperature change in China; (3) Most of them correspond to Wolf Minimum Period, Sporer Minimum Period, Maunder Minimum Period, and Dalton Minimum Period. The Planets geocentric convergence effect on the earth's climate, belongs to the centennial and millennial scale, is not the gravity torque effect, but mainly lies in moment effect. Because the earth revolves not around the sun centre, but around the center of the solar system. Planets convergence can make the center of the solar system is far away from the center of the sun up to 1.5 million kilometers, is about 1% of the sun-earth distance. When the four giant planets assemble at winter solstice, will inevitably lead to the revolution radius of the earth getting longer and velocity.

### Key words:

Minimum Period; planets convergence; the climate cold in winter

## The Three-dimensional Joint Distributions of Rainstorm Factors in Kuandian County Based on Copula Function

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### Abstract

Taking Kuandian county in Liaoning province as an example, extracted four rainstorm factors: the annual rainstorm days, annual of rainstorm depth, annual average rainstorm intensity and rainstorm contribution through the daily precipitation data from 1955 to 2012. Optimal probability distribution for each single factor was determined by K-S method. Three-dimensional joint distribution for multifaceted rainstorm factors was built by Copula Function, and AIC and RMSE was used to confirm the best fitted Copula. The probability of rainstorm and characteristics of return period with many combined factors were analysed. Research shows that: (1) annual rainstorm days fit Poisson distribution, and annual average rainstorm intensity, rainstorm depth and rainstorm contribution fit Generalized Extreme Value distribution; Frank copula was suitable for reflecting the occurred probability rainstorm under the background of multiple-factor.(2) Joint return period of rainstorm factor in Kuandian county was well reflected by multiple-factor connection of the joint of annual rainstorm days, annual of rainstorm depth and annual average rainstorm intensity. Joint return period is short and distribute on 0-2 years, while cooccurenc return period was concentrated in around 200 years; the change trend of two kinds of return period was consistent, it has synchronization effect, this reflect inseparable of rainstorm factor.(3) the univariate reflect just one factor of information in rainstorm and doesn't involved in the relationship between multiple-factor; Three-dimensional copulas joint can present the internal information between heavy elements from three aspects and closer to the actual; Multiple factors of rainstorm, as copulas function on the rainstorm analysis provides a broad prospects.

### Key words:

Copula function; three-dimensional joint; rainstorm factors; return period

## Variational Merged of Hourly Gauge-Satellite Precipitation in China: Benefits to Data-sparse Regions and to Heavy Rainfall Events

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### Abstract

The article describes a variational scheme for the analysis of high-resolution hourly precipitation from CMA gauges and NOAA CMORPH satellite products in China and tests their impact on data-sparse regions and the heavy rainfall occurrences during the July, 2009. In the variational scheme, a cost function is defined to measure the distance between analyzed precipitation field and observed rainfall quantity. A recursive filter is incorporated into the cost function which helps spread the observations to nearby grid points. Then a quasi-Newton method is used to solve the optimal estimation problem by minimizing the cost function. The adjoint technique is used to derive the gradient of cost function with respect to analysis precipitation. A series of experiments are performed to inter-compare the variational analysis with the original CMORPH satellite products (CMP) and the bias-adjusted satellite products (Adj-CMP) against the observations. The best overall performance is from the variational analysis especially rainfall intensity by more than 10 mm hr<sup>-1</sup> with a prevailing mean relative spatial bias nearly reduction zero and the correlation coefficient is almost around 0.5 in convection active areas. Ground Cross Validation experiments in which each affected station is withdrawal at once indicated that the variational analysis can particularly be beneficial and subsequent investigation of heavy rainfall events. It also reveals that the precipitation analysis field has the ability to improve the accuracy of rainfall estimation and capture the spatial precipitation pattern agreements in relatively data-sparse regions.

### Key words:

Precipitation; hourly; variational analysis; gauge-satellite; data-sparse regions; heavy rainfall events

## C12.04 Climatology

### Urban Climates and Bioclimatic Aspects

#### Oral



Home

1. [A Development of Mobile Monitoring System for Urban Climatology](#)  
Toshiaki Ichinose (NIES / Nagoya Univ., Japan), Victoria Likhvar (LSCE, France), Futoshi Matsumoto (Keiai Univ., Japan)
2. [An Assessment of Diurnal Air Heat Stress Conditions in Urban Core of Kano Metropolis, Kano Region of Nigeria](#)  
Muhammad Alhaji (Kano University of Science and Technology, Wudil, Nigeria), Luka Fito Buba (Bayero University, Kano, Nigeria)
3. [Estimation of Urban Heat Island with Urban Innovation to Mitigate Local Climate Change: A Case Study of Delhi](#)  
Mina Babazadeh (Jawaharlal Nehru University, India)
4. [Investigating the Properties of Aerosols During Intense Haze Events over Pakistan Using Remote Sensing](#)  
Salman Tariq, Zia ul Haq (Remote Sensing and GIS Group, Department of Space Science, University of the Punjab, Pakistan)
5. [Satellite-Based Assessment of Urban Sprawl and Its Impact on Land Surface Temperature \(LST\) over Pune City, India](#)  
Anargha Dhorde (Department of Geography, Nowrosjee Wadia College, Pune, 411001, Maharashtra, India, India)
6. [Spatial Patterns of Urban Heat Island](#)  
Blanca Arellano, Josep Roca (Technical University of Catalonia, Spain)
7. [Synoptic Variability of Vertical Distribution of Aerosols and Cloud Condensation Nuclei in Moscow Region](#)  
Amir Asarbaev (Central Aerological Observatory, Russian Fed), Bagrat Danelyan (Central Aerological Observatory, Russian Fed), Dmitriy Kirin (Central Aerological Observatory, Russian Fed), Ivan Sazhin (Moscow State University, Russian Fed), Ekaterina Zakha
8. [The Built Surroundings Induced Urban Heat Island Consequence in Speedily Urbanizing Sub-Humid Region using LANDSAT ETM+ Sensors](#)  
Pavan Kumar (Kumaun University, India), Meenu Rani (PDFSR, India)

9. [The Effect of Different Ground Surfaces On the Thermal Radiant Environment and Human Thermal Comfort: Comparisons Between Monitoring Results and Different Model Simulations](#)  
Liang Chen, Yongyi Wen, Bailang Yu (East China Normal University, China)
10. [The Effects of Street Trees for Human Thermal Sensation in Summer](#)  
Sookuk Park (Jeju National University, South Korea), Stanton Tuller (University of Victoria, Canada)
11. [Urban Climate and Urban Heat Islands in Brazil](#)  
Francisco Mendonça (Brazilian Society of Climatology, Brazil)
12. [Using High Spatial Resolution Images to Explore the Relationship between Land Use Changes and Urban Heat Island, a case study of Changchun](#)  
Chaobin Yang, Xingyuan He, Shuwen Zhang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
13. [Validation of The Calculation of the Solar Radiation in COSMO-Ru According to The Measurements at The Meteorological Observatory of MSU](#)  
Aleksei Poliukhov, Natalia Chubarova, Gdaliy Rivin (Lomonosov Moscow State University, Russian Fed), Marina Shatunova (Hydrometeocentre of Russia, Russian Fed)

## Poster

1. [High Density Meteorological Observation System \(E-METROS\) in Tokyo Metropolitan Area](#)  
Takehiko Mikami (Japan, Teikyo University); Hiroaki Yamato; Wataru Morishima (Japan, Nihon University)
2. [Review on the Effect of Urbanization on Extreme Precipitation](#)  
Zhao Jing (China, Geographic and Oceanographic Sciences Department, Nanjing University)
3. [The Effect of Nocturnal Cold Drainage On Pressure Distributions On Urban Area in A Basin](#)  
Yasushi SAKAKIBARA; Ryutaro SEKI (Japan, Shinshu University); Yoshio HANAI (Japan, Kiso-Seiho High School)
4. [Urban Heat Island and Outdoor Thermal Comfort Indices Research in Kazakhstan](#)  
Pavel Konstantinov (Russian Fed, Lomonosov Moscow State University, Faculty of Geography); Alina Akhmetova; Diana Tattimambetova (Kazakhstan, Kazakhstan Branch of Lomonosov Moscow State University, Astana, Kazakhstan)

## A Development of Mobile Monitoring System for Urban Climatology

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### Abstract

We developed a real-time mobile monitoring system on air quality and thermal environment at the city block scale. This system helps designing the city blocks to locally improve outdoor comfort and provides access to a high resolution spatio-temporal environmental database, which includes information on the fine-scale outdoor thermal environment, air pollution, magnetic field intensity, etc. Based on a citizen participation approach, this system provides an opportunity for citizens to collect data in the area where they live, work or exercise. To test and validate the system we performed several participatory experiments providing participants with portable sensors connected to their mobile devices through Bluetooth, who walked in the city blocks of interest and collected information on the surrounding them environments. The information was displayed on their mobile devices and uploaded to a server via WiFi in real-time. We also used this system during local sport activity events (Tokyo Marathon, Tsukuba Marathon, etc.) to obtain physiological responses in participants to potential environmental exposure. Indeed, using this fine scale monitoring we could identify areas in city blocks with low air quality, which could be dangerous for continuing human health activity events and should be re-constructed. Now we have kicked-off a new project on mobile monitoring of urban environment referring to this achievement. My lecture will focus on the review of relevant researches including our own and the expected outcomes from our on-going project.

### Key words:

Mobile technology; atmospheric environment; health impact; monitoring

## **An Assessment of Diurnal Air Heat Stress Conditions in Urban Core of Kano Metropolis, Kano Region of Nigeria**

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### **Abstract**

The Research assessed diurnal heat stress condition in urban core of Kano Metropolis. Nine sites were selected by cluster sampling method. The Meteorological data were collected simultaneously across the sample sites at interval of 3 hours (i.e. 3 am, 6 am, 9 am, 12 noon, 3 pm, 6 pm, 9 pm and 12 mid-night) each in the months of April, August, October and December. Heat stress condition was calculated by using Discomfort Index (D.I):  $0.5T_w + 0.5T_a$ . The result indicates heat stress existence in the study area with hottest points found in the city centers. The out-door mean seasonal / Diurnal Heat stress condition D.I ranges revealed as follows: 16-37.5 for urban core. The patterns of the stress indicated that the industrial and densely populated axes experienced more of the stress than the sparsely populated and institutional centers. A three ways Analysis of Variance revealed a significant differences between seasons and hour of the day. Its suggest: Intercity Street and houses spaces for effective ventilation, massive afforestation of city streets and initiating public heat stress detecting, monitoring and disseminating system for heat stress alert to the public should be done to improve the city habitat.

### **Key words:**

Heat stress; diurnal; seasons; ventilation; monitoring; monitoring

## Estimation of Urban Heat Island with Urban Innovation to Mitigate Local Climate Change: A Case Study of Delhi

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### Abstract

Developing countries are actually suffering from the concrete effects of local climate change. They are part of the local climate change problem; however they've also been an integral part of the solution. Therefore, there have to be a simultaneous study of both the local climate change and the city systems. This research is to respond to the need for exploring how information and communication technologies and urban physics are well positioned to provide key-contributions to the current urban problems in Delhi.

This paper presents a systemic modelling methodology with help of analysing 72 satellite images of Landsat (5, 7 and 8) from 1998-2015 to provide some primary information into the relationships between local climate change and city structures. This relationship can identify the significance of biodiversity in stabilizing the local climate which can be approached with SSO, NDVI, TDVI and emissivity. Analysing LST spots for enhanced disaster risk management, secondly, Modelling small-scale obstacles (SSO) to improve city strength and adaptive potential and finally, (SSO) for informed adaptation decision making. In fact UHI possessed a strong seasonality, with the highest LST in summer, which shows for first time several UHI spots across city in unrespectable places in Delhi. Sensible heat flux tended to change largely with surface physics, while latent temperature was generally modulated through the change in vegetation density abundance and vigour and the accompanying emissivity condition. We also access framework to support Delhi in the challenging process of adapting to local climate change. This technical methodology also helps to recognize local climate change adaption plans along similar lines.

### Key words:

SSO; LST; LSE; Local climate; Satellite image

## Investigating the Properties of Aerosols during Intense Haze Events over Pakistan Using Remote Sensing

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### Abstract

Aerosols released from biomass burning affect the tropospheric chemistry, radiation budget and cloud processes and hence can cause significant climate modifications. Due to rapid increase in industrialization and urbanization, megacities of Pakistan are facing intense haze events causing important effects on the regional environment and climate. In the present work we have analyzed the properties of aerosols during intense haze events over Pakistan. The data from ground based Aerosol Robotic Network (AERONET), satellite based MODIS and CALIPSO remote sensing instruments have been used for the characterization of aerosols during intense haze events of October 2010 and 2013. HYSPLIT model was also used to estimate the transport of air pollutants during high aerosols optical depth (AOD) days. The maximum AOD values were found to be 2.75 and 2.36 on 20 October, 2010 and 9 October, 2013 in the central regions of Pakistan. Cluster analysis was performed by utilizing the scatter plot between AOD and Angstrom exponent, and absorption Angstrom exponent AAE (440-870 nm) and extinction Angstrom exponent (440-870 nm) (EAE) to classify the dominant aerosol types such as biomass burning, dust and urban-industrial aerosols during the heavy aerosol loading periods over Pakistan. Aerosol sub-types were investigated further with the help of CALIPSO data. High values of single scattering albedo were observed during both the events ( $\sim 0.95$ ). MODIS fire activity image suggests that the areas in the southeast of Lahore across the border with India are dominated by biomass burning activities.

### Key words:

Haze; aerosols; remote sensing; Pakistan

## Satellite-Based Assessment of Urban Sprawl and Its Impact on Land Surface Temperature (LST) over Pune City, India

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### Abstract

Pune city, like many other cities across the globe has witnessed rapid urbanization and industrialization. This has resulted in increased economic productivity and rise in the living standard, but has also lead to many environmental problems. The current research focuses on the effect of urbanization on Land Surface Temperatures (LST). Research on very few studies in India has been done in this regard and there is need to investigate such issues since the cities of India are growing very fast. The main objective of the research was to investigate the changing land use pattern and its impact on surface urban heat island of Pune city by analysing LST. This was done by using remote sensing data acquired by Landsat series of satellites which are capable of collecting thermal data. Two images, spanning over 19-year period (1990-2009) were utilized for which LSTs were derived by applying standard algorithms. An analysis of land use change and Normalized Difference Vegetation Index (NDVI) accompanied this procedure. A model was prepared to derive LST in ERDAS IMAGINE, a satellite image processing software. The results confirmed rapid expansion of Pune city indicating doubling of built-up area and reduction in vegetation cover. This has resulted in intensification of surface urban heat island and its expansion too. LST has increased by 8-12 °C in the city core. The peripheral parts of the city have also witnessed increase in LST.

### Key words:

Land surface temperature; urbanization; land use; surface urban heat island; Pune

## Spatial Patterns of Urban Heat Island

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### Abstract

The specialised literature has devoted many efforts to analyse the contribution of urban systems to climate change and has developed different tools for studying the climate impact of urban areas (urban climate zones or "climatopes"). In such studies, the urban heat island (UHI) plays an important role. In this sense, the use of remote sensing technology has allowed detailed mapping of land surface temperature (LST) for urban and metropolitan systems.

These studies have demonstrated the key role played by vegetation, impervious surface and built-up area to explain the differences in the spatial distribution of LST. However, does not seems to have been a similar attention for studying the morphology of the UHI spatial patterns. Most of the studies in metropolitan areas attribute a progressively decreasing gradient of the UHI from the city center to the rural periphery. The maximum LST is often found in Central Business District (CBD), decreasing towards the rural periphery according to different land uses. In contrast, our research on the spatial distribution of the LST for the metropolitan area of Barcelona suggests a different morphology of the gradient of the UHI. On the one hand in Barcelona the highest temperatures in the daytime are not obtained in the CBD but in more peripheral areas specialized in economic activity (industrial parks), producing a "donut" in the spatial distribution of the LST. On the other hand, the nighttime temperatures were been determined or conditioned by geographical factors, such as proximity to the sea or altitude.

This paper aims to show the spatial patterns of LST in different cities, studying the differences according to the distribution of land use, quantity and quality of the vegetation, intensity of urban sprawl, spatial distribution of economic activity and type of urban structure.

### Key words:

UHI; climate change; remote sensing; LST; NDVI; land use; impervious surface

## Synoptic Variability of Vertical Distribution of Aerosols and Cloud Condensation Nuclei in Moscow Region.

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### Abstract

Atmospheric aerosols play an important role in global climate system influencing on radiative forcing, clouds and hydrological cycle. Aerosols can serve as cloud condensation nuclei (CCN) that have a great effect on processes of rainfall. This research is focused on influence of Moscow city air pollution on vertical distribution of aerosol and CCNs.

For the first time, unique aircraft measurements of aerosols and CCNs were made over the eastern part of Moscow region. Spectral characteristics and vertical distribution of aerosols in different synoptic situations were analysed. Aerosol number concentration counted by two aerosol spectrometers – UHSAS and PCASP with spectral range from 60 up to 3000 nm, and number of CCNs from DMT CCN-counter were used for analysis. Spectrometers obtaining data of aircraft measurements were compared with ground-based aerosols and particulate matter measurements in Moscow city and Moscow agglomeration.

Vertical profiles taken from forty flights in different seasons were generalized for high-pressure and low-pressure situations. Aerosol number concentration exponentially decreased with altitude. Inversion layers form aerosols and CCN accumulation zones varied in contrast synoptic conditions. The matter of discussion is existence of differences of aerosols number size distribution at different heights depending on synoptic situation.

Further results of research help to quantify the effects of aerosols in megacities and to improve aerosol blocks in models of general circulation of atmosphere and ocean.

### Key words:

Aerosols; cloud condensation nuclei; urban pollution, aircraft measurements

## The Built Surroundings Induced Urban Heat Island Consequence in Speedily Urbanizing Sub-Humid Region using LANDSAT ETM+ Sensors

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### Abstract

We are living in the age of a rapidly growing population and changing environmental conditions with an advance technical capacity. This has resulted in wide spread land cover change. One of the main causes for increasing urban heat is that more than half of the world's population lives in a rapidly growing urbanized environment. Satellite data can be highly useful to map change in land cover and other environmental phenomena with the passage of time. Among several human induced environmental and urban thermal problems are reported to be negatively affecting urban residents in many ways. The built-up structures in urbanized areas considerably alter land cover thereby affecting thermal energy flow which leads to development of elevated surface and air temperature. The UHI for the temporal period is estimated using geospatial techniques which are then utilized for the impact assessment on climate of the surrounding regions and how it reduce the sustainability of the natural resources like air, vegetation. The present paper describes the methodology and resolution dynamic urban heat island change on climate using the geospatial approach for the Haridwar district of Uttarakhand. NDVI were generated using day time LANDSAT ETM+ image of 1990, 2000 and 2005. In Haridwar district the temperature is inversely related and negatively correlated with NDVI value. The industrialization and increasing comforts have the adverse effect on surface temperature which is increasing at a fast pace. The urbanization is the way to progress but we forget the environmental dimension which must be considered.

### Key words:

UHI; NDVI; Surface temperature; Dynamic changes

## The Effect of Different Ground Surfaces on the Thermal Radiant Environment and Human Thermal Comfort: Comparisons between Monitoring Results and Different Model Simulations

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### Abstract

This paper presents a study that examines the effect of different ground surfaces on the urban thermal radiant environment, which is described by air temperature, ground temperature, radiation flux densities and the mean radiant temperature ( $T_{mrt}$ ). Case studies were carried out in different urban settings in Shanghai with various ground surface characteristics, including brick, tile, asphalt, concrete and grass. Three-dimensional radiation flux densities were monitored and the six-directional integrated radiation flux method was used to calculate  $T_{mrt}$ . Two computer models, ENVI-met and SOLWEIG were employed to simulate the local thermal radiant environment. Simulation results were compared with monitoring results, and the models' sensitivity to different ground surface characteristics was tested. The human biometeorological index of PET was then used to evaluate the effect of different ground surfaces on human thermal comfort. Based on the findings, urban design recommendations were proposed to mitigate the urban thermal radiant environment and promote outdoor thermal comfort in heat days.

### Key words:

Urban thermal radiant environment; mean radiant temperature; thermal comfort

## The Effects of Street Trees for Human Thermal Sensation in summer

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### Abstract

Climate change has worsened human thermal environments in warm summer climates. Trees have an important role in urban thermal modification through their microclimate controls. This study investigated effects of five different tree species on human thermal sensation in summer. The tree species were popularly planted on urban streets in Jeju island, Republic of Korea: two tall deciduous broadleaf species (*Prunus yedoensis* and *Zelkova serrata*) and three broadleaf evergreen ones (*Catanopsis sieboldii*, *Elaeocarpus sylvestris* and *Ilex rotunda*).

Mean air temperature, relative humidity and wind speed were slightly different between sunny and shady locations: 0.2-0.7 °C, 0.9-5.3 %, 0.1-0.5 ms<sup>-1</sup> depending on the tree species, respectively. However, the overall mean radiant temperature difference between them was large, 27.1 °C: 62.5 and 35.4 °C in sunny and shaded locations, respectively. Evergreen species made more differences than deciduous ones. Shaded locations had cooler computed human thermal sensations than sunny locations: mean Physiological Equivalent Temperature (PET) 8.8-14.8 °C (21.2-31.3 %) lower (Max. 11.7-18.8 °C) PET and mean Universal Thermal Climate Index (UTCI) 5.0-8.5 °C (12.7-20.0 %) lower (Max. 6.1-11.0 °C) depending on the tree species.

The differences are equivalent to 1.5-2 heat stress levels in PET and 1-1.5 levels in UTCI. Evergreen species made mean 5 % more modification effects in PET than deciduous ones, but *Zelkova serrata* which had dense branches and leaves had a similar effect as evergreen species. Therefore, the density of tree crowns and mean radiant temperature were key controls of trees' thermal modification in human thermal sensation.

### Key words:

Human thermal sensation; human thermal comfort; tree species effect; summer; urban

## Urban Climate and Urban Heat Islands in Brazil

Mendonça F, Anunciação V S, Armanl G, Collishonn E, Costa R C, Nobrega R S, Roseghini W F F, Steinke E T, Tavares R, Zanella M E

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### Abstract

Climate directly influences human societies, and it is heavily changed by them. The urban climate arouses special attention, particularly when we analyse the thermodynamic field (UHIs – Urban Heat Islands) because it is estimated (AR4 and AR5 IPCC Reports; PBMC Brazilian Report, 2015) that the heat conditions in large brazilian cities will more intense than today. Under the theoretical and methodological perspectives of Oke (1972) and Monteiro (1976), concerning the study of urban climate, brazilian cities have been studied since the 1970s. From that moment the brazilian population has become increasingly urban; actually about 85% of a population of 210 million brazilians live in cities. In this study, we present results concerning ten major brazilian cities distributed throughout the country, located in five different climatic regions. In the study, it was analyzed meteorological and climate data, and satellite images, with statistical and graphical approach. In all cities we observed the UHIs formation from low to high magnitude within the *urban boundary layer* (1°C to 20°C), the same occurring within the *urban canopy layer*, having recorded the formation of various simultaneous islands, including urban cooling islands (UCI). The most significant UHIs was formed on the evening in large urban areas (especially over São Paulo and Rio de Janeiro), although they were also strong in other cities (Campo Grande, Brasília, Porto Alegre and Curitiba); the islands had a lower intensity in the coastal cities in the Northeast and North regions of the country (Recife, Fortaleza, Manaus and São Luis).

### Key words:

Urban climate; urban heat island.; urban cooling island.; Brazil

## Using High Spatial Resolution Images to Explore the Relationship between Land Use Changes and Urban Heat Island, a case study of Changchun

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### Abstract

The urban spatial pattern and morphology do have important effects on UHI (urban heat island). Different land use types with different thermal properties and radiation features make different contributions to the UHI. Recently, studies on the relationship between urban land use changes and UHI attract much attention. Advances in the datasets used for characterizing land use will allow us to better describe the urban spatial patterns. Moreover, the landscape ecology approach had been used to explore the relationship between urban patterns and urban thermal environment. Using time series Landsat TM/OLI imagery and very high spatial resolution images SPOT5 and GF-2 of Changchun for 2002 and 2015, the relationship between land use changes, land surface descriptors and UHI were quantitatively examined with the technology of remote sensing and statistical analysis. Accurate retrieval of LST is the basis to have a better understanding of UHI, and mono-window algorithm was chosen in this study. Visual interpretation was used to obtain the information of the land use changes. The UHI effect will be a continuing challenge as the world continues to urbanize, cities grow in size and density. This study on the tem-spatial variations of UHI will enrich the theory and case study on the sustainable development and urban climate.

### Key words:

Urban heat island; land use change; land surface temperature

## Validation of the Calculation of the Solar Radiation in COSMO-Ru According to the Measurements at the Meteorological Observatory of MSU

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### Abstract

We tested a relatively new effective CLIRAD (FC05)-SW radiation code [Tarasova, T.A., Fomin B.A., 2007] and the radiation block [Ritter, B., Geleyn, J.-F., 1992] of the COSMO non-hydrostatic mesoscale model of the atmosphere and soil active layer [Doms G., Baldauf M., 2015; Doms G. et al., 2011] against the measured radiative data at the Moscow State University Meteorological Observatory (MO MSU). The radiation components were measured by the Kipp&Zonen net radiometer CNR4 with estimating all possible uncertainties of measurements by this instrument. The aerosol and the water vapor were measured by the CIMEL AERONET sun photometer measurements at the MSU MO [Chubarova N. et al., 2011].

The comparisons between the long-term MSU MO aerosol dataset and the other widely used aerosol climatology were made for different months. We showed the significant AOT overestimating in the older aerosol climatology. For example, the [Tegen et.al, 1997] AOT dataset is twice higher than real data for many months and 50% higher for annual means values. This bias provided a strong error in the calculation of the downward shortwave radiation. The uncertainty of the COSMO RT code was made against the new CLIRAD (FC05)-SW radiation model for different aerosol conditions. The application of various aerosol in COSMO RT codes has led to a pronounced temperature effects. We showed that in clear sky conditions the sensitivity of air temperature is about 0.5-0.8°C to the 100 W/m<sup>2</sup> shortwave net radiation changes due to variations in typical aerosol over Moscow. The reported study was partly funded by RFBR (research project № 16-05-00985a).

### Key words:

Radiation transfer; aerosol climatology; COSMO-Ru model

## High Density Meteorological Observation System (E-METROS) in Tokyo Metropolitan Area

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### Abstract

Since 2006, we have conducted high density meteorological observations in Tokyo Metropolitan Area with 130-200 data loggers settled in the Stevenson screens located on the primary schoolyards. We named this observation system as E-METROS. Basically, air temperature (and partly humidity/pressure) observations have been made with the interval of 10 minutes, and have been stored in the memory of data loggers continuously. The purpose of E-METROS is to clarify the mechanisms of urban heat island phenomena by analysing the temporal and spatial variations of temperature and humidity in relation to local circulation system (e.g., sea breeze) in Tokyo Metropolitan Area. The results show typical diurnal variations in summer temperature patterns, which is specific to Tokyo Metropolitan Area, where huge amount of anthropogenic energy consumptions and densely built high-rise buildings might accelerate urban heat island effects. In summer, although highest temperatures are distributed in central Tokyo from mid-night to early morning, they move to northwest-ward in accordance with the penetration of sea breeze from the Bay of Tokyo. In recent years, torrential summer rainfall over 50 mm/hr increased in north-western area of Tokyo, where daytime temperatures are highest in Tokyo Metropolis. These facts suggest that daytime urban heat islands may intensify the cumulonimbus which trigger torrential rainfall in Tokyo.

### Key words:

Meteorological observation; urban heat island phenomena; Tokyo; torrential rainfall

## Review on the Effect of Urbanization on Extreme Precipitation

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### Abstract

In recent years, urban rainstorm and flood disaster frequently occurred, bringing serious social and economic losses, more and more attention has been paid to the study of urban extreme precipitation. Overall, based on the data of measured meteorological station and regional rainfall estimation of satellite remote sensing and weather radar, combined with experimental plot and high resolution remote sensing image data, the main content of studying urbanization impact on extreme precipitation is the analysis of extreme precipitation temporal and spatial variation trends in the process of urbanization and the regional differences by observational analysis and numerical simulation. The research conclusion is relatively consistent, namely the extreme precipitation in cities take an intensified trend, and the probability of extreme precipitation was significantly higher than that in city suburbs. However, the impact mechanism of urbanization on extreme precipitation in city is relatively complex, current research focus on the underlying surface changes, which may be one of the main reason for the increase of city rainstorm. In addition, the variability of large scale climate system, local topography and aerosol are also the influence factors, which need an in-depth analysis to perfect the influence mechanism. Future study should focus on the improvement of temporal and special observations and extreme precipitation forecasts accuracy, perfecting urban extreme precipitation numerical simulation, comprehensively identifying and quantitatively analyse the increased city extreme precipitation probability causes in order to further explore the influence mechanism of urbanization on extreme precipitation.

### Key words:

Urbanization; extreme precipitation; trend; impact mechanism

## The Effect of Nocturnal Cold Drainage on Pressure Distributions on Urban Area in a Basin

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### Abstract

Heat island phenomenon can be seen not only in flat plain areas but also in basin areas (Sakakibara and Matsui, 2005). Generally speaking urban temperature is higher than rural. The heat island occur at calm clear nights distinctly. Oke (1982) showed the schematic image of urban atmosphere as 'urban circulation' at clear and calm nights. Winds blow from rural to urban. The upward current occurs in the central urban area and wind blows from over the city to rural. A cold air drainage flows along the mountain slope in the calm clear night. Both heat island and cold air drainage occur clearly at night with the same meteorological conditions. The objectives of this study are to show the pressure distribution on the urban in the basin and clarify the mechanism of nocturnal urban atmosphere formation on the basin city. The travelling observation of car with a high accuracy digital barometer and SAT was used, and automatic interval observation with temperature data loggers and weather station loggers was conducted in this study. The result shows that the pressure in alluvial (way out) area where cold air drainage blew was higher than other. High pressure zone was extended over the urban. There was a relatively higher air pressure zone on the route the cold air drainage passed through in the urban area.

### Key words:

Reduction to mean sea level; Atmospheric pressure; Temperature; urban climate

## Urban Heat Island and Outdoor Thermal Comfort Indices Research in Kazakhstan

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### Abstract

Current research presents investigation of UHI phenomenon and outdoor thermal comfort indices, calculated with Rayman model (Matzarakis et al., 2010) in the steppe zone on the example of Kazakhstan big cities. Current investigation covers the ten-year period from 2003 to 2012. This period is representative for the study because during this short time the city area and its population rapidly increased (from 250 000 to 835 000 within the city).

Research area is quite interesting domain because Kazakhstan's capital city, Astana is the second coldest capital city in the world after Ulaanbaatar, Mongolia. So, the main purpose of the research is to study the UHI phenomenon in Astana and the surrounding steppe areas. The average annual value of the UHI intensity (approximately 1, 26°C) is the indicator of high-intensity urban heat island for the steppe zone, and detected the positive trend of UHI intensity. The population growth of the Astana (mainly due to labor migration) raises the question of the expansion of the area of the city and the construction of new buildings.

Also analysis of several biometeorological indices, particularly PET (physiological equivalent temperature) and WBGT during summer heat waves showed significant differences between urban and rural outdoor thermal comfort conditions.

### Key words:

Urban heat island, steppe zone, Kazakhstan

## C12.05 Coastal Systems

### Harmonizing Pacific Coastal Oceans: Sustainability For a Future Earth

#### Oral



Home

1. [2D hydrodynamics of Pearl River Estuary using D-Flow Flexible Mesh](#)  
Li Li, Jürgen Böhner (University of Hamburg, Germany), Qinghua Ye (Deltares, Netherlands)
2. [An Evaluation Study on Maturity of China's Modern Marine Industry System Based on Improved Catastrophe Progression Method](#)  
Wang Zeyu, Cui Zhengdan, Sun Caizhi, Han Zenglin, Guo Jianke (Center for Studies of Marine Economy and Sustainable Development of Liaoning Normal University, China)
3. [Anthropogenic Activities Impact Assessment in The Coastal Zone Considering Spatial Heterogeneity](#)  
Lin Yi, Fang Zhu, Jinsong Chen (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China)
4. [Evolution of Cusps on a Gravel Beach](#)  
Douglas Sherman (University of Alabama, United States), Jinkang Wang (Legal Aid Foundation of Los Angeles, United States)
5. [Fluctuations in Water Level of Caspian Sea and Geomorphology Changes of its Southeast Coast](#)  
Parivash Karami (Kharazmi University, Iran)
6. [Green GDP Accounting of Marine Industries in Bohai Rim, China](#)  
Zhe Feng, Xuegong Xu (College of Urban and Environmental Sciences, Peking University, China)
7. [Low-Lying Coastal Plains of the Indo-Pacific Region and Their Vulnerability to Sea-Level Rise](#)  
Colin Woodroffe (University of Wollongong, Australia)
8. [Mercury Export from Mainland China to Adjacent Seas and Its Influence on the Marine Mercury Balance](#)  
Liu Maodian, Chen Long, Wang Xuejun (Peking University, China), Zhang Wei (Renmin University, China), Tong Yindong (Tianjin University, China), Ou Langbo, Xie Han, Shen Huizhong, Ye Xuejie, Deng Chunyan, Wang Huanhuan (Peking University, China)
9. [Random Fractal Characters and Length Uncertainty of the Continental Coastline of China](#)  
Jianhua Ma, Dexin Liu (Henan University, China)
10. [Research into Marine Ecological Suitability Assessment and Zoning Based on Spatial Analyst Model: a Case Study in Dongtou County](#)  
Yunyun Xiang, Hui Yang (Second Institute of Oceanography, State Oceanic Administration, China)

11. [Spatial Distribution Characteristics of Soil Salinity in Coastal Reclamation Area, Eastern China](#)  
Xie Xuefeng, Pu Lijie (Nanjing university, China)
12. [Spatial-temporal Analysis of Shoreline Change along Andhra Coast: An Analytical Approach of Remote Sensing and Statistical Techniques](#)  
Sindhu Tyagi, Dr. S.C. Rai (delhi university, India)
13. [Study on the Evolution of the Pearl River Delta, China:6-2.5 kBP and Recent 100 years](#)  
Chaoyu Wu (Center for Coast Ocean Science and Technology Research, Sun Yatsen University, China),  
Xing Wei (Tropics, South China Sea Institute of Oceanology, China), Jie Ren (Center for Coast Ocean  
Science and Technology Research, Sun Yatsen University, China)
14. [Using Benthic Foraminiferal Assemblages as Bio-indicator to Assess Environmental Stress, a Case Study in Zhoushan Port, China](#)  
Feng Gui (Zhejiang Ocean University, China)

## Poster

1. [Adaptability Assessment of Marine Industrial Ecosystem in Bohai Region](#)  
Li Bo; Zhang Zhiqiang (China, Study Center of Marine Economy and Sustainable Development,  
Liaoning Normal University); Han Zenglin (China, Liaoning Normal University)
2. [An Evaluation of Chinese Marine Economy Efficiency Based on SBM and Malmquist Productivity Indexes](#)  
Lin Zhao; Yushuo Zhang; Xinying Jiao (China, Beijing Normal University)
3. [Analysis on Potential Dry-Wet Change in Haihe River Basin on the West Coast of Bohai Bay in 1961-2010](#)  
Lu Yi (China, State Environmental Protection Key Laboratory of Environmental Planning and Policy  
Simulation, Chinese Academy for Environmental Planning); Ma Zw (China, China Science and  
Technology Exchange Center); Jiang Hq (China, State Environmental Protection Key Laboratory of  
Environmental Planning and Policy Simulation, Chinese Academy for Environmental Planning)
4. [Assessment of land- sea Coordination Based on the Principal Component Analysis——A Case Study of Qinzhou, China](#)  
Li Meng; Baoqing Hu (China, Guangxi Teachers Education University)
5. [Beach Morphodynamics and Impact Factors on the Beaches of Shandong Peninsula](#)  
Baojing Yue; Maosheng Gao; Liangyong Zhou (China, Qingdao Institute of Marine Geology)
6. [Characteristics and Transport Trends of Surface Sediments in Inner Lingdingyang Firth of the Pearl](#)

## River Estuary

Shi Cui; Peng Hua (China, School of Geography and Planning, Sun Yat-sen University)

7. Chinese Marine Economy Development: Dynamic Evolution and Spatial Difference

Caizhi Sun; Xin Li (China, Center for Studies of Marine Economy and Sustainable Development, Liaoning Normal University); Wei Zou (China, School of Foreign Languages, Liaoning Normal University)

8. Chinese Marine Ecosystem Services Value: Regional and Structural Equilibrium Analysis

Caizhi Sun; Song Wang (China, Center for Studies of Marine Economy and Sustainable Development, Liaoning Normal University); Wei Zou (China, School of Foreign Languages, Liaoning Normal University)

9. Effects of Storm Waves and Heavy Rainfall Events on Topographic Changes at Jinshawan, Northeastern Taiwan

Yung-Wen Ho; Tsung-Yi Lin (China Taiwan, Department of Geography, Taiwan Normal University)

10. Estimating the Efficiency of Complex Marine Systems in China's Coastal Regions using a Network DEA Model

Caizhi Sun; song wang (China, Center for Studies of Marine Economy and Sustainable Development, Liaoning Normal University); Wei Zou (China, School of Foreign Languages, Liaoning Normal University)

11. Evolution of the Tidal Flats in Yangtze Estuary under the Influence of Deep-water Navigation Channel Project

Xianyun Qi (China, State Key Laboratory of Estuarine and Coastal Research (East China Normal University))

12. Impact of Landscape Pattern on Ecological Vulnerability and Ecosystem Services Value :An Empirical Analysis of Yancheng Nature Reserve in China

Zheng ZANG; Xinqing ZOU (School of Geographic and Oceanographic Sciences, Nanjing University)

13. Research on Time-Space Differentiation of the Vulnerability of Marine Economy System Based on BP Neural Network: The Case in Chinese Coastal Areas

Peng Fei; Han Zeng-lin (China, Research Center for Marine Economy and Sustainable Development, Liaoning Normal University)

14. Response of Soil Quality to Different Vegetation Types on Coastal Sandy Land of Hainan Island

Congju Zhao; Zhiqing Zhuo; Wenxian Xu (China, School of Geography and Tourism, Hainan Normal

University, Haikou, 571158, P. R. China)

15. [Sedimentary Environment Change in A Semi-Enclosed Embayment and Its Response to Fast Urbanization Process](#)  
Aijun Wang; Binxin Zheng; Xiang Ye (China, Third Institute of Oceanography, SOA, China)
16. [Seismic Stratigraphy of the North Jiangsu Plain Coast, China since the Last Deglaciation](#)  
Fei Xia (China, Nanjing University; Jiangsu Second Normal University); Yongzhan Zhang (China, Nanjing University); J. Paul Liu (United States, North Carolina State University)
17. [Spatial Agglomeration of Marine Industries and Region Coordinated Development in China](#)  
GAO Yuan; Zeng-lin HAN; Jun YANG (China, The Geographical Society of China)
18. [Spatial Evolution of Container Shipping Network: Evidence from China](#)  
Fan Fei (China, Wuhan university)
19. [Spatiotemporal Analysis of Nutrients Concentrations Based on ArcGIS, a Case Study in Zhoushan Coastal Area](#)  
Liuzhu Wang (China, Zhejiang Ocean University)
20. [The Evaluation Model of Island Sustainable Development and Its Application](#)  
Ke Lina; Han Zenglin (China, Center for Studies of Marine Economy and Sustainable Development Liaoning Normal University, China.); Wang Quanming (China, National Marine Environment Monitoring Center, China.)
21. [The Impact of Landscape Pattern on Ecological Vulnerability and Ecosystem Services Value : An Empirical Analysis of Yancheng Nature Reserve in China](#)  
Zheng ZANG; Xinqing ZOU (China, School of Geographic and Oceanographic Sciences, Nanjing University)
22. [The Study of the Yao Sandbank's Geomorphological Evolution Based on the Remote Sensing](#)  
Wu Lidar (China, Nanjing Normal University)
23. [Wetland Dynamic and Ecological Compensation of the Yellow River Delta in China](#)  
Han Mei (China, Shandong Normal University)

## 2D hydrodynamics of Pearl River Estuary using D-Flow Flexible Mesh

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### Abstract

We apply a hydraulic model called D-Flow Flexible Mesh, to analyse the hydraulic processes between River Estuaries and the Marine System in Pearl River Delta. Pearl River Delta is one of the most complicated river networks and the most developed megalopolises worldwide. The coastal area of the Pearl River delta is more vulnerable to the natural disasters, such as flooding, landslides and weather extremes.

We have set up the D-Flow model for the Pearl River Delta, covering the domain between 15.54 - 23.94°N and 108.95 - 117.07°E. Our domain includes the Pearl River distributaries and approximately 100 km sea area. We simulate the hydraulic interaction process in wet and dry season of the year 1999, 2002 and 2009. We choose different roughness scenarios as the sensitive test of the model in order to calibrate the model performance.

Research results show that the discharge distribution depends strongly on temporal hydrodynamic processes varying with seasons. The model performance differs in the upstream area depending on the roughness, however, modelling results distinctly underestimation direct flow in the largely sealed upstream area. Instead, the modelling of the sea side tidal variations yields proper estimations and suggest, that tidal propagation can also have an effect on floods in the Delta. Wet season has much influence on the subtidal discharge in the upstream part of the Pearl River Delta and in case of relative high lateral sources of river discharge on the downstream bays.

### Key words:

D-Flow Flexible Mesh; the Pearl River Delta; hydrodynamics; modeling

## **An Evaluation Study on Maturity of China's Modern Marine Industry System Based on Improved Catastrophe Progression Method**

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### **Abstract**

The construction of the modern marine industry system has important strategic significance for leading the optimization and upgrading of China's marine economy structure, and for enhancing the comprehensive strength of China's marine economy. In this study, beginning from the perspective of maturity, we proposed the concept of modern marine industry system maturity; constructed the modern marine industry system maturity evaluation index system; evaluated the modern marine industry system maturity of 11 China's coastal provinces and municipalities (excluding Hong Kong, Macao and Taiwan) through the improved catastrophe progression method; conducted a grade division according to the maturity model. The study results are as follows: The modern marine industry system maturity of Guangdong, Shandong and Shanghai is at the near-mature period; the modern marine industry system of Zhejiang, Jiangsu, Liaoning, Fujian and Tianjin is at the development period; the modern marine industry system of Hebei, Hainan and Guangxi is at the starting period. The influence factors of our country's modern marine industry system maturity differences include resources endowment, location conditions, industry system foundation, national policy, innovation capability and talent, among them, the national policy, innovation capability and talent are the decisive factors for the differences in the future. Finally, we put forward the corresponding countermeasures and suggestions for each province, thereby providing a strong scientific basis for formulating the marine economy development strategy necessary for achieving the phased goals of being a strong oceanic country. (Foundation item: Under the auspices of Youth Project of National Natural Science Foundation of China (No.41301129), New Century Excellent Talents in University (No. NECT-13-0844))

### **Key words:**

The modern marine industry system; maturity; catastrophe progression method; evaluation

## **Anthropogenic Activities Impact Assessment in the Coastal Zone Considering Spatial Heterogeneity**

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### **Abstract**

Anthropogenic activities intensified in coastal zone has been increasingly causing severe ecological and environmental problems. Quantifying human activities intensity is crucial to the analysis of eco-environment degradation drivers. Existing efforts in quantifying human activities intensity give less consideration to spatial heterogeneity in their methodology development. In this paper, we combine landscape metrics and spatial gradient method to analyse the influence of spatial heterogeneity on anthropogenic activities, and then develop a new method to evaluate the anthropogenic activities impact. With recent land use data for Shenzhen, China, we explore the spatial heterogeneity of ecosystems in coastal zone, and evaluate the anthropogenic activities impact. The results illustrate that in the study area, the spatial distribution of anthropogenic activities impact is more specific and objective than other methods. We believe the proposed approach will have significant implications for similar human activities assessment research.

### **Key words:**

Anthropogenic activities impact; spatial heterogeneity; coastal zone; human activities

## Evolution of Cusps on a Gravel Beach

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### Abstract

Field experiments were conducted on a gravel foreshore at Portmore Beach, Ireland, to test edge wave vs. self-organization hypotheses. Gravel beaches are ideal for testing the hypotheses because the edge wave model predicts greater cusp spacing with increased beach slope whereas the self-organization model indicates that spacing decreases. We also evaluated the Sunamura (2004) model for cusp spacing. The gravel foreshore comprised 20-250 mm particles, and cusps are ubiquitous thereon. The foreshore is fronted by a sandy (0.15-0.25 mm) nearshore. Waves and currents were measured with seven Marsh-McBirney model 511, bi-directional current meters, and eleven KPSI pressure transducers, hard-wired to a shore-based data acquisition system. Prior to the experiment, the study area was graded to remove existing cusps and a video camera installed to monitor morphological change.

Beach cusps formed within a few hours of inundation by the rising tide, with  $H_s = 0.66\text{m}$ ,  $T = 12.2\text{s}$ : breaker heights exceeded 1.1 m and the surf similarity parameter was 0.83 for the foreshore. Mean cusp spacing and width were 7.6 m and 3.6 m. Phase relationships between waves and currents and the cross-shore structure of spectra indicated the presence of a mode 1, synchronous standing edge-wave that should generate cusp spacings of 130 m. Analysis of video data indicated a mean swash excursion length of 4.66 m that should have generated cusp spacing of 7.9 m. The results support the self-organization hypothesis and, to a lesser extent, the Sunamura model. Although edge waves were present, they did not form the beach cusps

### Key words:

Self-organization; edge waves; reflective beach; run up model

## Fluctuations in Water Level of Caspian Sea and Geomorphology Changes of its

### Southeast Coast

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#### Abstract

Due to the heterogeneous morphology of coastal areas, the impact of fluctuations in the Caspian Sea in the coastline of Iran is not the same. While the middle parts are ending to the beaches of the coastline with a high slope, Iran's northeast coast reached to the coastline with a mild slope. Because of the special circumstances and morphology of the Southeast coast of the Caspian Sea, it has been considered as one of the most important areas to reconstruct the balance of the Caspian Sea in response to the fluctuations of the sea. The purpose of this study was to assess changes in water level of the southeast coast of the Caspian Sea using satellite imagery, historical maps and field observation in its last cycle. The results show that, the coastal morphology in the northeast of Iran is affected by changes in water level.

#### Key words:

Geomorphology changes, Fluctuations in Water Level, Caspian Sea, Water progression

## Green GDP Accounting of Marine Industries in Bohai Rim, China

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### Abstract

In this work, environmental accounting method was used to adjust the value of gross domestic product (GDP) of marine industries in Bohai Rim. The green GDP which was defined as GDP account deducts values of marine resource loss, marine environmental degradation and the products related to the environment was calculated. The results are as follows: 1. The Green GDP of marine industries in Bohai Rim is 1848.65 Billion Yuan in 2013, which is equal to 93.68% of marine GDP. 2.70% of marine GDP is deducted to compensate marine resource loss, and 1.47% of marine GDP is deducted for environmental degradation, 2.15% of marine GDP is related to marine environmental management. 2. The amount of fishing in Bohai area is approximately equal to fish population growth in 2013, without causing fishery resource loss. The oil and natural gas loss in this area is valued as 50.21 billion Yuan, whereas the ecosystem loss caused by sea reclamation is 3.11 billion Yuan. 3. The main pollutants generated by the marine industry is COD. The environmental degradation in 2013 is valued as 28.93 billion Yuan caused by sea-farming, offshore oil exploration and development, river transportation and sewage outlet. 4. About 4.42 billion Yuan is spend by national and provincial government departments, while 38.08 billion Yuan is invested in marine environmental researching. This research is supported by the NSFC Project (No.41271102).

### Key words:

Green GDP; environmental-economic accounting; marine industry; Bohai Rim

## Low-Lying Coastal Plains of the Indo-Pacific Region and Their Vulnerability to Sea-Level Rise

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### Abstract

There are extensive low-lying plains along many of the coastlines across the Indo-Pacific region. They have formed over the past 7000 years during a period of relatively stable sea level. The topography of these plains reflects the geomorphological processes that formed them. Many are the focus of increasing populations. Sea-level rise poses a threat that will be experienced differently in particular settings. This paper examines the vulnerability of deltas, estuaries and strandplains in the region and considers the opportunities for adaptation.

### Key words:

Coastal plains; vulnerability; geomorphology; adaptation; topography

## Mercury Export from Mainland China to Adjacent Seas and Its Influence on the Marine Mercury Balance

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### Abstract

Export from mainland China is a significant source of mercury (Hg) in the adjacent seas (Bohai Sea, Yellow Sea, East China Sea and South China Sea) near China. A total of  $240 \pm 23$  Mg was contributed in 2012 (30% from natural sources and 70% from anthropogenic sources), including Hg originating from rivers, industrial wastewater, domestic sewage, groundwater, non-point sources and coastal erosion. Among the various sources, Hg from rivers amounts to  $160 \pm 21$  Mg and plays the dominant role. Hg exported from mainland China increased from 1984 to 2013; the contributions from rivers, industrial wastewater, domestic sewage and groundwater increased, and the contributions from non-point sources and coastal erosion remained stable. A box model is constructed to simulate the mass balance of Hg in these seas and quantify the sources, sinks and Hg biogeochemical cycle in the seas. In total, 150 Mg Hg was transported to the Pacific Ocean from these seas through oceanic currents in 2012, which could have negative impacts on the marine ecosystem. A prediction of the changes in Hg export through 2030 shows that without effective pollution reduction measures, the impacts of terrestrial export might increase, and the Hg load in these seas will increase, especially in the seawater of the Bohai Sea, Yellow Sea and East China Sea and sea margin sediments of the Bohai Sea and East China Sea.

### Key words:

Hg; mainland China; river; transport; sea; mass balance

## Random Fractal Characters and Length Uncertainty of the Continental Coastline of China

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### Abstract

A coastline is a random fractal object in a geographical system whose length is uncertain. To determine the coastline length of a country or a region, the scaling region and fractal dimension of the coastline is first calculated, and then, the length of the coastline is measured using the scale at the lower limit or near the limit of the scaling region. For this study, the scaling region of the continental coastline of China is determined. The box counting dimension is calculated with ArcGIS software using thirty-three scales and a map scale of 1:500,000, and the divider dimension is manually calculated. Moreover, the reliability of the Chinese coastline length value that is currently widely used is discussed in this paper. The results show that the scaling region of the continental coastline of China is from 0.1 to 400 km. In the scaling region, the box counting dimension and the divider dimension of the coastline are 1.2004 and 1.0929, respectively. According to fractal theory, the divider dimension more accurately represents the irregularity of a coastline. The length of the continental coastline of China is approximately 21,900 km when the measurement scale is 0.1 km; however, the length is 18,214 km when the scale is 0.25 km, and this value approaches the continental length of China (18,400 km) in popular use today. Although the coastline length is shorter than 21,900 km, the length is acceptable because the measurement scale (0.25 km) is close to the lower limit of the scaling region.

### Key words:

Continental coastline of China; scaling region; random fractal; fractal dimension; uncertainty

## Research into Marine Ecological Suitability Assessment and Zoning Based on Spatial Analyst Model: A Case Study in Dongtou County

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### Abstract

As one of the important parts of the global life supporting system, marine ecosystem has gradually become an important basis providing natural resources and environmental conditions for human survival and socio-economic development; meanwhile, the complexity of human activities has exerted increasingly negative impacts on marine ecosystem, intensifying the contraction of marine resources utilization and regional development. Given the complexity and mobility of marine ecosystem, ecological suitability analysis can reflect the advantages of regional marine resources and the potential of socio-economic development. Thus, it could provide scientific evidence for environmentally marine spatial planning in coastal cities. This research chooses the island county DongTou as the research area, using the multi-temporal remote sensing data, field-research, interviews with expert, the "3S" technology, statistics, indicators and other methods to construct a comprehensive evaluation model of ecological suitability of the region, then to designate its ecological function areas. The results illustrate that in the study area, marine resources utilization can be clearly divided into four categories: key protected zone, buffer protected zone, moderate developed zone and optimized developed zone; the first two are always sensitive to the environment and thus are considered to be the important ecological restoration areas of the county, while the latter two are buffer areas for future marine resources utilization and marine engineering. This study has significant implications for the coordination of the contradictions between the marine resources conservation and exploitation, thus achieving the integrity of the marine ecosystem and the sustainability of regional development.

### Key words:

Marine ecosystem; ecological suitability; spatial analyst; hemeroby

## Spatial Distribution Characteristics of Soil Salinity in Coastal Reclamation Area, Eastern China

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### Abstract

The content and spatial distribution of chemical substances in soil is the key to understand the law of water and salt transport in porous media and then put forward the improvement measures of saline soil. This study collected 30 samples of top soil in Rudong coastal reclamation area to measure total salt content,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{CO}_3^{2-}$ ,  $\text{SO}_4^{2-}$  and  $\text{Cl}^-$ , then the Pearson correlation analysis, principal component analysis and grey correlation analysis were adopted to analyze the characteristics of soil salinity, the ordinary Kriging interpolation method was used to study the spatial distribution pattern of soil salt ions, SAR,  $\text{Cl}^-/\text{SO}_4^{2-}$  and salt content. The results showed that soil salt content in top soil was  $0.41\sim 27.96 \text{ g}\cdot\text{kg}^{-1}$  with the average content of  $8.35 \text{ g}\cdot\text{kg}^{-1}$ , and  $\text{Na}^+$  and  $\text{Cl}^-$  are the main salt ions, the type of soil salinization belongs to chloride saline soil. Soil salt content was extremely significant correlated with salt ions except  $\text{CO}_3^{2-}$ , while the correlation coefficient of  $\text{Na}^+$  and  $\text{Cl}^-$  have reached more than 95% ( $p < 0.01$ ); Principal component analysis and gray correlation analysis obtained similar results. The content of soil salt and salt ions have declined significantly with increasing of reclamation years, and also with descending order of Halophyte > Sesbania > Cotton > Aquaculture pond > Corn under different vegetation. The interpretation map of  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ , SAR,  $\text{Cl}^-/\text{SO}_4^{2-}$  and soil salt content showed a similar spatial pattern which the higher areas are mainly in YD and DL, while lower areas are in LBK and XBK.

### Key words:

Soil salinity; coastal reclamation area; principle component analysis; eastern China

## **Spatial-temporal Analysis of Shoreline Change along Andhra coast: An Analytical Approach of Remote Sensing and Statistical Techniques**

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### **Abstract**

Due to global warming, sea level rise and its impact on shoreline became a burning issue in all over world especially low laying coast like Maldives and East Indian coast. There are number of reports and studies on sea level rise and its impact on shoreline changes. Shoreline is highly productive and most dynamic zone because of interference of three processes namely terrestrial, atmospheric and marine, acting on the earth surface. Due to this it's becoming an area of development like rapid urbanization and industrialization in the world. This is also an area which is very sensitive to sea level rise along coast. So as level of sea is increasing, the population of the coast becoming very Vulnerability to natural phenomena. So analysis of shoreline changes and relation with sea level rise becomes very important due to its importance in the coastal management and planning program in all over the world.

Therefore, the present study is focusing on the effect of sea level change on shoreline position along Andhra coast. Because Shoreline change study helps to understand provides useful data on predicting the future trend which is useful in further planning.

### **Key words:**

Sea Level Rise; Shoreline; Remote sensing and GIS

## Study on the Evolution of the Pearl River Delta, China: 6-2.5 ka BP and Recent 100 a

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### Abstract

Since the end of the eustatic rise about six thousand years before the present, based on both the natural processes, the proper method of survey and disciplines evolved, the development of the Pearl River delta (PRD) can be distinguished into four substantially different episodes. From 6-2.5 ka BP, tidal and riverine energy as major driving forces were redistributed and flow currents were separated by the convoluted coastline and the hundreds of rocky islands in the paleo-estuarine bays of the PRD. The application of a hybrid process-based long-term morphodynamic model verified by sediment cores gives more temporal and spatial details to the development of the PRD. Morphodynamics and sedimentology analyses are conducted to justify and explain the output of the model. Based on its genetic evolution, the PRD can be divided into a number of sub-deltaic plains (SDP). Each SDP consists of several individual deposition bodies. A hierarchical structure of deposition of the PRD is revealed through an interdisciplinary approach. The evolution of the PRD is different from most deltas facing open continental shelf. The approach developed in this study reveals some important aspects and more morphodynamic details of the evolution of the PRD which could not be provided by previous studies. Modelling of delta development in the scale of thousands and of hundreds of years is different at least in two aspects: the techniques of surveys and the scale/capability of human activities. The overall effect of human activities on the PRD has been exceeding natural processes since some hundred years ago, especially after the 1970's in China. A decadal morphodynamic model is developed to simulate and predict the development of PRD in different scenarios which consider both decision/policy making and natural processes. In the present work scale crossing methods and interdisciplinary approach are necessity rather than option. The present study provides a case study which may indicate a possible paradigm shift of delta research.

### Key words:

Delta evolution; long-term; morphodynamics; modelling; Pearl River delta; human activities paradigm shift.

## Using Benthic Foraminiferal Assemblages as Bio-indicator to Assess Environmental Stress, a Case Study in Zhoushan Port, China

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### Abstract

Forty three surface samples were collected from the central part of Zhoushan Port, China. As well as a monthly sample collection was taken at a tidal flat near Zhoushan Port. Benthic foraminiferal studies were carried out and environmental parameters, including heavy metal Hg, Cr, Cu, Pb, Cd, Zn, TOC in sediment, and nutrients concentration in water were measured to determine the anthropogenic effect on local assemblage characteristics. A total of 33 genera and 60 species were identified. The results showed that the local benthic foraminiferal assemblages were dominated by hyaline tests, with an average percentage of 86.7%, and an average abundance of 1676 individuals per 50 g dry sample. The study area assemblages were mainly dominated by the marginal marine environmental species, *Ammonia beccarii* vars. *Ammonia maruhasii* and *Epistominella naraensis*. Compared with previous studies, new characteristics were determined as follows: (1) an increased percentages of agglutinated species, with the highest value of 15.9%; (2) appearance of some pollution-tolerant species, e.g. *Fursenkoina schreibersiana*; (3) relative higher ratio of deformed individuals (up to 8.5%) in the well-sheltered harbor area; but (4) the Foraminiferal Abnormality Index (FAI) and H(s) should be used with great caution, because of the strong dynamic transport, and similar ratio of deformed individual found in near intertidal flat. In coastal area, foraminifera can be used as a good bio-indicator to assess environmental stress, but new foraminiferal index should be designed.

### Key words:

Benthic foraminifera; bio-indicator; environmental stress; coastal area

## Adaptability Assessment of Marine Industrial Ecosystem in Bohai Region

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### Abstract

Adaptability analysis is one of the frontier and hot pot of current global environmental change and sustainable scientific research. It provides a new research paradigm for the study of the coupling mechanism of industrial ecosystem from the theory and methodology. The industrial ecosystem is introduced into the ocean research, putting forward the concept of marine industry ecosystem adaptability. The paper establishes an adaptability assessment index and uses the variance weighting method for weight assignment. Based on the data of marine industry and environment in Bohai region, the paper analyzes the marine industry ecosystem characteristics, types, and influencing factors in Bohai region. According to the model, the paper obtains the adaptability characteristic of marine industry ecosystem in Bohai region. (1) From a view of overall, the difference of adaptability of marine industrial system in Bohai region is relatively large. (2) From a view of space, the feature of adaptive spatial distribution in marine industry ecosystem shows the adaptive spatial distribution of Shandong>Liaoning>Tianjin>Hebei; In the industrial subsystem, it presents the adaptive spatial distribution of Tianjin>Shandong>Liaoning>Hebei; In the environmental subsystem, present the adaptive spatial distribution of Shandong>Liaoning>Tianjin>Hebei. (3) From a view of time, 2006-2012, the adaptability of marine industry ecosystem in Bohai region increased, rising with fluctuate. Comprehensive index of adaptation have a trend of expanding, for this trend, the main reason is that the difference of the industrial system in adaptive growth. (4) From a view of specific provinces and city, according to the development of time, it is concluded that the characteristic of the development in specific province and city in marine industry ecosystem, analyzing the advantages and disadvantages of development. Then, the marine industry ecosystem is divided into six grades. The rating criteria are as follows: (<0.215) extremely weak adaptability; (0.215-0.225) weak adaptability; (0.225-0.235) weaker adaptability; (0.235-0.245) stronger adaptability, (0.245-0.255) strong adaptability, (>0.225) extremely strong adaptability. From the overall perspective, the adaptability is enhanced, the level of adaptation is promoted. The paper by analyzing the coupling of Bohai marine industry and environment subsystem obtain the marine industrial ecosystem level and adaptive characteristics, analyzing the advantages and disadvantages of the marine industry ecosystem in Bohai region, thereby for the sustainable development provides countermeasures and suggestions in Bohai region.

### Keywords:

marine industrial ecosystem; adaptability; Bohai region; variance weighting method

## An Evaluation of Chinese Marine Economy Efficiency Based on SBM and Malmquist Productivity Indexes

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### Abstract

This paper is based on consideration of undesirable outputs from the SBM model and Malmquist productivity index model when, measuring marine economic efficiency values for 11 coastal provinces in China from 2001 to 2012 and analyzing dynamic changes. We found that the marine economic efficiency value of inconsideration of undesirable output was higher than the one for consideration of undesirable output; undesirable output has a significant effect on marine economic efficiency. The spatial pattern of marine economic efficiency shows that the efficiency of northern and southern China is high, and the middle area is low in the initial stage, in 2012, the spatial pattern shows three poles. Chinese marine economic efficiency showed a fluctuating upward trend from 2001 to 2012. The regional absolute and relative gap of marine economic efficiency in coastal provinces shrank and then expanded. Inter-provincial variation of marine economic efficiency varied from province to province. Eleven coastal provinces can be divided into four patterns: leveling, increasing, descending and fluctuating. Total factor productivity, technical efficiency and technological progress efficiency slowly increased. Technological advances play an important role in enhancing total factor productivity. The evolution of marine economic efficiency can be divided into three stages since 2001: a declining and fluctuating stage (2001-2005), transformation stage(2005-2008) and improving stage(2008-2012). The driving mechanism in these three stages are marine resources, policy, market and technology, respectively.

### Key words:

marine economic efficiency; undesirable output; Chinese coast

## Analysis on Potential Dry-Wet Change in Haihe River Basin on the West Coast of Bohai Bay in 1961-2010

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### Abstract

Water resources are highly exploited and utilized in the Haihe River Basin on the west coast of Bohai Bay. Studying the dry-wet change in this region is of practical significance for reasonable utilization and scientific management of water resources there. Precipitation for 1961-2010 is analyzed according to the monitoring data provided by meteorological stations, potential evaporation is figured out by use of the Penman-Monteith model (P-M model) and dry-wet index is calculated via Vysotskii model on the basis of precipitation and potential evaporation obtained. Research findings indicate: (1) average annual precipitation of the Haihe River on the west coast of Bohai Bay is between 378.26mm and 711.01mm and is on a decline, with the range of decline decreasing progressively from the southeast to the northwest and getting maximized in the lower reaches; (2) average annual potential evaporation is between 476.26mm and 937.96mm, with the maximum in Tanggu Meteorological Station and the minimum in Chengde Meteorological Station; the potential evaporation increases in some areas; (3) the dry-wet index varies apparently from an area to another; most areas getting dried extend to Tanggu in the southeast, to Fengning in the north and to Weixian and Shijiazhuang in the southwest, with the center in Beijing, and the Beijing-Tanggu region witnesses the most serious drying. Multiple approaches should be adopted to increase water resource supply, raise rain and sewage utilization rate, implement water conservation measures and reduce water consumption in agriculture and daily life.

### Key words:

surface water resources; dry-wet index; west coast of Bohai Bay; Haihe River Basin

## Assessment of Land- sea Coordination Based on the Principal Component Analysis: A Case Study of Qinzhou, China

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### Abstract

The strategy of Land- sea coordinate have a great significance for economic-social development and China's ocean superpower dreams. However, with the rapid economic development and population growth, the contradictions among resources and environment are becoming seriously and prominently in the Beibu Gulf Economic Zone, southern China, especially understand the strategy of the Belt and Road Initiative of China. Hence, it has become increasingly importance in assessment of Land-Sea Coordination in the national economic development zone. This paper attempts to quantify land-sea coordination theory and apply it to regional economic development more accurately. Taking Qinzhou gulf as a case, and according to the characteristics of the two systems of sea and land, this study quantitatively evaluate the degree of land - sea co-ordination based on combining principal component analysis (PCA) and a indicator system. The evaluation indicator system included resource, economy development, scientific innovation and environmental management four level. The results showed that: the comprehensive ability of land and marine economy increased in Qinzhou, and relation with the resource development. However, the growth trends of land and marine economy were different, and the ability to use land resources is downward trend. Moreover, the land-sea coordination increased as regional economic growth, and the change trend was fluctuations. (Foundation: National Natural Science Foundation of China (41361022), the scientific and technological development projects of Guangxi zhuang autonomous region (2014DD29090), the Natural Science Foundation of Guangxi (2014GXNSFDA11803).)

### Keywords:

land-sea Co-ordinate; Degree of coupling, PCA, Qinzhou

## Beach Morphodynamics and Impact Factors on the Beaches of Shandong Peninsula

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### Abstract

Types of beach morphodynamics are divided for the typical beaches along the coasts of Shandong Peninsula based on beach flat forms, wave sediment parameters (Dean Parameters) and five repeated beach profile surveys carried out from 2012 to 2014. Relationships between the beach morphodynamical types and the wave conditions are also discussed by comparing the differences in seasonal changes of beach profiles in the north with those in the east. The results show that: 1) according to the wave sediment parameters, which are indicative of division of beach morphodynamical types in the studied areas, the beach along the northern coast of the peninsula are dominated by a dissipative type and a transition type, whereas along the eastern coast of the peninsula the beaches are mainly composed of a transition type and a reflective type; 2) the forms of beach bars and beach profiles indicate that the beaches along the northern coast of the peninsula have a changing tendency opposite to those along the eastern coast of the peninsula in summer and winter, with the beach bars occurring frequently on the former profiles in summer and on the latter profiles in winter due to small waves; 3) although the northern coast of the peninsula is mostly subjected to the actions of waves and tides at the same time, the seasonal changes in wave conditions have played an more important role to the beach morphodynamics of the beaches.

### Key words:

Shandong Peninsula; beach profile; morphodynamics; Dean Number

## Characteristics and Transport Trends of Surface Sediments in Inner Lingdingyang Firth of the Pearl River Estuary

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### Abstract

The characteristics of surface sediments are studied with the 158 bottom samples taken from the inner Lingdingyang Firth of the Pearl River Estuary. Sediment transport trends are identified by the USTA model. The results indicate that there are six types of bed deposits in the inner Lingdingyang Firth, with clayey silt being the dominant. The sediment transport pattern in the inner Lingdingyang Firth is complex. Regarding the sediment migration trend, the firth could be divided into three subareas. In the subarea I, or in the east part of the firth, sediments move from the east to the west. In the subarea II, sediments move in a pattern from northeast to southwest due to the effect of strong reciprocating flow and deep brine water wedge caused by the Coriolis force. In the subarea III from the Hengmen Gate to the Jinxinmen Gate, sediment move from distributaries to the coastal beaches. Around the Qiaodao Isle, however, sediments move in a clockwise pattern driven by the local circulation.

### Key words:

surface sediments; sediment transport trend; Pearl River Estuary; inner Lingdingyang firth

## Chinese Marine Economy Development: Dynamic Evolution and Spatial Difference

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### Abstract

Chinese coastal areas are the research object of this study, which established a kernel density function model based on the marine economic per capita index to depict the distribution of the marine economy in 1996–2013. A large quantity of sample data is needed in the application of kernel density estimation. In order to make up for the lack of information, information diffusion technology is used to deal with the data. The marine economic distribution function was decomposed and the influence of growth and inequality in the process of the development of the marine economy was analyzed. This study shows that the development of the Chinese marine economy presented a single-peak distribution trend and marine economy development is more harmonious and balanced in coastal areas; the greatest impact on the distribution function of the marine economic growth was the mean effect, followed by the variance effect, and last, the residual effect. The mean effect is the same as the direction of the distribution of the annual density difference. The relative development rate was introduced to analyze the spatial difference of the development of the marine economy. Therefore, space and time dimensions fully characterized the evolution of the Chinese marine economy. The results favor the Chinese coastal areas formulate long-term planning of the ocean and provide theoretical guidance for the rapid development of the marine economy.

### Key words:

Information diffusion; kernel density function decomposition; dynamic evolution; spatial difference

## Chinese Marine Ecosystem Services Value: Regional and Structural Equilibrium

### Analysis

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### Abstract

The ocean is the regulator of the Earth's environment, and the value of the marine ecosystem services is the concrete embodiment of human enjoyment of marine ecological resources. In this paper, we combine past research and statistics to calculate the value of marine ecosystem services and to achieve dynamic measurement of these values with minimal subjective factors, and measure the marine ecosystem services value for 11 coastal provinces and cities in China. In view of the difference between the marine ecosystem services value foundation and the speed of development, we performed regional and structural equilibrium analysis of the marine ecosystem services value using an improved Gini coefficient. In the region, the overall equilibrium was found to have improved over time, and the contribution rate and share weights of the Northern region increased significantly. As for the structure, the overall Gini coefficient decreased due to an improvement in a sub-part of the marine ecosystem service value equilibrium. We can improve the equilibrium according to the marginal effect of Gini coefficient. The idea that ecosystem service values can be calculated based on data rather than opinion, and breaking ecosystem services into components allows for detailed analysis in this paper, will be still valid in the worldwide.

### Keywords:

Ecosystem services; equilibrium analysis; Gini coefficient; Coastal China

## Effects of Storm Waves and Heavy Rainfall Events on Topographic Changes at Jinshawan, Northeastern Taiwan

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### Abstract

Taiwan, located in west Pacific Ocean, is very often attacked by typhoons. The storm surge and waves associated with typhoons can cause severe erosion at sandy beaches and sand dunes. Monitoring the topographic changes of beaches and dunes can help predict the topographic change in future typhoons, which may alert coastal residents and local governments of the need to prepare appropriate plans for potential typhoon hazards along the shoreline.

According to statistical analysis of typhoon paths between 1897 to 2014, the Central Weather Bureau in Taiwan found that 28 percent of the paths are in path types 2 and 6, which are the typhoon paths that may affect the Jinshawan area the most. Typhoons in these path types, if accompanied by the northeastern monsoon, may cause extremely heavy rainfall in the eastern and northern coasts of Taiwan. Jinshawan beach is, therefore, an ideal place to observe the effects of storm waves and heavy rainfall events.

By using the RTK (Real-time kinematic) technique to survey the topography of Jinshawan beach before and after typhoons and heavy rainfall events, we found that typhoons could cause shoreline retreats at Jinshawan beach for about 3 to 5 meters and the dune vegetation line to retreat about 1 meter. A heavy rainfall event may cause numerous sediments to be transported to the sea from the Jinshawan river while large amounts of gravel pile on the berm.

### Key words:

Beach erosion; beach topography; RTK; storm waves; heavy rainfall

## Estimating the Efficiency of Complex Marine Systems in China's Coastal Region using a Network DEA Model

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### Abstract

Marine economies have become the hotspot, while coastal social and ecological problems are gaining increasing attention worldwide. Previous studies have focused on the economic, social, and ecological efficiency of single and dual systems in a composite system, thus ignoring the impact of other subsystems. Drawing on the theory of system, this study constructs a ring structure of a complex marine system and then selects a corresponding decision-making unit on the basis of labor and capital circulation in each subsystem to calculate the efficiency of the chain structure using a network DEA model. The results revealed that while social-ecological-economic efficiency increased, social-economic-ecological and ecological-social-economic efficiencies remained stable. By contrast, economic-social-ecological and ecological-economic-social efficiencies showed a downward trend, whereas economic-ecological-social efficiency demonstrated varying changes. The overall efficiency of the chain is highly similar to that in the first stage, although there are differences in numerical values. The study also demonstrates that the network DEA results based on the theory of system do not deny those of previous studies, but contribute to the accuracy of efficiency calculation. The differences between the overall efficiency and that in the first stage indicate that previous studies have underestimated socioeconomic and socioecological efficiencies but overestimated ecological efficiency.

### Key words:

Efficiency Calculation; Marine Complex System; Network DEA; Coastal China

## **Evolution of the Tidal Flats in Yangtze Estuary under the Influence of Deep-water Navigation Channel Project**

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### **Abstract**

Of great amount of sediment and discharge, Yangtze estuary has three-order bifurcations and four-branch channels. Under the influence of the Deep-water Navigation Channel project (DNC), tidal flats (JIUDUANSHA shoals and Hengsha shoals) become highly susceptible to anthropogenic disturbances instead of a natural state of growth. We collated remote sensing (RS) data, such as SPOT-7, FORMOSAT-2, GF-2, aerial images, and the nautical charts, spanning before and after three stages of the construction of DNC. We used geological information system (GIS) and RS technique to acquire geometric characteristics so as to analyze the trend and extent of erosion and deposition in tidal flats. Moreover, geomorphological change was analyzed by assessing the variation of surface suspended sediment concentration (SSC) in channels. The results indicated that tidal flats in both sides of channel increased by 171.89 km<sup>2</sup> in total after completion of the DNC. The Jiangya Shoal (JYS), the Upper Shoal (US) and the Middle-Lower Shoal (MLS) showed different responses to the DNC. Instead of severe fluctuation during the DNC, JIUDUANSHA shoals leveled off after the project and have continuous change and periodic change in a slowing velocity of increase recently, including broadness of the island area, siltation of the tail of tidal island and swaying to south periodically. Hengsha shoals significantly silted eastward along the northern dike of channel, which has certain influence on navigation safety. The SSC showed no evident correlation with either variation of siltation and erosion in tidal flats or siltation of channels, which deserves more attention in further study.

### **Key words:**

DNC project; tidal flats; JIUDUANSHA shoals; Hengsha shoals; siltation and erosion

## Impact of Landscape Pattern on Ecological Vulnerability and Ecosystem Services

### Value: An Empirical Analysis of Yancheng Nature Reserve in China

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#### Abstract

In this study, an ecological vulnerability assessment indicator system was constructed using the “exposure–climate sensitivity–adaptive capacity” framework with reference to the theory of ecological vulnerability. An improved ecosystem services value calculation model was proposed based on empirical parameters. Using Yancheng Nature Reserve in China as an example, we employed remote sensing data to conduct an empirical analysis of the changes in the spatiotemporal pattern, ecological vulnerability, and ecosystem services value of typical landscape types over the period 1987–2013. The results showed that during the investigation period, the fragmentation of three natural wetland landscape types (i.e., *Spartina alterniflora*, *Suaeda glauca*, and *Phragmites australis*) gradually increased in the study area. The ecological vulnerability scores of major landscape types were, in descending order, *P. australis* (0.053), farmland (0.047), *S. alterniflora* (0.042), *S. glauca* (0.031), and bare mud flat (0.002). From 1987 to 1997, the ecosystem services values of *S. glauca* and *P. australis* wetlands decreased, while that of *S. alterniflora* wetland increased continuously. From 2002 to 2013, the ecosystem services values of all three types of natural wetland showed a downward trend. In conclusion, the combined effect of human and natural factors, including the expansion of farmland and aquaculture waters and changes in seawater erosion and deposition, led to changes in the landscape pattern, ecological vulnerability, and ecosystem services value of Yancheng Nature Reserve during the investigation period. It is recommended that a “dual adaptive” management system based on natural succession and supplemented by appropriate manual intervention be implemented to improve management efficiency and flexibility and to adapt to landscape pattern changes.

#### Keywords:

Landscape pattern; Ecosystem response; Empirical analysis; Ecological vulnerability; Ecosystem services value; Dual adaptive management

## Research on Time-Space Differentiation of the Vulnerability of Marine Economy System Based on BP Neural Network: The Case in Chinese Coastal Areas

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### Abstract

The research on the vulnerability of marine economy system aims for the vulnerability's reduction and the realization of the sustainable development of marine economy. Based on the conception of the vulnerability of marine economy system, this paper established an assessment index system from its sensitivity and response capacity, then used the BP artificial neural network model with vulnerability index and the formula of obstacle degree evaluation to analyze characteristics and the mechanism of spatial and temporal evolution, as well as the influence factors of marine economy system in 11 provinces and cities in China's coastal regions during 2006 to 2011 (not including Hong Kong, Macao and Taiwan regions). The results showed: (1) The response capacity and sensitivity of Chinese marine economy system kept the same tendency, indicated a slow-declining trend as a whole with partial mutation and a gently change in the vulnerability. (2) The spatial distinction type of the vulnerability of China's coastal areas showed overall dispersion, partial concentration and distinctive spatial differentiation, while the vulnerability in northeast and east China coastal areas was gradually reduced and extremely differentiated in north and south coastal region. (3) The vulnerability of Chinese marine industry system showed three phase characters, which consist of increasing vulnerability type (Guangxi, Hebei, and Fujian), lower vulnerability type (Guangdong, Tianjin, Shanghai, and Liaoning) and steady vulnerability type (Shandong, Jiangsu, Hainan, and Zhejiang). Lastly, through the analysis of the impact factor of the vulnerability of Chinese coastal areas' marine economy system, pertinent directions of the marine economy development were put forward.

### Key words:

marine economy system; Vulnerability; BP artificial neural network; spatial-temporal variation; China coastal area

## Response of Soil Quality to Different Vegetation Types on Coastal Sandy Land of Hainan Island

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### Abstract

To evaluate the effect of different vegetation types on soil quality in coastal sandy lands, several vegetation types, including pure forest of *Casuarina equisetifolia*, shrub mixed forest, grassland and bare land were taken as the research subjects in east coast of Hainan Island. The indicators such as alkali hydrolysable nitrogen, available phosphorus, available potassium, organic matter, soil moisture, and soil density in topsoil (0-30 cm) and subsoil (30-60 cm) were selected as the evaluation factors. In addition, the weight value of each evaluation factors was identified by principal component analysis (PCA) and the response of soil quality to different vegetation types were evaluated by gray relational analysis and soil degradation index. The results show that: there is significant difference in soil quality of different vegetation types, and the order of weighted degree of association is that: shrub mixed forest (0.7028) > grassland (0.6916) > forest (down slope, 0.6893) > forest (up slope, 0.6816) > forest (middle slope, 0.6637) > bare land (0.6524). Moreover, during the recovery of degraded sandy soil, the study suggests that shrub mixed forest of *Casuarina equisetifolia* gave priority to restoring soil quality, and followed by grassland. However, the effects of slope position and altitude on improvement of soil fertility are also significant. Based on the landform features, only reasonable allocation of vegetation types in degraded sandy soil can optimize the model on vegetation and soil restoration. This study can provide scientific reference for soil fertility reconstruction and vegetation restoration in the coastal zones under similar condition.

### Key words:

Soil quality; vegetation types; grey relation analysis; soil degradation index; East coast of Hainan Island

## **Sedimentary Environment Change in a Semi-Enclosed Embayment and Its Response to Fast Urbanization Process**

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### **Abstract**

Coastal embayments, as an important type of coastal system, are undergoing a heavy influence by strong human activities. Tongan Bay is a typical semi-enclosed embayment adjacent to Xiamen Island, southeast China. Due to construction of the Gaoji Seawall, the Tongan Bay have occurred a heavy accretion from 1950s', and the hydrodynamic processes were changed obviously, and the fine fraction of the sediment increased. Since 2005, the coastal area around the Tongan Bay was experienced a fast urbanization process, and hydrodynamic processes were changed again, and associated suspended sediment and bedload transport patterns were also altered, and then the new sediment distribution pattern and geomorphology structure were established correspondingly. The sedimentary environment and evolution of geomorphology in Tongan Bay are experiencing the adjustment from naturally developed pattern to artificial pattern. After the complicated rearrangement, it will be fashioned into a set of new geomorphology pattern which is the net effects of physical hydrodynamic processes and human activities.

### **Key words:**

Semi-enclosed embayment; fast urbanization; coastal geomorphology evolution; sedimentary environment

## Seismic Stratigraphy of the North Jiangsu Plain Coast, China since the Last

### Deglaciation

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### Abstract

Based on the high quality and high resolution shallow seismic profiles in the Abandoned Yellow River subaqueous delta (AYRSD) and northern radial sand ridge field (NRSRF) off the north Jiangsu plain coast, synthesized studies on the seismic stratigraphy since the last deglaciation have been done. It could be clearly seen that, in the AYRSD area, the sequence boundary was fairly uneven, buried in the depth of ca. 20-50 m bpsl from west to east, with a compound clinoform deposits overlaying on it. The clinoform deposits varied in reflection configurations, showing parallel or sub-parallel, low angle to high angle progradational patterns from west to east. On the contrary, in the NRSRF area, the sequence boundary was pretty even, buried in the depth of ca. 30-35 m bpsl in the nearshore, with a compound deposits overlaying on it, which was relative to the AYRSD area, however, with remarkable regional differentiation. In the area north of ca. 33°19' N, the deposits varied in reflection configurations, showing parallel or sub-parallel, complicated progradational patterns from bottom to top. Even the high angle progradational pattern could be seen in the topmost part, interpreted as tidal sand ridges. In the area south of ca. 33°19' N to Jianggang, the layer with parallel or sub-parallel reflection configurations was missing, while it was a key seismic reflection layer distributed commonly in the nearshore north of ca. 33°19' N and likely to be derived from the Holocene Yellow and Huaihe River deltaic deposits.

### Key words:

Seismic profile; clinoform deposits; Abandoned Yellow River subaqueous delta; Northern radial sand ridge field

## Spatial Agglomeration of Marine Industries and Region Coordinated Development in China

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### Abstract

This article analyzes the spatial structure gradation of regional marine industrial agglomeration of China and considers that the interprovincial scale research should be regarded as playing the role of “nexus”. Then it has measured the agglomeration degree of marine industries in 11 coastal provinces (Hong Kong, Macau and Taiwan excluding) by employing location quotient during 1996-2012. As a result, the differentiation of agglomeration degree appeared in the first stage of 1996-2000, and increased gradually during the second stage of 2001-2005, and in the recent seven years: 2006-2012 was very remarkable. One half of the coastal areas, Tianjin, Shanghai, Fujian, Hainan, Shandong and Guangdong, has been growing up into agglomeration areas. The former four areas has been showing the higher location quotient value and the tendency of agglomeration enhancing. According to the literatures, a model has been made to study quantitatively the coupling coordination degree of two systems in Tianjin, Shanghai, Fujian and Hainan: the marine industrial agglomeration system and the marine resources and regional environment system (a compound system). The study has indicated that during 2001-2012, the coupling coordination degree of the compound system in the four agglomeration areas has been rising constantly and showing an upward tendency. According to the grade of coupling coordination degree, the compound systems of the four areas are all in the condition of incoordination before 2006 and in the condition of coordination after 2006. At present, all of the compound systems of the four agglomeration areas are being in the stage of medium coordination.

### Key words:

Marine industrial agglomeration; interprovincial scale; compound system; coordinated development

## Spatial Evolution of Container Shipping Network: Evidence from China

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### Abstract

In order to depict the spatial evolution of container shipping network, based on the estimated value of the trade volume of container transportation in the port, the international space distribution of container transportation trade is analyzed. Evidence from China (2000-2010), it discusses the mechanism of the international space layout of China's port container transportation system. Result display: Global container ports' distribution, Top 100 ports are gradually fastening on the three maritime regions (developed or rapid-developing economies): Asia-Pacific (East Asia, Southeast Asia and East Australia), North America and Europe Unions, driven by the big-three forces as China, the USA and West Europe. On the other hand, with respect to China, besides continuous increasing in container ports throughput in whole, a parallel growth in the centralization in part is also observed, especially in Southeast part coastal belts of China. In the sorting with China's container ports, a shifting process of transiting position from lower to higher level during one decade. The ports of Shanghai, Hong Kong and Shenzhen are of the highest three ones that well above average with an excellent accessibility and transport capacity that hold a pivotal position. The formation and change of the international space of China's port container transportation system has been influenced by many factors, such as scale economy, industrial structure, port management system and so on. These findings are meaningful to understand the spatial evolution of container shipping network and China's status and role in the structure of the world ocean transportation, for decision makers to develop a comprehensive, strategic sea transport scheme.

### Key words:

Container shipping system; China's container port; spatial evolution; influence factors

## Spatiotemporal Analysis of Nutrients Concentrations Based on ArcGIS, a Case Study in Zhoushan Coastal Area

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### Abstract

Eutrophication caused by over enrichment of nutrients has been a long time environmental problem in China's coastal area. Zhoushan, located near the estuarine of Yangtze River and Qiantang River, is a typical zone under the interaction between land and ocean. To improve the water quality, great effects have been taken, including various monitoring work to find the contribution from different pollution source, i.e. territorial pollution and local point source, et al. In this study, spatial and time analysis were carried out using ArcGIS software to show relative high-resolution distribution of inorganic nitrogen and reactive phosphate concentrations and their changes with time. The study was based on collected environmental monitoring data between 2006 and 2014, as well as with investigation data in 1990s. All the data collected were processed using ArcGIS to build the database. The study showed (1) an increase trend in eutrophication from 1990s to 2014. (2) A relative serious pollution in the western part of study area. And besides regional distribution, we also find some sub-regional "hot-spot", which indicate a possible pollution source tracing method. (3) A black-box model was described in our study to show the dual forcing from territorial extraneous and local nutrients inputs. With further study and application, our study may improve the utilization and sharing of monitoring data, and provide basic research work for pollution source management.

### Keywords:

Nutrients; Spatial and time analysis; ArcGIS; Database

## The Evaluation Model of Island Sustainable Development and Its Application

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### Abstract

With the vulnerable ecological environment of sea islands, protecting the ecosystem of islands as well as their surrounding waters, reasonably exploiting and utilizing the natural source of sea islands, and promoting the sustainable development of island economy and society have become basic purpose of *Legislation of Sea Island Protection of PRC*. This essay attempts to refer to the idea of land area sustainable development index system, select indexes in terms of four aspects including survival support, ecological environment, economical development, social and intellectual support, integrating the natural environment of islands and the particularity of society and economy, determine the weight of evaluation index of island sustainable development with the integration of entropy weight method and the nonstructural decision fuzzy set theory model, and build the index system of island sustainable development; the essay also further import variable fuzzy evaluation method of the unity of the opposites and quality interaction law set up the comprehensive evaluation model of island sustainable development based on the theory of variable fuzzy set, evaluate and verify the condition of sustainable development in Changhai County from 2001to2013,and identify key factors, existing problems and restrictive factors affecting the capability of sustainable development. This provides scientific analyst data for improving the level of sustainable development of economy and society.

### Key words:

Variable fuzzy set; islands; evaluation of sustainable development; Changhai County

## The Impact of Landscape Pattern on Ecological Vulnerability and Ecosystem Services Value: An Empirical Analysis of Yancheng Nature Reserve in China

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### Abstract

In this study, an ecological vulnerability assessment indicator system was constructed using the “exposure–climate sensitivity–adaptive capacity” framework with reference to the theory of ecological vulnerability. An improved ecosystem services value calculation model was proposed based on empirical parameters. Using Yancheng Nature Reserve in China as an example, we employed remote sensing data to conduct an empirical analysis of the changes in the spatiotemporal pattern, ecological vulnerability, and ecosystem services value of typical landscape types over the period 1987–2013. The results showed that during the investigation period, the fragmentation of three natural wetland landscape types (i.e., *Spartina alterniflora*, *Suaeda glauca*, and *Phragmites australis*) gradually increased in the study area. The ecological vulnerability scores of major landscape types were, in descending order, *P. australis* (0.053), farmland (0.047), *S. alterniflora* (0.042), *S. glauca* (0.031), and bare mud flat (0.002). From 1987 to 1997, the ecosystem services values of *S. glauca* and *P. australis* wetlands decreased, while that of *S. alterniflora* wetland increased continuously. From 2002 to 2013, the ecosystem services values of all three types of natural wetland showed a downward trend. In conclusion, the combined effect of human and natural factors, including the expansion of farmland and aquaculture waters and changes in seawater erosion and deposition, led to changes in the landscape pattern, ecological vulnerability, and ecosystem services value of Yancheng Nature Reserve during the investigation period. It is recommended that a “dual adaptive” management system based on natural succession and supplemented by appropriate manual intervention be implemented to improve management efficiency and flexibility and to adapt to landscape pattern changes.

### Keywords:

Landscape pattern; Ecosystem response; Empirical analysis; Ecological vulnerability; Ecosystem services value; Dual adaptive management

## The Study of the Yao Sandbank's Geomorphological Evolution Based on the Remote Sensing

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### Abstract

Yao Sandbank (YS) is the largest sand bar of south wing of tidal systems in the South Yellow Sea. It has complex shoal, rich deep water coastline and development potential. Research on the geomorphological evolution can support the further development and utilization of construction in the complex dynamic environment of the YS. Landsat images in 1987, 1995, 2000 and 2008 and survey data of beach profile were interpreted and analyzed to obtain the typical geographical features. After geometric calibration and overlay, the positions of beach ridge, channel axis and shoreline during 4 different periods were compared and their changes were analyzed.

The results showed that: The basic combination form of "water channel-sandbar system" was at the status of stability. The relative scale of tidal flat was decreased with the current situation of east-outside part silting while north part washed. The north part and the south part differ in the forms and the evolution trends. The Xiao Miao Hong channel's dynamic axis of flow was migrating southward.

### Key words:

Yao Sandbank; Geomorphological evolution; Remote sensing and GIS techniques

## Wetland Dynamic and Ecological Compensation of the Yellow River Delta in China

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### Abstract

As a new type of resource and environmental management, ecological compensation has increasingly become a concern among Chinese and international scholars. In the past 20 years, many domestic and foreign scholars have studied a lot of work on the concept, mechanism and mode, standard, and benefit evaluation of ecological compensation. However, the study on eco-compensation has significant discipline overlapping and regional differences, causing some divergences in the above mentioned study contents, so it needs further improved. The essay tries to explore the eco-compensation standard based on the value loss of ecological function and the loss of marketable value with the hope of supplying scientific evidences for the researched areas' carrying out the eco-compensation as well as methods' reference for the related research of other areas. Ecological function value of wetland unit area in the study area is higher than the national and global average level. The material production function and the degradation pollutants function have the maximum value. Natural wetlands value is much higher than artificial wetlands. This study was supported by the Natural Science Foundation of China (41371517).

### Key Words:

Wetland dynamic; ecological value; compensation standard

## C12.06 Cold Region Environments

### Sustainability and Resilience Monitoring in the Arctic



Home

#### Oral

1. [Adaptive Realities of Single-Industry Communities of Murmansk Region in The Changing Arctic](#)  
Yulia Zaika (The Faculty of Geography, Lomonosov Moscow State University, Russian Fed)
2. [Design of an Integrated Framework for the Arctic Socio-Ecological Systems Resilience and Sustainable Development Monitoring.](#)  
Tatiana Vlasova (Institute of Geography, Russian Academy of Science, Russian Fed), Andrey Petrov (University of Northern Iowa, United States), Joan Nymand Larsen (Stefansson Arctic Institute, Iceland), Sergey Volkov (Institute of Agricultural Economy, Russian Academy of Science, Russian Fed), Ivan Lytkin (Soil Science Institute by V.V. Dokuchaev, Russian Academy of Sciences, Russian Fed), Alexander Khropov (Institute of Geography, Russian Academy of Sciences, Russia, Russian Fed)
3. [Developing Sustainable Development Indicators for Monitoring of Industrial Development Impacts in Northern Communities](#)  
Andrey Petrov (University of Northern Iowa, United States)
4. [Environment Response of the Yenisei Siberia Mid -Taiga to Global Warming at the edge of the Millenium](#)  
Aleksy Medvedkov (Lomonosov Moscow State University, Russian Fed)
5. [Geographical Aspects of Spitsbergen Environment Transformation after the Little Ice Age](#)  
Wieslaw Ziaja (Jagiellonian University, Institute of Geography and Spatial Management, Poland)
6. [Naskapi Observations On Changes in Caribou and Related Impacts On Wildlife Food Security and Health in Northern Quebec, Canada](#)  
Marie Jeanne S. Royer (Aberystwyth University, United Kingdom), Thora Herrmann (Université de Montréal, Canada), Nicolas Brunet (McGill University, Canada), Nathalie D'Astous (Naskapi Nation of Kawawachikamach, Canada), George Guanish (Naskapi Nation of Kawawachikamach, Canada), John M. Mameamskum (Naskapi Nation of Kawawachikamach, Canada)
7. [Permafrost in Beiluhe Basin, Qinghai-Tibet Plateau by Ground-Based and Satellite-Based Methods](#)  
Guoan Yin, Fujun Niu (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Science, China)
8. [Projected Climate Change Impacts on Urban Infrastructure: Quantitative Assessment for Russian Permafrost Regions](#)



Nikolay Shiklomanov, Dmitry Streletkiy (The George Washington University, United States)

9. [Road Infrastructure and Sustainability in the Sayan Mountain Region of Russia](#)

Vera Kuklina (V.B. Sochava Institute of Geography SB RAS, Russian Fed)

10. [The 2030 Agenda for Sustainable Development: Implications for the Arctic Ocean and the Circumpolar Region](#)

Nancy Doubleday (McMaster University, Canada), Tatiana Vlasova (Moscow State University, Russian Fed)

## Poster

1. [Permafrost Thawing and CO<sub>2</sub> eFlux of Frozen Peatlands: Relationship, Spatial Variability, Trend of Climate Change \(Western Siberia, Russia\)](#)

ANNA BOBRIK; Georgy Matyshak; Olga Goncharova (Russian Fed, Lomonosov Moscow State University)

## **Adaptive Realities of Single-Industry Communities of Murmansk Region in the Changing Arctic**

Zaika Yu.V.

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### **Abstract**

Among other Arctic territories of Russia, Murmansk region holds the first place by the number of single-industry cities (8: Polyarnie Zory, Kirovsk, Nickel, Zapolyarniy, Tumanniy, Monchegorsk, Revda, and Kovdor). At present 23% of the region's population (over 150000 people) live and work in single-industry cities and set up the greatest industrial potential for further socioeconomic and sustainable development of this area. The most part of regions' single-industry cities has a mining profile.

Arctic resource stocks are expansive due to the new exploration possibilities opened by the human-driven climate and environmental change. But resource markets and political situations dictate their own demands through the historic period from Soviet times to nowadays. These demands place new economic realities to the industries allocated in the region to which they should be adaptive and resilient.

The exceptional socioeconomic and environmental factors which contribute to sustainable development balance of single-industry cities mostly are structural and paradigm changes in economy and functionality of enterprises after collapse of Soviet Union; the triple contradictions of interests: enterprise owner – regional government – local workers; downsizing and depopulation; domestic and foreign market conditions; pollution; the quality of life of local population, and other key factors.

The rapidly changing resource, political and military role of the Arctic and its economy nowadays brings in new challenges and benefits to the sustainable development of the region and its mining communities. An ineffective governmental strategy for social services, human capacity building, socially-oriented regional budget and world/domestic demand for particular resource are therefore the major milestones.

### **Key words:**

Sustainable development; Arctic; extractive industries; mining; adaptation; strategy

## Design of an Integrated Framework for the Arctic Socio-Ecological Systems

### Resilience and Sustainable Development Monitoring.

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#### Abstract

The Belmont Forum project “ASUS: Arctic SUSTainability: A Synthesis of Knowledge” brings together an international team of experts from seven Arctic countries to develop an interdisciplinary synthesis and assess the state of knowledge about Arctic sustainability and sustainable development. A special domain of this ASUS project is “Monitoring of sustainability and sustainable development”. The aim of this activity is to assess what has been already done in monitoring Arctic sustainability and sustainable development at different scales, what approaches and methods were implemented to delineate and monitor trends, both positive and negative on the way towards sustainability in the Arctic. The focus on creating knowledge infrastructure for multi-scale socially-oriented observations and assessments of Arctic socio-ecological systems sustainability and resilience in changing natural and living environments is of great importance. A design of the suitable monitoring frameworks of sustainable development and resilience of complex socio-ecological systems is one of the project’s goals to be discussed. We envision integration of the established indicators frameworks developed by the Arctic Social Indicators (ASI) and Integrated Arctic Socially Oriented System (IASOS) network projects, putting main focus on quality of life, human and social capital development in the Arctic. The presentation is going to be based on the results of the wide stakeholder discussion during the Arctic Observation Summit in March 2016.

#### Key words:

Arctic; monitoring; sustainability; resilience; socio-ecological system; socially-orientated observation

## Developing Sustainable Development Indicators for Monitoring of Industrial Development Impacts in Northern Communities

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### Abstract

This paper develops a multilayered system of indicators designed to assess and monitor socio-economic impacts of resource activity on northern communities in respect to sustainable development. The proposed monitoring system is based on existing data available to communities at no or little cost, incorporates baseline and regional comparisons as well as “slow” and “fast” variable components. We use the case of Inuvialuit Settlement Region in northern Canada to implement this system. The results indicate that ISR underwent considerable improvement in the years since finalizing its Land Claim Agreement and subsequent resource-related activities. However, the gap with reference regions still persists.

### Key words:

indicators; sustainable development; Arctic

## Environment Response of the Yenisei Siberia Mid -Taiga to Global Warming at the edge of the Millenium

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### Abstract

Results of long-term investigations on middle taiga ecosystems response to climate warming since early 80-s , 20th c. are presented. The author demonstrates original data on modern middle taiga ecosystems characteristics in one of the less explored regions of the Central Siberia. It was made clear that these natural complexes are particularly vulnerable to any external impact and are the most important indicators of modern climate changes. These data promoted development of a scientific basement of ecosystems differentiation regarding response degree to climatic signal as well as elaboration of taiga nature management diversification for different ethnic aborigine population groups and forest conservation measures.

### Key words:

climate change; permafrost landscapes; exodynamic processes; Siberian taiga; traditional knowledge; adaptation strategies

## Geographical Aspects of Spitsbergen Environment Transformation after the Little Ice Age

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### Abstract

Intensive environmental transformation occurs in Spitsbergen due to global and local climate warming. Dramatic transformations of all the environmental components lead to significant changes in functioning of environment. The snow line (together with the glaciers' firn and equilibrium lines) is being uplifted due to the temperature increase (the same refers to the upper limit of vegetation). Hence, accumulative zones and extents of glaciers, especially in their lower parts, become smaller and smaller. Glacial recession generates big changes in the coastline and coastal topography. New deposits, landforms and water bodies appear in areas abandoned by glaciers if their bedrock is situated above the sea level (their bedrock below this level is being flooded by the sea). New unglaciated landscapes undergo pioneer animal colonization and plant succession, and soil formation begins there (the same refers to areas free of glaciers but devoid of plants due to severe climatic conditions before). The glaciers located newly below their equilibrium lines (after its uplift) begin to decline. A lot of glaciers change their type into a more simple one, e.g. valley glaciers into cirque or slope (hanging) ones. Spitsbergen becomes much less glaciated. Some of its mostly glaciated regions are being transformed into mostly unglaciated ones. The active layer, thawing on permafrost in summer, is deeper and deeper. All these changes will lead to development of continuous tundra vegetation on the eastern coast and transformation of the southern Spitsbergen peninsula into a new island (if a cold climatic fluctuation will not appear).

### Key words:

environmental and landscape transformation; new landscapes

## **Naskapi Observations on Changes in Caribou and Related Impacts on Wildlife Food Security and Health in Northern Quebec, Canada**

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### **Abstract**

The George River caribou (*Rangifer tarandus* L.) herd in northern Quebec (Canada), one of two active herds in the area, has declined from a high of about 800,000 heads in 1993 to 14,200 heads by the summer of 2014. Caribou has always been very important to the Naskapi Nation of Kawawachikamach in Subarctic Quebec. Still today the Naskapi depend on caribou for meat and other raw material. Caribou population declines are thus increasing food insecurity for the Naskapi. Here we presents the outcomes of the Naskapi Climate Change Adaptation and Caribou Project, a participatory methods (i.e. community workshops, community caribou surveys, questionnaires and interviews) based community-led study; which had as aim to document Naskapi observations on changes in caribou population and the resulting impacts on Naskapi traditional activities and health. Results show that the size and abundance of caribou has decreased, and that caribou behavioural and migratory patterns have changed due to mining, outfitters and climate change. Diverse actions have been taken by the Nakapi Nation to adapt to these changes and to improve food security such as: modifying their traditional hunting practices, encouraging the use of other food source (e.g. moose or fish). The integration of the documented observations by the Naskapi of Kawawachikamach can help community members and policy makers develop appropriate adaptation and mitigation measures to socio-environmental changes occurring in the area.

### **Key words:**

Naskapi; Food security; Caribou; Canadian Subarctic; TEK; Northern Quebec



## Permafrost in Beiluhe Basin, Qinghai-Tibet Plateau by Ground-Based and Satellite-Based Methods

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### Abstract

Beiluhe basin, in the central Qinghai-Tibet Plateau, is an ideal area for monitoring permafrost characteristic and response to climate change. This paper is to provide a synthesis on the thermal state, influencing factors and recent evolution of permafrost conditions in Beiluhe basin. Satellite-based method is used to classify the vegetation type and geomorphic unit. The analysis is based on ground temperatures and soil samples from 21 boreholes and field investigation. The results show that the vegetation can be classified as four units and vegetation unit is one of the indicators of the spatial distribution of permafrost conditions. The ground surface thermal state is significantly influenced by the ground surface characteristics.

### Key words:

permafrost; geomorphology; thermal state; influence factors

## Projected Climate Change Impacts on Urban Infrastructure: Quantitative Assessment for Russian Permafrost Regions

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### Abstract

Planned socio-economic development during the Soviet period promoted migration into the Arctic and work force consolidation in urbanized settlements to support mineral resources extraction and transportation industries. One of the most significant impacts of climate change on arctic urban landscapes is the warming and degradation of permafrost which negatively affects the structural integrity of infrastructure. In this paper we focus on quantitative assessment of potential changes in stability of Russian urban infrastructure built on permafrost in response to projected climatic changes using permafrost - engineering model. To address the uncertainties in climate projections produced by state-of-the art General Circulation Models (GCMs), we have utilized results from six GCMs participated in most recent Climate Model Inter-comparison Project (CMIP5). The analysis was conducted for entire extent of the Russian permafrost-affected area and on several representative urban communities. Our analysis demonstrates that significant climate-induced reduction in urban infrastructure stability throughout the Russian permafrost region should be expected by mid XXI century. Although high uncertainty, resulted from GCM-produced climate projections, prohibits definitive conclusion about the rate and magnitude of potential climate impacts on permafrost infrastructure, the results presented in this paper can serve as guidelines for developing adequate adaptation and mitigation strategy for Russian northern cities.

### Key words:

Arctic; cold regions; permafrost; urban systems; climate change; Russia; spatiotemporal

## Road Infrastructure and Sustainability in the Sayan Mountain Region of Russia

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### Abstract

In harsh natural conditions of the Arctic and mountainous regions construction of road infrastructure is usually related to extraction of resources and presented by policy makers as part of economic development. In the article I will discuss the challenges brought by road construction in the Sayan mountain region where one might observe diversity of perception of sustainability among local communities, policy makers, extractive industries, and tourists. Traditionally the whole region has been settled by nomadic reindeer breeding indigenous groups of Soyots (Okinskii raion of Republic of Buriatia), Tozhu (Todzha kozhuun of Republic of Tyva), and Tofalars (Tofalarskoie municipality of Irkutskaiia oblast). While Okinskii raion, connected with the outer world by automobile road since 1970s, hosts number of extractive companies operating in the area with the use of long-distance commute workers, in the Todzha area the Chinese-owned company “Lunsin” has just built the road a few years ago and started exploration of ore, and in Tofalaria exploration of rare metals is on a stage of geological surveys, and connection is limited by winter roads and air-transportation only. The risks for environment and sustainability of traditional indigenous ways of life; opportunities for economically prosperous sustainability with the resource extraction, tourism development and road maintenance; and the ambiguities of social sustainability related to the co-presence of different interests for the future of the region will be discussed based on field studies (interviews and observations in Okinskii raion in 2012, in Tofalaria and Todzha in 2013) and secondary data.

### Key words:

remote region; sustainability; infrastructure

## The 2030 Agenda for Sustainable Development: Implications for the Arctic Ocean and the Circumpolar Region

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### Abstract

Transforming Our World, the 2030 Agenda for Sustainable Development, opens a new chapter in integration of human and natural sciences and indigenous and local knowledges. It calls for integration across domains of research, and for participatory methods of developing policy. Here we take a polar perspective on the multiple stressors and changes affecting Arctic Peoples and polar environments, beginning with the Arctic marine and coastal areas, and including tundra, taiga, and high altitude environments, with a view to advancing the integrative approach to interpreting scientific findings and policy innovation in support of adaptive responses that is advocated by the UN General Assembly resolution 70/1 Transforming Our World? We review the key features of this Resolution, in terms of its impacts and potential as a policy watershed for the Arctic and for Arctic Peoples and States.

### Key words:

Arctic; circumpolar; sustainable development; UN General Assembly Resolution 70/1

## Permafrost Thawing and CO<sub>2</sub> Efflux of Frozen Peatlands: Relationship, Spatial Variability, Trend of Climate Change (Western Siberia, Russia)

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### Abstract

Global warming, recorded in recent decades in the North West Siberia, leads to a change in soils temperature regime, changing plant associations, gradual degradation of permafrost and changing landscape as a whole. We investigated the spatial and temporal variability of active layer thickness and CO<sub>2</sub> efflux of CALM R1 grid. The research CALM site R1 (Nadym Grid) (N65°20', E72°55') is located on north of West Siberia (Russia) within the zone of sporadic permafrost of north taiga. Soil carbon dioxide emission is low and does not differ from year to year (156 ± 21 – 2013; 132±17 – 2014; 170±30 – 2015) mgCO<sub>2</sub>m<sup>-2</sup>h<sup>-1</sup>. Average content of TOC in the upper 15 cm of soil is high (34,24±1,92%). The climatic record (weather station “Nadym”) indicates a progressive warming of annual air temperatures of ~2°C over the past 17 years (an average of -6°C to -4°C). For last 17-years period of CALM R1 measurements was determined that active layer thickness is characterized by high spatial and temporal variability. Area with small active layer thickness (<50 cm) decreased from 14% to 0% in this period. Areas with deepest thaw (more than 200 cm) increased from 16 to 56%. Average active layer thickness increases from 119±6 to 166±8 cm from 1997 to 2014. The values of microbial biomass are high, but permafrost and hydrothermal conditions inhibit soil biological processes. So the main factor, which determines the soil carbon efflux, is the depth of permafrost table; it determines the organic matter transformation processes.

### Key words:

Greenhouse gases; permafrost; climate change; arctic; terrestrial ecosystems

## C12.06 Cold Region Environments

### Land Cover Change and Ecosystem Dynamic in High Mountain Asia



Home

#### Oral

1. [Analysis of Cropland Change and Its Relationship with Climate Change and Human Activities in Nepal Over Past 30 Years](#)  
Basanta Paudel, Yili Zhang, Linshan Liu (IGSNRR, CAS, China)
2. [Assessing The Relationship between Phenological Change of the Alpine Grassland and Elevation on the Qinghai-Tibetan Plateau](#)  
Li Lanhui (IGSNRR, CAS, China), Zhang Yili (IGSNRR, CAS, China), Ding Mingjun (JNU, China)
3. [Changes in Urban Green Spaces of Kolkata](#)  
Mishra Praveen (University of Delhi, Delhi, India)
4. [Changing Agriculture Landuse in Response to Environmental Change in Cold & Dry Agro-climatic Zone of Himachal Pradesh](#)  
Singh Inder Jeet (University of Jammu, Jammu, India), Thokchom Pratap (Rama Krishna Mission School, India)
5. [Climate Change and Earthquake Effects to Natural Springs of the Melamchi Watershed of Nepal Himalayas](#)  
Prem S Chapagain (Tribhuvan University, Nepal)
6. [Coverage Changes of Forest and Grassland of Transitional Areas of Farming and Pasturing in Northeast Qinghai-Tibet Plateau During Qing Dynasty](#)  
Wu Zhilei, Liu Fenggui (Qinghai Normal University, China)
7. [Current State and Changes of Glaciers in The Tavan Bogd Mountains \(Mongolia\)](#)  
Choijinjav Lkhagvasuren, Dmitriy Ganyushkin (Saint Petersburg State University, Russian Fed)
8. [GIMMS NDVI-based Vegetation Changes in the Korean Peninsula from 1982 to 2012](#)  
Kang Chol Hyok, Wang Zhaofeng, Zhang Yili (IGSNRR, CAS, China)
9. [Habitat Loss Assessment of the Key Species from 1992 To 2010 In Koshi River Basin, Central Himalaya](#)  
Liu Linshan, Zhang Yili, Zhao Zhilong, Wu Xue (IGSNRR, CAS, China)
10. [Investigation and Estimating the Storage of Glacial Lakes Based On Remote Sensing Data in Western China](#)  
Liu Qionghuan (Hunan University of Science and Technology, IGSNRR of CAS, China), Wang Xin

(Hunan University of Science and Technology, China)

11. [Land-Cover Structure Changes Due to Recreational Development on Lake Baikal](#)  
Vanteeva Iuliia, Svetlana Solodyankina (The V.B. Sochava Institute of Geography SB RAS, Russian Fed)
12. [Present State and Dynamics of Glacio-Nival Systems of Tavan Boghd Mountain Massif \(Altai mountains\)](#)  
Chistyakov Kirill, Dmitriy Ganyushkin (Saint Petersburg State University, Russian Fed)
13. [Socio-Economic Analysis of Land use Land Cover Change: A Geo-spatial study of Hangrang Valley, Himachal Pradesh](#)  
HUSAIN ARIF, Pankaj Kumar (University Of Delhi, Delhi, India)
14. [Spatial-temporal Dynamics of Cultivated Land in Recent 35 Years in the Lhasa River Basin of Tibet](#)  
Bai Wanqi (IGSNRR, CAS, China)
15. [Temperature Dependence of Variations in The End of the Growing Season from 1982 to 2012 on The Qinghai–Tibetan Plateau](#)  
Ding Mingjun (Jiangxi Normal University (JNU), China), Zhang Yili (IGSNRR, CAS, China), Li Lanhui (IGSNRR, CAS, China), Chen Qian (JNU, China), Liu Linshan (IGSNRR, CAS, China), Wang Zhaofeng (IGSNRR, CAS, China)
16. [The Dynamic Response of Lakes in the Tuohepingco Basin of The Tibetan Plateau to Climate Change](#)  
Zhao Zhilong (Institute of Geographic Sciences and Natural Resources Research (IGSNRR), CAS, China), Liu Fenggui (Qinghai Normal University, China), Liu Linshan (IGSNRR, CAS, China), Zhang Yili (IGSNRR.CAS, China)
17. [The Review about ABM/LUCC](#)  
Gu Changjun, Liu Linshan, Zhang Yili (IGSNRR, CAS, China)

## Poster

1. [An Integrative Investigation of the Causation for Pre-historical Catastrophes in the Lajia Ruins, Qinghai Province](#)  
Qiang Zhou (China, Shaanxi Normal University/Qinghai Normal University); Chunchang Huang (China, Shaanxi Normal University); Yuzhu Zhang (China, Northwest University)
2. [Determination of the Temperature Effect on the Structure of Landscapes near Lake Baikal with using the NOAA Data: First Results](#)  
Mikhail Vilor; Julia Vanteeva; Svetlana Solodyankina (Russian Fed, the V.B. Sochava Institute of

Geography SB RAS)

3. [Farmers' Perception to Farmland Conversion: A Questionnaire Survey in Xining City, Qinghai Province, China](#)  
Qiong Chen (China, Qinghai Normal University); Yunlong Cai (China, Peking University); Feigui Liu (China, Qinghai Normal University)
4. [Features of the Radiation Regime of the North Caucasus According to the Result in-situ measurements during Winter 2016](#)  
Aleksii Poliukhov; Pavel Toropov; Vladimir Platonov (Russian Fed, Lomonosov Moscow State University)
5. [Impact of Mosses on Water Flux in an Alpine Shrub Site in the Qilian Mountains of China](#)  
Zhangwen Liu (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)
6. [Isotopic Content of the Snow-firn Thickness and Meltwater in the Tavan-Bogd Mountain Massif.](#)  
Dmitrii Bantsev; Dmirtiy Ganyushkin; Alexey Ekaykin (Russian Fed, Saint-Petersburg state university)
7. [Recent Glacial Fluctuations and Control of Non-Climatic & Climatic Parameters in Sikkim Himalaya](#)  
Parvendra Kumar (India, Dr. Harisingh Gour University, Sagar, Madhya Pradesh)
8. [Reconstruction of Land Use Pattern of Typical Areas of Farming and Pasturing in Qinghai-Tibet Plateau during Qing Dynasty](#)  
Fenggui Liu (China, Qinghai Normal University); Yili Zhang (China, Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research)
9. [Some Research Results of the Climate and Glaciations of the Mongol-Altai mountains \(case study of Tavan Bogd mountains\)](#)  
Tsedevdorj Ser-Od; Dash Doljin; Tsogbadral Khurelbaatar (Mongolia, MNUE)
10. [Variation of Atmospheric Dust over the Past 100 Years Recorded by Visible Dusty Layers of the Kuokuosele Ice Core, Western Tibetan Plateau](#)  
Tenzin Drolkar Tenzin Drolkar; Ping Yao (China, State Key Laboratory of Environment changes and land Surface Processes, Institute of Tibetan Plateau Research, Chinese Academy of Sciences)

## Analysis of Cropland Change and Its Relationship with Climate Change and Human Activities in Nepal over Past 30 Years

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### Abstract

Nepal, mountainous country, covering two-thirds of the Himalayan region, where the main economic activities are based on agriculture was selected as the study area. The objective of this study is to assess the spatial patterns of cropland changes and their changing relationship analysis with climate change and human activities in past over 30 years status. Aerial photographs and remote sensing images based datasets of 1978 and 2010 were obtained to assess the spatial pattern of cropland changes. Expansion and contraction were determined by cover changes in cropland. Logistic regression analysis were used to analyze the impact of topographic, neighborhood, socio-economic and climatic related variables on cropland changes. The spatial results showed that cropland area between these periods increased by 3891 km<sup>2</sup>. The expansion rate is noticeably higher on the flat area, lower slopes and also in areas closer to rivers and roads, while most contraction was found on the steep slopes, high altitude areas and faraway from roads, and streams. It was found that the climatic conditions was also play significant driven factor for contraction. Cropland expansion and contraction in Nepal were mainly affected by population, temperature and precipitation. The results, on socio-economic based house hold survey in 15 different places of Nepal shows that in recent decade, drought had significant effects on cropland contraction but not on expansion. Similarly, the increased GDP, migration of young people as a foreigner labors, shifting occupation and, development of infrastructure and market centers were major driving factors of cropland change in Nepal.

### Keywords:

Cropland change; climate change; human activities; major driving factors; Nepal

## Assessing the Relationship between Phenological Change of the Alpine Grassland and Elevation on the Qinghai-Tibetan Plateau

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### Abstract

Plant phenology is one of the best indicators of climate change and its impacts on vegetation ecosystem. Elevation is known to play an important role in the change of plant phenology and surface warming. Therefore, assessing the relationship between phenology change of the alpine grassland and elevation is of great significance to the research of vegetation ecosystem change over the Tibetan Plateau. Based on SPOT-VGT-NDVI dataset from 1999 to 2012, DEM, physic-geographical regions and grassland vector data, the elevation dependency of the alpine grassland phenology were examined. The results showed that: (1) the alpine grassland phenology at different physic-geographical regions, except for Southern Tibet mountain shrub-steppe zone, had significant elevation dependencies ( $P < 0.001$ ). With increasing elevation, the spring phenology and autumn phenology of the alpine grassland were delayed and advanced by 0.76~1.50 days per 100m and 0.37~0.79 days per 100m, respectively. The standard deviations of the alpine grassland phenology at high altitude areas were smaller than that at low altitude regions. (2) The alpine grassland phenology change was more sensitive to the variations of elevation in southeast with wetter areas than in northwest with dryer areas. (3) Opposite trends of alpine grassland phenology change were observed between the high and low elevation in the most of the physic-geographical regions, which suggests that the alpine grassland phenology change derived from remote sensing could not directly verify the elevation dependency in surface warming across the Tibetan Plateau. Our results demonstrate there are remarkable discrepancies among the whole plateau and the different physic-geographical regions in the relationship between the alpine grassland phenology and elevation, and further suggest that more attention should be paid to the scale in the investigation of regional differentiation characteristics.

### Key words:

Phenology; Alpine grassland; Elevation; physic-geographical regions; Tibetan Plateau

## Changes in Urban Green Spaces of Kolkata

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### Abstract

Green spaces play important functions in urban environments. Reducing air pollution, providing shade and habitat for arboreal birds, producing oxygen, providing shelter against winds, recreational and aesthetic qualities and architectural applications are the main functions of urban green spaces. With the rapid change of urban area in Kolkata city during the past decades, green spaces have been scrappy and isolated causing destruction and dysfunction of these important urban elements. The objective of this study was to detect changes in extent and pattern of green areas of Kolkata city. In this research, we classified a Landsat TM and an Landsat ETM image belonging to the years 1993 and 2015, respectively. I then used a post-classification comparison to determine the changes in green space areas of Kolkata city during the 22 years covered by the images. The results showed that during 22 years from 1993, a significant decrease had occurred in the extent of urban green spaces with a concomitant fragmentation resulting in downgrading and destruction of the functions and services these areas provide. We conclude that the general quality of life in the central parts of the city has been diminished. We also state that a combination of remote sensing image classification, landscape assessment and vegetation indices can provide a tool for assessing life quality and its trend for urban areas.

### Keywords:

Landuse Change; Satellite Imagery; Geospatial; Kolkata Municipal Corporation, Green Space

## Changing Agriculture Landuse in Response to Environmental Change in Cold & Dry Agro-climatic Zone of Himachal Pradesh

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### Abstract

Himachal Pradesh is a mountainous state of India lies in the North West Himalayan Region. State exhibits a complex mosaic of Hills Mountains and river valley. The state has diverse climatic conditions ranges from sub-tropical to temperate, therefore it has been divided into four agro-climatic zones and these zones are known for the cultivation different agricultural as well as horticultural crops. Among these zones Cold & Dry zone was once known for the cultivation of peas, potato and dry fruits but since last three decade this zone has experienced a drastic change in agriculture land use. Many new crops such as apple, tomato, hops have replaced area under potato and peas and large number of farmers have brought the grass land under apple plantations. This change in agriculture landuse is largely attributed to the changing climatic conditions of the area. It is clearly evident from the metrological data that precipitation in the form of snowfall has reduced during winter season and on the other hand rainfall has increased, at the similar fashion mean minimum temperature has decreased and mean maximum temperature has increased. Farmer's perception has also supported the fact that changing climatic conditions are responsible for change in agriculture land use of the study area.

### Key Words:

Agro-climatic; landuse; precipitation; temperature; rainfall; snowfall; farmers

## Climate Change and Earthquake Effects to Natural Springs of the Melamchi Watershed of Nepal Himalayas

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### Abstract

The Middle Hill is one of the three geographical regions of Nepal where climate change effect on water resources has been so severe. Natural springs and the small rivers are the major sources of water for drinking, livestock, irrigation and other purposes at there. Melamchi watershed lies in the north eastern part of Nepal from where the river water is piping to Kathmandu city for the purpose of drinking. The recent study shows that temperature in this region has increased by about 1.2 degree C in last 30 years and draught frequency has also increased. The detail GPS survey of springs has been conducted in March-April 2016 with respect to spring types, location, ownership, purpose of water utilization, changing water volume, management practices and effects of April 2015 earth quake in Nepal. The analysis shows that 70 percent of the springs are used for multiple purposes such as drinking, livestock, irrigation and cleaning at households. The remaining spring's water is used for either drinking or for livestock or irrigation. It is critical that the water volume of about 30 percent springs have decreased with in last decade. Out of such water decreasing springs, 37 percent springs' water has decreased by 50 percent and above within last decade. Importantly, the 2015 April earthquake has severely affected the springs and 13 percent springs have been dried after the earthquake that has increasing time distance and workload to women as women are the primarily responsible for managing water for drinking, livestock and cleaning at household.

### Key words:

climate change; water resource; springs; Melamchi watershed; water utilization; 2015 earthquake effect.

## Coverage Changes of Forest and Grassland of Transitional Areas of Farming and Pasturing in Northeast Qinghai-Tibet Plateau during Qing Dynasty

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### Abstract

Yellow River-Huangshui River Valley where located in the Northeast of Qinghai-Tibet Plateau is a typical farming-pastoral area. Since the Qing Dynasty, the expansion of cultivated land have led to the obvious changes of forest and grassland coverage. This study, which is based on reconstruction of original forest and grassland structure and combines with the rebuilt results of farmland changes in Qing Dynasty, calculates the coverage changes of forest and grassland in YHV by historical literature data and representing historical scene. The results show that the boundary of the natural vegetation distribution today is consistent with the boundary before the farmland expansion of Qing Dynasty. The range of forest was slightly larger, the continuity of the brushwood was more obvious on the space and the distribution of grassland was wider than early years of Qing Dynasty. It estimated the areas of forestland, brushwood and grassland were  $0.28 \times 10^4 \text{ km}^2$ ,  $0.93 \times 10^4 \text{ km}^2$ ,  $2.1618 \times 10^4 \text{ km}^2$  before reclamation activities in Qing Dynasty and have decreased by  $441.31 \text{ km}^2$ ,  $1330.35 \text{ km}^2$ ,  $5180.41 \text{ km}^2$  because of serious farmland reclamation activities at the end of Qing Dynasty. The grassland was occupied the largest (52% of potential grid of grassland was occupied for cultivated cropland) and deepest (the average reclamation area of grid for grassland was  $0.1 \text{ km}^2$ ) area among them. The differences of original plant cover types that have been reclaimed by human being in YHV in Qing Dynasty not only influenced by natural environment factors but also affected by social policies.

### Key words:

Qinghai-Tibet Plateau; Yellow River-Huangshui River Valley; transitional areas of farming and pasturing; coverage changes of forest and grassland

## Current State and Changes of Glaciers in the Tavan Bogd Mountains (Mongolia)

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### Abstract

Current state and dynamics of main glaciers on the eastern slopes of the Tavan Bogd mountain massif is investigated on the basis of results obtained in 2013 field survey with use of remote sensing as well. According to our estimates, areas of these glaciers did not significantly changed since 1989 however a certain regression of the glacier tongues had been fixed. Ablation-accumulation value amounts to 110g/cm<sup>2</sup> at mean summer temperature on the equilibrium line of 1°C

This study is the first stage of detailed investigation of large glaciers located in the Tavan-Bogd Mountains. The main task of this work is to estimate a current state and dynamics of glaciers and to update glacier and rock-glacier inventory. Basing on results of 2013 field survey together with remote sensing data the main glaciers located on eastern slopes of the Tavan Bogd mountain massif in the Tsagan-Us and Tsagan-Gol river basins are described (these glaciers are Potanin, Alexandra, Grane, Kozlov, and Krylov ones). In order to monitor regime of glacier systems the geodetic survey of glaciers and rock-glacier edges was carried out using Trimble GNSS system and the ranging mark system. The Landsat satellite images made taken in August-September of 1989, 2006, and 2013, their spatial resolution 15-30 m, were used to map areas of debris-free glaciers and to estimate the glacier changes between 1989 and 2013.

Pictures were taken from the USGS site, the ArcGIS software was used for this work. In addition, the high-resolution satellite pictures with resolution of 0.5-2.5 m made at the end of the ablation season if 2008 (CARTOSAT-1) and 2010 (Geoeye-1 and SPOT-5) were also used to analyze current conditions and changes of the above glaciers and to improve visual estimation of the Landsat imagery. In 2013, the study included 26 glaciers with the debris-free glacier area of 67 km<sup>2</sup> in the Tsagan-Gol river basin and 37 glaciers with area of 30 km<sup>2</sup> in the Tsagan-Us river basin. According to our estimates, areas of these glaciers did not significantly changed since 1989 however a certain regression of the glacier tongues had been fixed.

The Kozlov glacier retreated with average rate of 21 m/year between 2001 and 2013. Retreat of the Potanin glacier was slower and between 1989 and 2001 the average rate was equal to 5 m/year, but between 2001 and 2013 it became more active and its average rate reached 24 m/year. One of the largest rock-glacier of the Tavan Bogd Mountains was found in the Tsagan-Us valley on its south-eastern slope, its area was estimated 1.2 km<sup>2</sup>, length -3 km, steep front height -20-25 m. Indirect indicators of its activity such as transverse and longitudinal furrows were noticed. Using data of

local weather station data we calculated some climatic characteristics needed to monitor equilibrium line for end of the 2013 ablation season. Mean summer temperature on the weighted mean equilibrium line of five glaciers (3250 m a.s.l.) was defined as 1.0 °C. Ablation-accumulation value was estimated 110 g/cm<sup>2</sup> and the mean annual snowfall on the equilibrium line as 785 mm.

**Key words:**

Glaciers; USGS site; the ArcGIS; Ablation-accumulation; monitor; Tavan-Bogd Mountains; these glaciers are Potanin; Alexandra; Grane; Kozlov; and Krylov

## GIMMS NDVI-based Vegetation Changes in the Korean Peninsula from 1982 to 2012

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### Abstract

Study on Normalized difference vegetation index (NDVI) change is one of the important steps for understanding vegetation growing conditions and regulating the terrestrial carbon cycle and the climate system. In this paper, using the maximum synthesis method, mean method, slope analysis, based on the GIMMS NDVI of Korea Peninsular region during 1982 – 2012, we analyzed the spatiotemporal changes in the region. The results have showed that:(1) The spatial distribution pattern of cumulative average of NDVI from 1982 to 2012 presented a gradual decrease from the southeast to northwest in Korea Peninsular, a decrease from the east to west is obvious. (2) The vegetation growing season on the Korean peninsula had been assessed as from April to October by using the three points smoothing method. (3) From 1982 to 1991 and from 1992 to 2002, the average annual NDVI changes for the growing season have the trends of increase. But its change from 2003 to 2012 is not obvious. Although the average annual NDVI change from 1982 to 1991 has the trend of increase, but its change during 1982 - 1988 has a trend of obvious decrease. (4) From the slope analysis, over the past 31 years, the slope of vegetation changes in Korea peninsular has obvious regional difference. It has obvious increase trend in the south area of the peninsular, but it has decrease trend in north area of the peninsular.

### Key words:

GIMMS NDVI; Vegetation change; Korea peninsular

## Habitat Loss Assessment of the Key Species from 1992 to 2010 in Koshi River Basin, Central Himalaya

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### Abstract

Koshi River Basin is one of the areas with great abundance in species diversity in the world because of its great landscape heterogeneity. Land use is very important factor for the biodiversity stability. The existing materials of vegetation, animal, ecology and geography were collected, coordinated and analysed. Maxent model was chosen to simulate the potential habitat of the key species in Koshi River Basin. The environmental layers "Bioclimatic Variables" supplied by World Climate Project were used in the predicting procedures. We take the land cover data as one of the environment layers for the habitat estimation. The research area include the entire KRB (including China, Nepal and India three countries), the main data sources are 1992 and 2010 land cover data in KRB. The overall accuracy of the model was high, implying that the Maxent-derived distributions were a close approximation of the distribution probability that represents the reality. Comparing the distribution data of the keys species in 1992 and 2010, we found that for all of the key species we selected in this research work, their habitat changed a lot during these years. If we look from the decrease rate, the habitat of *Alcimandra cathcartii* is most serious, it decreased almost 15%. And the habitat area of *Pseudois nayaur* also decreased 11%. Similarly, the habitat of *Panaxpsqudo ginseng* is most stable, only decreased 2%. As for the area changed most, the habitat area of *Pseudois nayaur* and *Tetraogallus tibetanus* decreased 475km<sup>2</sup> and 335km<sup>2</sup> separately. *Trillium govianum*'s habitat only decreased 1.78 km<sup>2</sup>.

### Key words:

Maxtent model; Koshi River Basin; Land use; Habitat; Key species

## **Investigation and Estimating the Storage of Glacial Lakes Based On Remote Sensing Data in Western China**

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### **Abstract**

A large amount of meltwater was retained as glacier meltwater continuously flows into glacial lake, which resulted in lake area expansion and water level rising. This has motivated the development of empirical relationships to predict lake volume given a measurement of lake surface area obtained from satellite imagery and analyzed the meltwater retention effect by computing the increment volume of glacier-fed lake based on Landsat TM/ETM<sup>+</sup>/OLI imagery and SRTM DEM, aerial survey topographical map and field surveyed data. The results through research show that the total meltwater storage of glacial lakes is  $9.26 \pm 0.05 \times 10^9$  m<sup>3</sup> around the year 2013 in glaciated zone, and during the past 23 years, the lake storage has expanded at an average rate of 17.9 % or 0.78 %/a. Furthermore, glacial lake volume of various types, drainage basin, elevation and mountain was calculated and heterogeneity of lake storage distribution and changes and its controlling factors were discussed in this paper. Discrepant water storage expansion of different types of glacial lake implies contrasting signals of climate change in western China. Ice-contacting lakes characterized by the fast expansion rate (1.57 %/a) depicts accelerated glacier shrinkage caused by climate warming. Non-glacier-fed lakes expansion at the rate of 0.54 %/a reflect an apparent increase of precipitation western China.

### **Key Words:**

glacial lakes; lake storage; remote sensing data; western China

## Land-Cover Structure Changes Due to Recreational Development on Lake Baikal

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### Abstract

Land-cover structure of Lake Baikal surrounding landscapes varies in depend on local climate, relief, geological structure, human activity. Also recreational development has a significant impact on the landscapes. The number of tourists in the Baikal region has increased during the last 10-15 years. The aim of this research is investigation the land-cover structure of study areas and its changes. We analyzed three study areas which are located in different parts of Lake Baikal (on the east-northern – “Khakusy”, 69.1 km<sup>2</sup>; the western – “Kurkutskiy bay”, 19.9 km<sup>2</sup>; and southern shore – part of Khamar-Daban range, 125.3 km<sup>2</sup>) and exposed to different degree of impact. For these areas the land-cover maps were compiled using landscape approach, and the information about land use was analyzed. We used the following data: fieldwork, DEM, and remote sensing. Fieldworks were conducted in summer seasons from 2010 to 2015 years. The study shows different degree of changing in land-cover structure on the study areas. In the “Khakusy” area new recreational facilities were constructed on narrow coastal area and around hot springs. It was observed that lichen cover (*Cladonia* spp.) was trampled in surrounding landscapes. The study area “Kurkutskiy bay” is affected by land cover change due to tourism and urbanization, for example, loss of plant biomass can have a dramatic effect on hydrological functions, with consequential erosion in a whole mosaic of habitats. The transformed area has increased by 6.3%. Forest cutting and mountain tourism development are main reasons of land-cover changing in the Khamar-Daban study area.

### Key words:

Land-cover structure; Lake Baikal; landscape approach; recreation development

## Present State and Dynamics of Glacio-Nival Systems of Tavan Boghd Mountain Massif (Altai Mountains).

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### Abstract

Saint-Petersburg geographers study glaciation of the northern slope of Tavan Boghd since 1999. According to the results of in situ observations of 2015 and delineation of satellite imagery in 2015 the glaciation there was represented by 13 glaciers with total area 21.66 km<sup>2</sup>. Slope glaciers prevail, there are also 2 valley glaciers with area 4.77 (№10) and 3.32 km<sup>2</sup> (№13). Generally the rate of degradation of the glaciers decreases. In 2009-2015 the total area of the glaciers lost 0.6%, consequently about 0.1% per year, in 2002-2009 the total glaciations area lost 9% (1.3% per year). Slowing down of glacial retreat can be explained by the growth of snow accumulation observed in the area of research since 2009. Increase of snow accumulation leads to intermittence of uncovering of high altitude ice divides and rocks and decrease of melting of glacial termini. The valley glaciers behave in a different way. The rate of retreat for glacier №13 increased from 15.3 m/year in 2006-2009 to 22.3 m/year in 2009-2015. Glacier №10 in 2009-2015 rapidly retreated (248 m, 41.3 m/year), in 2006-2009 the retreat was much slower (7.5 m, 2.5/year). This can be explained by the local morphology of subglacial relief: the glacial snout withdrew to a steep rock-bar, it cut off the former marginal part of the glacier which partly deraded, partly became debris-covered. At the same time relatively large valley glaciers are more inert and react slower on the increase of snow accumulation.

### Key words:

Glaciers; dynamics; monitoring; in-situ observations; retreat; Altai

## **Socio-Economic Analysis of Land use Land Cover Change: A Geo-spatial study of Hangrang Valley, Himachal Pradesh**

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### **Abstract**

Land use/land cover (LULC) although words very frequently used interchangeably signifies two different aspects, land cover says how much of a region is covered by forests, wetlands, impervious surfaces, agriculture and water while Land use shows how people use it for socio-economic activity. They have a significant role to play in the socio-economic development of any region. The paper deals with relationship between land-use/cover change and its socio-economic impact in Hangrang Valley, Himachal Himalaya. Unlike other cold deserts Hangrang has vegetation's cover around the villages which is the major resource of the region and the source of livelihood to the people. Land use/cover changes in the past few decades have bearing on the socio-economic pattern of the valley dwellers. The snow cover is only source of fresh water which provides water for drinking purposes and also for irrigation but the study revealed that snow cover has been decreasing. Here Geo-Spatial tools in the form of remote sensing, GIS software, ERDAS Imagine 14 and Arc-GIS 10.1 have been effectively used to analyze LULC. The assessment of land use/cover change was performed using Land-sat TM/ETM images of the year 1990 and 2015. Both supervised and unsupervised classification was to classify images. Land use cover change matrix was prepared to know the shift of land from one to other uses. Normalised Difference Vegetation Index (NDVI) and Normalised Difference Snow Index (NDSI) were used to demarcate vegetation and snow area for the same period. The study revealed that the area of snow cover has been decreasing and on the other hand agricultural land or horticulture activities are on increase in last few decades. Increase in horticulture activities providing more economic activity to remote village dwellers primarily in the form of Apple, Pea, and Almond cultivation.

### **Key words:**

Snow cover; Vegetation; LULCC; Socio-economic; Livelihood; geo-spatial tools; fragile ecosystem.

## Spatial-temporal Dynamics of Cultivated Land in Recent 35 Years in the Lhasa River Basin of Tibet

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### Abstract

Based on satellite remote-sensing images of 1976, 1988, 2006 and 2011, and DEM data with a resolution of 30 meters, the spatial-temporal dynamics of cultivated land in recent 35 years in the Lhasa river basin of Tibet has been analyzed with GIS and statistic methods. The results show that: (1) between 1976 and 2011 cultivated land increased from  $5.63 \times 10^4$  hm<sup>2</sup> to  $6.56 \times 10^4$  hm<sup>2</sup>, and its proportion to the total area of the Lhasa river basin increased from 1.71% to 2.00%. The process of cultivated land expansion within 35 years can be divided into three periods with slow (1976-1988), fast (1988-2006) and radical (2006-2011) increasing, and the average annual increasing rates are respectively 0.09%, 0.59%, and 0.86%. The increased cultivated land is mainly from grassland, and the decreased mostly resultant from construction land expansion. (2) From downstream to upstream in the Lhasa river basin, there is a decreasing level of cultivated land contagion, and the cultivated land in Lhasa city has the highest but fastest declining contagion. The spatial dynamics in cultivated land has been on the trend of increasing in middle reaches and decreasing in lower reaches. Maizhokunggar County which is located in middle reaches owns the highest relative changing rate, and thus with maximum regional difference. (3) Cultivated land expansion has been reaching to higher altitude and greater slope, of which 4000~4200 m and 5°~10° slope have the most net gain in area of cultivated land.

### Keywords:

cultivated land; spatial-temporal dynamics; landform factors; Lhasa river basin

## Temperature Dependence of Variations in the End of the Growing Season from 1982 to 2012 on the Qinghai–Tibetan Plateau

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### Abstract

A growing number of studies have focused on variations in vegetation phenology and their correlations with climatic factors. However, there has been little research on changes in spatial heterogeneity with respect to the end of the growing season (EGS) and on responses to climate change for alpine vegetation on the Qinghai–Tibetan Plateau (QTP). In this study, the satellite-derived normalized difference vegetation index (NDVI) and the meteorological record from 1982 to 2012 were used to characterize the spatial pattern of variations in the EGS and their relationship to temperature and precipitation on the QTP. Over the entire study period, the EGS displayed no statistically significant trend; however, there was a strong spatial heterogeneity throughout the plateau. Those areas showing a delaying trend in the EGS were mainly distributed in the eastern part of the plateau, whereas those showing an advancing trend were mostly scattered throughout the western part. Our results also showed that change in the vegetation EGS was more closely correlated with air temperature than with precipitation. Nonetheless, the temperature sensitivity of the vegetation EGS became lower as aridity increased, suggesting that precipitation is an important regulator of the response of the vegetation EGS to climate warming. These results indicate spatial differences in key environmental influences on the vegetation EGS that must be taken into account in current phenological models, which are largely driven by temperature. (This paper had been published in *GIScience & remote sensing* (2016))

### Key words:

End of the growing season (EGS); Spatial-temporal variation; climate change; GIMMS-3g NDVI; Qinghai-Tibetan Plateau (QTP)

## The Dynamic Response of Lakes in the Tuohepingco Basin of the Tibetan Plateau to Climate Change

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### Abstract

The Tibetan Plateau (TP) is particularly sensitive to the influences of climate change. As the indicators of climate change, lakes on the TP play a key role in the earth's climatic system. Lake Yazi (LY), Lake Tuohepingco (LT) and Lake Changtiao (LC) in the Tuohepingco Basin are three inland lakes on the plateau. Using object-based image analysis for remote sensing and 22 images from the Landsat satellites (from September to December between 1972 and 2015), the extents of LY, LT and LC were obtained. The inter-annual changes in the extent of LY, LT and LC were then analyzed. The results show that the total area of the three lakes changed from shrinkage to expansion during the 1972 to 2015 period. In general, there was a trend towards shrinkage during 1972 to 1999, distinct expansion during 2000 to 2007 and slight expansion during 2008 to 2015. Moreover, we found that 14 other lakes have also expanded dramatically since 2000. Some lakes at 30°N and 35°N (LY, LT and LC are also located in this region) exhibited the same dramatic expansion period between 2000 and 2005. In other words, 2000 appears to be a critical transition point for changes to lake size on the Tibetan Plateau. Although increased precipitation, decreased lake evapotranspiration, caused by climate change contributed to the expansion of lakes to a certain level, the growth of lakes in the Tuohepingco Basin is primarily due to warming-triggered deglaciation on the plateau. Given the importance of wetlands to human society, these are no trivial issues and we now need accelerated research based on long-term and continuous remote sensing.

### Keywords:

Tibetan Plateau; Lake Tuohepingco; climate change; lake expansion; dramatic expansion period

## The Review about ABM/LUCC

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### Abstract

Land use and land cover change is not only the main cause to the global environment change and also the main content to the global change research. with the rapid development of the computer science, using computer technology to analyze and simulate the practical issue has become more and more extensive. ABM (Agent-based Model) is widely used in studying the LUCC in recent years, the paper introduces the background of the proposal and basic concept about ABM/LUCC and employs Citespace software to map the research front about the ABM/LUCC by using the "ABM" and "LUCC" as research word. We analyse the main application about this model and try to find the research hotspot by using Citespace software. So we think it does help to our research about ABM/LUCC.

### Key words:

LUCC; ABM; Citespace

## An Integrative Investigation of the Causation for Pre-historical Catastrophes in the Lajia Ruins, Qinghai Province

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### Abstract

Archaeological excavations have exposed a shocking picture of the prehistorical calamities in the Lajia Ruins in the Guanting Basin along the Yellow River. The destruction reasons has been a hot and focus issue in recent years. Geological records of the major disasters in relation to the devastation of this prehistorical settlement were investigated by detailed field observations, sedimentological analysis, Quaternary Geology, Geomorphology and Palaeoflood hydrological analysis. More importantly, we made a comparative study of the conglomerated red clay, the gully deposit at the foot of the Great Red Hills where the Ganggou gullies emerge onto the Guanting Basin, and the palaeoflood slackwater deposits of the Yellow River in the barrier lake in the Jishixia. The results show that at ca. 3950 a BP, immediately followed by a major earthquake, the settlement was overtaken by immense mudflows coming along the tributary gullies from the hillsides behind. The enormous mudflows suddenly buried and destroyed the dwellings, which led to the prehistorical calamities in the Lajia Ruins. These results are of important implications in understanding the prehistorical environmental change in the environmentally sensitive zones over the world. It has very important reference value for the further studying of man-land relationship. (Foundation: National Nature Science Foundation of China, No.41261010, No.41271123)

### Keywords:

guanting basin; lajia ruins; prehistorical catastrophes; earthquake; mudflow

## Determination of the Temperature Effect on the Structure of Landscapes near Lake Baikal with using the NOAA Data: First Results

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### Abstract

Scientifically Lake Baikal is a very interesting object for investigation of environment and landscape structure due to special geological peculiarities (the rift zone) and climate. Model area “Khakusy” (69, 1 km<sup>2</sup>) is located on the east-northern shore of the Lake Baikal. For the area is characterized by presence of powerful hot mineral springs (40 dm<sup>3</sup>/s). The purpose of the study is determination of temperature effect impact on the shore area. The temperature effect on the landscape structure consists of several factors: main of them are general climate conditions and influence of water mass of the Lake Baikal. We tried to find the ratio of these factors for 23 landscape types identified on the landscape map of model area (1:50 000). The landscapes of this area are mainly represented by light coniferous forests. Dark coniferous forest occupies restricted territory. For GIS analysis we used remote sensing data (brightness temperature, DEM), which was verified by fieldwork investigation. Swamped areas are found near the river mouths. To consider of the temperature effect we estimated brightness temperature from the average nighttime winter NOAA data images (1996-2006). According to primary results the temperature is almost unchanged (by 0.8 K) in river valleys (on the distance 5 km). Near the hot mineral springs the brightness temperature 247.5 K. For instance, in the same landform and distance from shore of Lake Baikal like hot mineral springs the brightness temperature is 0,2 K.

### Key words:

Temperature effect; landscape structure; remote measurements; NOAA data images

## Farmers' Perception to Farmland Conversion: A Questionnaire Survey in Xining City, Qinghai Province, China

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### Abstract

China is experiencing a fast process of farmland conversion which is conducted mainly by local governments to fuel economic development. Social tension is aroused and policy makers take great concerns on coordinating interests among different stake-holders, especially for increasing farmers' interest. The purpose of this study is to get some insights related to land acquisition institution by exploring farmers' perception to farmland conversion. Participatory Rural Appraisal (PRA) was applied for the investigation in peri-urban area, of Xining City, Qinghai Province, China. The total of 519 householders from 15 villages completed valid questionnaire survey from July to November, 2012. The results indicate that farmland conversion has several impacts on farmers' life. Most farmers are gradually adapting to city life. Higher living expenses and more income are perceived by farmers with average score of 4.21 and 2.69, respectively. The average scores of 2.38 and 2.46 are for improvement of life security and more job opportunities. Farmers expect to get some stable ways of compensation in addition to lump-sum compensation in cash. Stable subsidies every year and obtaining same number of land received strong proposal. And these two options are cited by 49.6% and 43.9% of respondents. Farmland conversion brings about cleaner living condition and more amenities, but lower air visibility and drier air. Results reflect landless farmers' economic and life pressures and various demands. Local government should pay more attention to increase farmers' income and improve rural security system.

### Key words:

farmland conversion; farmers' perception; questionnaire survey; Xining City

## Features of the Radiation Regime of the North Caucasus According to the Result in-situ measurements during winter 2016

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### Abstract

Mosaic structure of the underlying surface in major mountain systems such as the Caucasus, determines the characteristics of the radiation fluxes and, as a consequence, forms a sophisticated mode of the whole complex of meteorological elements. In this regard, the quality of weather forecasts of global and even mesoscale models in mountainous areas is often unsatisfactory. Modern complex studies of the radiation regime in the Caucasus and the factors that determine it are quite rare, especially for winter season. So the main goal of the expedition was to obtain rather unique data about the distribution of radiation fluxes and the properties of aerosols in various contrasting geographical conditions of the North Caucasus.

In order to achieve the stated goal, three measuring complexes have been deployed: 870 m (Kislovodsk), 2070 m (IAP RAS Kislovodsk high-mountain scientific station) and 3500 m (Mount Elbrus). At each point, regular measurements of shortwave and longwave radiation, aerosol optical thickness, moisture content, UV radiation, air temperature, atmospheric pressure, integral and surface ozone concentration were carried out.

As a result of the conducted research, the altitude dependence of the aerosol optical thickness and radiation characteristics, as well as regional characteristics of the radiation regime were revealed. The measured values of aerosol optical thickness and the integral ozone concentration were compared with the data obtained by satellite remote sensing and aerosol climatology [2, 4]. A relatively new effective CLIRAD (FC05)-SW [3] radiation code, the radiation block [1] of the COSMO-Ru1 model and CFSv2, NCEP/NCAR, FNL, ERA-Interim reanalysis were tested against the measured values.

The reported study was partly funded by RFBR (research project № 16-05-00985a).

### Key words:

Mountains meteorology; Radiation transfer; aerosol climatology; COSMO-Ru model; reanalysis

## Impact of Mosses on Water Flux in an Alpine Shrub Site in the Qilian Mountains of China

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### Abstract

With a warming climate, cold regions ecosystems undergo significant ecological changes including the spread of canopy-forming shrubs into tundra communities (termed as *shrubification*) over past decades. Based on field and laboratory experiments from July to September, 2012, taken the typical mosses under alpine shrubs in Qilian Mountains as test objects, Controls of mosses on water fluxes were investigated and analyzed. The results indicated that mosses under alpine shrub had a strong water holding capacity, and can reduce evaporation flux. The maximum water holding capacity per unit area of mosses under shrubs varied from 13 790 g•m<sup>-2</sup> to 18 980 g / m<sup>2</sup>. The mosses could absorb water that exceeds its own weight from 386.94 % to 782.51 % times. Water holding capacity increased with time immersed in water in laboratory experiment, and the relationship between water holding capacity and time immersed in water could be fitted with logarithmical curve. Water absorption rates of mosses under all shrubs decreased according to power function curve with time immersed in water. Compared to the control experiment, remove the green moss layer increased evapotranspiration by 29% in shrub ecosystem in Qilian Mountains during from July to September, 2012. The effects canopy cover on evapotranspiration moss layer is not significant. The most of the water vapor came from the evaporator of organic layers under mosses. Controls of mosses on water fluxes may influence the soil temperature and water moisture in seasonal frozen soil in alpine regions.

### Key words:

Alpine shrub; Mosses; Qilian Mountains; water fluxes; Seasonal frost soil

## Isotopic Content of the Snow-firn Thickness and Meltwater in the Tavan-Bogd Mountain Massif.

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### Abstract

The isotope-geochemical research was carried out in the different parts of the Tavan Bogd mountain massif during the SPbSU expeditions. This massif is located on the border between Russia, Mongolia and China. Field work was carried out in Mongolia in 2013 and 2014 and in Russia in 2015.

The task was to obtain the isotopic characteristics (deuterium and  $^{18}\text{O}$  concentrations) in different parts of glacio-nival systems. The main objects of the research were: precipitations, glacier runoff and snow-firn thickness. More than 300 samples had been collected during 3 years.

The average melting water  $d^{18}\text{O}$  in Mongolian part of the massif was  $-17,3\text{‰}$ . The analysis of the water samples showed, that the isotopic content of Tsagan-Us river water didn't change along 30 km from the edge of the glacier. In river water from Russian part of the massif isotopic content is different.

Stable isotope records in snow and firn may present information about accumulation and about the origin of precipitations. For this kind of research the samples were collected from 4 snow-pits at different altitudes.

The fluctuations of water stable-isotope records partly show preserved seasonal variations. Therefore, it is possible to establish annual accumulation and the main precipitation source. Annual accumulation in Russian and Mongolian parts of the massif is different.

The autumn snowfalls take the biggest part in the accumulation and main source of precipitation is Inner Asia. At this moment the further analysis of the collected samples is in process.

### Key words:

Glaciers; Isotopes; Inner Asia; Accumulation; Meltwater

## Recent Glacial Fluctuations and Control of Non-Climatic & Climatic Parameters in Sikkim Himalaya

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### Abstract

Glaciers being one of the highly sensitive indicators of climate change, produce a huge repository of landforms which can be used as proxy data source to assess magnitude and frequency of the processes over time and space. We assessed 26 glaciers based on geospatial data sets (1975 to 2014) and several field visits to the glaciers in the Sikkim Himalaya. In addition, we present an assessment of climatic parameters from 1957 to 2005, along with non-climatic parameters on glacial terminus behavior. On an average, glaciers retreated at  $6.89 \text{ m yr}^{-1}$  from 1975 to 2014 which is lower than other parts of the Himalaya as reported. Contrary to this, annual average temperature decreased ( $-0.24 \text{ }^{\circ}\text{C}$ ) and precipitation increased ( $19.79 \text{ mm}$ ) during 1957-2005. Only two glaciers retreated continuously for the entire assessment period. At the same time, 15 glaciers remained stationary, and 11 glaciers retreated with varied rates. Temporally, the average rate of retreat increased from  $6.60 \text{ m yr}^{-1}$  (1975-1988) to  $10.86 \text{ m yr}^{-1}$  (2000-2005), which further reduced drastically to  $1.47 \text{ m yr}^{-1}$  during 2005-2009. It is followed by an increased average rate of retreat  $7.66 \text{ m yr}^{-1}$  between 2009 and 2014. Dissimilar patterns of glacial retreat for the entire Sikkim Himalaya, and within 10 km wide buffer zones, in particular, suggest a weak control of general climate on glacial fluctuations. Moreover, non-climatic parameters have shown a strong control on glacier fluctuations as the glaciers with glacial lakes, glaciers with simple form, glaciers with snout aspect to E, SW, and ES and glaciers with a length below 7 km show a higher rates of retreat than the others. In the Sikkim Himalaya, altitudinal variation with assumed normal lapse rate of temperature and the line of zero temperature (3990 m asl) make glacial processes and the response to climatic variation different. It implies that glaciers of this region cannot be concluded directly as the one's in retreat with reference to recent general climatic variations and glacier trends, without ascertaining response time of individual glacier in such a dynamic environment.

### Key words:

Sikkim Himalaya; glaciers; non-climatic factors; climate change; lapse rate.

## Reconstruction of Land Use Pattern of Typical Areas of Farming and Pasturing in Qinghai-Tibet Plateau during Qing Dynasty

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### Abstract

Yellow River-Huangshui River Vally where located in the Northeast edge of Qinghai-Tibet Plateau is a typical farming- pastoral region, due to its special geographical location, the expansion of cropland is affected by natural conditions constraint, because of large-scale immigration and Farming frontiers policy in Ming and Qing Dynasties, land use pattern has undergone major changes. By collecting the data of cropland, grassland, forestland in this region of the Qing Dynasty and representing historical scence, it reconstructed the area and spatial pattern change of cropland, grassland and forestland at five time sections during Qing Dynasty.The results show that: (1) The basic pattern of land use in Yellow River-Huangshui River Vally in the early Qing Dynasty is: area of cropland is 1426.68km<sup>2</sup>, forestland area is about 2752.75km<sup>2</sup>, area of grassland is about 2.168 × 10<sup>4</sup>km<sup>2</sup>, area of brushwood is about 9182.15km<sup>2</sup>. (2) Land Use Pattern of Yellow River-Huangshui River Vally has significant volatility during Qing Dynasty, cropland experienced four stages that wasteland reclamation stage, abandoned stage, reclamation stage and the stage of abandoning cultivation again. There are two significant increasing stages of cropland, simultaneously forestland and grassland has significant decreasing trend, the increased cropland mainly focused on reclamation grassland. (3) The changes of Tun, Ke, Qiu, Zhan, Ken land and Fan land are complementary, the relationship of them is as one falls, another rises. It shows that the scale of the cropland have tended to the limitation of reclamation in Yellow River-Huangshui River Vally during Qing Dynasty.

### Key words:

Qinghai-Tibet Plateau; Transitional Areas of Farming and Pasturing; land use Pattern

## Some Research Results of the Climate and Glaciations of the Mongol-Altai mountains (case study of Tavan Bogd mountains)

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### Abstract

The mountain massif Tavan Bogd located on the border of Mongolia, Russia and China is a large modern glaciation centre, the watershed between the Arctic Ocean basin and Inner Asia closed drainage area. Still there are few data about the mass balance, modern morphometric features, glacio and hydro-climatic relations of large glaciers in the mongolian part of the region.

In august 2013-2015 Saint-Petersburg State University together with Khovd University carried out the reconnaissance investigations in the Tavan Bogd region and surrounding area.

The main goal of the expedition was to choose the representative glaciological basins for further several years' monitoring of the mass balance, glacio- and hydro-climatological relations, cryogenic forms, to expand sparse dendrochronological net and to make some primary measurements.

Currently the most underinvestigated and difficult to access Kozlov glacier in the Tsagaan-Us basin and Potanin-Alexandra glaciological complex in the Tsagaan Gol basin were chosen as a representative. We made visual estimation of the accumulation and ablation zones of the Kozlov, Alexandra, Grane and Krylov glaciers and several rock glaciers.

We are measuring the tree-ring width using Lintab 6 system with accuracy of 0,01 mm and are planning to estimate the natural factors which influence on tree-ring growth, make reconstructions of the climatic characteristics using meteorological data from the regional weather stations, and also make dendroglaciological and dendrohydrological analysis.

### Key words:

Climate; glaciers; hydro-climate; meteorological station; monitoring

## Variation of Atmospheric Dust over the Past 100 Years Recorded by Visible Dusty Layers of the Kuokuosele Ice Core, Western Tibetan Plateau

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### Abstract

Atmospheric dust plays a significant role on regional and global climate change. However, many uncertainties of their climatic effects exist due to the regional distribution and transportation system. Glaciers distributed in the Tibetan Plateau contain substantial dust deposition which provide an opportunity to reconstruct past continental aridity and atmospheric circulation. Visible dust layers (VDL) show excellent potential on environmental exploration. Additionally, their external appearances benefit researchers acquiring both dating and environmental coding as soon as they get the cores. Retrieved in 2012 from the Muztagh Ata Mts. in the eastern Pamir Plateau, the top 52 m of the Kuokuosele ice core was dating to 1900-2012 with  $\pm 1$  uncertainty via identifying stratigraphic markers of beta activity and counting seasonal cycles of  $\delta^{18}\text{O}$  and VDL. After observed under natural light and floodlight in the cold room by three independent researchers, two indicators level ( $L_{VDL}$ ) and thickness ratio ( $R_{VDL}$ ) of visible dust layers were examined and calculated. The ice core contained 181 visible dust layers and can be classified to five different levels. Moreover, five-year average of  $R_{VDL}$  showed a decreasing trend, and illustrated vivid low values in 1900-1915, 1920-1930, 1990-2010 and high values in 1915-1920. Meanwhile, the comparison with  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  suggested that arid areas of central Asia and northern Tibetan Plateau could be the sources of dust deposition. Increasing precipitation in the possible sources and the local region caused by the strength of Westerlies might be related to this trend, and decreasing wind speeds in the past cannot be ignored.

This paper has been accepted by Chinese Science Bulletin.

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### Key words:

Kuokuosele ice core; visible dusty layers;  $\text{Ca}^{2+}$ ;  $\text{SO}_4^{2-}$ ; atmospheric dust

## C12.08 Dynamics of Economic Spaces

### Rethinking the Dynamics of Economic Spaces: New Themes, New Ideas, and New Approaches



Home

#### Oral

1. [A Beer Index for International Food Security? A Stochastic Actor-based Modelling of Network Evolutions](#)  
Tiffany Tsui (Wageningen University), Ronald Wall (Erasmus University, Netherlands)
2. [Analysis of Cyberspace Construction and Dynamic Mechanism of China's Coal Resources Flow](#)  
Xinlin Zhang (School of Geographic Science, Nanjing Normal University, China), Yuan Zhao (Jinling College, Nanjing Normal University, China)
3. [Application of Spatial Econometric Models in Regional Studies](#)  
Cheng Yeqing (Hainan Normal University, China)
4. [Cities and Sisterhood: Building Connections between Kolkata and Kunming](#)  
Pratyusha Basu (University of Texas at El Paso, United States)
5. [Clusters, Industrial Districts and Local Productions Systems; Coincidences, Differences and Implications on Public Policies.](#)  
Rocío Rosales (Metropolitan Autonomous University campus Iztapalapa, Mexico)
6. [Comparative Analysis on Social Network of Korea-invested Enterprises in Jiangsu Province: Implications for Regional Development](#)  
Xu Haiying (Huaiyin Normal University, China)
7. [Competing with the Global Economic Superpowers: Coping Mechanisms of Local Firms in Sub-Saharan Africa](#)  
Tebarek Megento (Addis Ababa University, Ethiopia)
8. [Comprehending The Internal as Well as The Entrance-Exit Dynamics of GPN/GVC: Towards The Typology of Firm'S Repositioning Strategies](#)  
Jiří Blažek (Charles University in Prague, Czech Republic)
9. [Coupling Relationship between Industrial Production Space Change and Industrial Structure Adjustment During the Transformation Period in Pearl River Delta, China](#)  
Jun Ding, Kaiyong Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
10. [Dynamic Diffusion of Technological Knowledge in Agri-industrial Clusters: Evidence from Japan's](#)

## Wine Industry

Takehiko Fujii (The University of Tokyo, Japan)

11. [Economic New Normal and the Performance of Regional Economic Development in China](#)  
Changhong Miao, Wenying Shang, Jingjing Li (Henan University, China)
12. [Exploring The Role of Epistemic Communities as Knowledge Creation and Creativity in Regional Path Creation in Korea](#)  
Jiwon Lee (Seoul National University, South Korea)
13. [Features of The Model "Center-Periphery" In Yakutia: Continuing Transformation of Spatial Structure](#)  
Tuyara Gavrilyeva (North Eastern Federal University, Russian Fed), Nikita Bochkarev (Yakut filial of the Siberian Branch of the Russian Academy of Sciences, Russian Fed)
14. [Geography of International Trade: An Analysis of the Common Market of South 'MERCOSUR'](#)  
Purva Yadav (Jawaharlal Nehru University, India)
15. [Geopolinomic Analysis of Industrial Structural Changes of Countries based on a Multiple-country-sector General-Equilibrium Model](#)  
Hu Min (College of Urban and Environmental Science of Northwest University, China), Zheng Wang (Institute of Policy and Management, Chinese Academy of Sciences, China)
16. [Global Megacity and Urban Restructuring: Jakarta Metropolitan Region under the Global Economic Flows](#)  
Galuh Syahbana Indraprahasta (PAPPIPTEK, Indonesian Institute of Sciences (LIPI), Jakarta 12710, Indonesia), Ben Derudder (SEG, Dept. of Geography, Ghent University, B 9000 Ghent, Belgium)
17. [How Similar Are the Environmental and Income Kuznets Curves? Evidence from China](#)  
Jianming Miao, Shiqiang Hu (Henan University, China)
18. [Industrial Sickness and Its Impact On Economy and Labour Force of West Bengal with Case Study of Haora District](#)  
Sumana Roy (Vidyasagar College, Kolkata, West Bengal, India, India)
19. [Innovation Cooperative Network of Industry, Education and Academy: A Case Study of Zhongguancun Hi-Tech Park](#)  
Lachang lyu, Ru huang (College of Resources Environment and Tourism, Capital Normal University, China)
20. [Interrelations Between Value Chains and The Use of Information and Communication Technologies \(ICT\) in Small-Scale Agriculture: A Producer Perspective](#)

Peter Dannenberg (Institute of Geography, University of Cologne, Germany)

21. [Knowledge Spillover Effects of Regional Innovation Networks in China from The Perspective of Multi Scale: A Case Study of Biotechnology](#)  
Tao Wang, Xiaoyan Huang (School of Geography Science, Nanjing Normal University, China)
22. [Revisiting The Role of Institution in The Evolutionary Economic Geography: State Spatial Selectivity Strategy in The Indonesian Spatial Planning System](#)  
Agung Mahesa Himawan Dorodjatoen, Matthew Tonts (The University of Western Australia, Australia, Australia)
23. [Rural-To-Urban Migration and Skill Upgrading: A Comparative Study Between Suzhou and Taizhou in China](#)  
Huasheng Zhu (Beijing Normal University, China), Fan Xu (Beijing Normal University, China), Maojun Wang (Capital Normal University, China)
24. [Spatial Features of Sale for the Online Retailers and Its Influencing Factors: A Case Study of M-Y Store in Tmall](#)  
Jin wanfu, Zhou chunshan (School of Geography and Planning, Sun Yat sen University, China)
25. [Study of Regional Division of non-agricultural industries and the Coupling Degree with Urbanization: A Case Study of Three Big Geographical Area in Shanxi Province](#)  
Xinxin Zhao (Northwest University, Xi'an, China)
26. [Temporal Evolution of Cultural Industries Diffused Capacity in Xi'an City](#)  
Dongqian Xue, Shaomin Zhao, Beibei Ma, Zhiyong Duan (Shaanxi Normal University, China)
27. [Territorial Dynamics and Drivers of Innovation in Turkish Regions](#)  
Nuri Yavan (Ankara University, Turkey)
28. [The Comparative Analysis About Economic Developing Features of Inland Key Urban Agglomerations of "One Belt One Road"](#)  
Ting Chen, Zhongnuan Chen, Yuxing Huang (South China Normal University, China)
29. [The Dynamics of Petrochemical Enterprises Decline \( I \): Big Petrochemical Enterprises](#)  
Lichun Hou, Zhenshan Lin (College of Geographical Science, Nanjing Normal University, China)
30. [The East Asian Variety of Territorial Planning: Theorising Integration of Economic Planning and Territorial Planning based on S. Korean and Chinese Experiences](#)  
Jung Won Sonn (University College London, United Kingdom)
31. [The Mechanism of Chinese Export Product Cross-boundary Evolution](#)

Yunxiong Li (Peking University, China)

32. [The Progress of Real Estate Transactions by Fukushima Refugees and Land Price Changes after the Great East-Japan Earthquake](#)

Shinya Kawamura (Hokkaido University, Japan)

33. [The Rural Floating Population'S Impact and Relocation in A Changing Climate](#)

Xue Fu (Nanchang University, China), Guixin Wang (Fudan University, China), Yunyuan Yiin (UBA, Canada)

34. [Transition Pathways in Conventional Food Systems: Geographies of Crisis](#)

Christine Tamásy, Oliver Klein (University of Vechta, Germany)

## Poster

1. [An Resilience Exploration Between Regional Economy and Ecological Resilience: Taking Beijing-Tianjin-Hebei Urban Agglomeration as the Case](#)

Chong Peng; Minhang Yuan; Yingzi Lin (China, Huazhong University of Science and Technology)

2. [Division of Housing Price Monitoring System Based on Price's Spatial Segregation:A Case Study in Chongqing Metropolis Core Area](#)

Renhao Yang; Qingyuan Yang; Wen Yin (China, Southwest University)

3. [Firm Heterogeneity and Industrial Agglomeration in Metropolitan Region: Evidence from Beijing-Tianjin-Hebei](#)

Junzhu Zhao (China, Central University of Finance and Economics)

4. [Resource, Location and Economic Development: A Case Study of Resource Curse Effect in Northeast China](#)

Yue Huang; Yangang Fang; Jisheng Liu (China, Northeast Normal University)

5. [Spatial Characteristics and Forming Mechanisms of Retail Businesses in Changchun, China](#)

Feilong HAO; Shijun WANG (China, School of Geographical Sciences, Northeast Normal University)

6. [Study on Economic Convergence of Main Countries Along the Silk Road Economic Belt](#)

Cao Jingjing; Zhang Jinhe; Chen Min (China, Nanjing University)

7. [The Relationship between Road Centrality and Spatial Distribution of Retail Stores in Guangzhou, China](#)

Xiaoxuan Chen; Geng Lin; Yutian Liang (China, School of Geography and Planning, Sun Yat-sen University)

## A Beer Index for International Food Security? A Stochastic Actor-based Modelling of Network Evolutions

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### Abstract

This paper adopts a cross-disciplinary approach combining international economics and network theory to provide a new angle to the understanding of the dynamics of global networks, of how they evolve in interactions with their inherent network structures and with external factors, and how they interact with each other as interdependent networks. A stochastic actor-based modelling framework is used to analyze the dynamic evolution and co-evolution of global networks of trade and investment respectively as aggregated relational networks. The trade network is the global trading relations of beer, which represents a mature business network evolved through a long history, and the investment network is the emerging and dynamic investment relational networks in the food sector. The longitudinal time series data includes the period from 2003 to 2011 and covers the relational ties between the total of 178 world nations.

After controlling for 1) exogenous effects such as the impact of economic development, regionalism and urban growth; 2) endogenous effects such as reciprocity, preferential attachment and local clustering, the statistically significant results confirmed that the presence of trading relations in beer is a strong predictor for development of investment relations in the food sector. The reverse causality tests did not yield robust results. Based on our affirmative findings, we can conclude that the evolution of the mature beer network can be used to indicate the future evolution dynamics of the more volatile food investment network.

### Key words:

Global value chains; international business; dynamic network evolution; stochastic actor-based modelling; trade and investment; international food security; beer industry; urbanization

## Analysis of Cyberspace Construction and Dynamic Mechanism of China's Coal

### Resources Flow

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#### Abstract

The characteristics of coal flow has been attracted more and more attention. Previous studies have focused on space characteristics. In this paper, we combine the characteristics of network and space to analyze the coal flow to reduce the attribute data's information loss using the methods of global spatial autocorrelation and social network analysis and so on, and analyze the dynamic mechanism using spatial econometrics model. (1) Spatial aggregating feature of source regions has increased firstly and then decreased, and showed stable state relatively in the end; That of terminal regions has decreased firstly and then increased. (2) Spatial distribution of terminal and source regions has showed the pattern of gradient distribution on the whole. (3) Network density of coal flow has been low; Shanxi and Hebei have been the core nodes in the network of coal flow; Shanxi、Hebei、Inner Mongolia have been the regions that node strength of coal flow was the strongest; Coal flow from Shanxi to Hebei has been the the main axis of flow network. (4) System of coal flow has showed the characteristics of internal condensation, and each subgroup was not a geographical area; both inside and outside contact of condensing subgroup have been weak relatively, and not formed a stable and interconnected network structure. (5) The influence of the traffic conditions has been the largest for coal flow; the influence of coal production on the source regions has been only next to the traffic condition; Coal demand and industrial structure has been the important driving forces.

#### Keywords

Distribution characteristics; topological structure; dynamic mechanism; coal flow



## Application of Spatial Econometric models in Regional Studies

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### Abstract

With the rapid development of spatial econometrics, spatial theory and econometric models have achieved considerable application in economics to reveal the influence of spatial geographical distribution on economic phenomena. Moreover, the development of GIS provides powerful technical support for the application of spatial econometric model in regional studies of geography, and series of important theoretical and practical achievements have been made. This paper, taking urban-rural development, carbon emission and regional innovation as the examples, discusses the application issues of spatial econometric models such as exploratory spatial data analysis, confirmatory spatial data analysis and spatial panel model, aiming at illuminate the influence of spatial factors on geographical phenomena by spatial weighted matrix, and provide scientifically reference for the application studies of spatial econometric model in geography.

### Key words:

spatial econometric model; application; regional studies

## Cities and Sisterhood: Building Connections between Kolkata and Kunming

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### Abstract

As cities across the world aspire to attract the ‘creative class’ or represent themselves as ‘smart,’ there is also a push to pair cities into so-called sisterhoods. However, within urban studies, the phenomenon of sister cities has attracted less attention, despite its possible theoretical and empirical value to extending the study of comparative urbanism. This paper attempts to reflect on the notion of sister cities based on a case study of Kolkata, India, and Kunming, China. Through a critical content analysis of governmental publications and pronouncements as well as transport and trade reports in India and China, this paper examines two significant aspects of the Kolkata-Kunming relationship. First, it analyzes how sister cities provide an insight into alternative forms of regionalization, enabling escape from the constraints of the national into both sub-national and trans-national realms. One way in which such escapes from the national are plotted is through access to airline connections, and the role of Kolkata and Kunming as global transportation hubs becomes useful to understanding their ability to link with one another. Second, the paper dwells on how the rhetoric of sister cities functions within the context of competition between cities imposed by the need to draw foreign investment. Thus, whether the rhetoric of sister cities translates into actual interactions and exchanges between cities needs to be considered. Overall, this paper seeks to contribute to the study of comparative urban and economic geographies by reflecting on how relationships between cities shape economic and political approaches to globalization.

### Key words:

urban geography; economic geography; regionalization; India; China

## **Clusters, Industrial Districts and Local Productions Systems; Coincidences, Differences and implications on public policies.**

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### **Abstract**

The main objective of this paper is to analyse theoretical coincidences and differences among Clusters, industrial districts and Local production systems, in order to discuss his implications on public policies.

Even though these territorial agglomerations share several coincidences, his different theoretical backgrounds and methodologies have very heterogeneous public policy implications. On relation with that, recent concern on sustainable value chains has created new discussions about economic governance among enterprises on those territorial agglomerations.

On this paper we identify five axes to analyse theoretical differences and public policies implications of the aforementioned territorial agglomerations; concept of space, ontology of economic actors, interrelationship between scales, methodologies and adaptation through sustainable value chains.

### **Key words:**

Cluster; Industrial district; local production systems; economic governance; multi-scalar interrelations; sustainable value chains

## **Comparative Analysis on Social Network of Korea-invested Enterprises in Jiangsu Province: Implications for Regional Development**

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### **Abstract**

This paper analyzes the nature of social network for Korean auto ventures in Jiangsu Province and discusses their implications for coordinated development among regions. We investigated 62 Korea-invested enterprises in Suzhou and Yancheng, based on large-scale questionnaires and face-to-face interviews, and make some comparative analysis between Subei and Sunan. In terms of social network pattern, we found significant differences between two regions. In subei, internal social network of Korean ventures are enclosed and hierarchical, which is not helpful to innovative activities. Moreover, in Subei, there shows unequal strong tie between Korean ventures and local government. Hostile and breakable relationships are harmful for long-term development for two parts. Comparatively speaking, in Sunan, Korean firms have open internal social relation network and relaxed social relationships with local government and other relevant actors. More efforts are still needed to better expand social network, integrating Korean ventures and local economies in Subei.

### **Key words:**

Social network; Korea-invested enterprises; regional coordinated development; Subei and Sunan

## Competing with the Global Economic Superpowers: Coping Mechanisms of Local Firms in Sub-Saharan Africa

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### Abstract

Drawing on insights from social network theory, the socio-economic and cultural dimensions of intra-ethnic business networks are examined for the *Gurage*, an ethnic group in Ethiopia, who have an overwhelming dominance in the footwear industry. This study also examines the extent of Chinese impacts on the footwear industry of Ethiopia. A qualitative approach based on in-depth interviews with owners and/or managers of footwear firms was utilized in order to assess intra-ethnic business networks, while a quantitative approach, based on a cross-sectional survey, was employed to collect background data which is needed to have a clear picture of the network, to assess the impact of Chinese imports on local footwear producers and to identify potential cases for in-depth interviews.

Gurage use ethnic networks to mobilize resources and opportunities, which in turn contributes to their success in the business. In response to the threats of Chinese imports on production activities and social capital /livelihoods of local footwear enterprises, quite a high number of respondents reported that they downsized their business (such as reduction in a firm's work force), stopped business and resorted to other alternatives of getting money such as repair of shoes, petty trading or went back to farming. However, some informants see Chinese imports as both a threat and opportunity for their competitiveness. They underline that they have learnt much from Chinese shoes as they are of superior design and better in quality to local shoes. This resulted in a better position of small and medium enterprises in the value chain in terms of finance, machineries and workshops as well as quality improvement and eventually reputation in the local market.

### Key words:

intra-ethnic business networks; the Gurage; Chinese impacts; footwear industry; Ethiopia

## **Comprehending The Internal as Well as The Entrance-Exit Dynamics of GPN/GVC: Towards the Typology of Firm'S Repositioning Strategies**

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### **Abstract**

This presentation examines various upgrading and downgrading repositioning firm strategies in order to underline the variegated and protean nature of global production networks (GPNs). It is argued that the existing dissonance in the literature over possibilities for functional upgrading can be attributed to the different modes of governance that can exist within a particular GPN and to the diverse nature of functional upgrading. A typology of functional upgrading is outlined, and it is argued that these different types vary significantly according to their probability and potential risk-benefit ratios. The presentation also distinguishes passive, adaptive and strategic downgrading and outlines their potential negative and positive effects on firms. Secondly, presentation points to a fundamental dilemma concerning the evolutionary dynamics of GPNs – the dilemma between their stability and flux. Consequently, borders of GPNs are necessarily permeable to allow the entrance of new suppliers with a superb cost-capability ratio, while discharging suppliers that fail to improve in sufficient time or those suppliers that do not fit the new organizational and management model. Therefore, in order to unravel intensity and key drivers of exit - entrance dynamics as well as the modalities of how the stability-flux dilemma is being addressed in practice, a qualitative, firm-level analysis, has been performed.

### **Key words**

Global production networks; functional upgrading; functional downgrading

## **Coupling Relationship between Industrial Production Space Change and Industrial Structure Adjustment during the Transformation Period in Pearl River Delta, China**

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### **Abstract**

With the rapid process of industrialization and urbanization, the Pearl River Delta (PRD) faces a series of problems and is forced to transform and upgrade due to limited land, rising labour cost and constantly overloaded resource environmental bearing-capacity. Therefore the optimal regulation of industrial production space and the transformation and upgrading of industrial structure have become the urgent and significant task for the sustainable development of PRD. Based on the high resolution Google Earth image, this paper extracts the industrial production space information of PRD in 2007 and 2014, introduces the spatial integrated variation coefficient and structure adjustment index to analyse the change of industrial production space and industrial structure during the transformation period in PRD, and evaluates their coupling coordination degree by using the coupling model. The results illustrate that the industrial production space has an expanding trend from core area to periphery in PRD. The change degree in periphery is larger than that in core area of PRD. Industrial structure of PRD has been constantly optimized during the transformation period, but cities which are in different stages of industrialization development have different adjustment directions. The coupling coordination degree between industrial production space change and industrial structure adjustment in periphery of PRD is higher than that in core area. According to the coupling and coordination value, PRD can be divided into four types which are high coordinating and coupling area, high coordinating and gearing area, medium coordinating and coupling area and low coordinating and separate area.

### **Key words:**

industrial production space; industrial structure adjustment; coupling; Pearl River Delta

## Dynamic Diffusion of Technological Knowledge in Agri-industrial Clusters: Evidence from Japan's Wine Industry

FUJII T

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### Abstract

Many studies about industrial clusters have clarified their static structure and/or interconnectivity among actors there, but dynamism or transformations of clusters have been less focused. This paper focuses the mechanism how competitiveness of individual actors leads to competitiveness of a cluster, and examines the dynamic diffusion of technological knowledge in Japan's Katsunuma, Yamanashi wine cluster which locates 100 km away from Tokyo. Since changes in agri-industry tend to be comparatively slower influenced by crop cycle, terms between 1980' and 2010' have been observed. Katsunuma is the pioneered and leading wine cluster in terms of both quality and quantity in Japan's wine production, and includes wide range of wineries from national enterprise-owned to smaller boutique-scaled, or from traditional co-operative style to new comers from other industries. During the term, the cluster has faced fierce competition against foreign wines which are, in general, better in quality but cheaper in price. Their wine used to be regarded as a poor substitute of foreign ones, but gradually succeeded to obtain the reputation to be competitive in quality by introduction and diffusion of some technologies. The three case studies selected are Sur Lie as oenology, rain protection system as viticulture and Kiiroka (yellow fragrance in English) as both technologies. The results show that (1) national wineries work as technological gatekeepers, (2) technologies tend to be diffused via locally embedded networks and (3) hierarchy of diffusion has become more flexible as local wineries gained their levels of technological knowledge.

### Key words:

Industrial cluster; knowledge diffusion; social network; wine; oenology; viticulture; Japan

## Economic New Normal and the Performance of Regional Economic Development in China

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### Abstract

China has experienced two stages of the planned economy and the transition economy. With the slowdown of economic growth from high speed to medium-high speed, China's development is coming to the new normal stage. This is a severe challenge for any city and region to improve the quality of economic growth, achieve a diversified growth momentum and promote the upgrade of industrial structure. In order to evaluate the performance of economic growth for different regions in the new stage, this paper, based on the five development concepts: innovation, coordination, green development, opening up, and sharing, this paper, construct a integrated assessment model with the four aspects of economic growth speed, structural adjustment, innovation driven and ecological civilization. Although the tertiary industry has developed rapidly in some provinces, the industrial structure is more unreasonable. The gap of the regional innovation capability and the ecological environment is getting large and large. The indexes of economic performance in Chinese 31 provinces shows that: (i) innovation is a new driver to accelerate economic growth; (ii) environmental governance shows the significant positive effect to the total economic scale, but has a negative impact on growth rate; (iii) the traditional industrial structure has become a strict constraint; (iv) government intervention has restricted the economic growth to some extent;(v) 31 provinces could be classified into five policy types: world city, innovation-driven, efficiency-driven, upgrading-structure ,and transformation-revitalization.

### Key words:

new normal stage; regional economy, development performance, China

## Exploring the Role of Epistemic Communities as Knowledge Creation and Creativity in Regional Path Creation in Korea

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### Abstract

Economic space has been changed dynamically. Especially, Declined industrial districts has transformed into creative space. Creative actors have begun to locate in old industrial facilities. Creative class that is new species in the regional ecosystem has been attracted in a certain area. The inflow of creative class contributes to overcome regional economic crisis resiliently while bring a particular artistic and liberal atmosphere to the region, which can be described as path creation in path theory. Creative actors try to share tacit knowledge and develop creativity through informal meetings. Epistemic communities which are one of the informal meetings play a pivotal role in dynamics of knowledge creation and creativity. In this regard, the primary objective of this study is to identify the role of epistemic communities as knowledge platform in a creative ecosystem from the perspective of regional path creation.

### Key words:

epistemic communities; creative class; dynamics of knowledge creation; creativity; path creation; regional resilience

## Features of the Model "Center-Periphery" In Yakutia: Continuing Transformation of Spatial Structure

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### Abstract

The transformation of spatial structure in Russia in the 20th c. had its own peculiarities. The northern regions are different from other regions of Russia on the speed of the process and its intensity. The study is devoted to the transformation of spatial structure in Yakutia and Russia in the 20th - early 21st century. Standard statistical methods were used for analysis, including the calculation of the Theil index. Similar trends and regional features of transformation of spatial structure in Russia and Yakutia were identified. The base includes data of census in Russia in 1897 – 2010, and Soviet statistics. It is proved that the concentration of the rural population in Yakutia was forced and very intense in the 20th c. At the same time, urbanization in Yakutia corresponds the general trend in Russia. Results of the study confirm the findings of the new economic geography. Regional model "center-periphery" has a centripetal character. Yakutsk is the main core of the spatial system of the region. The transformation of spatial structure of region continues, a new spatial equilibrium has not yet been found. Yakutia needs the new spatial structure it can be both decentralized and more concentrated and linear. This task can be solved within the framework of the strategic spatial planning.

### Key words:

urban; rural; settlements; Yakutia; census; transformation; spatial structure; sustainable development

## Geography of International Trade: An Analysis of the Common Market of South 'MERCOSUR'

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### Abstract

Regionalization is a widespread feature of international trade. In Latin America, several efforts were made to create free trade areas at the sub-regional level. One of the most significant initiative is the formation of MERCOSUR by Argentina, Brazil, Paraguay and Uruguay. The origins of MERCOSUR can be traced to the July 1986 agreement between Argentina and Brazil. The MERCOSUR trade bloc's purpose is to allow for free trade between member states, with the ultimate goal of full South American economic integration. MERCOSUR's full members include Argentina, Brazil, Paraguay and Uruguay. The common market of the South 'MERCOSUR' is the largest trading bloc in South America. Yet experts say MERCOSUR has become somewhat paralyzed in recent years. The MERCOSUR economies are different in terms of their economic size, level of development as well as nature of their markets. At the same time, there are other structural and political differences which led to differential pattern of international trade of individual MERCOSUR member economies intra-regionally and inter-regionally. Hence, an attempt is made through this paper to compare volume of trade and commodity composition of export and import among MERCOSUR member countries, and MERCOSUR with the rest of the world, from 1990s onwards. Regression analysis with residual mapping is used to analyze relationship between trade and GDP, also between actual trade flows (trade ratio) and expected trade (ratio of gravity model estimates) flows between individual MERCOSUR partners with the 84 economies of the world. Data is mainly extracted from UNCTAD and World Bank.

### Key words:

International trade; Regionalization; MERCOSUR; Merchandise trade; Gravity model; Regression; Residual mapping

## **Geopolinomic Analysis of Industrial Structural Changes of Countries based on a Multiple-country-sector General-Equilibrium Model**

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### **Abstract**

Based on a multiple-country-sector general-equilibrium model, this paper analyze the development and industrial structural changes of several main countries or regions. Taking geographic interaction into account, the world in this paper is divided into 10 countries and regions, and every country or region has 12 industrial sectors. And this paper also make different investment structures to analyze the changes of industrial structure. The results show that if China strengthen the development of the service sector, the development of China's and global economy will be better. If the USA and Japan strengthen the development of second industry, the economy of them will get bad influence, and this will also be bad to the economy of global economy.

### **Key words:**

general-equilibrium model; international trade; industrial structure; investment structure

## Global Megacity and Urban Restructuring: Jakarta Metropolitan Region under the Global Economic Flows

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### Abstract

It is increasingly inevitable that the current process of urbanisation, including in the developing countries, has been to a larger degree attached to the wider spatial spectrum of economic globalisation. As in the case of Jakarta Metropolitan Region (JMR), foreign direct investment (FDI) has enabled this particular megacity to be globally connected and has therefore reshaped and reorganised its internal spatial-economic landscape. This paper aims to understand the role of FDI and state intervention in making JMR as a global city-region. In doing so, particular attention is devoted to exploring the intra-metropolitan restructuring process prior and subsequent to the advent of 1997-1998 Asian financial crisis and 2007-2008 global financial crisis. The result shows that FDI inflows into JMR have experienced a gradual structural and spatial shift during the past twenty-four years. FDI, coupled with several selective state interventions articulated through mega and capital accumulation projects, has selectively picked certain poles functioning as the superimposing global-national-local obligatory passage point. Consequently, notably after 1997-1998 crisis, JMR has been characterised by the spatial divisions of labour where global service circuits have increasingly concentrated in the central business district (CBD) and, meanwhile, global manufacturing has dispersed towards the smaller cities in the outskirts. Notwithstanding the enactment of regional autonomy in the early 2000s, national state has still played a major role in shaping global places within the local administrative boundaries.

### Key words:

megacity; global city-region; Jakarta Metropolitan Region; foreign direct investment; urban restructuring

## How Similar Are the Environmental and Income Kuznets Curves? Evidence from China

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### Abstract

Inequality has always been a hot issue around the world. Since the reform and opening up, the the fast economic growth in China has caused significant inequality. This develop mode, which is a meaningful experience, has gained more and more attention. Beginning from the analysis of relationship between economic development and income inequality using Kuznets curve, many researches have moved on to other aspects caused by economic development, such as disparities in environment and health. Although some of these researches have reached significant conclusions, few of them has been analyzing the intrinsic relationship between the environmental and income Kuznets curves. This paper brings Chinese empirical evidence to fill this vacancy. First, by using cross-sectional data of China at city level in 2013, this paper estimates the income and the environmental Kuznets curves for China respectively. We select some indicators to measure income and environment such as income ratio between urban and suburban areas, per capita dispensable income, and indexes of industrial water pollution, SO<sub>2</sub> and smoke. Second, we compare their similarities and analyze the interconnections, such as whether these two curves overlap with one another, or which one represents a higher level than the other. Last, we further investigate the reasons behind such outcome.

### Key words:

Kuznets Curve; Income; Environmental Pollution; Inequality; China

## **Industrial Sickness and Its Impact on Economy and Labour Force of West Bengal with Case Study of Haora District**

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### **Abstract**

Industrial sickness is a commercial term but it can reflect the socio-economic composition of any region. After independence West Bengal was considered as an industrially front running state of India. Among the districts of this State Haora district has great contribution to the industrial economy of this State. The process of industrialization in West Bengal was started during the colonial period but with the march of time this state has lost its industrial glamour and many well running large scale units have become sick units. This study concentrates on the status of different scales of industries from micro and small to medium and large scale units as well a chronology of industrial sickness. A large number of labours are involved in these units and they have become affected after the closure of these units. This type of ailment can alter the occupational structure of any region. Many policies and acts are available in print and electronic media but in reality Board of Industrial and Financial Reconstruction has failed to revive these units and is unable to render benefit to this huge labour force. Thus quick revival of these sick units may provide some economic space to the entrepreneurs in future and new blood circulation in the industrial economy may be possible.

### **Key words:**

sick units; labour force; industrialization; different scales of industries; economic space

## Innovation Cooperative Network of Industry, Education and Academy: A Case Study of Zhongguancun Hi-Tech Park

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### Abstract

High Tech Park has been a major engine of China's innovation and development. Zhongguancun national innovation demonstration zone is the flag of Chinese Hi-Tech Park with comprehensive strength, forefront industry and the fastest developing speed. It has been known that innovation cooperation network of industry, education and academy in Zhongguancun Hi-Tech Park (ICNIEA) play a vital role in its development. Though literature has emphasized the importance of cooperation of industry, education and academy in the development of the park, these questions, such as how is the network of cooperation evolution, and what is the characteristic and spatial pattern of this networks, are still unsolved. This paper, we examine the evolution process of cooperation of networks of industry, education and academy and spatial pattern based on granted patents by employing the method of the social network analysis and spatial analysis. Based on the quantitative analysis of the node of expanding network transition, we divide the evolution of the cooperative networks as five phases and reveal the network characteristics of each phase. We find, firstly, the actors in the ICNIEA have much increased, reaching the maximum in 2013 and accounting for 66.89% of the total number of 6 years of the innovation actors; Secondly, the sectors, such as science\_education\_culture\_health, Industry and construction industry, have been an important cooperative sectors, and the way of cooperation are between universities and enterprises, and after 2002, are between Scientific Research Institute - enterprises, thirdly, the spatial cooperative trend spread from the near to the far, first in Beijing, Tianjin and Hebei province, gradually to the Ring Bohai area, and then east area of China and along the Beijing Guangzhou railway to the Pearl River Delta region. We also discuss the policy implications.

### Key words:

Innovation Cooperative Networks; Cooperation of Industry, Education and Academy; Zhongguancun Hi-Tech Park; China

## Interrelations between Value Chains and the Use of Information and Communication Technologies (ICT) in Small-Scale Agriculture: A Producer Perspective

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### Abstract

Integration into Global Value Chains (GVC) has been emphasized by many authors as an opportunity for economic growth, particularly within the Global South. Nevertheless, insufficient access to markets restricts opportunities. Advances in information and communication technologies (ICT) have expanded the possibility to communicate information and knowledge across geographical distances and to shorten the link between producers and buyers.

By using the example of different Kenyan and Tanzanian fresh fruit and vegetable value chains this paper assesses to what extent small-scale farmers are able to integrate themselves within these value chains through using ICT and how different conditions affect ICT usage amongst small-scale farmers. Based on a mixed methods research design this study analyses different forms of value chain integration, their distinctive coordination types, different activities within the chain and the relational proximity between producers and buyers. The results indicate different effects on financial transactions, coordination between producers and buyers and on the access to different types of information and knowledge, to establish and maintain linkages to different buyers in order to access commercial markets.

With this differentiated perspective this paper contributes to enhancing the general debate on ICT for development and addresses some current contradictions regarding the effects of ICT in the Global South.

### Key words:

agri-food networks; ICT; value chains; Africa

## Knowledge Spillover Effects of Regional Innovation Networks in China from the Perspective of Multi Scale: A Case Study of Biotechnology

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### Abstract

With the coming of knowledge economic era, knowledge has become the main source of regional competitive advantages by replacing the traditional production factors. The paper selects the biotechnology article written by Chinese scholars from 2000 to 2013 and their citing articles in Web of Science as the database and explores the research from the three aspects. First, it studies the different evolutions of topology and spatial structure in eastern, central and western areas in China at three spatial scales. Second, it studies the characteristics of knowledge spillover in the network. Third, it builds the knowledge spillover model by using knowledge production function, in order to know how the network structural elements affect the level of knowledge spillover. The results are followed: Firstly, the difference of knowledge stock in eastern, central and western areas is huge and the gap is expanding. Secondly, the innovation networks differ on three levels during the process of knowledge spillover. At the international level, the evolution of the network size and density of three regions have the same trend, but large differences in quantitative value. The main receivers are developed countries such as USA, Japan and Germany, and the USA has always been the biggest recipient. During the process, geographical proximity played a positive role. At the domestic level, the three network follows a power-law distribution, but their heterogeneities are different, the strongest in the eastern and the weakest in the central. The spillover in the eastern almost accounted for 70%. At the district level, the three network structure showed a dense development. After 2008, the number of nodes are close to saturation, but the times of spillovers are still increasing. The core cities in the eastern are stable and the structure is mature, however in the central and western, the core cities change a lot and the network are unstable. Thirdly, the companies have a low participation and poor motivation during the process. Fourthly, different structural elements have different effects on the level of knowledge spillover. Network size and degree centrality take positive correlations to the level of knowledge spillover, but the effect of network density depends on the different area. There is a negative correlation in the western due to the lack of communication infrastructure.

### Key words:

biotechnology; knowledge spillover; innovation network; multi scale

## Revisiting the Role of Institution in the Evolutionary Economic Geography: State Spatial Selectivity Strategy in the Indonesian Spatial Planning System

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### Abstract

There is a longstanding recognition in economic geography that institutions play a critical role in shaping regional development. One of the most significant recent contributions is through the work on Evolutionary Economic Geography (EEG). This perspective aims to understanding how economies unfold over space and time, and gives detailed attention to the role of institutions in shaping economic growth. The research presented in this paper uses EEG as a framework, to explore the evolution of regional development policy in Indonesia during the democratic transitional period, 1998-2013. It argues that place-based policy initiatives embedded in the spatial planning system played a significant role in attempts to address the geography of the uneven development in the country. The national government employed a spatially selective strategy that aimed to foster the development of economic clusters to promote growth. The paper reviews these policies and offers some preliminary insights into their success. The findings not only contribute to empirical research aligned to EEG, but also offer novel insights by drawing on a developing country as the case study.

### Key words:

Evolutionary economic geography; planning; institution; cluster; spatial selectivity; Indonesia

## Rural-To-Urban Migration and Skill Upgrading: A Comparative Study between Suzhou and Taizhou in China

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### Abstract

Rural-to-urban migrants have become the main body of industrial labors in China. Their human skill upgrading or human capital accumulation after migration not only means more individual benefits for migrant workers, such as more opportunities of getting a new job and more income, and of accelerating the process of social integration into the cities, but importantly also means satisfying the urgent demands for high-quality workers as a result of industrial upgrading and economic transformation. Extant relevant literature mainly focuses on the determinants affecting the skill upgrading and the mechanism from the individual, firm and institutional perspective, but cares little for territorial and organizational context, and the regional differences of workers' skill upgrading especially between advanced cities in the coastal area of China. This paper originates from the speculation whether or not there are differences concerning migrant workers' skill upgrading between a grass-rooted locality and a foreign-dominating one. If yes, whether and how do territorial factors play a role into the process? The questions are explored based on the questionnaire surveys in Suzhou, Jiangsu province and Taizhou, Zhejiang province in the summer of 2014 and 2015.

### Key words:

rural-to-urban migration; skill upgrading; human capital; agglomeration

## Spatial Features of Sale for the Online Retailers and Its Influencing Factors: A Case Study of M-Y Store in Tmall

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### Abstract

The traditional commercial geography believe the survival and development of retailers need a threshold of demand, and its selling space should not beyond a certain scope. However, the sale model of traditional retailers and the shopping manner of consumers have been changed by the information and communication technologies. This huge change has a great impact on the traditional theory of commercial geography. It is against such a background that this paper examines the M-Y store in Tmall as a case study to compares its sale spatial features and influencing factors in 2014 with the traditional theory of commercial geography. The study shows that the sales amount in counties exist significantly the spatial agglomeration phenomenon. The sales volume doesn't follow the distance decay law. The relationship between the price of commodity and the distance of sales displays a significant fluctuation change. The sale distance of high price commodity maybe not longer than the low price. In the studied geographical space, the relationship among the income curve, cost curve and profit curve don't abide by the traditional theory. Income curve is always upper the cost curve. Therefore, there are not a threshold of demand and a maximum range of sales. The intensity of influence factors for the spatial disparity of sales are, per capita disposable income of urban residents, number of Internet domain names, the female population scale, distance, number of the postal service sites, in that order. The spatial action of these factors appears heterogeneity.

### Key words:

spatial features; influencing factors; online retailers; commercial geography

## **Study of Regional Division of non-agricultural industries and the Coupling Degree with Urbanization: A Case Study of Three Big Geographical Area in Shanxi Province**

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### **Abstract**

The non-agricultural industry support is necessary for the healthy development of urbanization, under the background of new urbanization in our country was deepened, the development of the regional industry effective impact on regional development more and more strong. Based on the three geographical areas in Shanxi province as the research object, the regional division of non-agricultural industry and the coupling degree with Urbanization as the breakthrough point, based on the fifth census, six data, the methods of regional specialization index and spatial coupling analysis, the three major regional non-agricultural industry division and the coupling degree of non-agricultural industry with urbanization is analyzed. Research shows that: the non-agricultural industry have a certain centripetal specialization degree and Xi'an as the center outward descending; Non-agricultural degree of specialization and level of urbanization showed some positive correlation.

### **Key words:**

Regional division; Non-agricultural industry; Urbanization

## Temporal Evolution of Cultural Industries Diffused Capacity in Xi'an City

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### Abstract

Obtaining data point of Xi'an cultural industry enterprises in 1997, 1999, 2002, 2005, 2007, 2009 and 2012 by Yellow Pages, authoritative search engine, statistics, and field research. The basic spatial unit are 51 offices (town) in the main city street within ring expressway, Using same sector analysis and diffusion index model of cultural industries and other methods, Researching the quantitative of diffused capacity of the cultural industry and exploring the momentum factor of cultural industry diffusion. Research shows: ①The dominated diffusion directions of cultural industries are SW and NWW from 1997 to 2012. ②In a certain space, spatial diffusion capacity of cultural industries enhanced to stabilized state after saturated state. ③The extremely vulnerable grade of spatial diffused capacity of cultural industries was distributed in NE, NW direction, they are near ring expressway and away from the city center, The street number of this grade are rapid decline in the study period. ④The strong ability grade streets of spatial diffused capacity of cultural industries were mainly distributed in 4 km circular area at the core of the Bell Tower, The spatial diffusion center of cultural industries in Xi'an Basically was formed. ⑤The major factor affecting spatial diffusion ability of cultural industries are Market factors, policy factors, related industries and natural resources.

### Key words:

Culture Industry; diffused ability; Xi'an City

## Territorial Dynamics and Drivers of Innovation in Turkish Regions

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### Abstract

Innovation has become one of most important driving force of global economy. As innovation activity is spatially concentrated and thus has an obviously geographic dimension, more than two decades economic geographers examined the territorial dynamics, location and determinants of innovation at local, regional and national level. In this context, this paper analyses the geography of innovation in Turkey using a variety of indicators such as patent grants and utility models. Based on a data sets derived from Turkish Patent Institute and TurkStat, this paper presents the recent space-time patterns and determinants of regional innovative activities during the 2000s. The study reveals that innovative activities in Turkey has been concentrated in metropolitan areas such as İstanbul, Ankara and İzmir and as well as neighboring metropolitan areas. It also finds that innovative efforts has been increasing in new industrial cities like Konya and Kayseri represented the last wave of industrialization in Turkey. In addition, this paper also shows that the location of innovation is fundamentally driven by agglomeration forces, industrial specialization, FDI and various infrastructure availability and quality. The paper contributes to the geography of innovation literature by providing some empirical evidence for understanding the territorial patterns of innovation.

### Key words:

innovation; patent; concentration; spatial distribution; regional development; economic geography; Turkey

## The Comparative Analysis about Economic Developing Features of Inland Key Urban Agglomerations of “One Belt One Road”

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### Abstract

According to the panel data analysis results, the economic development influence factors of Guanzhong-Tianshui and Chang Zhu Tan were divided into three parts: common, dominant and others. Then, in order to enrich the theoretical thinking about the characteristics and the differentiation about economic development under the background about "One Belt and One Road", writers tried to use VAR, IRF and VD to analyze and compare the action intensity and features of each factor. The result showed: Firstly, the degree of market development of Guanzhong-Tianshui was weaker than Chang Zhu Tan. And the regional economic momentum could be stronger when the market conditions improved. Secondly, the transport level of Chang Zhu Tan had gotten ahead of its current needs, and limited the development. With the economic environment and conditions improved, the limitation would vanish. Thirdly, science and technology promoted Guanzhong-Tianshui economic growth permanently. So, this urban cluster, maybe, could be built as the regional creative economic center. Finally, as the core power of Chang Zhu Tan, the secondary industry couldn't promote this region developing fast and permanent unfortunately. And, this industry was not suit for the development strategy about ecological cities. Therefore, the industry structure needed to be restructured.

### Key words:

economic developing features; quantitative economy; inland urban agglomeration; One Belt and One Road; comparative analyze

## The Dynamics of Petrochemical Enterprises Decline ( I ): Big Petrochemical Enterprises

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### Abstract

A nonlinear dynamic model of the competition by international petrochemical enterprises as a result of petroleum shortage has been set up. The model shows the internal binding relationship among the number of big petrochemical enterprises that go decline, the petroleum shortage ratio ( $D$ ) and the petroleum occupancy ratio of the biggest enterprise ( $q$ ). The results show that if  $D > q$  in the international petroleum resource market, the following rules and characteristics exist in the evolution of petrochemical enterprises: (1) the biggest enterprise in the petrochemical system will inevitably go decline. (2) After an incident of petroleum shortage, the surviving petrochemical enterprises will go through three stages. A petrochemical enterprise will continually develop and grow stronger in the petroleum competition, only if it seizes the  $D$  and  $q$  in the petroleum resource market, understands the rules and characteristics in the petroleum economical system and positions itself correctly.

### Key words:

decline; dynamic mechanism; mathematical model; Petrochemical enterprise

## The East Asian Variety of Territorial Planning: Theorising Integration of Economic Planning and Territorial Planning based on S. Korean and Chinese Experiences

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### Abstract

Bringing back the earlier tradition from development theories in the 1960s and the 1970s, this paper attempts to piece back together theories of economic growth and spatial planning within a late industrialization context. This paper argues that an understanding of spatial dimensions is important because economic planning for late industrialization is required to simultaneously be spatial planning. This paper use Lefebvre's insight on space as a means of production and explain how the developmental state in East Asia integrates economic planning and spatial planning and reconfigures the national territory as a more efficient means of production. The integration of two types of planning was necessary because due to the productivity gap between advanced economies and late industrialisers and due to the globally integrated and saturated market, the state had to fully appropriate agglomeration economy. The spatial planning that the developmental state conducted (e.g., industrial estate development, new town development and national territorial planning) had some apparent similarity with enterprise zone development, new town development and Keynesian regional policies in the advanced economies. The formers were significantly more intensive in the sense that the developmental state took them as national agenda and used diverse means (e.g., tax exemption, informal negotiation and political loans, among others) to an extreme degree. But more importantly, while spatial policies in the advanced economy are usually responses to correct problems caused by economic changes, spatial policies under the developmental states were themselves economic policies whose aims were industrial upgrading and economic growth.

### Key words:

developmental state; national territorial planning; regional policy; getting the price wrong; East Asia

## **The Mechanism of Cross-boundary Product Evolution in China: An empirical analysis based on export product of prefecture-level cities**

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### **Abstract**

New product promotes the sustainable growth of the local economy. Evolutionary economic geographers believe that the emergence of new products is based on local original products, and related industries. However they have only concentrated on a local perspective, omitting the truth of factor mobility and space opening. This paper discusses whether the evolutionary process can also cross regional boundary and administrative boundaries. Based on the current evolutionary theories, this research studies the cross-boundary evolution progress under the background of Chinese transforming economy. we analyze the development of new products in Chinese prefecture-level cities during the two periods——2002-2006 and 2007-2011. The results show that the cross-boundary evolution product do exist among neighboring cities. Related industry foundation is precondition for this cross-boundary evolution. However the administrative limitation between provinces is a significant barrier due to the Chinese decentralization process. Besides, subject of cross-boundary evolution has change from collective owned firms to foreign direct investment firms during 2002-2011 due to industry upgrading.

### **Key words:**

Cross-boundary evolution; Export similarity; Knowledge diffusion; Proximity; Decentralization

## The Progress of Real Estate Transactions by Fukushima Refugees and Land Price Changes after the Great East-Japan Earthquake

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### Abstract

The Great East-Japan Earthquake and the accident at the Fukushima nuclear power stations significantly damaged public trust in the safety of nuclear power. The earthquake and tsunami thus caused not only physical damage and radioactive contamination, but also psychological and social damage to residents.

This study focuses on changes in land prices and the buying and selling of real estate after the Great East-Japan Earthquake, and clarifies the progress of real estate transactions by Fukushima refugees and changes in land prices.

The results of the study show that in Miyagi Prefecture and Iwate Prefecture, land prices are rising in the inner cities of Sendai region and the coastal region of the stricken area. On the other hand, with the exception of the residential area of Iwaki city, land prices in Fukushima Prefecture are generally falling.

This study finds that real estate transactions and land prices changed after the earthquake in Fukushima Prefecture, but that while the amount of buying and selling increased along with demand, land prices did not increase almost at all. This differed from the land price fluctuations in Miyagi and Iwate Prefectures.

There is a possibility that the high levels of radiation in Fukushima Prefecture will prevent many evacuees from returning for a long time. This study suggests that these evacuees' social and psychological anxiety about their new potential homes is preventing an increase in land prices in a part of areas where buying is on the rise.

### Key words:

land price; real estate transactions; radioactive contamination; Fukushima refugees; The Great East-Japan Earthquake

## The Rural Floating Population’S Impact and Relocation in A Changing Climate

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### Abstract

We consider the change in carbon emissions induced by labor that must migrate to accommodate the interindustry shifts across regions, some of which may be the basis of further urbanization. Such urbanization results from mass rural to urban migration. Naturally, insofar as at least household consumption is concerned, carbon emissions necessarily follow population changes. As workers migrate from an undeveloped rural region to an affluent urban region, they change their consumption pattern—most particularly the amount of energy they use. The change in carbon emissions can be estimated as the product of the new floating population and the appropriate gap (depending on whether the region is the origin or destination for the floating householder) in the carbon emissions per household between a rural household and its transformed urban equivalent. Note the implication here is that much population shifts out of primary industries, which are largely rural. This necessarily promotes GDP, but raises carbon emissions embodied in the products and services, as well as via directly in household consumption. Due to the population shifts, we estimate households will directly reduce their production of carbon by 36,600 tons. This, however, is offset indirect rise of 970,000 tons carbon from and average consumption change, so as to the increase of 933.4 thousand tons in total, accounting for 0.2% of the total carbon emissions. So after the trade-off of carbon emissions, the total carbon emissions increase by around 1.95%.<sup>2</sup>

### Key words:

input-output analysis; floating population; carbon emissions

<sup>2</sup> When workers migrate from region  $r$  (say, e.g., Heilongjiang) to region  $s$  (say, e.g., Shanghai), they assume consumption patterns of households in region  $s$  (Shanghai). The change in carbon they emit from energy use is the difference between resident carbon emissions per capita in Shanghai versus that in Heilongjiang  $({}^s C_f / {}^s PE) - ({}^r C_f / {}^r PE)$ . It also changes the emissions of carbon *indirectly* through their consumption of other goods as their income rises as well as from the change in their household consumption bundle in moving from Heilongjiang to Shanghai  $({}^s F / {}^s PE) - ({}^r F / {}^r PE)$ . We define the set of migrating workers from Heilongjiang to Shanghai as  $({}^{rs} PE)$ , and the direct  $({}^{rs} DE)$  and indirect effect  $({}^{rs} IE)$  of migration on carbon emissions respectively are  ${}^{rs} DE = ({}^s C_f / {}^s PE - {}^r C_f / {}^r PE) {}^{rs} PE$  and  ${}^{rs} IE = {}^{rs} \tilde{I}_c (I - {}^{rs} A) ({}^s F / {}^s PE - {}^r F / {}^r PE) {}^{rs} PE$

## Transition Pathways in Conventional Food Systems: Geographies of Crisis

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### Abstract

In the 21st century, the conventional food sector is more than ever positioned in a field of conflict between various forces. Driven by processes of intensification, concentration, specialization and globalization, the conventional production of food is increasingly regarded as 'unsustainable', especially by critical NGOs and consumer groups. The reasons are many and refer, for example, to ecological damages, land-use conflicts, animal welfare issues, and impacts on climate change.

Against this background, the creation of alternative pathways towards more sustainable food systems is claimed. Such a transition depends to a high degree on the acceptance for change by participating actors and the existence of change agents whose attitudes are strongly influenced by perceptions of technological and economic feasibility with respect to sustainability innovations. However, possible conflicts between the contribution of innovations to sustainable development and their acceptance are not very well researched until now.

Our contribution aims at addressing these issues by taking three steps: first, we outline a number of key challenges which must be overcome in order to transform conventional food systems. Second, we describe some appropriate concepts dealing with socio-economic transitions and sustainability in the context of food production. Third, we give concrete insights from two interdisciplinary research projects dealing with innovation potentials which could have significant effects for more sustainability in conventional agrifood production networks.

### Key words:

Food systems; transition pathways; sustainability

## **An Resilience Exploration Between Regional Economy and Ecological Resilience-:**

### **Taking Beijing-Tianjin-Hebei Urban Agglomeration as the Case**

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#### **Abstract**

In the current serious contradiction between ecological protection and urban and rural construction, under the condition of resilience concept is particularly important in the process of regional development, the research of urbanization resilient and the relationship between the ecological resilience and urbanization resilience, explore its influence relations is imminent. Current research shows that the resilience area is divided into economic resilient, engineering resilient, social resilient and ecological resilient. economic resilient which will be as a representative of the ability of urbanization resilience. based on the beijing-tianjin hebei urban agglomeration as the research object, first of all, determine the impact of economic resilience and ecological resilience, second, respectively and the ecological evaluation of beijing-tianjin-hebei urban agglomeration economy resilience, finally, to explore the correlation between economic and ecological resilience. Through the above the construction of the evaluation process to determine the influence of the economic and ecological resilience to promote urbanization resilience and harmony development of the ecological resilience.

#### **Key words:**

resilience

## Division of Housing Price Monitoring System Based on Price's Spatial Segregation: A Case Study in Chongqing Metropolis Core Area

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### Abstract

As a fundamental work for monitoring housing price, it is very important to divided the monitoring and statistics areas of housing price. Many factors affect the spatial distribution of housing price, which can be used to divided monitoring and statistics areas of housing price according to their spatial marginal effect. Selecting nine urban areas of Chongqing as the study area ,this paper analyzes housing price data of Chongqing metropolis core area in 2013-2014 using hedonic model to get the influencing factors of housing price and calculates the contribution degree of housing hedonic price via geographical weighted regression (GWR), and then divides monitoring and statistics areas using Voronoi space division technology. The results indicate that 1) there are five main factors that affect the housing price spatial segregation, business supporting, education supporting, medical supporting, traffic condition and convenient distance, and traffic condition effect hard; 2) According the housing price spatial segregation, Chongqing metropolis core area formed by 4 metropolitan plates can be divided into 88 monitoring and statistics areas which share homogenizing internal effects. Among them, Nanan-Banan plate is divided into 6 areas; three north plate (Beibei-Yubei-Jiangbei plate) is divided into 46 areas; Yuzhong plate is divided into 4 areas; Shapingba-Jiulongpo-Dadukou plate is divided into 32 areas. Diverse regulation measures are put forward for all kinds of housing price areas of the 4 unbalanced development primary plates to guide the meticulous monitoring and statistics of estate market price.

### Key words:

housing price; spatial segregation; area division; price monitoring and statistics; Chongqing metropolis core area

## **Firm Heterogeneity and Industrial Agglomeration in Metropolitan Region: Evidence from Beijing-Tianjin-Hebei**

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### **Abstract**

Using the unique and detailed firm-level data based on the Annual Survey of Industrial Firms in China during 2001-2009, we apply the footloose capital model with heterogeneous firms to construct a discrete choice model, and verify the 'selection effect' and 'sorting effect' of firm heterogeneity on location choice. The interaction of firm heterogeneity, labor heterogeneity and spatial heterogeneity on industrial agglomeration in Beijing-Tianjin-Hebei metropolitan region is significant. In addition, our empirical results are consistent with the predictions of the theoretical model. They show that the firm scale, regional integration and enterprise productivity are closely related to industrial agglomeration.

### **Key words:**

firm heterogeneity; discrete choice model; location choice; industrial agglomeration; Beijing-Tianjin-Hebei

## Resource, Location and Economic Development: a Case Study of Resource Curse Effect in Northeast China

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### Abstract

Resource curse theory points out the negative correlation between resource abundance and economic development. However, former research has rarely considered the factor of location in the resource curse effect analysis. Northeast China, with many resource-based cities, is the old industrial base and under the increasing downward pressure of economic development in recent years. Taking the location factor into account, this paper analyzes the relationship between resource abundance and economic development by using the fixed-effect regression model and the data of 33 cities in Northeast China from 1998 to 2013. The results reveal that the resource curse effect still holds in Northeast China when the location factor is taken into account. In the control variables, manufacturing level, fixed assets investment and education level promote the economic development; however, foreign capital investment impedes the economic development, which means foreign capital investment has not been effectively and rationally utilized in Northeast China. From the viewpoint of location factors, both distance from provincial capital city and distance from nearest port city are negatively correlated with economic development, and yet the significance level of the former factor is much higher than the latter one. In other words, the distance from provincial capital city has an important impact on economic development.

### Key words:

resource curse effect; economic development; location; Northeast China

## **Spatial Characteristics and Forming Mechanisms of Retail Businesses in Changchun, China**

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### **Abstract**

The rationalization of spatial retailing distribution has an important effect on urban economic development, circulating resource allocation, and resident consumption demand satisfaction. Based on 2013 survey data for large-scale commercial sites in the central district of Changchun, this paper provides a detailed discussion of the spatial characteristics and formation mechanisms of retail businesses using spatial density analysis, nearest neighbor distance, and location entropy analysis. The results show that spatial distribution of retail outlets in Changchun is made up of coexisting areas of concentration in the core area and diffusion in the peripheral areas. The results also show that a spatial pattern of multi-center clustering and a spatial development trend from northeast to southwest among retail sites characterize the overall spatial distribution of retail outlets in Changchun. Different retail formats show different spatial distribution features, and the expansion of emerging formats such as chain supermarkets towards the city periphery has become a trend. Furthermore, different blocks of the retail industry show quite different characteristics: the mature districts generally have high integrated service capacity, while the function pattern of developing districts features a more single-focus approach. Overall, a combination of factors working together with a cross-cutting mechanism influenced the spatial evolution process of retail businesses, including the evolution of retail formats and their characteristic feature selection mechanisms, residents' consumption structure and behavioral factors, the promotion of agglomeration, the government's macroeconomic control policy, and planning factors.

### **Key words:**

commercial site; retail format; spatial characteristic; forming mechanism; Changchun

## Study on Economic Convergence of Main Countries along the Silk Road Economic Belt

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### Abstract

Convergence of economic growth is the core study of economic growth. There are significant differences in each level of growth economies in time and space dimensions, convergence of long-term trends can reflect the level of output per worker between different economies. China is the sponsor and advocates of the "Silk Road Economic Belt", further rose it to a national strategy. Analyzed the differences between the level of economic growth trends of China and neighboring economies will play a significant role in promoting the implementation of the national strategy and international cooperation. This paper studies economic convergences between China and core countries (China and Five Central Asian Countries) of "Silk Road Economic Belt" during 2005-2015, verify the existence and the mechanism of convergence, with some evaluation and forward-looking social effects, provide the basis for the strategic implementation of policy "Silk Road Economic Belt".

### Key words:

Silk Road Economic Belt; economic convergence; international cooperation

## The Relationship between Road Centrality and Spatial Distribution of Retail Stores in Guangzhou, China

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### Abstract

Many researches have confirmed that transport accessibility can affect the location pattern of commercial activities. However, it has rarely examined the relationship between distribution of various types of retail stores and road network in a centrality perspective in megacity scale. This paper focuses on the problem that whether different types of stores favor different centrality indices based on the multiple centrality assessment (MCA) model composed of closeness, betweenness and straightness. Based on the location information of retail stores on Guangzhou navigation map, we investigate statistical and spatial distribution of three road centrality indices and various retail stores in Guangzhou, a megacity with a long history of commerce in China, using GIS-based methods such as the nearest neighbor index, the centrophobic method, the kernel density estimation (KDE) and band collection statistics as well as correlation and regression analysis by SPSS. Results show that the spatial distribution of retail stores is closely associated with road centrality. Specialty stores favor road centrality most, followed by shopping malls, convenience stores, textile and clothing stores, supermarkets, grocery stores and building-material stores. More specifically, different types of stores are affected by the specific centrality index. These findings indicate that road centrality has significant influences on the location of retail stores and various properties of road centrality capture the location pattern of retail stores in Guangzhou. We hope this study can provide some valuable references for researches on urban economic space and commercial planning through the analysis of big data by GIS and statistical methods.

### Key words:

road centrality; retail stores; spatial distribution; big data; the multiple centrality assessment (MCA) model

## C12.08 Dynamics of Economic Spaces

### Placing Finance in Urban and Regional Development



Home

#### Oral

1. [Banking Sector in Siberia and its Influence On Regional Development](#)  
Olga Sysoeva (The Irkutsk Scientific Center SB RAS, Romania)
2. [Determinants of Financial Inclusion: A Global Perspective](#)  
Elizabeth Bermeo (University of Bristol, United Kingdom)
3. [Financial Centre Development: New Data and Scenarios for Asia-Pacific](#)  
Dariusz Wojcik (University of Oxford, United Kingdom), Eric Knight (University of Sydney Business School, Australia), Phillip O'Neill (University of Western Sydney, Australia), Vladimir Pazitka (University of Oxford, Slovakia)
4. [Financial Potential of Natural Resources for Regional Development](#)  
Vitalii Pylypiv (University of the State Fiscal Service of Ukraine, Ukraine), Igor Bystryakov (Institute of Environmental Economics and Sustainable Development National Academy of Sciences of Ukraine, Ukraine)
5. [From Global Financial Networks to Financial Chains: Some Preliminary Thoughts](#)  
Martin Sokol (Trinity College Dublin, Ireland)
6. [Global Financial Crisis and Hotel Chains Financialization in Spain: Towards New Accumulation Frontiers?](#)  
Ismael Yrigoy (University of the Balearic Islands, Spain)
7. [High Frequency Traders Challenge Hong Kong and Singapore as Financial Centers](#)  
David Meyer (Washington University in St. Louis, United States), George Guernsey (Insight Mapping, United States)
8. [How Big is Chinese's Real Estate Bubble and Why Hasn't It Yet Burst: A Comparative Study between China and World Major Financial Crises 1980-2014](#)  
Xiaobin Zhao (The University of Hong Kong, HongKong SAR, China)
9. [How China's Financial Reforms May Shape Its Growth and Development](#)  
Winston Mok, (Private Investor and Columnist of South China Morning Post)
10. [Listing Companies and Transformation to Smart Manufacturing in Traditional Industrial Clusters of China: Rethinking The Dynamics of 'Jinjiang Model'](#)  
Yue Ding, Huasheng Zhu (School of Geography, Beijing Normal University, China)

11. [Mapping Chinese Inter-city Cooperation Networks : A Study Based on Advanced Producer Service Firms in Initial Public Offerings](#)  
Wenkai Bi, Fenghua Pan (School of Geography, Beijing Normal University, China)
12. [Regional Banking Market Structure and Its Determinants in China](#)  
Peng Baoyu, Wei Wei, Xie Gui zhen (Henan University, China)
13. [Regulation of Local Government Debt in Case of Ukraine](#)  
Olga Shevchenko (NISS, Ukraine)
14. [Relationship Between Effective and Comprehensive Financial Reporting with Good Governance and Financing Urban Infrastructure in Indian Context](#)  
Nishank Tyagi (Member of The Institute of Chartered Accountants of India, India)
15. [The Geography of Startup City in China: The Importance of Financial Supports](#)  
Bofei Yang, Fenghua Pan (School of Geography, Beijing Normal University, China, China)
16. [The Making of Air Rights Market: Muddling Toward the Financialisation of Urban Space](#)  
Hung Ying Chen (Durham University)
17. [The New Financial Technologies and The Recent Bancarization of Brazilian Population](#)  
Fabio Betioli Contel (University of São Paulo / Department of Geography, Brazil)
18. [The Production of a Legal-financial 'Nexus' Space in Chinese Financial Centres](#)  
Andrew Jones (City University London)
19. [The Spatial Agglomeration of Entrepreneurial Hedge Fund Firms in Hong Kong, Singapore and Beyond](#)  
James Lenzer Jr (University of Hong Kong, HongKong SAR, China)
20. [Urban Planning in China: Land as A Leverage for Debt and Growth](#)  
Thierry Theurillat (LATTS, Paris Est University, France), Hongyu Zhan, Jim Lenzer, Simon Zhao (Department of Geography, HKU, HongKong SAR, China)
21. [Urban Rent and Urban Value: A Territorial Approach](#)  
olivier crevoisier (university of Neuchatel)
22. [Where are Services Provided? Comparing the Financial and the Cultural Service Networks of the Pearl River Delta](#)  
Xu Zhang (Department of Regional Planning and Management, Wuhan University of Technology, China)
23. [Why do Domestic and Foreign Venture Capital Firms Have Different Spatial and Network](#)

## [Configurations in China: A Comparison Study](#)

Fenghua Pan, Yiqing Xu (Beijing Normal University, China)

### Poster

1. [Agglomeration of Economic Activities in the Ecuadorian Amazon: Development vs. Pollution](#)

Jose Grefa; Diana Yáñez; Catherine Tuci (Ecuador, UFA-ESPE)

2. [Green Bonds Implementation in India](#)

Shubham Gandhi (India, KJ Somaiya Institute of Management Studies & Research); G. S. Chauhan (India, University Grants Commission)

3. [Spatial Pattern, Evolution and Formation Mechanism of Financial Inclusion in the Process of Urbanization: A Case Study of Guangdong](#)

Guojun Zhang (China, Guangdong University of Finance & Economics)

## Banking Sector in Siberia and its Influence on Regional Development

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### Abstract

Siberia (Siberian Federal District – SFD) is regarded as a part of Asian Russia, which covers one third of the area of Russia and is populated by over 19 million people (13%). The GRP of the district is 10% of the whole country. The investment in fixed capital is also 10%. Despite the high indicators there are apparent features of economic peripherality in the area including the banking sector.

The structure of the Siberian banking system is considered. The differentiation in the level of provision by bank offices coverage in SFD is demonstrated. The characteristics of bank unit location are formulated. The bank credit share in the investment in the regions is analysed. Thus the role of the banking system as a source of investment is revealed. There are some spatial features of the investments related to implementation of big state projects.

Special attention is paid to the activity of local banks. Their development reflects the process of capital accumulation in the region. The authorized capital of Siberian local banks is small. There are great difficulties for the development of small and medium business. The role of local banks is defined taking into account resource component of the region economy. Therefore, lending to small regional firms is a prerogative for local banks. The relationship among such banks as part of ‘financial chains’ and regional economy is shown. In conclusion the paper proposes to increase access to lending by introducing special regulatory and legislative support for small local banks.

### Key words:

banking sector; finance; regional banks; spatial features; Siberia.

## Determinants of Financial Inclusion: A Global Perspective

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### Abstract

Financial inclusion—defined here as the widespread use of formal financial services— has been identified as a key driver of people's economic well-being. Yet the determinants of financial inclusion have received little attention from quantitative researchers and have not been extensively studied from an individual perspective. Using multilevel models fitted to data from the Global Financial Inclusion Survey (Global Findex) for 147 countries and over 152, 000 individuals, this paper aims to fill this gap by analysing the personal and contextual characteristics determining individuals' use of financial services across countries.

This paper seeks to explain why some people are more prone to financial exclusion than others. In particular, I am interested in analyzing how characteristics of the countries where individuals reside influence their probability of using financial services, and whether policies to advance financial inclusion are especially effective among the most commonly excluded groups: the poor, the less educated and women. In contrast to many of the cross-country studies on the topic, which portray financial inclusion as either a consequence of economic development or access to financial services, I highlight the institutional and policy dynamics that are important in explaining the large variations in financial inclusion levels across countries.

### Key words:

financial Inclusion; financial access; multilevel modeling; Findex microdata

## Financial Centre Development: New Data and Scenarios for Asia-Pacific

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### Abstract

Globalisation and technology continue to fuel worldwide competition among cities for the status of an international financial centre. This study introduces novel data on revenues earned from international finance in 2000-14 by city, and investigates their determinants. It shows that IFCs develop in cities that are leading domestic financial centres, with large, deep, flexible and open labour markets and a large and internationalised non-financial sector, in countries with strong rule of law and contract enforcement. Stock market size and prices, corporate and finance-specific taxation, English as the official language, legal family of origin, and the GMT zone do not seem to matter. In the second part of the paper we draw lessons from this analysis to evaluate various scenarios of financial centre development in the Asia-Pacific region.

### Key words:

financial centres; Asia-Pacific; China; globalisation; competition, networks

## Financial Potential of Natural Resources for Regional Development

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### Abstract

Current difficult situation in public financial sector of low-income East European non-EU states (such as Ukraine) limits the possibilities for the regional development financing. Under such conditions sustainable development of territories needs attracting not only extremely limited and insufficient financial resources of public sector but also of wider financial space.

The fruitful direction of the situation improvement is seen in formation of modern institutional support that creates conditions for the local resources transformation into the territorial capital. In other words, territorial resources capitalization mechanisms are considered as a possible way of sustainable development and territorial dynamics stimulating.

Natural resources are considered as the main unengaged source of regional sustainable development that is still not involved in financial turnover and undercapitalized in the states with underdeveloped financial infrastructure. Process of natural resources capitalization require an adequate institutional framework in which natural resources could receive an adequate assessment and be easily transformed into financial form.

The concept of natural resources capitalization relates to the idea of territorial capital mobilization for the purpose of sustainable regional economic development. However natural resources are not expected to be used in the direct way (as a factor of production) but as reproducible assets able to generate new financial flows in the regions. Key issues include the specification of natural resources ownership, assessment of natural wealth, financial infrastructure modernization.

The paper explores some opportunities of regional sustainable economic development financing focusing on unleashing of territorial natural resources financial potential.

### Key words:

territorial capital; natural resources; capitalization; regional sustainable development.

## From Global Financial Networks to Financial Chains: Some Preliminary Thoughts

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### Abstract

Against the backdrop of continuing financialisation, efforts have been made to integrate the conceptualisation of finance with mainstream economic geography frameworks. Perhaps most significantly, the concept of the Global Financial Network has been recently proposed, in strong recognition that geographies of globalising economies cannot be fully understood without understanding finance and its geographies. This paper argues that while the concept of the Global Financial Network is a step in the right direction, there are alternative and complementary ways in which the role of finance in economic geographies can be conceptualised. One such possibility is a concept of Financial Chains. This paper makes the case for the Financial Chains concept, while tentatively outlining its key features and spelling out its implications for economic geography research.

### Key words:

financialisation; finance; economic geography; Global Financial Network; Financial Chains

## Global Financial Crisis and Hotel Chains Financialization in Spain: Towards New Accumulation Frontiers?

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### Abstract

The paper argues that Spanish hotel corporations are increasingly becoming financialized. From a theoretical point of view, it is claimed that the current dynamics of financialized capital circulation through hotel chains represents at the same time a process by which liquid capitals get *spatially fixed*, whereas for hotel chains financialization represent one of its foremost strategies of creating *liquidity* beyond the traditional hotel overnight stays.

From an empirical point of view, it is argued that hotel corporations financialization takes place in four interrelated spheres (i) the built environment (hotel buildings property becoming controlled by financial funds), (ii) actors (emergence of new actors such as hotel-oriented REITs) (iii) hotel management (new forms of management due to the emergence of financial actors within hotel chains) (iv) profit extraction (hotel corporations increasingly relying on financial profitability).

The paper is structured in the following parts. The first item explores how the new dynamics of hotel chain financialization 'fits' within the Marxian scheme of expanded reproduction. The second part outlines how the financial crisis and particularly the restructuring of the Spanish banking system have forced hotel chains to become further 'financialized'. The third part focuses on the emergence of financialization as a reponse to hotel chains crisis in the abovementioned spheres, arguing that financialization of hotel chains need of an increased treatment of land and property as financial 'assets'. The conclusion of the paper deals with the uneven spatialization of hotel chains' financialization.

### Key words

financialization; hotel chains; global financial crisis; global property; REIT.

## High Frequency Traders Challenge Hong Kong and Singapore as Financial Centers

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### Abstract

Hong Kong and Singapore, arguably, are the two greatest financial centers in Asia. Their exchanges, the Hong Kong Exchanges and the Singapore Exchange, comprise signature features of their financial institutions. Global commercial and investment banks, fund management companies, and hedge funds both trade on these exchanges and house large local offices in their cities. High frequency trading (HFT), which is part of the wider trend towards algorithmic trading, is becoming increasingly important on global exchanges. Consequently, exchanges that are receptive to HFT enhance their competitiveness in attracting trading, which is essential to the profitability of exchanges. The exchanges, the regulators, and the local political economic actors in Hong Kong and Singapore, however, remain conflicted in their approach to HFT in contrast to other Asian financial centers such as Tokyo, Mumbai, and Sydney, which aim to attract high frequency trading. Even as Hong Kong's and Singapore's exchanges vacillate over their approach to HFT, the exchanges are enhancing their technological infrastructure and connectivity to other global exchanges, all of which supports HFT. Financial firms in Hong Kong and Singapore, therefore, have access to other Asian and global exchanges for their high frequency trading. These trends demonstrate that technological change in trading has the potential to partially undermine both cities as leading global financial centers.

### Key words:

financial centers; high frequency trading; Hong Kong Exchanges; Singapore Exchange

## How Big is Chinese's Real Estate Bubble and Why Hasn't It Yet Burst: A Comparative Study between China and World Major Financial Crises 1980-2014

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### Abstract

This paper represents an international, comparative, empirical study of the relationship between financial crises and real estate development – with a focus on Japan, Hong Kong, the U.S. and China. We look at the way nine variables related to real estate and financial sector development change during a crisis. We then discuss the ways real estate crises develop into financial crises (considering that most recent financial crises actually trace their origins to real estate bubbles). We summarise the similarities and differences in major crises around the world from 1980 to 2013, demonstrating the linkages between real estate bubbles and financial crises. We also look at China's current economic situation, and identify potential threats to country's economic development by comparing its current situation with other countries' historical experiences. We further explore the deep-seated underlying Chinese systemic causes and characteristics that explain why China's economic bubble has yet to burst. Historical heights in nine variables in particular, used to predict economic bubbles, foretell an upcoming burst in China's bubble economy. Our findings suggest that a financial crisis often emerges from a weak financial system which is too closely linked to the country's real estate sector. These linkages allow real estate crises to mushroom into financial crises. In turn, these financial crises balloon into macroeconomic crises. China's current situation is extremely alarming, though the country shows remarkable resilience to crisis. The government seems to possess the tools and capacity to avoid a hard landing. We particularly draw parallels between modern-day China and the pre-asset bubble period in Japan. These two experiences resemble each other in many ways – and such resemblance should sound a clear warning to China's policymakers.

## How China's Financial Reforms May Shape its Growth and Development

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### Abstract

China's state dominated banking system has impeded efficient economic growth through misallocation of capital. Good private companies were starved of capital while SOEs received ready and cheap credit for wasteful projects. In the aftermath of the RMB 4 trillion stimulus package, ensuing over-capacities highlighted the unsustainability of investment driven growth. China's leadership recently reoriented its economic policy from Keynesian to Schumpeterian. Partly in support of the new strategy, a range of financial reforms are taking place. Thus, as much as financial reforms drive growth, growth strategy shapes financial reforms.

In the multi-faceted transitional economy of China, its financial system is deeply embedded in its unique political economy. Any discussions of financial reforms can only be understood in the context of China's overall economic evolution. Importantly, China's capitalism is different from either the Anglo-Saxon liberal or the East Asian varieties. Thus, financial reforms can be effective – only if they go beyond narrow financial sector reforms – but extend to a broader set of institutional reforms.

Placing China's financial system in its historical and international context, the paper highlights some of its key problems. To address these problems, Beijing is embarking on a range of financial related reforms, including institutional reforms, fiscal reforms and financial sector reforms. The paper will explore how some of these reforms may shape the future economic map of China. It argues that, in a liberalized financial market, the strong regions may get stronger – resulting in more uneven development.

### Key words:

Financial reform, Economic growth; China

## **Listing Companies and Transformation to Smart Manufacturing in Traditional Industrial Clusters of China: Rethinking The Dynamics of 'Jinjiang Model'**

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### **Abstract**

Attracting foreign investment and then participating in global value chain division is a way for developing countries to integrate into the global economy. However, some studies have shown that this development model likely makes developing countries be locked in the low end of the value chain, and be "captured". From the perspective of global production network (GPN), this paper takes Jinjiang, a county-level city in Fujian province, as the study area to explore how local leading firms move up to a higher position in the value chain and promote local cluster upgrade. The authors conducted questionnaire surveys and semi-structured interviews with local leading firms, associated enterprises, government departments, and industry associations during April-June 2015. Preliminary finding shows that local leading firms have turned to build up their own brands to de-embed into global production networks (GPNs), and to go public to re-embed into GPNs. Those companies initiate innovation strategies to contribute to the ongoing transformation from mass production to smart manufacturing.

### **Key words:**

Industrial clusters; GPN; industrial upgrading; listing companies; Jinjiang

## Mapping Chinese Inter-city Cooperation Networks: A Study Based on Advanced Producer Service Firms in Initial Public Offerings

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### Abstract

Corporate networks, in particular, the intra-firm networks of advanced producer service (APS) have been widely used to measure urban networks in existing studies. Recently, the inter-firm relationships have been found to be increasingly important to describe urban linkages. This study provides an alternative strategy to build up inter-city networks based on inter-firm collaboration linkages during the process of initial public offering (IPO), a typical high-end financing practice, in which APS firms—including securities, law firms and accounting firms—cooperate with each other for firms aiming to get publicly listed. It maps the overall pattern of Chinese urban networks based on the inter-firm collaboration linkages. City-Dyad analysis is used to identify the most connected city pairs. In addition, it applies the social network analysis (SNA) to explore the urban system in China. The results show that Beijing, Shenzhen and Shanghai have attained strategically dominant positions within Chinese urban networks; Beijing-Shenzhen has become the most influential city-dyad with regards to urban linkages measured by APS collaboration relationships in the country. Particularly, Beijing holds an overwhelmingly dominant position over other cities than expected, while Shanghai is found to be less important than what was found in previous studies. The collaboration linkages between APS firms prove to be an effective way to explore the urban networks in China.

### Key words:

advanced producer service; collaboration linkages; initial public offering; urban network; China

## Regional Banking Market Structure and Its Determinants in China

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### Abstract

This paper is concerned with the spatial characteristics of Chinese banking market structure. Along with the market-oriented financial reform, China's banking concentration kept falling and regional banking market structure was showing significant differentiation. Based on Herfindahl-Hirschman Index(HHI) and ArcGIS spatial analysis methods, the paper empirically analysed the changes of regional banking structure in Chinese 31 provincial administrative regions in 2005-2014, as measured by bank assets, branches and employees. The results indicated HHI of banking structure in many provinces was falling, and the disparity of regional banking structure was enlarging. Different type of Banks had a quite different spatial distribution. Then the paper made an empirical study on the determinants of regional banking market structure by employing a panel data ranged from 2005 to 2014. Based on the above results and optimal financial structure theory, the authors finally put forward some proposals for different regions.

### Key words:

regional banking market structure; banking market concentration ratio; determinants; optimal financial structure theory

## Regulation of Local Government Debt in Case of Ukraine

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### Abstract

Ukraine experiences authority decentralization and enlargement of local communities now. Decentralization is accompanied by budget and fiscal decentralization. At the present moment, there are 159 joint communities which have more responsibilities (in practice) and more finance resources (in theory). On one hand, fiscal decentralization leads to the increase of financial efficiency of local communities, but it is true only for stable and strong communities. On the other hand, poor communities after their integration did not become more reach in financial and resource terms. Due to the Ukrainian laws, the central government has no responsibilities as to the local debts, thus, it constitutes the problem for local authority and citizens which have no possibilities to find resources for debt covering. The local authority can act in some ways to prevent the appearance and rising of local debts and to stabilize the local finance system. Firstly, it can use the outsourcing system for some services execution in big investment projects (in road construction, waste handling, and water supplying). Secondly, it can propose particular guarantees for investors of local communities, i.e. reduced amortization rate, lower tax rates, some privileges during the distribution of land for construction. And thirdly, it can optimize expenditures of local budgets according to the responsibilities and real financial resources. More attention should be paid for external borrowings – municipal loans, because these instruments in Ukraine are not widespread now. More authority means more obligations and thus, the ability of local bodies to operate finance influences the effectiveness of decentralization.

### Key words:

local community; decentralization; local government debt

## Relationship Between Effective and Comprehensive Financial Reporting with Good Governance and Financing Urban Infrastructure in Indian Context

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### Abstract

The rapid urbanization in the country leads to urban mess in terms of the requirement of urban infrastructure and urban services against the demands of urban population. The urban infrastructure is grossly inadequate to meet the demand of the existing urban population and therefore, there is an urgent need for up-gradation and development of urban infrastructure and urban services.

Public disclosure laws have put more responsibilities on the urban bodies to become more accountable for management and use of public money which in turn able to make urban local bodies self-reliant and responsive. The preparation and presentation of financials for the stakeholders needs to be done in more comprehensive and simple manner so that any stakeholder may able to assess the position of their local body and compare it with other local bodies.

The paper is to assess the relationship between the quality of financial reporting and disclosures made by the local bodies for the stakeholders and more particularly, for the general public so as to review whether the financial statements are being able to bring any transparency in its affairs and to contribute for 'Good Governance'. In turn, how much good governance can contribute by bringing more money for the new urban infrastructure and urban services? The effective and comprehensive financial reporting by the local bodies will strengthen the good governance and would support them in generating more avenues and sources of funds for financing their urban development programs.

### Key words:

Good Governance; Financial Reporting; Disclosures; Financing Urban Infrastructure

## The Geography of Startup City in China: The Importance of Financial Supports

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### Abstract

It has been widely observed that financial support is key to entrepreneurships in existing studies. The last decade has witnessed a tremendous growth of startups as well as the financial markets in China. Despite that the “mass entrepreneurship and innovation” has become a national agenda in recent years in China, few studies have investigated how financial development is related to entrepreneurships across cities in such a transitional economy. Drawing on a unique dataset of over 5000 publicly listed firms in the National Equities Exchange and Quotations in China, this study investigates the geography of startup cities and the role of finance in promoting startups across Chinese cities. It is found that there exists significant geographical concentration of startups and Beijing, Shanghai and Shenzhen are the most important startup cities in the country. Regression results show that better financial supports are significantly related to the number of startups of a city. In particular, the venture capital financing the better access to stock market financing are found to have positive effects on the growth and success of startups. There is strong evidence that more successful divestments of venture capital firms through initial public offerings, and particularly in Growth Enterprise Market, can significantly promote the entrepreneurships of a city.

### Key words:

startups; entrepreneurship; venture capital; stock market; geography

## The Making of Air Rights Market: Muddling Toward the Financialisation of Urban Space

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### Abstract

This paper sets an exploratory goal to assemble a variety of air rights-based urban policies that reflect the spatial processes of financialization and providing a topographical mapping of the ‘air rights’ sources, channels, and platform in the case of Taipei metropolitan area, Taiwan. The main inquiry of this paper is how do financial rationality and power intertwine within spatial practices. To simply put, it asks why the air rights are assembled? And by whom? Albeit diverse issues ranging from urban resilience, sustainability, to fiscal austerity are developing the action plans respectively, a shared motto is to formulate air rights-based instruments as the key to success risk management strategies. This paper casts doubt on such equation. It unbundles the equation through two parts: The first part explains the ‘whys’ through identifying the linkages between causes and strategies of risk management, and its spatial interfaces in Taipei and beyond through mapping the glocal resonances of these practices. The perspective of ‘assembling air rights’ attempts to juxtapose ‘air rights’ policies in the urban Taipei. It helps us spatializing financialization that underlies in the urban landscapes and urban dwellers’ everyday experiences. The second part features on the derivation of spatial-financial instruments and the transforming process of trading platforms of air rights. Both entries help us to depict the variegated processes of capital de-territorialisation through the spatial embodiment of financialization. In this chapter, I argue that the assemblage of air rights calls into question the everyday politics of urban dwellers. The utilization of air rights does not only reflect upon the restructuring of the urban landscape but also, display state-promoted ‘air rights based urban policy’ as new forms of capital accumulation regimes.

### Key word:

austerity; air rights; floor area bonus; liquidity; financialisation

## The New Financial Technologies and The Recent Bancarization of Brazilian

### Population

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#### Abstract

Since the 1990s various types of informational technical systems started to be used by Brazilian banks to the provision of financial services, such as ATMs, internet banking and mobile banking. These new technical systems brought more capillarity to banks action in the national space, and allowed a significant bancarization of the Brazilian population. The banking system that was more "analog" and presential, became more automatized and remotely assisted, through the intensive use of information techniques. According to the data of the Brazilian Federation of Banks (FEBRABAN, 2015), it is possible to identify the decrease of importance of the "traditional" channels of providing banking services (mainly bank branches), compared with contemporary/digital channels. In the period identified by the survey (2010-2014), the variation of the use of bank branches was negative (-2%), as well as the use of call-centers (-1%). The use of ATMs increased by 5%, the banking correspondents also grew by 6%, while the use of Points-of-sales (POS) increased by 14% and use of mobile banking, 17%. The most striking change was the use of internet banking, which grew 209% in the period. This new banking topology is one of the most important factors related to the increasing number of Brazilian population that have, at least, a bank account or/and a bank card.

#### Key words:

Financial Geography; bancarization; banking system; banking technology

## The Production of a Legal-financial ‘Nexus Space’ in Chinese Financial Centres

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### Abstract

This paper brings together existing work within two substantial bodies of work within economic geography concerned respectively with the geographies of finance, and the role of advanced business service industries in emerging economies. In recent years, there has been a growing emphasis in research on finance and legal services on the importance of understanding the nature of economic practices within and between firms, as well as the entanglement of these practices between industry sectors. Similarly, research on professional service firms has increasingly questioned the validity of viewing specific business service activities in isolation. This paper develops these arguments by presenting research into the entwinement of the finance and legal service industries involved in foreign investment into China. Drawing on research into financial and legal service firms in leading Chinese financial centres, it argues that because of the specific nature of the jurisdictional and regulatory spaces that exist, these industries are well understood as a professional service nexus that exists across specific physical, economic, organizational and social spaces. It goes on to contend that this ‘nexus’ space sets the frame by which foreign investment in China occurs with legal-financial actors being key intermediaries and gatekeepers in relation to the nature of foreign economic activity in the Chinese economy.

### Key words:

Finance; legal services; global financial centres; economic practices; China;

## The Spatial Agglomeration of Entrepreneurial Hedge Fund Firms in Hong Kong, Singapore and Beyond

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### Abstract

International financial center (IFC) development is a hot topic in today's global arena at the political level and within academic circles as they can have a significant impact on global, national, regional and local economies. A review of the extant literature on this topic reveals that very little scholarly attention has been directed towards the agglomeration patterns that persist in IFCs, especially in regard to the physical location of different type of financial firms based on their commercial activities, ownership structure, size, origin and so forth. In addition, despite the advances in Geographical Information Systems (GIS) over recent decades, it has been minimally used as a methodological framework to investigate IFC phenomena.

This research specifically investigates the agglomeration patterns of entrepreneurial hedge fund firms (EHF) in Asia's leading IFCs, Hong Kong and Singapore, by incorporating descriptive spatial analysis and a GIS platform that utilizes nearest neighbor analysis and point density analysis. It also touches on preliminary findings on similar research undertaken using the same framework in regard to IFCs located in Europe and North America. The results suggest that EHF firms agglomerate in IFCs with the most intense clustering occurring within close proximity to the nucleus of the main financial district with secondary patterns emerging near its vicinity and along its perimeter. Conceptually, the empirical findings yield an IFC spatial agglomeration prototype to potentially explain the overall spatial patterns and their spatial linkages to large institutions, which can serve as a spearhead for future research on IFC development.

### Key words:

agglomeration effects; international financial center; hedge fund firms; entrepreneurial; Hong Kong; Singapore

## Urban Planning in China: Land as A Leverage for Debt and Growth

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### Abstract

This article develops a more comprehensive framework of China's land driven-growth model that emphasizes the land revenues as a main incentive for urbanization and capital accumulation in China. Based on a strand of literature that highlighted the cost of urbanization carried by local governments and the necessity to get into debt via the use of local government financing vehicles, this article shows that from the start the land model is based on debt. In this, land is mortgaged to finance collective-purposes' projects and urban infrastructures which are the condition to the commodification of urban land. Three main mechanisms have been used to finance and produce urban infrastructure, involving three types of LGIV such as land development centers, state-owned companies and other private real estate companies in the case of a «contractor model». The local governments' debt through LGIV have been related with mainly the banking system, but also with the stock exchange (issuance of corporate bonds by SOEs) and increasingly with the less regulated non-banking system (some would say shadow banking), such as trust and fund finance organized at a national scale and such as various credit companies at a local scale. The banking and non-banking systems are however closely related since banks (branches of the 4 large state-owned banks and also more local/regional banks) function as «intermediaries or brokers» for LGIV to get loans from trusts or funds.

### Key words :

China; local government investment vehicle; urban infrastructures; land-driven model

## Urban Rent and Urban Value: A Territorial Approach

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### Abstract

Work, production and workers were the core of the industrial society: spatially, the workplaces governed the place of housing of the worker and his family as well as most of their lifestyle. The spatial division of labor induced a mobility of goods, and the mobility of people is usually restricted to the mobility of workers. In such society, territorial value depends on the local capacity to produce competitive products. The productivity in the export sector determines local incomes as well as the price of local rents.

The postindustrial society is characterized by the more and more important role of consumers and by the immaterial and symbolic stakes in the processes of value creation. In spatial terms, information and knowledge have become more mobile. We witness a de-coupling between the place and time of work on the one hand and the place and time of consumption on the other hand because of the increased mobility of customers: the place of work and the place where incomes are spent are dissociated.

In this paper, we suggest a territorial approach to economic value. The value is the result of two dimensions: a transactional dimension (mobility issue) and a spatial dimension (static issue). Actors are getting in touch with other actors through transactions, and through the getting in touch with other places. Places become stages and the various kinds of customers interact with those stages through transactions whether by moving to that place or by consuming products related to that place.

### Key words:

value construction; urban development; rent; endogenous development

## Where are Services Provided? Comparing the Financial and the Cultural Service

### Networks of the Pearl River Delta

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#### Abstract

While financial and cultural service activities have both attracted increasing attention in urban studies, little work has been conducted to explore the geography of their service provision from a comparative perspective. This paper fills the gap by providing a first analysis of the financial and cultural service networks of the Pearl River Delta (PRD) region in China. Drawing on the method of the World City Network Analysis, the paper compares the location patterns and the inter-urban networks of firms from two financial (banking and insurance) and two culture-related (advertising and legal services) service sectors within and beyond the PRD. The finding demonstrates the distinct service geographies and networks created by firms from these two sectors, as well as the diverse location strategies adopted by firms with local, national and foreign origins. Information from in-depth interviews reveals that the differences between sectors and firms not only reflect their development histories and client orientations in the PRD, but also are shaped by China's unique regulatory environment and complex state-market relations.

#### Key words:

financial services; cultural services; urban network; world cities; Pearl River Delta

## Why do Domestic and Foreign Venture Capital Firms Have Different Spatial and Network Configurations in China: A Comparison Study

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### Abstract

Corporate networks, in particular, the intra-firm networks of advanced producer service (APS) have been widely used to measure urban networks in existing studies. Recently, the inter-firm relationships have been found to be increasingly important to describe urban linkages. This study provides an alternative strategy to build up inter-city networks based on inter-firm collaboration linkages during the process of initial public offering (IPO), a typical high-end financing practice, in which APS firms—including securities, law firms and accounting firms—cooperate with each other for firms aiming to get publicly listed. It maps the overall pattern of Chinese urban networks based on the inter-firm collaboration linkages. City-Dyad analysis is used to identify the most connected city pairs. In addition, it applies the social network analysis (SNA) to explore the urban system in China. The results show that Beijing, Shenzhen and Shanghai have attained strategically dominant positions within Chinese urban networks; Beijing-Shenzhen has become the most influential city-dyad with regards to urban linkages measured by APS collaboration relationships in the country. Particularly, Beijing holds an overwhelmingly dominant position over other cities than expected, while Shanghai is found to be less important than what was found in previous studies. The collaboration linkages between APS firms prove to be an effective way to explore the urban networks in China.

### Key words:

advanced producer service; collaboration linkages; initial public offering; urban network; China

## Agglomeration of Economic Activities in the Ecuadorian Amazon: Development vs. Pollution

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### Abstract

In the Ecuadorian Amazon Region (RAE), the main economic activities that make it a strategic territory for the local and national economy are: agriculture, petroleum, mining, and wood exploitation that together compose the 70% of the national PIB. The region has a rich biodiversity and great potential for eco and bio technology. The objective of the present work was to assess and understand the potentiality and the possible scenarios of the RAE in terms of its economic system. For that, the classical central place theory was applied across a spatial and temporal analysis using GIS. The *Christaller and Lösch's* model was chosen, because the RAE is an isotropic space, perfect for the cartographic representation of the economy in the region. The study showed an urban area dependent from, agriculture and exploitation system, with dispersed population and a simple mobility system. Moreover, RAE shows a trend to concentration of the economic forces in its six province capitals; in particular, the development of the tertiary sector exhibited a clear agglomeration in urban centers in contrast with a dysfunctional distribution of the population. The influence of the new non-isotropic characteristics, for the geographical opening of RAE, allows the fine causes and future effects of a bad urban distribution related to its economic potential development. For these reasons, the reprogramming of roles and functions of RAE's urban system is key to a new vision for sustainable development of its economic system, its spatial distribution and its influence in the organization of the territory.

### Key words:

economic development; economic; agglomeration; isotropic space; amazon region.

## Green Bonds Implementation in India

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### Abstract

This paper aims to examine the potential of green bond implementation in India. It researched the green bond origination, history, definition and categories. India is now re-engineering the financial system by integrating sustainability, social responsibility and environmental factors. Outdoor air pollution in India has significant adverse impact on residents' health and the country's economic development. The main source of outdoor air pollution in India is from burning of coal. And to reduce the coal burning, there are three main solutions: increase renewable energy use, improve energy efficiency and enhance clean production. Case studies from the Yes Bank and CLP Wind farms on green bond issuance and their proceed use show evidential facts that green bonds could help air pollution mitigation by providing financial resources for energy efficiency and for leveraging more capital flow into the environmental area. Green bond implementation could potentially contribute two positives: a) green bonds could help solve the financial resource shortage for mitigating the air pollution problem, b) they can add to the environmental finance products' diversities. This paper finally explores the potential and the challenges of green bond issuance in India based on a key question: can green bonds help air pollution mitigation? By studying the green bond product (concept, feature, proceed use) and bond market, and analyzing the financial need for air pollution mitigation in India, we can conclude a positive answer to the question proposed. The paper applied literature review, case study and interview methods to pursue a conclusion.

### Key words:

Green bond; Air pollution; Sustainable finance; Mitigation; Policy reforms

## **Spatial Pattern, Evolution and Formation Mechanism of Financial Inclusion in the Process of Urbanization: A Case Study of Guangdong.**

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### **Abstract**

Financial inclusion is conducive to promoting the rapid development of urbanization to meet the needs of financial services. However, the nature of the capital, despising the poor and currying favor with the rich, makes the spatial pattern of China's financial inclusion appear significant differences in the process of urbanization. This paper takes Guangdong province, China's first economic province with first-mover advantages disappearing, as a case study. from three dimensions of penetration, usage and effectiveness of financial services, we construct a comprehensive evaluation index system of provincial financial inclusion, measure the intercity financial inclusion from 2002 to 2014. Analyze the spatial pattern and its evolution of financial inclusion by integrating the ArcGIS spatial analysis mode. The research showed that:(1) While the disparity of intercity financial inclusion was low, and relatively stable, the financial inclusion was far higher in the Zhujiang River Delta than the surrounding areas; (2) The intercity financial inclusion showed significant spatial correlation and spatial gathering characteristics, with obvious spatial disparity between the Zhujiang River Delta and the surrounding areas and basically stable evolutionary pattern. (3) The evolution pattern of financial inclusion disparity was affected by many interacting factors such as the strategy of the financial provider, the objective demand of the real economy development, the guidance of government economic behavior, social culture and institutions etc.This article argues, to improve the financial inclusion, what is important is to speed up the regional economic development, reinforce governmental regulation, to develop micro-finance, and to cultivate good institutional and cultural environment.

### **Key words:**

financial inclusion; spatial pattern; Guangdong

## C12.08 Dynamics of Economic Spaces

### Foreign Direct Investment and Migration



Home

#### Oral

1. [Adaptation Process and Migration of Korean in Guangdong, China](#)  
Jiyoung JEON (School of Geography and Planning/Sun Yat Sen University, South Korea), Yungang LIU (School of Geography and Planning/Sun Yat Sen University, China)
2. [Analysis the Influence Factors of Location Selection of Chinese Private Enterprises Direct Investment in the United States](#)  
Ying CHEN (Shaanxi Normal University, China)
3. [Bridging Company Locations – Transmigrants in Multinational Companies](#)  
Philip Müller (Osnabrück University, Germany)
4. [High and Low Tide of Foreign Direct Investment in The Retail Sector: The Case of Turkey](#)  
Inka Gersch (University of Osnabrück, Turkey)
5. [The Growth of Korean Transnational Corporations and the Role of Expatriates in Vietnam](#)  
Yangmi Koo (Seoul National University, South Korea)
6. [The Relationship between Outgoing Migration and FDI Flows in Eastern Europe. A Spatial Model](#)  
Corneliu IATU, Alina MUNTEANU, Bogdan IBANESCU (Alexandru Ioan Cuza University of Iasi, Romania)

#### Poster

1. [Labor Force Participation in Mongolia: Cohort Analysis](#)  
Byambasuren Lkhagvadorj (Mongolia, University of the Humanities)
2. [Population Migration and Its Social-Economic Impact of China in Future Climate Change](#)  
Yi Sun; Zheng Wang (China, Chinese Academy of Sciences)
3. [The Theoretical and Applied Research on Location Decisions on Direct Foreign Investment in West China from the Perspective of Industrial Development](#)  
Ji Yahui; Ji Xuan; Cao Xiguang (China, College of Economics, Northwest Normal University)

## Adaptation Process and Migration of Korean in Guangdong, China

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### Abstract

The development of transportation and communication made the whole world a globalization and many people leave hometowns and move to another countries to look for work, for studying abroad, for international marriage and so on. In other words, meaning of a border on a map seems to have blurred. Korean national residing abroad increases year by year, in particular according to the Ministry of Foreign Affairs in Republic of Korea in 2015, there are about 7,185,000 Korean people live in abroad, of which about 2,586,000 live in China. The purpose of this study is to clarify the process of the adaptation and migration of Korean national residing abroad in China by analyzing the economy activities of Korean and their community activities for living-based. The study area is Guangdong, the provincial capital Guangzhou and economic hub Shenzhen are among the most populous and important cities in China, also the number of Koreans living in Guangdong is growing. It's especially so in prosperous cities and special economic zones such as Zhuhai and Shenzhen, near Hong Kong. In addition, it has been 24 years since Korea established diplomatic ties with China. The earlier stage, Korean expatriates emigrated to China for their job, and the next stage was some Korean expatriates started their own business, self-employed Korean and Korean students studying in China. At present, there are many different regional variations on Korean national residing abroad in China, in particular most of these Korean have worked that clothing business in Guangzhou and electronics business in Shenzhen. In conclusion, adaptation processes and migration of Korean are highly diversified in Guangdong, and their economy activities and community activities relates to the regional economy in China.

### Key words:

Korean; migration; adaptation process; diversification; Guangdong; China

## **Analysis the Influence Factors of Location Selection of Chinese Private Enterprises Direct Investment in the United States: Based on State Level**

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### **Abstract**

The United State of America has been the most important country that accept Chinese Outward Direct Investment since 2003 .China's private enterprises have been the main strength in this trend, accounted for 60% of the proportion and continuous growth in 10 years. However, research on their space distribution and the influence factors of location choice based on stated level is rare. In this paper, the spatial distribution characteristics of China's private enterprises direct investment in the United States (from 2003 to 2013years) are quantitatively analyzed by using EXCEL and Arc GIS. The results illustrate that the spatial framework that Chinese private enterprises investment in the U.S.A presents one point (Great Lakes regions) and two belts (the Pacific coast and the Atlantic coast) structure. The motivation of Chinese private enterprises direct investment in the U.S.A have a clear market –oriented .The influence of location choice factors are studied by applying method of grey correlation and the conclusion is: state GDP, China's import volume of trade as well as the number of patents in a state have the greatest impacts on state location selection of Chinese private enterprises direct investment in United States of America.

### **Key words:**

China's Outward Foreign Direct Investment (COFDI); Private Enterprises; State Location Selection; the United States of America

## **Bridging Company Locations – Transmigrants in Multinational Companies**

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### Abstract

Since the 1980`s research on highly-skilled international migration gained importance, as economic globalization increases. The literature on transnationalism indicates that migration isn`t a single, unidirectional phenomena, but builds – on the basis of increased mobility – transnational spaces between countries of origin and destination. Until now research in the field of economic geography has been mainly focused on emigrant entrepreneurs and their ethnic networks, which operate as boundary spanner, circulating product and market knowledge across national borders. Even though some studies show the value of migrant`s personal abilities (intercultural competences, multilingualism) and social networks (intra-firm, extra-firm) at the firm level, their role in multinational companies are poorly investigated. The presentation will set out first a conceptual framework of transmigrants in Multinational Companies, which combines migration theory with approaches of economic geography. Second the framework will be illustrated with findings of empirical fieldwork in German affiliates in the automobile sector in Turkey. Based on qualitative interviews the study demonstrates the relevance of transmigrants in reproducing and transferring knowledge across space as well as in managing conflicts between headquarters and subsidiaries.

### **Key words:**

transnational migration; multinational enterprise; knowledge transfer

## High and Low Tide of Foreign Direct Investment in the Retail Sector: The Case of Turkey

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### Abstract

To categorize the global expansion of Transnational Corporations (TNC) in the food retail sector the picture of waves is often used. However, this simplified metaphor obscures that there are many cases in which TNCs withdraw from the target countries after some years of unsuccessful attempts to reach leadership in the respective market. The case study on the development of the Turkish grocery retail sector will be used to show how not only the expansion of TNCs in an emerging economy can influence the domestic agri-food networks but also their withdrawal can result in new dynamics. The article gives deeper insights into the current market developments in of Turkey: TNCs are incrementally leaving the Turkish market and rapidly growing domestic retail companies are buying the Turkish subsidiaries of the TNCs. The domestic supermarket chains seem to have successfully adapted the TNCs` processes but adjusted them to local habits and conditions on the distribution and the supply site. Local embeddedness seems to be the crucial advantages in the strongly consolidating market environment after customers and suppliers have grown up to the requirements of modern retail.

### Key words:

retail sector, foreign direct investment

## The Growth of Korean Transnational Corporations and the Role of Expatriates in Vietnam

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### Abstract

This study aims to explore the role of expatriates and immigrants in the development of Korean transnational corporations in Vietnam. After the normalization of the diplomatic relations between Korea and Vietnam in 1992, Korea's investment to Vietnam have increased drastically as the connection between them progressed positively. At the beginning of the 2000s, the investment to Vietnam from global transnational corporations has augmented. Many Korean firms also invested in Vietnam, which included not only TNCs but also small and medium-sized enterprises. Early expatriates and immigrants of those firms have played important roles in the formation of formal and informal networks for business activities. These individual actors have been intermediates of different culture and institutional settings between the home and host country while communicating with their corporate headquarters on a daily basis. Their knowledge and network has been important especially in the communist and bureaucratic community of Vietnam. This study will focus on expatriation as channels of information, mediators of knowledge transfer and business pioneers.

### Key words:

foreign direct investment; knowledge transfer; Korean transnational corporations; expatriates; immigrants; Vietnam

## The Relationship between Outgoing Migration and FDI Flows in Eastern Europe. A

### Spatial Model

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### Abstract

The rescaling of territories is evolving at a pace faster than ever, accelerated by globalisation and processes of regional integration and/or reconfiguration. While some of the geographical scales gain momentum (such as the global, the regional or the local ones), others seem to go into the background (such as the national one losing the forefront). European Union countries of Central and Eastern Europe are a good place for observing these changes, as they are encouraged - and sometimes forced by circumstances - to burn stages in rescaling territories and foster good governance at the appropriate levels. Taking these into consideration our study presents an overview of the challenges the concerned countries are facing in building good governance at local levels. Special attention is paid to the Romanian case, on issues such as the role of local financial autonomy, new forms of horizontal cooperation at local level and the challenges facing public-private partnership. Furthermore, the role of European financial instruments and that of the national programmes and development plans are being presented and discussed.

### Key words:

Local governance; post-socialist countries; public-private partnership; financial autonomy; local cooperation; European financial instruments

## Labor Force Participation in Mongolia: Cohort Analysis

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### Abstract

This study is to find the effect of the birth year of workers on the Mongolian working force, using the data from Work force survey of 2002 to 2012. To do so, I have split the sample into groups regarding the date of birth and cohort.

As social welfare schemes and monetary payments are present in Mongolia, the study looks at its effect on labor force participation. To do so people who have received payment is considered from 9 work force surveys and a variable of the amount of monetary payment is introduced and a probit model is estimated using the Maximum Likelihood<sup>1</sup> approach.

From the cohort analysis the young generation tend to be less active confirming the effect of birth year. The probit model shows that monetary payments or welfare payments have a negative effect on labor force participation.

### Key words:

Labor force participation, labor supply, cohort, social welfare, monetary payment

## Population Migration and Its Social-Economic Impact of China in Future Climate Change

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### Abstract

In this paper, the Potential Agriculture Production index is introduced to estimate the scale of population migration caused by climate change by analyzing the change of Potential Agriculture Production index. We found that, for the changes of Potential Agriculture Production caused by climate change, circum-Bohai-Sea region, mature industrialized region and the industrializing region as the main regions of emigrating population will face a severe labor shortage. In addition, this paper also constructs a multi-regional CGE model, and analyzes the impacts caused by the change of population distribution pattern on regional economy, regional gap and the residents' welfare. The results show that the economic growth rate of the population immigrating regions has been accelerated; correspondingly, the economic growth rate of the emigrating population region has been reduced, and the greater the population migration scale, the greater the impact on the economy; population migration expands the inner-regional gap, and narrows the inter-regional gap, however the overall regional gap is somewhat reduced.

### Key words:

Climate Change; Population Migration; Potential Agricultural Productivity; Regional Gap; Household Welfare



## The Theoretical and Applied Research on Location Decisions on Direct Foreign Investment in West China from the Perspective of Industrial Development

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### Abstract

Since 1990s, the study on direct foreign investment by developing countries has been attracting more and more attention internationally. China's direct foreign investment after China's financial crisis is particularly of interest to many scholars. With China's economic growth and "Belt and Road" strategy proposed, domestic scholars begin to direct their attention to West China's direct foreign investment. Based on relevant theories of direct foreign investment, this research makes an empirical investigation into the current situation and motives of the direct foreign investment by western regions, and analyzes the factors affecting the location decisions on direct foreign investment, aiming to provide from the perspective of industrial development the decision-making basis for direct foreign investment in West China

### Keyword:

direct overseas investment ; locational decision; industry development

## C12.09 Environment Evolution

### Environment Evolution and Human Activity in the Late Quaternary



Home

#### Oral

1. [Chronology of Paleo Climatic Changes in Caspian Sea Region of Last 150 Ka Based on New OSL-Dating](#)  
Redzhep Kurbanov (Institute of Geography RAS, Russian Fed), Tamara Yanina, Alexander Svitoch (M.V.Lomonosov MSU, Russian Fed), Nikolai Tkach, Nikita Sychev (Institute of Geography RAS, Russian Fed)
2. [Early Warning Assessment of Ecological Security in the Three Gorges Reservoir Area](#)  
Dongjie GUAN (Chongqing Jiaotong University, China)
3. [Effect of Clear-Cutting On CO<sub>2</sub> and H<sub>2</sub>O Exchange between Land Surface and the Atmosphere: Experimental and Modeling Study](#)  
Alexander Olchev (A.N. Severtsov Institute of Ecology and Evolution of RAS, Moscow, Russian Fed), Juliya Mukhartova (Faculty of Physics, Lomonosov Moscow State University, Russian Fed), Alexander Molchanov
4. [Evaluation of Heavy Metal Pollution in Surface Sediments of the Red River in Vietnam](#)  
Thi Thu Hien Nguyen, Zhang Weiguo (East China Normal University, China)
5. [Heavy Metal Pollution of History Cultural Layers in Kaifeng City, Henan Province, China](#)  
Yanfang Chen, Jianhua Ma, Lei Gu (Institute of Natural Resources and Environment, Henan University, Kaifeng, China)
6. [Historical Trends of Anthropogenic Metals in Eastern Tibetan Plateau as Reconstructed From Alpine Lake Sediments over the Last Century](#)  
Haijian Bing, Yanhong Wu, Jun Zhou, Rui Li (Institute of Mountain Hazards and Environment, China)
7. [Late Quaternary Environment Reconstruction Based on Organic-Walled Dinoflagellate Cysts and Pollen in South American](#)  
Fang Gu, Anastasia Poliakova, Hermann Behling (Goettingen University, Germany)
8. [Late Quaternary History of Manych Depression and Its Role in Evolution of Caspian and Black Sea](#)  
Redzhep Kurbanov (Institute of Geography RAS, Russian Fed), Tamara Yanina (Moscow State University, Russian Fed), Nikolai Tkach, Nikita Sychev (Institute of Geography RAS, Russian Fed), Elena Garova (Moscow State University, Russian Fed)
9. [Mid- And Late-Holocene Vegetation History, Climate and Human Impact in the Forest-Steppe Ecotone](#)

## of European Russia

Elena Novenko (M.V. Lomonosov Moscow State University, Faculty of Geography, Russian Fed)

10. [Multiproxy Survey of Landscape Change Following Early Settlement at KÚDÁ, Northeastern Iceland](#)  
Natasha Roy, Najat Bhiry, James Woollett (Centre d'études nordique and Département de géographie, Université Laval, Canada)
11. [Obtaining an Improved Chronology for the Kostenki Palaeolithic Sites \(Russia\).](#)  
Nikita Sychev (Institute of Geography RAS, Russian Fed)
12. [Optical and Radiocarbon Dating Of Wulanmulun Site in Ordos and Its Implications](#)  
Jiafu Zhang (Peking University, China)
13. [Paleo-Fire History Revealed By Charcoal Records in Daxing'an Mountain Of China](#)  
Xu xin, Li Yiyin (Peking University, China)
14. [Research on Environmental Evolution of Taihu River Basin and the Response of Water Resources System](#)  
DU Longjiang (China Institute of Water Resources and Hydropower Research, China), WANG Biyu (Department of Civil, Environmental and Geomatic Engineering, Swiss Federal Institute of Technology, China), WANG Luyi (Peking University, Shenzhen, China)
15. [Take Climate, Land-Use and Social Economy into Estimation of Carbon Budget](#)  
Ting Li, Jing Li, Keyu Qin (Tourism and environmental college of Shaanxi Normal University, China), Xiaonan Yan

## Poster

1. [A study of the Chong Zhen Drought Event from Pollen Records in the Western Suburbs of Kaifeng city, China](#)  
Dexin Liu; Jianhua Ma; Lei Gu (China, Institute of Natural Resources and Environment, Henan University)
2. [About the Quality of Cultivated Land Spatial Distribution Features and Application Results](#)  
Chenxin Deng; Dingguo Ma (Jiangxi Normal University)
3. [Analysis and Countermeasures of the Change of Atmospheric Environmental Quality in Urban Area of Chongqing City](#)  
Wang Pengfei (China, South West University)
4. [Dating Method of Young Oxbow Lake Sediments Based on the Analysis of the 210Pb and Environmental Events: Example from Oxbow Lakes in Jingjiang Section of the Yangtze River.](#)

Feng Wang (China, State Key Laboratory of Estuarine and Coastal Research, East China Normal University); Tiefei Jia (China, Department of Geography, Shanghai Normal University)

5. [Flood Damage Deduction Method and its Application on The Yellow River Alluvial Strata of the Kaifeng City](#)

Lei Gu (China, Insitute of Nature Resoure and Environment, Henan University)

6. [Formation Age and Stratigraphical Cycles in the Pearl River Delta during the Quaternary](#)

Shuqing Fu; Pingri Li (China, Guangzhou Institute of Geography)

7. [Formation and Environmental Significance of Late Quaternary Calcareous Root Tubes in the Deserts of the Alashan Plateau, Northwest China](#)

Zhuolun Li; Nai'ang Wang; Hongyi Cheng (China, Lanzhou University)

8. [Hydrological Reconstruction of Holocene Palaeofloods and Historical Floods in the Longmen Gorge of the Yihe River](#)

Guiming Hu; Chunchang Huang (China, Shaanxi Normal University)

9. [Interaction Between the Human and the Environment of the Jaydar Dam Lake \(southwest Iran\)](#)

Mojtaba Yamani (Iran, University of Tehran, Faculty of Geography); Siyamack Sharafi (Iran, at Iranian academic center for education, culture and research, Lorestan uint, Iran)

10. [Labrador Current Fluctuation during the Last Glacial Cycle](#)

Longjiang Mao (China, Nanjing University of Information Sciences & Technology); Piper David (Bedford Institute of Oceanography); Saint-Ange Francky (Bedford Institute of Oceanography)

11. [Landscape Conditions of Nature Use in Ancient Taman](#)

Viacheslav Nizovtsev (Russian Fed, Lomonosov Moscow State University); Natalia Erman (Russian Fed, S.I. Vavilov Institute for the History of Science and Technology of the Russian Academy of Sciences)

12. [Late Quaternary Climate Dynamics Inferred from Pollen and Grain Size Analysis along Yangze River](#)

Fang Gu (Goettingen University)

13. [Reconstucting Wetland Dynamics in Northeastern Iceland in Response to Climatic Change and Human Impacts over the Last 1000 Years.](#)

Isabelle Cyr-Parent (University Laval and Centre northern studies); Najat Bhiry (Canada, University Laval and Centre northern studies); Reinhard Pienitz (Canada, University Laval and Centre northern studies)

14. [Starch Granule Evidence for Broad-spectrum Subsistence Economy in Neolithic South Yangtze River](#)

## Basin, China

Zhiwei Wan (China, School of Geography and Environment, Jiangxi Normal University, Nanchang)

15. Studies of Landscapes-zonal Features of the Formation of Anthropogenic Landscape Genesis in Russia

Viacheslav Nizovtsev (Russian Fed, Lomonosov Moscow State University)

16. Submarine Canyons and Gullies on the Continental Shelf and Slope of Rhodes Island, SE Aegean Sea,

## Greece

Georgios Angelos Hatiris (Greece, Hellenic Centre for Marine Research/Institute of Oceanography/Hydrobiological Station of Rhodes, Rhodes, Greece & Harokopio University, Department of Geography, Athens, Greece); Vasileios Kapsimalis (Greece, Hellenic Centre for Marine Research, Institute of Oceanography, Athens, Greece); Andreas Sioulas (Greece, Hellenic Centre for Marine Research, Institute of Oceanography, Hydrobiological Station of Rhodes, Rhodes, Greece)

17. The Sequence Stratigraphy and Sedimentary Evolution of the Late Quaternary in the Lingdingyang Estuary, South China

Shi Cui; Peng Hua (China, School of Geography and Planning, Sun Yat-sen University)

## Chronology of Paleo Climatic Changes in Caspian Sea Region of Last 150 Ka Based on New OSL-Dating

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### Abstract

Chronology of the Late Pleistocene events of the Caspian Sea is one of the most interesting problems of stratigraphy and paleogeography of this large region. With no consensus view on age limits of number of transgressive and regressive stages of the Caspian Sea, rate of sea level change and its impact on the ancient society, the application of modern techniques allow to create a new reliable chronology for Caspian Late Quaternary.

The reference region for stratigraphy and paleogeography of the Caspian Sea is Lower Volga, with series of sections one of which, Srednyaya Akhtuba was chosen for dating of samples of marine and continental loess-soil deposits.

The study based on the method of optically stimulated luminescence using standard Riso OSL-reader accomplished at The Nordic Luminescence Dating Lab. Samples from the middle of the alluvial sands of Akhtuba stage corresponds to MIS-3 (first estimate - 37-40 thousand years), while the age of loess sediments in the bottom of the sequences, selected between the two upper soil horizons 1 and 2, corresponds to 81- 92 thousand years (MIS 5b-c).

The first estimates of the absolute age of Early Khvalynian deposits confirmed a series of radiocarbon dates, which had previously been highly controversial because of their large spread - from 25 to 10 thousand years (Arslanov, 2015). These age-assessment provide a basis for a significant "rejuvenation" of Early Khvalynian transgression of the Caspian Sea, the maximum stage of which, according to new data should take place at the end of the Late Pleistocene.

### Key words:

Caspian sea; paleogeography; geochronology; Quaternary stratigraphy; sea-level change; climate change; OSL-dating

## Early Warning Assessment of Ecological Security in the Three Gorges Reservoir Area

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### Abstract

According to the characteristics of Three Gorges reservoir ecosystem in Chongqing of China, the system dynamics models of economy, population, and environmental subsystems were established. Then, main parameters and their mutual feedback relationships were determined; meanwhile, historical value and simulation value were compared to verify this model. Moreover, 3 scenarios containing sustainable development, resource exhaustion and natural state were designed to simulate and determine the thresholds for the indices of ecological security; then, these thresholds were applied into the assessment indices of ecological security for obtaining the comprehensive score of ecological security of Three Gorges reservoir in Chongqing. The results demonstrate that the ecological security in the reservoir area has been emerging an increasing trend, but still in a relatively sensitive period.

### Key words:

Three Gorges reservoir area; systems dynamics; ecological security; thresholds

## Effect of Clear-Cutting On CO<sub>2</sub> and H<sub>2</sub>O Exchange between Land Surface and the Atmosphere: Experimental and Modeling Study

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### Abstract

The main goal of the study is to describe the possible impact of clear-cutting on H<sub>2</sub>O and CO<sub>2</sub>, as key greenhouse gases, between a land surface and the atmosphere. This is experimental and modeling study that integrates intensive field campaigns to derive the spatial and temporal variability of H<sub>2</sub>O and CO<sub>2</sub> fluxes, and development and application of local scale process-based turbulent transfer models to quantify atmospheric fluxes.

To describe the difference in the H<sub>2</sub>O and CO<sub>2</sub> exchange between anthropogenically changed and undisturbed forest the eddy covariance measurements was applied. To describe the spatial heterogeneity of soil respiration within the clear-cut area and surrounding forest the chamber method was used. During the field measurements it was shown the large variability of soil CO<sub>2</sub> emission within the clear-cut area and its strong dependence on environmental parameters. It was found that the plots with various damage degrees of the upper soil horizon, and non-damaged soil covered with a litter and felling remains are characterized by different respiration rates and different dependences on environmental factors.

To assess the influence of clear cuttings on turbulent transfer of H<sub>2</sub>O and CO<sub>2</sub> between land surface and the atmosphere the numerical experiments using the developed two- and three-dimensional transfer models were conducted. Modeling results showed that a clear-cutting leads to strong disturbance of vertical and horizontal exchange within the clear-cut area and surrounding forest.

The study was supported by grant of the Russian Science Foundation (14-14-00956).

### Key words:

clear-cutting; H<sub>2</sub>O and CO<sub>2</sub> fluxes; process-based models; eddy covariance; chamber soil respiration measurements

## Evaluation of Heavy Metal Pollution in Surface Sediments of the Red River in Vietnam

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### Abstract

Heavy metals are non-degradable in the environment and most of them have toxic effects on living organism. The content of heavy metal is an important index to evaluate the quality of river. In this study, fifty surface sediment samples were obtained from the river bank along the main channel from upstream down to the coast and subaqueous delta of the Red River in Vietnam. Two groups of heavy metals (Cr, V, Cu, Cd, Pb, Ni and Zn) can be distinguished in the Red River sediments. (1) Cr and V show strong correlations with particle size, Al, Fe, Mn and TOC, indicating the enrichments of these metals in the fine fraction with abundant Fe/Mn oxides, clay minerals and organic carbon. It suggests that particle size is one of the major factors influencing heavy metal concentrations, and these metals are derived primarily from natural sources such as weathering processes. (2) Cu, Cd, Pb, Ni and Zn do not show significant correlations with particle size. They show no obvious trends along the river. At some sites in the upstream, they show extreme high values. It suggests that these heavy metals are most probably influenced by anthropogenic input. According to the enrichment factor (EF), it is found that heavy metals pollution is present in the Red River sediments from upstream down to river mouth. Heavy metal pollution is most serious in the upstream. Here, Cd, Cu and Pb are the dominant pollutants, with their values reaching a moderate to high degree of pollution.

### Keywords:

heavy metal pollution, river sediment, the Red River

## Heavy Metal Pollution of History Cultural Layers in Kaifeng City, Henan Province, China

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### Abstract

Several dynasty palaces in Kaifeng city were buried underground by flood sediments of the Yellow River, forming the unique spectacle of “city overlapping city”. Different dynasty grounds meaning different cultural layers had various heavy metal concentrations and pollution degrees. In view of this, four 25-long drill cores in Kaifeng city ( $ZK_{sz}$ ,  $ZK_{yz}$ ,  $ZK_{ml}$  and  $ZK_{jm}$ ) with a division of 861 samples in total were obtained. The buried cultural layers including the Warring States (WS), Songjin (SJ), Early Ming (EM), Mid Ming (MM), Late Ming (LM) and Qing Dynasty (QD) of  $ZK_{sz}$ ,  $ZK_{yz}$  and  $ZK_{jm}$ , as well as WS, Mid Song, Late Song, Jin, Yuan Dynasty, EM, MM and LM of  $ZK_{ml}$ , were selected from the flood sediments. Then their heavy metal pollution degrees were assessed using pollution load index (*PLI*). Because of the location near the political, economic and cultural centers in different dynasties with more anthropogenic activities, the heavy metal pollution degrees of  $ZK_{sz}$  and  $ZK_{yz}$  were generally more serious than  $ZK_{ml}$  and  $ZK_{jm}$ .  $ZK_{sz}$  and  $ZK_{yz}$  had the same average *PLI* value of 1.5, indicating light pollution. The cultural layers of  $ZK_{ml}$  were not polluted except MM layer, while average *PLI* value of  $ZK_{jm}$  was 1.21 of light pollution. The WS, SJ, EM, MM, and QD layers were lightly polluted, with their respective average *PLI* values of 1.21, 1.84, 1.38, 1.27, 0.98 and 1.15, while LM layer was not polluted due to flood of Yellow River.

### Key words:

Kaifeng City; the Yellow River flood sediments; cultural layers; heavy metal pollution

## Historical Trends of Anthropogenic Metals in Eastern Tibetan Plateau as Reconstructed From Alpine Lake Sediments over the Last Century

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### Abstract

Reconstructing trace metal historical trends are essential for better understanding anthropogenic impact on remote alpine ecosystems. We present results from an alpine lake sediment from the Eastern Tibetan Plateau to decipher the accumulation history of cadmium (Cd), lead (Pb) and zinc (Zn) over last century, from the preindustrial to the modern period. Cadmium, Pb and Zn in the sediment of Caohaizi Lake clearly suffered from atmospheric deposition, and the mining and smelting were regarded as the main anthropogenic sources. Since the mid-1990s, over 80% of trace metals were quantified from anthropogenic emissions. The temporal trends of anthropogenic metal fluxes showed that the contamination history of Pb was earlier than that of Cd and Zn, which was in agreement with the regional Pb emission history, but lagged behind the Pb decline in Europe and North America. The fluxes of anthropogenic Cd and Zn were relatively constant until the 1980s, increased sharply between the 1980s and the mid-1990s, and then kept the high values. The anthropogenic fluxes of Pb showed a marked rise around 1950, and increased sharply in the 1980s. In the mid-1990s, this flux reached the peak, and then decreased gradually. The Pb deposition flux at present in comparison with other lake records in the areas of Tibetan Plateau further demonstrated that trace metals in the Caihaozi Lake region were probably from Southwest China and South Asia. Economic development in these regions still puts pressure on the remote alpine ecosystems, and thus the impact of trace metals merits more attention.

### Key Words:

Trace metals; atmospheric deposition; lacustrine sediment; alpine lake; Gongga Mountain

## Late Quaternary Environment Reconstruction Based on Organic-Walled Dinoflagellate Cysts and Pollen in South American

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### Abstract

Marine sediment cores GeoB2107-3 and GeoB6211-1 located in the South Atlantic Ocean off coastal of southern Brazil has been studied by dinoflagellate cysts and pollen to reconstruct the sea-surface currents circulation of the South Atlantic Ocean and the vegetation evolution during the last glacial and Holocene period. The aim is to understand the interactions between ocean changes and climate dynamics on the continent, and to discover how changes in the marine parameters such as seasurface currents, sea-surface temperature influence the local and global climate. Living organicwalled dinoflagellates and vegetation are very sensitive and greatly influenced by the environment change, so they are good indicators to reconstruct the physical water conditions and past vegetation changes.

The results show that during glacial times, grassland was dominant vegetation on the South American continent, indicating cold and dry climate, and dinoflagellate cysts data indicate that the Malvinas Current had a markedly stronger influence during the same period, particular during the last glacial maximum period. During Holocene period, the expansion of trees and tree ferns indicate humid and warm climate condition and together shows the increase of the sea-surface temperature in the South Atlantic Ocean. The similar climate background indicates that changes in the South Atlantic Ocean had a strong influence on the vegetation dynamics in South American continent during last glacial and Holocene times.

### Key words:

climate dynamics; the Atlantic Ocean; dinoflagellate cysts

## Late Quaternary History of Manych Depression and Its Role in Evolution of Caspian and Black Sea.

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### Abstract

Manych strait, that connected Caspian and Black Sea in Pleistocene, is unique paleogeographic event. Manych depression (that was the place of strait's occurrence) extends sublatitudinally from western coast of Caspian Sea to north-eastern part of Azov Sea. Pleistocene of Manych strait have important stratigraphic and paleogeographic significance in Ponto-Caspian history, because only here can be found direct relationship of Caspian and Black sea deposits. It is basement for correlation of deposits and events and creation of unified stratigraphic scheme of region. It is accumulated great amount of books and articles about this region.

Complex geomorphological and paleogeographical field work were carried out in central part of depression with mapping of territory and drilling (8 boreholes, max. depth 12 m) and 2 cores (depth of each appx. 45 m).

First results allowed to reconstruct preliminary scheme of paleogeographic events in the central part of the Manych depression in the Late Pleistocene. The beginning of Late Pleistocene (MIS 5e) was characterized by deep penetration of ingressive bay of Karangat interglacial transgression of the Black Sea into the Manych depression. Its water was quite high (at least 18-20 ‰) salinity that allow the existence of huge amount of Black Sea shells' complex. Transition to a glacial era (MIS 5d-a) led to the gradual retreat of Karangat bay from Manych depression to the Black Sea basin.

Preliminary results show complex geological history of Manych depression in Late Pleistocene. Research was supported by Russian Scientific Foundation, project 14-17-00705.

### Key words:

Caspian sea; paleogeography; Manych strait; Quaternary stratigraphy; geochronology; sea-level change

## Mid- And Late-Holocene Vegetation History, Climate and Human Impact in the Forest-Steppe Ecotone of European Russia

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### Abstract

Appropriate management of contemporary environments requires knowledge of their long-term history. We use palaeoecological data to explore how contemporary forest-steppe environments have been shaped by climate change and human impacts through the Holocene using the western Mid-Russian Upland as a case-study. Our paper presents new reconstructions of Mid- and Late Holocene climate, vegetation dynamics and local environmental change based on pollen, plant macrofossil and testate amoeba records from a site at Selikhovo (Mid-Russian Upland, Russia). Eutrophic fen vegetation dominated by *Phragmites australis* developed around 6800 cal yr BP and has been resilient to episodes of local burning and variable input of mineral material through the Holocene. New and previously-published data show that the boundary between broadleaf forest and steppe occupied a similar position to present during the period 7000–4800 cal yr BP, despite a warmer and drier climate, but shifted to the south following climate cooling and an increase in precipitation from 4800–2500 cal yr BP. A subsequent decline in woodland cover was caused by both climate change and human impacts, with human activity becoming increasingly significant over the last two millennia. Prior to major human disturbance (about 1700 cal yr BP) the landscape was dominated by mixed broadleaf-pine forests with some spruce covering about 60% of the study area. Our results emphasize the variability of steppe-forest habitats over long time periods and the need to consider human impacts and climate change when setting targets for habitat conservation.

The study was supported by RFBR, project №14-05-00550-a

### Key words:

Holocene; Palaeoenvironment; Palaeoclimate; Pre-agrarian landscape; Pollen; Plant macrofossil; woody coverage.

## Multiproxy Survey of Landscape Change Following Early Settlement at KÚÐÁ, Northeastern Iceland

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### Abstract

As part of the research program of the *Archaeology of Settlement and Abandonment of Svalbard project*, a series of peat core and monoliths were collected from localities of an abandoned farm sites in the Svalbarðstunga region of northeastern of Iceland. Although the climate is considered the main factor of environmental changes in the North Atlantic islands over the last millennium, in Iceland, it seems that humans have caused the opening of landscape due to over-use of wood resources. But to what extent, the Norse were able to benefit from their environment to adapt to climate change? To answer this question, a multi-proxy paleoecological study (pollen, diatoms and macrofossil) was jointly undertaken the excavation of an ancient farmhouse, Kúðá, located in Svalbarðstunga. According to our data, ecological changes take place well before human occupation. In fact, Birch woodlands had virtually disappeared from inland areas by 5910 cal yr BP at Kúðá. By the time of the initial Norse settlement of the region, *Betula* sp. was scarce and appears to have taken the form of shrubs and isolated trees. The initial settlement of Kúðá appears to have occurred at circa AD 960, as indicated by the occurrence of charcoal, ecofacts and synanthropic insects in off-sites contexts. This result implies a relatively early and rapid spread of Norse colonisation to the inland zones of northeastern Iceland. Human settlement and the expansion of sheep grazing during and following the MWP promoted the spread of sedge species and facilitated the introduction of new plants.

### Key words:

paleoecology; northeastern Iceland; climate changes; environmental changes; human impact.

## Obtaining an Improved Chronology for the Kostenki Palaeolithic Sites (Russia).

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### Abstract

The Kostenki group of palaeolithic sites are unique on the East European Plain, both in terms of density and variety. We have undertaken an extremely detailed study of geological features. A combination of different geochronological methods have been used to make reliable chronology for these reconstructions. A large number of radiocarbon ages are available, based on charcoal or bone derived from the deepest cultural horizon. Unfortunately, recent studies have shown that dating, based on these materials can underestimate the age by up to 70% (Higram, 2011). Ages were also obtained by tephrochronology (Giaccioi, 2006) of an ash-rich horizon present in this section (41-38.5 ka). In addition, palaeomagnetic studies indicated the presence of the Lashamp excursion (40 ka). Unfortunately, investigation into the usefulness of infra-red luminescence signals from feldspar showed that this signal is unstable. Because of inconsistencies, which are often between data from various geochronological methods, during field work in 2015 a series of samples was collected for quartz for Optically Stimulated Luminescence dating. We obtained 7 dates, using sand-sized quartz and a SAR protocol in the section Kostenki-14, supporting the suggestion that the ages obtained by radiocarbon for the cultural horizon underestimate the real age. Elsewhere in the section, age inversion and other analyses of properties and characteristics of the material indicate a likely slope deposit genesis. We have begun to use single grain quartz dating; the first results are expected in the near future, which will help to advance a reliable geochronology for the Kostenki complex.

### Key words:

OSL-dating; Paleolith; stratigraphy; Late Quaternary; Human evolution; ; paleogeography

## Optical and Radiocarbon Dating Of Wulanmulun Site in Ordos and Its Implications

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### Abstract

Now radiocarbon and luminescence techniques are most widely used dating tools for Paleolithic sites. Especially for the luminescence (including thermoluminescence (TL) and optically stimulated luminescence (OSL) dating method, its application in determining the sites >40 ka (close to or beyond the upper limit of the radiocarbon method) or without organic material has been increased significantly. Recently, we have used the two methods to date the Wulanmulun site in Ordos, China. Here we compare the dating results of the ages obtained from the two methods and assess their reliability. The radiocarbon ages (33-41 cal. ka BP) obtained for the cultural deposits from the site by the conventional ABA method are much less than the OSL dates (50-65 ka), but the radiocarbon ages obtained from the new ABOX method are in agreement with the OSL dates. This implies that radiocarbon ages obtained from the conventional ABA method are much underestimated. The implication of the radiocarbon age underestimation of old charcoal samples from the site is that the radiocarbon age of such old charcoal samples from some archaeological sites in China may need to be re-evaluated or re-dated. Combined with pollen and fauna data, the paleoenvironment of the site during occupation is reconstructed.

### Key words:

Wulanmulun Paleolithic site; Radiocarbon dating; Luminescence dating; Paleoenvironment

## Paleo-Fire History Revealed By Charcoal Records in Daxing'an Mountain of China

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### Abstract

Charcoal records from two high resolution peat profiles in Daxing'an Mountain revealed the paleo-fire history over the past 1700 years. CharAnalysis is used to identify the fire events and to calculate mean fire frequency (MFF) and fire return intervals (FRI). Results showed that these two sites have different fire trends. 12 fire events were identified in TQ peat profile over the past 1700 years with 81 years of mean FRIs, and MFF was 3.5 fire events per 500 years. Three periods of high frequent fire were 1250~1650 year BP, 900~1000 year BP and 50~150 year BP, respectively. 12 fire events were identified in PG peat profile over the past 1300 years with 87 years of mean FRIs, and MFF was 4.3 fire events per 500 years. Four periods of high frequently fire were 1150~1250 year BP, 850~950 year BP, 450~750 year BP and 50~150 year BP, respectively. Fire activity not only responded to regional climate changes, but also presented local characteristics. The different results of two sites may relate to biomass burning, geomorphic conditions and human impacts.

### Key Words:

Charcoal; Fire history; CharAnalysis; Daxing'an Mountain

## Research on Environmental Evolution of Taihu River Basin and the Response of Water Resources System

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### Abstract

In over thousand years of development history of the Taihu Lake Basin, the water resources systems play a core role in human-nature relationship. The construction and maintenance of water resources systems embody human beings' adaptation to the brooky area and development of the resources. By comparing the natural environment changes in the Taihu Lake Basin with the layout and use of water resources systems, this paper concludes the changing characteristics and the inherent law of human-nature relationship. The results show that:

1. Artificial water resources systems have inner instability and interacts with outer destructive factors. The water resources systems mostly have negative impact on natural environment.
2. Mature water resources systems contribute much in the beginning of the construction. But they gradually become the technology lock-in of social development, which brings hindrance to the reform of economic structure.
3. Through research on Contend with each other of hydrology and water resources systems and deep understanding of the human-nature relationship, this paper reevaluates the advantages and disadvantages of grand water resources engineering systems.

### Key words:

Environmental evolution; water resources system; the Taihu Lake Basin; human-nature relationship

## Take Climate, Land-Use and Social Economy into Estimation of Carbon Budget

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### Abstract

Global climate change is increasingly recognized as major threat to ecological balance. Mapping and valuing ecosystem services by considering natural and social factors synthetically is an inevitable trend of ecosystem services research. This paper set up 24 scenarios comprised of land-use, climate change, population growth and carbon emission. Then we quantified carbon sequestration (aboveground and underground) under varies climate and land-use scenarios by using the model of Carnegie-Ames-Stanford Approach and carbon cycling, and quantified carbon emission caused by human activities through spatiality of population density. We also assessed the economic value of carbon deficits and profits under different carbon price and discount rate scenarios by using Net Present Value. Our results show that the whole Guanzhong-Tianshui economic region shows a significant carbon deficit: carbon source range from  $5.66 \times 10^9$  t to  $1.84 \times 10^{10}$  t while carbon emission caused by human activities range from  $0.51 \times 10^8$  t to  $0.64 \times 10^8$  t. The value of carbon deficits range from  $2.02 \times 10^9$  RMB to  $1.12 \times 10^{10}$  RMB. Deforestation, urban sprawl, population explosion and excessive carbon consumption are the main challenges to the balance of carbon source and sink. Carbon price and discount rate can be effective tool to control excess carbon consumption. The result of this study provides a reference for harmonious and sustainable development of study area.

### Key words:

Carbon sequestration; Ecosystem services; Scenario; Guanzhong-Tianshui economic region

## A study of the Chong Zhen Drought event from pollen records in the western suburbs of Kaifeng city, China

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### Abstract

A 9-m long core was obtained from the western suburbs of Kaifeng City. Detailed pollen analysis, along with AMS<sup>14</sup>C dating, grain size and historical documents revealed an extreme drought event in the Late Ming Dynasty in North China. Sediments below the surface of 0-1.8 m interval of the core are the Yellow River warping layer in the mid-20th century and the recent accumulation layer. In the years AD 1642-1644 and AD 1841, the Yellow River flood sediments deposited below the surface of 4-7.8 m interval and 1.8-4 m interval respectively. It turns out that the 5-7.8 m interval's palynological assemblage proved the Chongzhen Drought event. During the time when the 6.7-7.8 m interval was deposited, the percentage of arboreal pollen dramatically decreased, while Chenopodiaceae pollen increased remarkably, drought indicator species such as *Nitraria* and *Ephedra* pollen also appeared. The percentage of arboreal pollen increased, however, particularly that of *Pinus* pollen when the 5-6.7 m interval was deposited. Probably because decrease of vegetation coverage and increase of precipitation variability in the middle reaches of the Yellow River during the drought, which led to more pollen of the topsoil into the Yellow River and transport with water. Large arboreal pollen were carried by the flood to the downstream due to suspension ability and deposited in the water slowly or nearly stagnation. In addition, the surface of the Yellow River flooding sedimentary would also accept local pollen, regional pollen and extra-regional pollen, especially *Pinus* pollen under the influence of the wind.

### Key words:

The Yellow River flooding sedimentary strata; Chong Zhen Drought; pollen; sedimentary cycle; Kaifeng city

## About the Quality of Cultivated Land Spatial Distribution Features and Application

### Results

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#### Abstract

Cultivated land is an important agricultural resource, and its quality fit and unfit quality directly concerns the development of the national economy. Scientific and reasonable cultivated land protection partition into the key of quality assurance. In this paper, it cultivated land quality, available land and the economic index of spatial variable, the local spatial autocorrelation analysis combined with moran scatterplot chart, and determined by global autocorrelation index weights matrix partial correlation analysis, to explore it cultivated land use spatial agglomeration level and output level rule, and it the cultivated land protection partition scheme is put forward.

Research shows that: it there was a spatial distribution rule of cultivated land quality index, index and the natural spatial correlation between the use of such as, economy, etc. HH, LL region take the form of "group", no obvious concentration, LH, HL area, scattered. Cultivated land protection partition scheme based on partial autocorrelation results, give full consideration to the natural conditions of cultivated land, using conditions and economic conditions. Join the concept of "space" at the same time, expand the partition basis, more scientific and precise, provide reference for it the cultivated land protection.

#### Key words:

Jianshi; Cultivated land quality index space scale; Cultivated land protection

## **Analysis and Countermeasures of the Change of Atmospheric Environmental Quality in Urban Area of Chongqing City**

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### **Abstract**

In order to get the variation trend of annual seasons of atmospheric environmental quality in Chongqing, this article analyses by using the environmental monitoring data of five function areas provided by environmental protection agency of Chongqing from 2007 to 2014. According to partial materials of environmental protection bureau in Chongqing from 2007 to 2014, we analyse the trend of atmospheric pollution, the differences of geography, the corresponding changing of all kinds of air quality indexes over time. We can draw the conclusions that summer is the best season considering to air quality in Chongqing. Quite the opposite, the most heavily polluted season of a year is winter. There are a peak and a valley in a year. Though the analysis of meteorological conditions of Chongqing, it can be found the correlations between air environment quality and meteorological conditions like temperature, precipitation, sunlight. So, it can provide environmental evidences for the development of five function areas in Chongqing.

### **Key words:**

Atmospheric pollution; Variation; Environmental quality

## Dating Method of Young Oxbow Lake Sediments Based on the Analysis of the $^{210}\text{Pb}$ and Environmental Events: Example from Oxbow Lakes in Jingjiang Section of the Yangtze River.

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### Abstract

High-resolution and highly precise dating methods for recent lake sediments (last 50-100 years) are essential for quantitative paleoclimate research. Three oxbow lakes, i.e. Tiane'zhou (TE core, 85cm), Zhongzhouzi (ZZ-2 core, 89cm) and Chiba (CB-1 core, 91cm) in Jingjiang section of the Yangtze River were selected for understanding the dating method of young oxbow lake sediments. Dating of the  $^{210}\text{Pb}$  and characteristics of the grain size and frequency dependent susceptibility were analyzed. After combining local chronicles with environmental events, such as river/lake transformation events and flood events, which indicated by sediment characteristics, a new dating method with three steps was recommended: (i) According to the  $^{210}\text{Pb}_{\text{ex}}$  specific activity changes, the average deposition rate was calculated by constant initial concentration(CIC), and the date range of the sediments was determined. The results in the cores of TE, ZZ-2 and CB-1 are 0.88cm/a, 1.26cm/a and 1.49cm/a. (ii) According to the average deposition rate and the diagnostic characteristics of the grain size and frequency dependent susceptibility, the possible sediment depth of the river/lake transformation event layer was found. Then deposition rate was checked by segments. The average deposition rate of layer B (lake sediments) and layer A (fluvial sediments) were obtained respectively before and after river/lake transformation events. In TE core the average deposition rate of layer B is 0.63cm/a and layer A is 1.07cm/a. In ZZ-2 core the average deposition rate of layer B is 0.89cm/a and layer A is 1.85cm/a. (iii) Cross-validation with historical flood events of known age. According to the flood events, age model was checked again. Eventually, the chronology sequence was established. Although this method is lack of absolute age of the experimental data, the result from the double check of environmental events is closer to real ages of oxbow lake sediments, and the method improved the accuracy of using the  $^{210}\text{Pb}$  chronology analysis on short time scale in lake sediments.

### Keywords:

Oxbow lakes; sediment chronology analysis;  $^{210}\text{Pb}$ ; river/lake transformation events; flood events

## Flood Damage Deduction Method and its Application on the Yellow River Alluvial Strata of the Kaifeng City

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### Abstract

With too much of silt, the inundation of the Yellow River buried Kaifeng city in several dynasties, forming the unique spectacle “city overlap city”. The extent of damage created by the Yellow River flood to Kaifeng city is closely related with the flood intensity. In order to deduct the relationship between the Yellow River and the decline of Kaifeng city in turn, it is vital to propose the deduction method for flood risk index of alluvial strata. Three drill cores ( $ZK_{sz}$ 、 $ZK_{yz}$ 、 $ZK_{ml}$ ) were selected in urban area of Kaifeng City and 1 controlled core ( $ZK_{jm}$ ) in the suburbs, and each core depth is 25 m. On the basis of sediments grain size analysis and sedimentary cycle division, extracted 4 indicators, which induced the information of the flood intensity from the sedimentary strata, to describe the flood risk index of the Yellow River quantitatively. They are the ratio of sand and clay ( $RSASH$ ), deposition thickness( $H$ ), corresponded grain-size value ( $\Phi$ )of the intersection point of bedload line and saltation line and the slopes of the saltation line( $S$ ) in the grain size probability cumulative curve. Before the total flood risk index( $FI$ ) calculation, we carried on the standardization of the data range and assigned weight index to the indicators. On the basis of “Mean  $\pm$  Standard Deviation”, the  $FI$  were divided into 4 grades, which are weak ( $FI < 0.199$ ), moderate ( $0.29 \leq FI < 0.363$ ), strong ( $0.363 \leq FI < 0.528$ ) and very strong ( $0.528 \leq FI$ ). Combined with the historical documents, deduced the relationship between the Yellow River and the decline of Kaifeng city in turn.

### Key words:

The ancient capital of Kaifeng;The Yellow River flooding;Alluvial strata; total flood risk;Deduction method

## Formation Age and Stratigraphical Cycles in the Pearl River Delta during the Quaternary

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### Abstract

According to the common knowledge, only Late Pleistocene sediments, deposited since about 40 ka B.P., can be found in the Quaternary System of the Pearl River Delta (PRD) plain. And one or two weathering layers, which indicating depositional discontinuity and large-scale sea-level change, were sandwiched in the Late Pleistocene series. There is no relatively continuous stratum since the Mid-Pleistocene has been reported in the PRD plain, except a few ages of 130~550 ka B.P. dated by thermoluminescence (TL) or Optically Stimulated Luminescence (OSL) techniques. In recent study to a boring-core section from the west PRD plain, six red or brown weathering layers were found for the first time, showing at least six times paleoenvironmental change cycles. Through the preliminary age dating and correlation with other records from coastal areas of Southern China, the formation of this sediment profile may date back to the early stage of Late Pleistocene or even Mid-Pleistocene. It should be the first profile found so far in the PRD plain with the most stratigraphic cycles and the longest time span. As further study is performing and if the result is confirmed, it will create a milestone for both the PRD plain's formation history and the frequency of regressive and transgressive during Quaternary in PRD.

### Key words:

Formation age; Stratigraphical cycle; Pearl River delta; China

## Formation and Environmental Significance of Late Quaternary Calcareous Root Tubes in the Deserts of the Alashan Plateau, Northwest China

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### Abstract

Calcareous root tubes are widely distributed across the Badain Jaran Desert and the Tengger Desert of the Alashan Plateau in northwest China. However, the reliability of their  $^{14}\text{C}$  dating results and their environmental significance remain unclear. In this study, the conventional  $^{14}\text{C}$  ages of 31 calcareous root tube samples and one aquatic mollusk shell sample, which were all collected from the Badain Jaran Desert and the Tengger Desert, were measured. The results reveal that nine of the 14 calcareous root tube samples from the Badain Jaran Desert were from Marine Isotope Stage (MIS) 3, while two samples were from MIS 2; the other three samples were dated to the mid-Holocene, one of which is consistent with the aquatic mollusk shell sample collected from the shoreline of Zhunzhahanjilin Lake in the Badain Jaran Desert. Moreover, the 17 calcareous root tube samples from the Tengger Desert were all dated to the mid- and late-Holocene, most of which were from the mid-Holocene. The results demonstrate that calcareous root tubes can be used as  $^{14}\text{C}$  dating materials and that the accuracy of their  $^{14}\text{C}$  dating depends on the time scale. The dating results were reliable at the millennial scale. However, the reliability of the ages from MIS 3a is lower than that of the Holocene ages, though the ages were reliable in tens of thousands years. Based on the statistical analysis, the overwhelming majority of calcareous root tubes collected from the deserts of the Alashan Plateau were formed during MIS 3a and the mid-Holocene. The concentrated emergence of calcareous root tubes in phases implies that they were formed during periods of relatively humid environments in desert areas, arid regions. Moreover, the results indicate that the effectivity of the moisture level probably affects the formation of calcareous root tubes, and the presence of calcareous root tubes indicates the occurrence of periods of relatively humid environments in the study area.

### Key words:

Calcareous roots tubes; Radiocarbon; Late Quaternary; Holocene; Desert

## Hydrological Reconstruction of Holocene Palaeofloods and Historical Floods in the Longmen Gorge of the Yihe River

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### Abstract

In this study, palaeoflood hydrological and sedimentary investigations were carried out in the Yiluohe River basin. Typical loess- soil stratigraphy of the Holocene period was identified at the Longmenxia (LMX) site in the Yihe River basin. Based on the analysis of sedimentary characteristics, magnetic susceptibility and particle-size distribution, the five flood slackwater deposits were identified and interbedded into the loess- soil stratigraphy. By the stratigraphic correlation and the optically stimulated luminescence method (OSL), the four episodes of flooding events occurred at 3100-3000 a BP, 1800-1700 a BP, 770-610 a BP and 420-340 a BP, respectively, namely at the end of the mid-Holocene Climatic Optimum and the beginning of the late Holocene, the dynasties of Eastern Han to Western Jin, Song-Yuan and the Ming- Qing, respectively. These flooding events might include the AD223 and 1761 flooding events and they well corresponded to the phase of the Holocene monsoonal shift, climatic abrupt change and climatic decline. The flooding peak stages were estimated with the elevations and the depositional depths of the SWD. According to the flood peak stages and hydraulic parameters, the peak discharges were reconstructed at 14100-15800 m<sup>3</sup>/s with the slope-area method. The reconstructed peak discharges of the flooding events are much more than those of the gauged modern floods at the Longmenxia gauge station in the middle reach of the Yihe.

### Key words:

palaeoflood; slackwater deposits; Yiluohe River; Holocene

## Interaction between the human and the environment of the Jaydar Dam Lake (southwest Iran)

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### Abstract

The occurrence of Seymareh landslides, has caused the Kashkan River to be blocked and as a result Jaydar Dam Lake was formed. This blocking, as a result of the landslide, has changed the path of the Kashkan River, and thus it has caused the lake to sustain for a long period of time. Thermo luminescence dating of the lake sediments shows that the Seymareh landslides in  $5000 \pm 85000$  years ago, has caused the formation of the Jaydar Lake in this time zone and the lake has been also evacuated about  $700 \pm 5000$  years ago. Therefore, the dam lake has been existence for about 80,000 years. Moreover, the current research indicates that the settlement patterns of archaeological sites of the Epipaleolithic to Islamic period in connection with the formation of the lake. Due to the long-term sustainability of the lake (85000 to 5000 years ago), Archaeological sites in the Epipaleolithic to the early Iron Age formed in the lake area, and changes in the heights of the sites locations indicate the fluctuations in the lake water level. Furthermore, the results show that during the Neolithic period the lake's water level was in its highest level. In the early historical period, the lake has been completely discharged, and then drying the sediment has led to a proper living conditions for people in the area.

### Keywords:

Seymareh Landslide; Kashkan Valley; Jaydar Lake; archaeological site; settlement pattern.

## Labrador Current Fluctuation during the Last Glacial Cycle

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### Abstract

Records from cores 2011031-059 and 2011031-062 (hereafter 59 and 62) have been used to reconstruct changes in the strength of the Labrador Current in northern Flemish Pass during the last glacial cycle. Grain size proxies for current speed, planktonic foraminiferal  $\delta^{18}\text{O}$ , X-ray diffraction analysis for dolomite and calcite, and abundance of ice-rafted detritus (IRD) have been determined. An age model back to MIS 5e is based on recognition of eleven Heinrich events from total dolomite and calcite, confirmed by O-isotope stratigraphy and radiocarbon dates. A straight-line relationship between sortable silt mean size ( $\overline{SS}$ ) and percent of sortable silt (SS %) and non-relationship between  $\overline{SS}$  and IRD (>500  $\mu\text{m}$ ) indicate well-sorted sediments in cores 59 and 62, which can be used to reconstruct the paleocurrent intensity. Intensified current velocity occurs in MIS 5c, 5a, 3 and 1, so that warmer periods show faster currents, probably through the Irminger Current component of the North Atlantic sub-polar gyre. Low values of  $\delta^{18}\text{O}$ , SS% and  $\overline{SS}$  correspond to most H events, suggesting a slowdown in the Labrador Current, followed by a rapid return to strong circulation. In some cases current strength recovery lagged slightly after the H events. Correlation with deep-water current strength records in the Iceland Basin show a broad correlation on a multimillennial scale with Labrador Current variations. As our study is on a shallow sediment drift formed by the Labrador Current, one of the surface currents of the North Atlantic sub-polar gyre, it provides new evidence for a tight connection between surface current strength fluctuation and the strength of the deep thermohaline circulation.

### Key words:

North Atlantic Oceanic Circulation; North Atlantic subpolar gyre; meltwater events; Heinrich Events; Deep water formation; last glacial cycle; Labrador Current

## Landscape Conditions of Nature Use in Ancient Taman

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### Abstract

The landscape structure of the Taman Peninsula is dominated by seaside hilly-ridge type of terrain - with adherent mud volcanoes, as well as all the settlements of the peninsula. In ancient times, the peninsula was an archipelago of islands occupied by residential lands, steppe and in part forest landscape complexes. Economic development has affected virtually the entire territory of the islands - all the land suitable for cultivation in this period have been delimited. The lands free from cultivation were overgrown with bushes slopes of high coasts, steep slopes of ridges and peaks of mud volcanoes. An extensive network of ravines served as pastures and hunting grounds. Perhaps this was the first experience in Russia of the landscape contour agriculture. Detailed landscape and historical studies in the vicinity of the village Sennoy (the region of ancient cities Phanagoria and Kepoi) have let establish the dependence of the development of the settlement structure of the ancient time on the local landscape conditions. Cities, villages and farm lands were naturally incorporated into the landscape structure, which allowed to engage in complex economy that provided for own needs in the required amount of food supply. The most developed were the landscape complexes of low sloped plains and valleys of synclinal origin, elongated in the latitudinal direction. They are characterized by the presence of fertile black soils, the proximity of springs and groundwater outlets or allowing artificial reservoirs, as well as protection from adverse weather effects. These were the valleys in ancient times that were the most populated and cultivated. (The work is performed under project №14-05-00618 of the Russian Foundation for Basic Research)

### Key words:

Taman Peninsula; landscape; Phanagoria; Kepoi

## Late Quaternary Climate Dynamics Inferred from Pollen and Grain Size Analysis along Yangze River

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### Abstract

Yangtze River, the world's third largest river, derived from the glacier melt water of Tanggula Mountains on the Qinghai-Tibet Plateau and input into the East China Sea. The water volume of Yangtze River is influenced greatly by the climate dynamics. Two cores NT01 and CZ1-1, located oppositely of the Yangtze River alluvial plain, under the influence of the north subtropical, warm temperate monsoon climate and influenced frequently by the East China Sea. Due to the special regional location and tectonic characteristics, the study area is very sensitive to the climate change, grain size and pollen analysis were applied to the sediment samples of the two cores. From the grain size and pollen analysis, the past deposition mode and past vegetation can be inferred. The results also show that during the MIS-5 and the late MIS-3 phases of deep sea oxygen isotope records, transgression events happened frequently in the study area.

### Key words:

Yangtze River; pollen; grain size; late Quaternary; the East China Sea

## Reconstructing Wetland Dynamics in Northeastern Iceland in Response to Climatic Change and Human Impacts over the Last 1000 Years

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### Abstract

The Svalbarð farm was established in the 10<sup>th</sup> century and is located in the Svalbarð Valley, which formed on the Pistilfjörður shelf in northeastern Iceland. It is the main farm in the valley and is still active in the present day. Over the last 1000 years, several secondary farms were also established in the valley that had direct and indirect relationships with the Svalbarð farm and were then abandoned. Most of these farms were abandoned at different times, but the reasons for their abandonment remain unclear. Since the 1990s, archaeological studies have been conducted in this valley, but little paleo-environmental research has been done.

The aim of this project is to reconstruct the paleo-environmental conditions of Svalbarð Valley in response to recent climate change and human activity. Specific objectives were 1) to date the established peatlands in Svalbarð Valley and reconstruct their temporal evolution; 2) to document lake evolution in the vicinity of a satellite farm; 3) to estimate the impacts of known climatic periods (Little Ice Age and Medieval Climate Optimum) on the evolution of peatlands and lakes; and 4) to identify anthropogenic signatures present in lacustrine sediments. The following hypothesis was tested: the wetlands located on the northeastern part of the island were affected by climate and anthropogenic activities more than other coastal regions of Iceland because of their location.

Analyses of peat and lacustrine sediment (including plant macrofossils, diatoms and geochemistry) were used to document the environmental changes that occurred over the last 1000 years.

### Key words:

Paleo-environment; climate changes; human impacts; plant macrofossils; diatoms; geochemistry; Iceland

## Starch Granule Evidence for Broad-spectrum subsistence economy in Neolithic south Yangtze River Basin, China

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### Abstract

The Dawangling archaeological site is an important Neolithic age site located on the south bank of the Yangtze River. One stone knife and one stone muller were excavated from the Neolithic age layer and examined through starch residue analysis to reconstruct the subsistence economy pattern. More than 165 starch granules and a few bordered pits of tracheid were retrieved from the residues of these stone tools and were identified as *Coix* spp., food legumes, *Quercus* spp., lotus root, a type of underground storage organs, Palmae, and other unidentified plant residues. Ancient starch granule evidence indicates that the Neolithic-age society in the Dawangling site developed a broad-spectrum subsistence economy that included not only cereals, beans, and oak but also some plants that required much water and warm weather, such as lotus root and Palmae. The results of the present work offer direct evidence to confirm the existence of a Broad-spectrum subsistence economy system in Yangtze River Basin.

### Key words:

Starch granule residues · Underground Organisms (UGO) · Stone tools · Dawangling site · Yangtze River

## Studies of Landscapes-zonal Features of the Formation of Anthropogenic Landscape Genesis in Russia

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### Abstract

The economic human activity as a factor of differentiation and development of landscapes on the territory of Russia began to appear together with the development of the producing type of economy since the Aeneolithic-Bronze Age in the southern steppe regions and since the Bronze Age in the forest areas. The first natural and anthropogenic landscapes, comprising from 4 to 7 natural and economic systems, formed in the early Bronze Age in the steppe foothills of the North Caucasus. Their economy was based on a combination of hoe agriculture and house cattle breeding in valley and near-valley landscapes. On the landscape-zonal basis maps were drawn showing the spread of basic material cultures of the initial stages of formation of the producing economy of the forest, forest-steppe and steppe zones of Russia. Landscape-zonal features of the periodization of the process of the initial economic development, nature use and anthropogenic landscape genesis of these zones for the entire territory of Russia were determined. For key areas paleo-reconstruction of landscape features of the living conditions of settlers in different material cultures and retro- reconstruction of natural and economic systems of the initial stages of anthropogenic landscape genesis were made. This allowed to reveal differences in intra-landscape structure of the main zonal types of forest, forest steppe and steppe landscapes, as well as the associated features of formation of the settlement structure and the formation of the producing economy. Detailed studies in the Central Russia have also shown that the most effective economic relations developed on the landscape borders.( The work is performed under project №14-05-00618 of the Russian Foundation for Basic Research)

### Key words:

anthropogenic landscape genesis; landscapes; paleo-reconstruction of landscape features.

## **Submarine Canyons and Gullies on the Continental Shelf and Slope of Rhodes Island, SE Aegean Sea, Greece**

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### **Abstract**

A significant number of submarine canyons and gullies was mapped on the continental shelf and uppermost slope of Rhodes Island (SE Aegean, Greece) using multibeam echo-sounder and side-scan sonar. The major canyons are located in Faliraki, Afantou, Kolympia, Tsampika, Archangelos, Kalathos/Vlichia, Gennadi, Lachania, Plymmiri, to the northwest of Cape Prassonisi, Cape Karavolas, Kremasti and to the northwest of City of Rhodes. The heads of these canyons were found in a variety of water depths ranging from a few meters in the vicinity of shoreline to tens of meters on the outer shelf or upper slope. With the exception of the Karavolas and Cape Prassonisi single – channel canyons, the other display a dendritic pattern. The one third of the shelf-incising canyons that is not associated with rivers, the blind (headless) canyons that are confined below shelf-break, and the upper-slope gullies have been probably generated by down-slope erosive mass flows. In some cases, extended “rippled scour depressions” (RSDs) are in immediate vicinity or directly connected with heads of canyons and outer-shelf gullies, constituting a geomorphological continuum; this implies that RSDs may be directly associated with in canyons and gullies generation. RSDs have been identified at water depths of 5 m to 70 m, and consist of coarse sediments sorted in ripple marks or sandwaves with a relatively long wavelength (0.5-1 m).

### **Key words:**

Submarine canyons; rippled scour depressions; continental shelf; Rhodes Island; Aegean Sea

## The Sequence Stratigraphy and Sedimentary Evolution of the Late Quaternary in the Lingdingyang Estuary, South China

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### Abstract

The sedimentary characteristics, chronostratigraphy, paleobiological strata and geochemistry of the Pearl River estuary in South China were analyzed based on 22 bore holes. The results showed that the formation could be divided into two sections by the spotted clay layer which was the marker of erosion. These two sections correspond to the two transgressions since the Late Pleistocene. From bottom to top, the Late Pleistocene sedimentary sequences were made up of fluvial facies, flood plain facies and paleo-estuary facies, while the Holocene sequences were described as littoral facies, estuary facies, and delta facies. And six stages of evolution within two layers of transgressions can be divided since the Late Pleistocene: (1) The estuary presented all land areas during 65-32 ka BP; (2) When the first transgression event occurred during 32-22 ka BP, sea level began to show an upward trend, a paleo-estuary formed; (3) The top general of transgressive layer was exposed and suffered weathering, forming a unique "piebald" clay; (4) During 12-8.5 ka BP, the second transgression event led to a sharp rise in sea level, the sea-land interaction sedimentation formed; (5) The basic outline of the present estuary was formed when the second transgression reached maximum at about 6 ka BP. At this period, the global low-temperature event occurred at about 5.3 cal. ka BP was recognized through the rich sedimentary record of ancient climate information; (6) After 5 ka BP, the evolution of estuary is no longer a simple natural process, but rather a common remodeling process accomplished by nature and humans.

### Key words:

Lingdingyang estuary; late Quaternary; stratigraphic framework; sedimentary evolution

## C12.09 Environment Evolution

### Climate - Vegetation Interaction Under Past and Future Climate Conditions



Home

#### Oral

1. [A Modeling Study of Spatial Heterogeneity of Vegetation and Relief Effect on CO<sub>2</sub> Fluxes between Land Surface and the Atmosphere](#)Julia  
Mukhartova, Natalia Levashova, Maria Ryzhova (Moscow State University, Faculty of Physics, Russian Fed), Alexander Olchev
2. [Climate Change and Geo-Diversification in Agriculture: A Spatial Empirical Study](#)  
Paramjit Singh (Meerut College, Meerut, Uttar Pradesh, India)
3. [Dynamic of Fractional Vegetation Coverage of Cold Temperature Zone in Greater Khingan Mountains](#)  
Xuedong Li, Hongyan Zhang (Northeast Normal University, China)
4. [Effects of Climate Changes on Net Ecosystem Exchange of CO<sub>2</sub> and Evapotranspiration of a Tropical Rain and Temperate Spruce Forest Ecosystems](#)  
Alexander Olchev (A.N. Severtsov Institute of Ecology and Evolution of RAS, Russian Fed)
5. [Possible Link of Net Primary Productivity with Climate Change at Multiple Temporal Scale Based on EMD Method---A Case Study of Carst Area in West Guangxi, China](#)  
Huiyu Liu (Nanjing Normal university, China)
6. [Response of Key Species Abies Fargesii to Climate Change from Different Elevations at Timberline of Qinling Mountains](#)  
Qin Jin (Northwest University, China)
7. [Simulating the Impacts of Changes in Climate and Land Use on Runoff and Sediment in the Yanhe River Watershed](#)  
Dengshuai Chen, Jing Li (sediment yield, China)
8. [Spatiotemporal Change in Vegetation Cover Trend and Their Auto-Correlation Analysis in Ordos During 2000-2015year](#)  
Wendurina Bao (Inner Mongolia Normal University)
9. [Spatiotemporal Characteristics of Climate Change and the Ecological Responses in Hubei, China](#)  
Hongji Zhu, Aiwen Lin (School of Resource and Environmental Science, Wuhan University, China)
10. [Status of Biomass Energy Resource in Assam](#)  
Jnanashree Borah (Arya Vidyapeeth College, India)

11. [Study of Drought and Vegetation Response Using the Standardized Precipitation Index and Vegetation Health Index on Central China](#)  
Ling Zou, Aiwen Lin, Zhenzhen Zhao, Qian Yang, Yuling Peng (Wuhan University, China)
12. [The Guiana Shield Rainforests – Overlooked Guardians of South American Climate](#)  
Isabella Bovolo (Durham University, United Kingdom), Thomas Wagner, Geoff Parkin (Newcastle University, United Kingdom), David Hein (Met Office Hadley Centre for Climate Science and Services, United Kingdom), Ryan Pe
13. [The Use of Remote Sensing Data for Studying the Dynamics and Monitoring Climate Condition of Mountain Ecosystem \(Armenia\)](#)  
Vahagn Muradyan (The Center for Ecological Noosphere Studies National Academy of Sciences of RA, Yerevan, Armenia, Armenia)
14. [Variations in Vegetation Activities and Its Cause in Key Ecological Function Zones in China](#)  
Jiaqiang DU, Jianmin SHU (State Key Laboratory of Environmental Criteria and Risk Assessment, Chinese Research Academy of Environmental Sciences, China)
15. [Vegetation and Climatic Changes Reconstructed from a 3.3 Ma Sporopollen Record of the PL02 Borehole in the Yinchuan Basin](#)  
Li Xinling, Mingjian Wei, Yanyan Tian, Xiaolei Li (The Capital Normal University, China)

## Poster

1. [Analyzing Spatiotemporal Variation of Net Primary Productivity in the Part of Coastal West Bengal, India](#)  
Srikanta Sannigrahi (India, Senior Research Fellow, Indian Institute of Technology Kharagpur, India)
2. [Impact of CO<sub>2</sub> and Climate on Global Vegetation Distribution in Last Glacial Maximum and Late Holocene: Results from Model Study](#)  
Weizhe Chen (China, China University of Geosciences (Wuhan))
3. [Inferring the Patterns of Water Level Fluctuations and the Corresponding Influence on the Distribution of Wetland Vegetation in Poyang Lake, China](#)  
Dai Xue; Rongrong Wan; Guishan Yang (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences)
4. [Influence of Water Level Variation on the Distribution of Wetland Plant Community in Poyang Lake](#)  
Zebing Du (China, School of Geography & Environmental, Jiangxi Normal University, Nanchang 330022 P. R. China); Xie Zhenglei (China, Key Laboratory of Education Ministry for Poyang Lake

Wetland & Watershed Research, Nanchang, 330022 P. R. China); Xiang Lixiong (China, School of Geography & Environmental, Jiangxi Normal University, Nanchang 330022 P. R. China)

5. [Responses of Crop Yield to Multiple Environmental Changes in the North China Plain](#)  
Xiao Han Li; Jian Jun Wu; Hong KUi Zhou (China, Beijing Normal University)
6. [Spatial-temporal Analysis of Vegetation Change Trends and its Driving Factors in China from 1998 to 2013](#)  
Yuanheng Sun (China, Peking University)
7. [The Difference in Response of Planted Forests and Natural Forests to Prolonged Drought](#)  
Hui Luo; Tao Zhou; Shan Gao (China, State Key Laboratory of Earth Surface Processes and Resource Ecology, Beijing Normal University, Beijing; Academy of Disaster Reduction and Emergency Management, Ministry of Civil Affairs & Ministry of Education)
8. [The Spatial-temporal Variations Characteristics Research of Weihe River Basin Based on GIS and RS](#)  
Xi Zhou (China, College of Earth Science and Resource, Changan University)

## A Modeling Study of Spatial Heterogeneity of Vegetation and Relief Effect on CO<sub>2</sub> Fluxes between Land Surface and the Atmosphere

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### Abstract

The main goal of the study is to describe the influence of spatial vegetation and relief heterogeneity on turbulent CO<sub>2</sub> fluxes between land surface and the atmosphere using a process-based two-dimensional turbulent exchange model. As a key area for this modeling study the hilly territory situated at the southern boundary of broadleaf forest community of European Russia (Tula region) was selected. The vegetation cover in the region is mainly represented by mosaic of agricultural areas, grasslands, mires and groves that makes adequate determining the local and regional CO<sub>2</sub> fluxes using experimental approaches very difficult.

Applied two-dimensional model is based on solution of the Navier–Stokes and continuity equations using the *one-and-a-half order* closure scheme in the appropriate coordinate system taking into account the shape of the surface. The vegetation is modeled as a continuous permeable medium resisting an air flow. For description of plant canopy photosynthesis and respiration an aggregated approach based on model of Ball et al (1987) in Leuning modification (1990, 1995), the Beer-Lambert equation for the description of solar radiation penetration within a plant canopy (Monsi, Saeki 1953), and also an algorithm describing the response of stomatal conductance of leaves to incoming photosynthetically active radiation is used.

To quantify the possible effect of relief and vegetation heterogeneity on CO<sub>2</sub> fluxes several transects crossing the study area were chosen. For each transect the CO<sub>2</sub> fluxes were calculated for actual vegetation structure and for scenario assuming total deforestation.

The modeling results showed a significant impact of both relief and vegetation heterogeneity on CO<sub>2</sub> fluxes. (This study was supported by the Russian Science Foundation (Grant 14-14-00956).)

### Key words:

spatial heterogeneity of vegetation and relief, CO<sub>2</sub> fluxes, process-based models, *one-and-a-half order (TKE)* closure scheme

## Climate Change and Geo-Diversification in Agriculture: A Spatial Empirical Study

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### Abstract

This is a fact that climatic change may be considered as one of the important phenomenon not only at national level but also at global level which affects environmental challenges with implication of various factors such as agricultural production, irrigation, drinking water supply, education, health, urbanization, etc. The overriding complexity of the problem is attributed to its deeper global ramifications on a vast range of issues impacting the very survival of life on earth. There are varieties of perceptions regarding the exact size and consequences of climate change. It is stated that risks emanating from climate change are indeed profound, which call for urgent mitigation. Thus, there is an imperative need to take urgent and strong measures in the interest of calibrating and appropriate response to meet the emerging challenges of climate change.

Though climate change poses a variety of challenges, this proposed study would specifically focus on the issues viz: agriculture climate change, crop diversification, cropping pattern, production in agriculture etc. which have immense relevance from the perspective of developing countries like India.

In this paper, an attempt will be made to examine main characteristics of geo-diversification in agriculture and its related factors like production and productivity in agriculture, cropping pattern, use of seed and fertilizers, and sources of irrigation etc. in western Uttar Pradesh of India. Further, it will be sought to study the impact of climatic change on agriculture sector and to analyse problems, difficulties, hurdles related to climatic change and diversification in agriculture.

### Key words:

Climate Change; Diversification; Agriculture; Production

## Dynamic of Fractional Vegetation Coverage of Cold Temperature Zone in Greater Khingan Mountains

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### Abstract

In the process of future climate change, the increase of temperature in high latitude region is largely greater than the increase in low latitude region. Boreal forest (Taiga forest) widely distribute in northern Greater Khingan Mountain, where is unique cold temperature zone in China. At continental scale, this region is the southernmost cold temperature forest of eastern Eurasia. The forest of Greater Khingan Mountain is very sensitive for climatic changes which can be as an indicator or indirect proofs on biology or ecology. Fractional Vegetation coverage (FVC) characterize the dense degree of vegetation and the size of the area for photosynthesis. The index get different response to climate change according to the different temporal and spatial scales. This study setups a mechanism of spectrum response for typical forest vegetation in cold temperature zone of China with using the field investigation and measuring; Integration of high spatial resolution Landsat Thematic Mapper (TM) images and high temporal resolution Moderate Resolution Imaging Spectroradiometer (MODIS) images, combined with Multi-source and multi-model, quantitatively inverse FVC, at sub-pixel scale. The results show that the linear mixture model (LMM) used TM images provide higher classification accuracy than dimidiate pixel model based on MODIS images. Utilize the FVC result obtained by LMM to correct the values of NDVI<sub>soil</sub> and NDVI<sub>veg</sub> obtained by dimidiate pixel model. This method can obviously increase the accuracy of the results obtained from dimidiate pixel model, which can make this method more feasible and recommended in practice. Special emphasis has hence been put on the evaluation of potentials and advantages when coupling Landsat TM and MODIS images to inverse long temporal series. Based on the resulting maps, the spatio-temporal patterns of vegetation cover changes according to climate change are explained.

### Key words:

Greater Khingan Mountains; cold temperature zone; mixed pixel; climate change

## Effects of Climate Changes on Net Ecosystem Exchange of CO<sub>2</sub> and Evapotranspiration of a Tropical Rain and Temperate Spruce Forest Ecosystems

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### Abstract

The possible changes of Net Ecosystem Exchange (NEE) of CO<sub>2</sub>, Gross Primary Production (GPP) and evapotranspiration (E) of tropical rain and temperate spruce forests due to projected future climate change are estimated using a process-based model, climate and vegetation change scenarios. For modeling experiments two representative forest ecosystems were selected: the tropical rain forest situated in Indonesia close to equator, and temperate spruce forest situated in European Russia at the southern boundary of the boreal forest zone. For model projections several scenarios assuming future changes of climate conditions, species composition, plant biomass and nutrient supply were applied. Available climate change scenarios for the 21st century assume a double increase of CO<sub>2</sub> concentration in the atmosphere, an increase of the air temperature and precipitation and, at the same time, a decrease of incoming solar radiation and water vapor deficit. Scenarios of vegetation change assume possible increase due to global warming of the fraction of deciduous trees species in the boreal forest community and corresponding reduction of spruce tree proportion.

Results of modeling experiments show that under sufficient nutrient supply the climate changes can lead to increase of GPP and NEE, and as well as to small E decrease. Reduction of nutrient supply can result in decrease of GPP and E. In particular the decrease of nutrient supply of about 20% can completely offset the possible GPP increase due to projected increases of temperature and CO<sub>2</sub> concentration in the air. (The study was supported by grant of the Russian Science Foundation (14-14-00956).)

### Key words:

spruce and mixed forest; tropical rain forest; climate change; net ecosystem exchange of CO<sub>2</sub>; evapotranspiration; process-based SVAT model

## Possible Link of Net Primary Productivity with Climate Change at Multiple Temporal Scale Based on EMD Method---A Case Study of Carst Area in West Guangxi, China

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### Abstract

Net primary productivity is known as an important index for evaluating the carbon cycling of ecosystem, which is affected by climate change. Previous studies focused on the effects of the mean state of climate on NPP, and few focused on the effects of climate variability. In this paper, as a case study of Carst area in West Guangxi, the effects of the mean climate change and change variability on NPP were studied based on EMD method. The results showed that: 1) Monthly changes of NPP show positive correlation with monthly changes of temperature and precipitation. However, the anomalies of NPP have no significant relation with the Anomalies of temperature and precipitation. 2) with EMD method, monthly mean NPP anomalies can be completely decomposed into three significant quasi-period oscillations on various time scales including 1-, 2.7-, 5-year time scales as well as a trend. Moreover, 1-year time scale oscillation is the most significant. 3) at 1-year time scale, no significant relation exists between anomalies of NPP and climate anomalies; at 2.7-year time scale, a significant relation exist between NPP anomalies and temperature anomalies; at 5-year time scale, a significant relation exist between NPP anomalies and precipitation anomalies.

### Key words:

Multiple temporal scale; anomaly; NPP; EMD method

## Response of Key Species *Abies Fargesii* to Climate Change from Different Elevations at Timberline of Qinling Mountains

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### Abstract

The impact of climate change on vegetation in Qinling mountainous area has already been authenticated by numerous investigations, nevertheless, as the major ridge of Qinling Mountains as well as national natural conservation reserve, the ecology response of Niubeiliang sub-alpine vegetation to climate change has not yet gained enough public attention. In this study, in accordance with the method of dendrochronology, response analysis was carried out and multiple linear regression model was established respectively, so as to contrast *Abies fargesii*'s response pattern to climate change from different elevations. The results have showed that, with the rise of the elevation, the sensitivity of tree growth to climate factors are higher than that of the low elevation, however, the consistency of the series and the amount of the climate information showed the tendency of first decreased and then increased. In general, the arboreal radial growth is more sensitive to temperature than to precipitation, tree-ring width indices' correlation coefficients with temperature is increasing with the rise of elevation; Whereas, the chronology of high elevation presents a significant positive correlation with the air temperature of August in current year, while the chronology of middle elevation presents a significant positive correlation with the average precipitation from March to April in current year. The variation trend of contrast significantly factors revealed that climate change could promote growth season of *Abies fargesii* in advance, but growth dynamic of trees varies at different elevations. The results above showed that at the timberline of the study area, *Abies fargesii* growth from different altitudes may had different response mechanisms to global change.

### Key words:

Main ridge of Qinling mountains; *Abies fargesii*; Tree-ring width; Response to climate change; timberline

## **Simulating the Impacts of Changes in Climate and Land Use on Runoff and Sediment in the Yanhe River Watershed**

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### **Abstract**

Natural ecosystems provide human society with crucial products and services. Humans are enhancing the production of some services at the expense of others continuously with rapid increase of population and overexploitation of natural resources. The YanHe river watershed is one of the most serious soil erosion part of the Loess Plateau and policies of ecological protection such as Grain for Green have been carried out for more than 10 years. It is necessary to estimate water yield and soil conservation in this area, as well as analyzing the trends of runoff and sediment under varies climate and land-use scenarios. In our study, climate dataset of 2 periods, Recent (2020-2040) and Later (2040-2060), were simulated by NCC/GU-WG version2.0 (or BCC/RCG-WG version 2.0). Land-use maps under open development, constrained development and protect development scenarios of YanHe River watershed in 2050 were simulated by using Land Change Modeler. Runoff and sediment under varies climate and land-use scenarios, which can be used to evaluate ecosystem services, were quantified by using SWAT model afterwards. Our research can provide a scientific basis for related decision makers in soil and water erosion control, and coordinate ecological protection and economic development as well.

### **Key words:**

Land use change; climate change; SWAT model; runoff; sediment yield

## **Spatiotemporal Change in Vegetation Cover Trend and Their Auto-Correlation Analysis in Ordos During 2000-2015year**

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### **Abstract**

Based on the MODIS NDVI data from 2000 to 2015 year of Ordos city and the FVC data obtained by using dichotomy. This paper studied the characteristics of vegetation changing trend and its spatial variation clustering distribution through the linear regression trend analysis and spatial auto-correlation analysis. The result indicated that the growing season vegetation cover shows an increasing trend among 16 years in Ordos on the whole, and the vegetation dynamics differed from different vegetation types. Also there are differences in space. Spatial auto-correlation analysis showed that the change process of vegetation cover has a strong positive correlation on study area and obvious clustering phenomenon. The spatial auto-correlation analysis further verifies the result of trend analysis, indicating that the vegetation of Ordos has been partially restored and ecological restoration work has produced benefits. Finally, here on talking shallowly about driving factors.

### **Key words:**

fractional vegetation cover; spatial auto-correlation; spatial distribution characteristics; Ordos

## Spatiotemporal Characteristics of Climate Change and the Ecological Responses in Hubei, China

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### Abstract

To investigate the spatiotemporal characteristics of climate change in Hubei, Central China, measurements of air temperature and precipitation from 35 meteorological stations and multiple model simulation/prediction results from CMIP5 during 1962-2011 are analyzed. The results suggest a significantly increasing trend for air temperature and an overall stable trend for precipitation in the past 50 years. To examine the ecological responses to the climate changes in this region, annual gross primary productivity (GPP) and net primary productivity (NPP) from the MODIS products during 2000-2010 and leaf area index (LAI) from the AVHRR BU LAI products during 1981-2011 are also analyzed. It is discovered that both GPP/NPP and LAI have increased over the recent decades. Furthermore, the correlation analyses between climatic parameters (i.e., air temperature and precipitation) and ecological indicators (i.e., GPP, NPP and LAI) are conducted by a linear model. The analytical results demonstrate that the air temperature has a significant positive correlation with LAI and GPP; precipitation is positively correlated with NPP. Thus, it is concluded that the air temperature exerts a stronger effect on the ecosystem than precipitation in Hubei province over the past decades.

### Key words:

climate change; ecological responses; spatiotemporal variations; correlation analyses; Central China

## Status of Biomass Energy Resource in Assam

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### Abstract

Biomass has a very high potential as a renewable energy resource because of its reliability and availability everywhere around the globe, and occupies a significant status in the world's energy consumption. Estimates have indicated that 15-50% of the world's primary energy use could come from biomass by the year 2050. Like in most developing countries, the energy consumption in Assam, a constituent state of the north eastern part of India, is primarily for subsistence needs, and characterized by the predominance of biomass fuels. Assessment of available bio-resources is helpful in revealing its status and helps in planning sustained supply to meet the energy demand.

Against this backdrop, an explorative analysis is being attempted with the objectives of estimating the availability of forest biomass and agricultural biomass for energy use in Assam, India. The study is based on secondary data procured from satellite database. For this purpose, National remote sensing data has been used. Other secondary data includes Census of India, statistical handbook, published energy literature etc. The study has been made with regard to agro-climatic zones of Assam where a significant variation in biomass energy resource has been revealed. The status of biomass regarding its energy use in terms of efficiency in respective zones are thereby examined in which all the zones are found to be deficient depicting an alarming situation in the present bio energy resource scenario in Assam.

### Key words:

Biomass energy, agro climatic zone

## Study of Drought and Vegetation Response Using the Standardized Precipitation Index and Vegetation Health Index on Central China

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### Abstract

Drought is one of the most serious natural disasters in Central China. Drought events and vegetation response to drought are investigated by Standardized Precipitation Index (SPI) and Vegetation Health Index (VHI) in Hubei province. Precipitation data during 1980-2013 and remote sensing data during 2000-2013 are used in this study. Standardized Precipitation Index is calculated to reveal meteorological drought and analysis drought characteristics. The Vegetation Health Index are applied to study how different vegetation types response to drought. Results show that: a drier climate is observed in Hubei province in recent years as long-term decrease of SPI are observed for all time scales. There are about 48%-53% months of SPI less than 0 for all time scales during 1980-2013, and about 0.25%-1.96% months of SPI less than -1.5 during 1980-2013. A severe drought is observed in Hubei during 2010-2011, when all different timescale SPI less than -1.5 and VHI experiences significant variation: regional mean VHI is 63.38 in June 2010, 52.83 in September 2010, less than 30 in November 2010 and recover to 61.78 in June 2011. Comparing the variation of monthly mean SPI and VHI during 2010-2011, we find that all vegetation are significantly influenced by 3-month and 6-month scales meteorological drought. Best temporal consistency is detected between VHI and 6-month SPI, the correlation coefficient are 0.71, 0.67 and 0.62 for cropland, grassland and forest, respectively. Therefore, a drier climate is observed in Hubei province and 6-month scale's SPI closely link to the health of vegetation, especially crop and grass.

### Key words:

Drought variation; the Standardized Precipitation Index; the Vegetation Health Index; Hubei province

## The Guiana Shield Rainforests – Overlooked Guardians of South American Climate.

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### Abstract

Tropical forests are global climate regulators through their interaction with hydrological and biogeochemical cycles and impacts on planetary energetics. Driven by current deforestation trends, many studies have researched the South American and global impacts of Amazon deforestation; however, none have considered the role of the largely intact Guiana Shield (GS) forests north of the Amazon as part of this system. We use regional climate model simulations to show that small scale deforestation in the GS leads to significant multi-scale impacts across South America through vegetation-land-atmosphere interactions that disrupt the initial phases of flow of two major ‘atmospheric rivers’ across the continent: the Caribbean Low-Level Jet to the north; and the atmospheric river taking moisture-rich air from the equatorial Atlantic Ocean over the GS into Amazonia and then south to La Plata Basin (LPB) via the South American Low Level Jet (SALLJ). Our simulations demonstrate local precipitation and runoff increases in low elevation, down-wind forests, with mean annual temperatures increases of up to 2.2°C in savannahs. Regionally, wetting occurs in northern South America (Apr-Sep) and western Amazon (Oct-Mar) with temperature increases of up to 2°C in the central/eastern Amazon and an increase in the number of dry months. Highly diverse spatial responses occur in LPB due to a reduction of moisture transfer by the SALLJ. Such multi-scale changes would impact biodiversity and ecosystem services, including agriculture in LPB. Our simulations demonstrate a direct link between small-scale land cover change in the GS and hydro-climatic impacts 1000km west and 4000km south.

### Key words:

tropical climate; Guiana Shield; deforestation; atmospheric river; South American Low Level Jet; land-atmosphere interactions

## The Use of Remote Sensing Data for Studying the Dynamics and Monitoring Climate Condition of Mountain Ecosystem (Armenia)

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### Abstract

Seasonal characteristics of ecosystems are closely related to characteristics of the annual cycle of weather patterns, therefore changes in plant phenological events may signal important year-to-year variations of climatic condition or even global environmental changes. Monitoring ecosystems that are sensitive to climate change can improve our understanding of the relationships between climate and ecosystem dynamics. Recent advances in remote sensing technology have expanded opportunities to characterize the seasonal and inter-annual dynamics of ecosystems. However, research into the relationship between vegetation phenology and climate variability has not been fully investigated. The objective of this paper was to examine relationships between Normalized Difference Vegetation Index (NDVI), The Vegetation Condition Index (VCI) and climatic data in mountain ecosystem.

The VGT sensor, on board SPOT satellites, has provided daily coverage of the entire Earth since 1998. Ten-day (decade) NDVI synthesis images (NDVIS10) are available from VGT sensor globally. The study has shown that the NDVI values of vegetation varied over years. Analyzing the dynamics of mean NDVI values obtained for the study area for 21 decade periods between 1998 and 2014 indicates that NDVI has increased. The mean NDVI, temperature, and precipitation for the study area were plotted along a fifteen-year time series. The NDVI was correlated with temperature and precipitation: temperature showed higher correlation (positive) with NDVI compared to precipitation (negative). However, the relationships were increased when previous time periods were considered. In particular, high correlation is established between temperature, and precipitation of 2-3 decades' periods and mean NDVI values determined for 4-18 decades periods.

### Key words:

Remote sensing data, NDVI, VCI, dynamics and monitoring, climate, mountain ecosystem.

## Variations in Vegetation Activities and Its Cause in Key Ecological Function Zones in China

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### Abstract

As a critical component of national ecological barrier, key ecological function zones (KEFZ) are one of the hot-spot areas for ecological protection and restoration. Continued long-term monitoring of vegetation activity in KEFZ has implications for national ecological security. With GIMMS NDVI3g (1982-2013) dataset, the spatiotemporal patterns of change in vegetation growth were detected and their linkage with climate changes and human activity were analyzed in KEFZ over fifteen progressive periods starting in 1982. As a whole, a statistically significant trend of growing season, spring, and autumn NDVI in KEFZ was observed during all or most periods. Non-significant decreases of NDVI for growing season and seasonal seasons were found in 7 KEFZ during few periods, and obvious increases in all others KEFZ during fifteen periods. Vegetation growth in KEFZ was mainly regulated by thermal factor, and the dominant climatic drivers of vegetation activity varied across different regions and seasons. The influence of temperature was stronger on vegetation activity in spring and autumn for those KEFZ located in high latitude and high altitude, while the precipitation was the main control factor for those in the arid and semi-arid region. The impacts of human activity on NDVI were not been ignored, the significant decrease of NDVI in Sanjiang Plain may be related to the rapid land use change from wetland into farmland. The performance appraisal of ecosystem conservation and improvement should be considered from the point of view of history, fully considering the background, and strive to make scientific and reasonable quantitative evaluation.

### Key words:

NDVI; spatio-temporal changes; climate impact; human activity; key ecological function zones

## **Vegetation and Climatic Changes Reconstructed from a 3.3 Ma Sporopollen Record of the PL02 Borehole in the Yinchuan Basin**

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### **Abstract**

Understanding the climatic changes of the Asian arid and semi-arid region from the late Pliocene into the Quaternary is necessary in global change research in paleo-environment. However, it has been hindered by the lack of continuous, high-resolution records. A sediment core of the PL02 borehole from the Yinchuan Basin in the northwest China provides a sporopollen record from the transition zone of arid and semi-arid climates, spanning the past 3.3 million years. Comparisons reveal a close correspondence between the PL02 records and LR04 benthic stack. Spectral analysis of the A (*Artimisia*) / C (*Chenopodiaceae*) ratio shows periods of about 100-kyr and 41-kyr, which may correspond to Milankovitch periods, reflecting eccentricity and obliquity cycles, respectively. Besides, spectral analysis of the percentage of *Picea* and *Abies* shows extra period of about 600-kyr. The results of filter analysis verify temporal changes in periodicity. The fluctuation of A/C is consistent with frequency-dependent susceptibility may represents local climate as well as the changes of percentage of *Picea* and *Abies* is agree with low-frequency mass magnetic susceptibility may indicates the climate of the source area. Our results show that the local area is mostly influenced by global climatic changes, but the source area may affected by both the climatic changes and Tibetan Plateau uplift.

### **Key words:**

Yinchuan Basin; Quaternary; sporopollen; periods; climatic change

## **Analysing Spatiotemporal Variation of Net Primary Productivity in the Part of Coastal West Bengal, India**

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### Abstract

In order to assess the quality of different ecosystem components, reliable primary productivity measurement is essential to quantify the energy, carbon balance and soil productivity. Net Primary Productivity (NPP) is the dry organic matter produced by green plant after absorbing CO<sub>2</sub> from atmosphere and releasing O<sub>2</sub> to the atmosphere by the mechanism of photosynthesis. It has been established that to produce 1g of dry organic matter (NPP) by photosynthesis, plants sequester 1.47g to 1.63g of carbon from atmosphere (1g of dry Carbon is similar to 3.27g of CO<sub>2</sub>) and 1.22g of oxygen is added to the atmosphere. Research objective of this paper is to find out spatiotemporal variation of NPP in the highly productive mangrove ecosystem zone in West Bengal coast. The outcome of this study reveals that there is a declining trend of both average NPP and Maximum NPP values during the study period (2000 to 2013). The Average NPP has decreased from a level of 514 gC/m<sup>2</sup>/year in 2000 to 383 gC/m<sup>2</sup>/year in 2013 and the Maximum NPP has also decreased from 1586 gC/m<sup>2</sup>/year in 2000 to 1392 gC/m<sup>2</sup>/year in 2013 respectively. The above mentioned changes is not homogeneous in terms of spatiotemporal variation, as in the northern part of the study area, NPP has increased with time whereas in the rest of the region, NPP has decreased. The decreasing trend of NPP in the study period can be mainly accounted due to conversion of forest land to bare and urban land in the study region.

### Key words:

NPP; Carbon; Organic matter; Photosynthesis; Sequestration; Mangrove; Ecosystem

## Impact of CO<sub>2</sub> and Climate on Global Vegetation Distribution in Last Glacial Maximum and Late Holocene: Results from Model Study

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### Abstract

The interactions between vegetation and atmosphere play an important role in both agriculture and economy. As global mean CO<sub>2</sub> concentration has reached 400 ppm, it is urgent to better understand the relation between CO<sub>2</sub> and vegetation. In this study, we aim to assess the effect of CO<sub>2</sub> and climate on vegetation competition. With the ORCHIDEE model, we performed five simulations with different CO<sub>2</sub> levels and climatic forcings in Last Glacial Maximum and Late Holocene. The result shows a significant global increase of tree proportions as CO<sub>2</sub> rises. Partial correlation analysis illustrates the spatial pattern of sensitivity of forest proportion to different climatic drivers. Forests proportions have strong positive correlation with mean annual precipitation (MAP) globally, while both short wave radiation and air temperature indicate positive impact on tree proportions in high latitudes, negative impact in low latitudes. Based on 90th quantile nonlinear regression analysis, we found the MAP for potential full woody cover in African savannas reduces with elevated CO<sub>2</sub>. However, areas of broadleaf and needleleaf change separately in Northern Hemisphere in response to increased CO<sub>2</sub>. Different transpiration change of broadleaf and needleleaf are mainly responsible for their different competitiveness. We also propose that improvements of this model are required to regulate the optimum temperature for each vegetation type under different CO<sub>2</sub>. Understanding how vegetation responds to elevated CO<sub>2</sub> and climate change are essential for the prediction and management of future vegetation distribution.

### Key words:

ORCHIDEE model; elevated CO<sub>2</sub>; climate change; regression analysis; vegetation competition; broadleaf and needleleaf;

## **Inferring the Patterns of Water Level Fluctuations and the Corresponding Influence on the Distribution of Wetland Vegetation in Poyang Lake, China**

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### **Abstract**

The influence of water-level fluctuations (WLF) on vegetation distribution and the structuring of wetland environments is of growing interest as hydrological regimes has been profoundly modified by human actions and the increasing threat from climate change. In order to develop a scientifically defensible and empirically testable relationship between WLF alteration and the corresponding ecological responses at the regional scale, including both the linear continuum responses and the discontinuous threshold responses, correlation analyses, curve-fitting methods and Classification and Regression Tree (CART) model were used to quantify the relationships between WLF alteration indicators and the distribution of spring Sedge belts (surface area) in Poyang Lake wetland. Those ecologically meaningful WLF indicators, including seasonal, dekadal and antecedent multi-diurnal WLF, were considered which have been proved to have different impacts with different magnitudes and complexity to the distribution changes of spring sedge belts. The results showed that: (1) Areas of spring sedge belts have significant continuum responses to the antecedent 30-day WLF, which were apparently reflected by the antecedent water-level index (AWI) day 30, the average water level over a 30-day period before observation. So it could suggest that sedge belts exposed to rapid fluctuated water regime in nearly 30 days would adjust distribution to adapt the new environment. (2) Areas of spring sedge belts have discontinuous threshold responses to both the antecedent 20-day WLF and the WLF of the last retreating season, which were apparently reflected by the AWI day 20 and the water level amplitude of the last retreating season, respectively. So it could suggest that the situations that continuous exorbitant water level lasting up to 20 days during spring or extremely high water amplitude occurred during the last retreating season could trigger catastrophic changes in the distribution of spring sedge belts. This study is among the first to show both the linear continuum responses and the discontinuous threshold responses of typical wetland vegetation to WLF patterns of lake at multi-temporal scales. Results of this study linked ecological responses to WLF patterns quantitatively, which will be helpful for water resource managers to make informed



# 33rd International Geographical Congress

21-25 August, Beijing, China

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decisions about how to regulate these conservancy water projects and conserve the degenerating wetland ecosystems.

**Key words:**

water-level fluctuations; Sedges; response time lags; continuum responses; discontinuous threshold value

## Influence of Water Level Variation on the Distribution of Wetland Plant Community in Poyang Lake

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### Abstract

[Objective] To identify the complex relationship between the hydrological and the growth of typical wetland plants, and then reveal the growth regularity of the wetland plants which depend on water level change. [Method] Based on the images in different months by remote sensing interpretation, the paper analyzed wetland vegetation zone area and its spatial distribution under different water level conditions. [Result] Poyang Lake wetland hydrology has a remarkable characteristic of monthly period, there are significant differences among flood frequency within different elevation vegetation zone, flooding duration and period, thus controls the significant band features of wetland vegetation distribution. [Conclusion] The research results can provide scientific references for the protection and utilization of wetlands resource in Poyang Lake area.

### Key words:

Poyang lake; Water level variation; Wetland vegetation; Distribution rules; Influence

## Responses of Crop Yield to Multiple Environmental Changes in the North China

### Plain

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#### Abstract

In the past few decades, agricultural ecosystem in the North China Plain (NCP) has experienced a complex set of climate changes. In the NCP, atmospheric CO<sub>2</sub> concentration and heat resources significantly increased, while precipitation decreased obviously, and climatic zone has been moved northward obviously. Although climate changes impact on crop yield has received attention, their combined effects and relative contributions are still not well understood. In this paper, by using the crop growth model ( CERES–Wheat ), and setting four simulation scenarios based on the meteorological data from 1961 to 2010, we examined the responses of crop yield to individual environmental stress and multiple environment changes in the NCP at a fifty-year scale. The results show that temperature increase has a positive impact on wheat yield in all sites. The crop production increased by 13.9 - 51.2%/10a under rain-fed condition, whereas by 12.9% - 40.1% /10a in the irrigated condition. To the contrary, the influence of solar radiation decrease on crops is negative, and the adverse effect under rain-fed condition is smaller than in the irrigated condition. The impact of long-term precipitation's fluctuation is small on wheat production.

#### Key words:

CERES-Wheat; Multiple Environmental changes; Crop Yield; Impact; North China Plain

## Spatial-Temporal Analysis of Vegetation Change Trends and Its Driving Factors in China from 1998 To 2013

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### Abstract

As an essential part in terrestrial ecosystem, vegetation links many environmental elements and balances the circulation and exchange of substance and energy. The spatial distribution and dynamics of vegetation not only reflect its response to climate change and anthropogenic activities, but also influence carbon-nitrogen cycle and social development of human beings, thus attract much research attention in recent years. In this study, we combined datasets of satellite-derived Normalized Difference Vegetation Index(NDVI), nighttime light and ground-site based meteorological data to analyze spatial-temporal patterns of variation in vegetation growth in China from 1998 to 2013 and the relationship between them. Theil-Sen median slope was adopted to estimate linear trends of NDVI and nighttime light in pixel scale for 16 years, in order to explore their temporal variation. Meteorological data, such as temperature and precipitation, were aggregated by growing season and processed with the similar method for each site. Results show that at regional scale spatial heterogeneity of NDVI trends appears clearly. Significant positive trends of NDVI was detected in Loess Plateau and Hengduan Mountains, whereas NDVI in the Middle Part of Inner Mongolia Plateau and Eastern China (i.e. Shandong and Jiangsu Province) decreased. Temperature increased slightly nationwide and precipitation varied from region to region, which all illustrated their little correlation with the trend of NDVI change. However, a strong negative correlation was observed between the change of NDVI and nighttime light in most area of China, which demonstrated human activities may be the main driving factor in vegetation change there.

### Key words:

vegetation; NDVI; spatial-temporal pattern; climate change; anthropogenic activities; China

## The Difference in Response of Planted Forests and Natural Forests to Prolonged Drought

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### Abstract

During the global warming, the duration of drought is increasing and the impact on forest ecosystems could be further intensified. But whether will planted forests and natural forests respond to drought differently remains controversial. In this research, the non-parametric Wilcoxon test was used to compare the growth state of forests in short-term drought (2001-2008) and prolong drought (2009-2014), which based on the best time scale of SPEI that obtained by the correlation between MODIS EVI and meteorological drought index SPEI. The results showed that (1) the relationship between the June of EVI of all forests and the 5 months scale of SPEI (SPEI\_5) was most close; (2) The growth state of two forests was similar in the short-term drought years, but natural forests were affected more by prolong drought than planted forests. The duration of droughts will increase continuously in the future, given that we suggest more attention should be paid to natural forests.

### Key words:

Planted forests; Natural forests; SPEI; EVI; Prolong drought; Yunnan province

## The Spatial-Temporal Variations Characteristics Research of Weihe River Basin Based on GIS and RS

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### Abstract

Based on MODIS-NDVI remote sensing images in 2000 and 2010 of Weihe River Basin, using the Erdas to maximize the data, classifying the NDVI image by the ArcGIS raster calculator, and combining with sub-basin zoning map, county administrative zoning map, landscape and 30m resolution DEM data to make processing and statistical analysis. The results show that 2000~2010 Weihe River Basin vegetation coverage overall in a growth state. Vegetation coverage of each sub-basin, Baojixia to Xianyang Basin > Xianyang to Tongguan Basin > Baojixia basin above > Jinghe River basin above Slips. Different counties vegetation coverage, the low degree of urbanization were better than the higher. Elevation less than 1000m and more than 2500m of the vegetation coverage is higher than the area between 1000~2500m.

### Key words:

Weihe River Basin; Vegetation Cover; NDVI; Reclassify

## C12.09 Environment Evolution

### Prehistoric Human Occupation and Environmental Changes on Tibetan Plateau and Surroundings

#### Oral



Home

1. [Demic Diffusion of the Southward Expansion of Millet Agriculture](#)  
Yu Chun Li, Jiao Yang Tian (Kunming Institute of Zoology, Chinese Academy of Sciences, China), Feng Wen Liu, Guang Hui Dong (Lanzhou University, China), Qing Peng K
2. [Early Human Occupation on Nujiang River Valley, Southeast Tibetan Plateau](#)  
Guanghui Dong, Honggao Liu, Dongju Zhang, Guoqiang Li, Jiawu Zhang, Fahu Chen (Lanzhou University, China )
3. [Holocene Climate Change Records from Sand Wedge at Linggo Co, Qiangtang Plateau](#)  
Baolin Pan (The Key lab resource environment and GIS, College of Resource, Environment and Tourism, Capital Normal University, Beijing 100048, China, China), Chaolu Yi (a Laboratory of Tibetan Environment Changes and Land Surface Processes, Institute of T
4. [Human Adapt To the Pleistocene Vegetation Changes in South Luohe River, Central China](#)  
Hongyan Zhang (Nanjing University, China)
5. [Human Migration to the Northeastern Tibetan Plateau-Preliminary Study of 151 Site in the Qinghai Lake Basin](#)  
Dongju Zhang, Guanghui Dong (Lanzhou University, China), Qianqian Wang, Xiaoyan Ren (Research Institute of Archaeology and Relics, Qinghai, China), Fahu Chen (Lanzhou University, China)
6. [Land Use Change and Its Effects on Water Supply and Sediment Retention Services in Tibetan Plateau for 1900s-2000](#)  
Shicheng Li, YiLi Zhang (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
7. [Life in the Cold: What Do We Know About the Bioclimatology of the Tibetan Plateau and the Himalayas During the Late Quaternary](#)  
Georg Mieke (Philipps-Universität Marburg, Germany)
8. [Luminescence Dating of Prehistoric Hearths in Northeast Qinghai Lake and Its Palaeoclimatic Implication](#)  
E ChongYi (Qinghai Normal University, China), Sun Yongjuan (Key Laboratory of Salt Lake Resources and Chemistry, Qinghai Institute of Salt Lakes, Chinese Academy of Sciences, China)
9. [Prehistoric Human Dispersal to the Tibetan Plateau and Adaptation to the High Altitude Environment](#)

Fahu Chen, Dongju Zhang, Guanghui Dong (Lanzhou University, China)

10. [The Calibration Study of the Soil Moisture Monitoring Data of Qiangtang Plateau, China](#)  
[The domestication of the Yak and its environmental implications for the pastoral environment of the Qinghai-Tibet Plateau](#)

Jianquan Liu (Lanzhou University, China)

11. [The Domestication of the Yak and Its Environmental Implications for the Pastoral Environment of the Qinghai-Tibet Plateau](#)

Jianquan Liu (Lanzhou University, China)

12. [The Last Deglaciation History in the Mid-Latitude Westerlies Dominated Tibetan Plateau](#)

Xuezhen Zeng, Liubing Xu (South China Normal University, China)

13. [The New Evidence of Human Activities at an Altitude of 4000 Meters Area of Qinghai-Tibet Plateau](#)

Hou Guangliang (Qinghai Normal University, China)

## Poster

1. [Cosmogenic Radionuclide Exposure Dating Constrained on Glacial Fluctuations on Xuebaoding from 12 Ka B.P. , Northeast of Tibetan Plateau](#)

Beibei Liu; Gengnian Liu; Zhijiu Cui (China, Peking University)

2. [Diet of Late Prehistoric Humans Reconstructed From an Analysis of Plant Microfossils in Human Dental Calculus from the Shilinggang Bronze Age Site, Yunnan Province, China](#)

Naimeng Zhang (China, Lanzhou University); Guanghui Dong (China, Lanzhou University); Xiaoyan Yang (China, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences)

3. [Prehistoric Human Dispersal to the Tibetan Plateau and Adaptation to the High Altitude Environment](#)

Fangdi Xie (China, IGSNRR, CAS)

4. [Spatial Distribution and Agglomeration Characteristics of Prehistoric Settlement around Songshan Mountain](#)

Yan Lijie; Lu Peng (China, Geographical Institute of Henan Academy of Sciences)

5. [Study on Academician Shi Yafeng's Academic Thought](#)

Sun Jinjin (China, South China Normal University)

6. [The Exposure Dating and Formation Mechanism of Hummocky Moraines in Bodui Valley, Southeast Tibet Plateau](#)

Kailin Zhao (China, South China Normal University)

## **Demic Diffusion of the Southward Expansion of Millet Agriculture**

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### **Abstract**

It is now widely accepted that broomcorn millet and foxtail millet were initially domesticated in northern China along the Yellow river valleys during the early Neolithic period and spread into vast geographic areas including western China, southwestern China, Southeast Asia and even India. However, whether the southward spread of millet agriculture resulted from migration of human (demic diffusion) or through acculturation (cultural diffusion) is still elusive. Here we reported mitochondrial DNA (mtDNA) haplogroups (M9a1b, M9a1a1c1b and A14) and Y chromosome haplogroup (O3a3c) that distributed restrictively in populations from northern and southwestern China. Phylogeographic analysis indicated that these haplogroups originated in northern China at ~12-8 kya and went through demographic expansion at ~7.5 kya, probably promoted by expansion of agriculture in northern China. Significantly, the dispersal routes of these haplogroups are exactly concordant with the southward spread of millet as suggested by archaeological evidences, indicating a codispersal of millet agriculture and millet farmers. Considering that these haplogroups only account for 6.5% of the populations residing along this southward migration route, we speculated that the initial millet farmers had assimilated indigenous genetic components during their southward expansion.

### **Key words:**

millet agriculture; demic diffusion; mitochondrial DNA; Y chromosome

## Early Human Occupation on Nujiang River Valley, Southeast Tibetan Plateau

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### Abstract

The history of prehistoric human occupation on the Tibetan Plateau, the highest area of the world, has been increasingly concerned and studied in recent years. However, when human firstly inhabited the high Plateau, is still open to debate, due to the competing deductions based on different research works. Previous archaeological studies suggest human might have occasionally central Tibetan Plateau around 20,000 years ago, and surely inhabited in northeast Tibetan Plateau since 14,700 years ago. In this work, we systematically dating the charcoals, bones and sediments from the cultural layers of Yushuiping Paleolithic site by radiocarbon and OSL dating methods, which locates at middle Nujiang River valley, southeast margin area of the Tibetan Plateau, with elevation of 2510 m asl. Our dating results, and plenty of lithic artifacts and animal bones from cultural layers in Yushuiping site, indicate that human occupied the site around 39,000-31,000 years ago, suggesting human had inhabited the low-mid altitude areas of the Tibetan Plateau far earlier than previous estimation. The comparison dates in this work with reliable dates from other Paleolithic in the Tibetan Plateau and its surrounding areas, further support our hypothesis that foragers might have migrated to the Tibetan Plateau during MIS III from its southeastern neighboring areas.

### Keywords:

Yushuiping site; Yunnan Province; Paleolithic period; radiocarbon dating; OSL dating

## Holocene Climate Change Records from Sand Wedge at Linggo Co, Qiangtang

### Plateau

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### Abstract

As a type of the periglacial landform, the formation time of sand wedges are usually represent the period of dry and cold, can substantially write down the ancient temperature. So, the sand wedges are good notepads on the reconstruction of the paleoenvironment. One sand wedge was found, about 1.5 m height and 0.5 m width, in the east lakeshore of Linggo Co which a lake is located in the Qiangtang Plateau (QP) which lies in on the west Tanggula Mountains in the central Tibetan Plateau (TP). Three optically stimulated luminescence (OSL) samples were collected from this sand wedge (SW) section, from the top, the middle, and the bottom of the SW. In addition, one OSL sample was collected from the sand layer which overlies on the sand wedge, about 30cm depth. OSL measurements also were used to make sure the ages.. We obtained ages of  $0.4\pm 0.0$ ,  $1.5\pm 0.2$ ,  $1.4\pm 0.1$  and  $6.5\pm 0.5$  ka for one sand layer and three sand wedge samples from top to the bottom of the section, respectively. The age results from sand layer sample indicate that the sediments have been deposited at  $\sim 0.4\pm 0.0$  ka, corresponding to the Little Ice Age (LIA). The three ages from the SW section illustrate that the sand wedge had been formed at about 1.5 and 6.5 ka ago, which indicate the sand wedge had shaped at two different stages, during late and middle Holocene. During the sand wedge forming, Lake Level is lower than the bottom of the sand wedge section, belonging to cold- dry period.

### Key words:

Linggo Co; sand wedge; OSL; Holocene

## Human Adapt to the Pleistocene Vegetation Changes in South Luohe River, Central China

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### Abstract

The relationship between human adaptation and their ecological environment has been debated for nearly a century. The existent research on this discussion are concentrated in Africa, and the main problems are the paucity of *in-situ* archaeological sites and continuous environment records. Here we show quantitative reconstruction of the woody plant content at hominin habitat, based on organic stable carbon isotopic analysis of surface soil and paleosol samples from 5 *in-situ* loess preserved Paleolithic sites in the South Luohe River region, central China. Our results show that, during the Pleistocene, in spite the existed large area of grass dominated landscape of northern China, hominins persistently living in a mosaic of grass and woody plant environment in central China. Grass cover in the South Luohe River region expended/extracted in corresponding to the glacial-interglacial oscillations and global climatic trending. In these ecological scenarios, hominins preferred the patches of woody plant in their early phases, whereas they adapted to the open environment as C4 grass increased to a maximum at late mid- Pleistocene.

### Key words:

Paleolithic; Hominin habitat; Vegetation; Climate; Loess; South Luohe River

## Human Migration to the Northeastern Tibetan Plateau-Preliminary Study of 151

### Site in the Qinghai Lake Basin

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#### Abstract

Current study indicates that Northeastern Tibetan Plateau (NETP) is one of the first widely occupied places by prehistory people on the Tibetan Plateau, which makes NETP very important to understand the human history on the plateau and human adaptation to high elevation environment. Hence, 151 site, a paleo- to Epi-Paleolithic site in the Qinghai Lake basin on NETP, is chosen to excavate. Thousands pieces of animal bones, hundreds pieces of stone artifacts and several possible hearths were unearthed and obtained. Carefully redating of the site shows that it was first occupied shortly around 15 ka BP, then reoccupied from 9000-6000 a BP more intensely. Preliminary study of the site suggest that the first appearance of human in Qinghai Lake basin is closely related to the amelioration of the Last Deglaciation and the prevalence of microlithic technology in North China, which may enlighten the study of early human migration on to whole plateau.

#### Key words:

human migration; Paleolithic

## Land Use Change and Its Effects on Water Supply and Sediment Retention Services in Tibetan Plateau for 1900s-2000

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### Abstract

By changing the structure and processes of ecosystems, land use and land cover change (LUCC) affects the provisioning capability of ecosystem services (ES). LUCC in Tibetan Plateau (TP) and its influence on ES are hot topics. Firstly, we estimated the cropland, forestland and grassland area of TP at provincial level for 1900s, 1930s, 1950s, 1980s and 2000. Then the spatially explicit reconstruction models of LUCC were designed based on in-depth analysis of TP land use history. Subsequently, the provincial area datasets were transformed into spatial datasets with 1 km resolution based on the above-mentioned models. Finally, using InVEST model, we assessed the changes of water supply services (WSS) and sediment retention services (SRS) under the influences of LUCC. The results show that the dramatic change tendency for 1950s-1980s was the most obvious characteristic of LUCC in TP over the past one hundred years, which resulted from the intensified human deforestation and over-grazing activities. The cropland expanded obvious in the Yellow River-Huangshui River Valley and the valley of Brahmaputra River and its two tributaries. The spatial extent of forestland shranked significantly in the southeast of TP and grassland degraded obviously in northwest of TP. Owing to the degradation of forestland and grassland, WSS value decreased for 1900s-1980s and slightly increased for 1980s-2000. In terms of SRS, most regions of TP stay in a low erosion level. Decreasing tendency for 1900s-1980s and slightly increasing tendency for 1980s-2000 were found because of cropland expansion and forestland degradation.

### Key words:

land use and land cover change; water supply and sediment retention services; reconstruction; assessment; InVEST models; Tibetan Plateau; past one hundred years

## Life in the Cold: What Do We Know about the Bioclimatology of the Tibetan Plateau and The Himalayas During the Late Quaternary?

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### Abstract

The paleo-climate scenarios of the Tibetan Plateau or the Himalayas diverge depending on the proxies used: ice shield, desert or persistence of life in the high altitude grasslands or forests.

A new approach relies on endemic plants and animals: their current vertical and horizontal envelopes provide temperature and humidity thresholds to be used cross-checking phylogeographical results of range extensions and allow for a re-interpretation of the paleo-climate state of the art: Temperatures and humidity during the LGM allowed the endurance of plants, herbivores and hunters in the Tibetan highlands.

Table 1 Last glaciation temperature depression estimations for the Tibetan Plateau and adjacent areas

Location	Method	maxDT [K]	Time [ka BP]	Reference
Tibet Plateau	<sup>18</sup> O value in ice core, ice wedges	7 (annual)	16-32	Shi et al. 1997
Guliya Ice cap, West Kunlun	<sup>18</sup> O value in ice core	9.0 (annual)	23	Yao et al., 1997
Dunde Ice cap, Qilian Mountain	<sup>18</sup> O value in ice core	6.0 (annual)	30	Thompson, 1989
Qarhan Salt Lake, Quaidam Basin	<sup>18</sup> O and D of intercrystalline brine	8.0 (annual)	16–19.5	Zhang et al., 1993
Eastern Qilian Mountain	Paleo-peat in frost heave	7.0 (annual)	31+/- 1.5	Xu et al., 1984
Gonghe Basin, Qinghai Province	Paleo-sand wedge	7.0 (annual)	17 +/- 0.25	Xu et al., 1984
Zoige Basin, East Tibet	Pollen analysis	6.0 (annual)	18	Shen et al., 1996

Zhabuye lake, southwest Tibet	Pollen analysis	6.0 (annual)	18	Xiao et al., 1996
Hidden Lake & Ren Co, Southeast Tibet	Pollen analysis	7–10 (January)/ 0–1.5 (July)	18–14	Tang et al., 1999
South and central Tibet	Atmospheric model	3–5 (winter)/ 2–4 (summer)	21	Liu et al., 2002
High Asia	Estimate	< 5 (mean summer)	LGM	Shi, 2002
Tibetan Plateau	Atmospheric model	0.8–1.9 (annual)	21	Zheng et al., 2004
High Asia	Atmospheric model	6.3–6.4 (annual)/ 5.6–6.1 (July)	21	Böhner and Lehmkuhl, 2005
Nyenquentangula Shan	Present elevational range of endemic beetles	3-4 (summer temperature)	LGM	Schmidt et al. 2011
Southern Tibet	Private Juniper haplotypes	3-4 (summer temperature)	LGM	Schmidt et al. 2011
Changthang	Present elevational range of endemic plants	3-4 (summer temperature)	LGM	Miehe et al. 2011
Loess Plateau	Terrestrial mollusk	3-5 (annual)	LGM	Wu et al. 2002
Lake Rukche, Nepal	Forest/grassland biomarker	3 (annual)	LGM	Glaser & Zech 2005
Kathmandu, Nepal	<i>Pinus</i> -Pollen	3 (annual)	LGM	Paudyal & Ferguson 2004

## Luminescence Dating of Prehistoric Hearths in Northeast Qinghai Lake and Its Palaeoclimatic Implication

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### Abstract

Archeological research has been trying to provide evidence relevant to understanding both the timing of and processes responsible for human colonization of the Qinghai-Tibetan Plateau (QTP). According to the previous study, the prehistoric human occupation of the Qinghai Lake dated back to ~15-4.2 ka. Hearths are one of the most extensive, important and typical prehistoric humanity activity evidence on QTP. However there are a number of hearths lacking charcoal material because of the wind and water erosion. Fortunately, most of these hearths can be dated by luminescence dating on the remnant sediments around the hearth. In this study, 18 optically stimulated luminescence (OSL) samples from 14 hearths in Yandongtai site (YDT) and Bronze Wire site (BW) in the northeast of Qinghai Lake area were systematically dated. The OSL ages range from  $6.8 \pm 0.7$  ka to  $14.4 \pm 1.2$  ka. There is a good agreement between OSL dating results and charcoal ages during the late glacier period, which indicates OSL method has great potential in dating hearth on QTP. Combined with the previous dating results from other hearths, the age of hearths concentrate in 11-13 ka BP, i.e. the Younger Dryas (YD) chronozone. The increased number of hearths indicates reinforced colonization in the Qinghai Lake area during YD cold event, implying that the cold climate during YD event was not severe enough to hinder the inhabitation of prehistoric humanity in this elevation of 3.2 km.

### Key words:

Qinghai Lake area; Hearth; OSL dating; Human migration pattern; Younger Dryas

## Prehistoric Human Dispersal to the Tibetan Plateau and Adaptation to the High Altitude Environment

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### Abstract

Human history of the Tibetan Plateau and human adaptation to the high altitude environment is hotly debated in the past decade among archaeological, anthropological, genetic, and even past climate change studies. Based on previous studies on the Tibetan Plateau and our own archaeological studies in northeastern Tibetan Plateau (NETP), we propose that human migrated to the Tibetan Plateau from the last Deglacial period to late Holocene mainly from North China via Yellow River valley and its tributary valleys in NETP. This migration is constituted of four stages (Upper Paleolithic, Epi-Paleolithic, Neolithic and Bronze Age) when human adapted to the high altitude environment and climate change with different strategies and techniques. Particularly, the prevail of microlithic technology in North China provoked hunter-gatherers' first visit to the NETP in relatively ameliorated last Deglacial period, and the quick development of millet farming and subsequent mixed barley-wheat farming and sheep herding facilitated farmers and herders permanently settled down on NETP, even above 3000 masl, during mid- and late Holocene.

### Key words:

Tibetan Plateau; Prehistoric human adaptation

## The Calibration Study of the Soil Moisture Monitoring Data of Qiangtang Plateau, China

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### Abstract

ECH<sub>2</sub>O EC-5 soil moisture sensor can effectively monitor the soil moisture content, and it can reveal the soil moisture dynamic change under different rainfall events. However the ECH<sub>2</sub>O EC-5 sensors' monitoring data about soil moisture content is also influenced by soil particle size composition, surface vegetation types, temperature and other factors to deviation. This paper discusses the property of the EC-5 soil moisture sensor's measuring data of soil water content, and the soil sample are taken from the field observation sites in the Qiangtang plateau, western Tibetan Plateau of China. The results show that all samples have good imitative effects, according to the fitted line, the measured data which had already been corrected could efficiently reflect the practical soil moisture content in the next place, according to the further calibration between the soil temperature data and the humidity data, the accuracy of data could be improved a lot, especially in the low temperature time quantum at night.

### Key words:

soil volumetric water content; calibration; soil dielectric constant; bulk density; temperature

## The Domestication of the Yak and Its Environmental Implications for the Pastoral Environment of the Qinghai-Tibet Plateau

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### Abstract

Yak domestication represents an important episode in the early human occupation of the high-altitude Qinghai-Tibet Plateau (QTP). The precise timing of domestication is debated and little is known about the underlying genetic changes that occurred during the process. Here we investigate genome variation of wild and domestic yaks. We detect signals of selection in 209 genes of domestic yaks, several of which relate to behaviour and tameness. We date yak domestication to 7,300 years before present (yr BP), most likely by nomadic people, and an estimated sixfold increase in yak population size by 3,600 yr BP. These dates coincide with two early human population expansions on the QTP during the early-Neolithic and the late-Holocene, respectively. Our findings add to an understanding of yak domestication and its importance in the early human occupation of the QTP.

## **The Last Deglaciation History in the Mid-Latitude Westerlies Dominated Tibetan Plateau**

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### **Abstract**

A knowledge of the timing of glacial activities relative to climate change, CO<sub>2</sub>, and changes in insolation is of significance to understand the forcing mechanisms of glacial fluctuations during the last deglaciation. A compilation of 233 cosmogenic <sup>10</sup>Be exposure ages of 60 moraines from main mountain ranges, including the Kunlun, Tianshan, Pamir and Karakorum Mountains, constrains the last deglaciation history of mid-latitude westerlies dominated Tibetan Plateau, climatically dominated by the mid-latitude westerlies. After reducing underproof samples by stratigraphic characteristic analysis and statistic strategy, two main deglaciation intervals are identified. One lies around 21 ka, in discrepancy with the saying that the timing of LGM retreat of mountain glaciers in Tibet occurred several thousand years later due to the influences of monsoon, while consistent with interhemispheric deglaciation, indicating the regional signal of onset of the termination of the global Last Glacial Maximum (LGM), which is considered primary triggered by rising boreal insolation. Another distinguished deglaciation happened at about 17.5 ka, synchronous with Heinrich event stage 1 (HS1), a distinct cold interval suggested by ice-core and ocean sediment archives. Seasonality (extreme cold winters and moderate summers) amplified by the North Atlantic ocean and conveyed by westerlies are likely a significant component for driving the glacial retreat at this cold spell, moreover, convincing evidence of local seasonal signals are provided by model simulations and surrounding lacustrine studies. However, when considering triggers for glacial recession, the contribution of continuous rising insolation and increasing concentration of atmosphere CO<sub>2</sub> can not be denied.

### **Key words:**

Tibetan Plateau; the last deglaciation; cosmogenic dating; Heinrich event; seasonality

## The New Evidence of Human Activities at an Altitude of 4000 Meters Area of Qinghai-Tibet Plateau

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### Abstract

Human activities during the early stage in Tibetan Plateau are crucial to improve the knowledge about how human beings react and respond to extreme environmental conditions, especially those in the area with elevation >4000 m asl, which is considered as the key of the migration and diffusion of human from plain to hinterland. Ash layer dated as  $11290 \pm 69$  cal.yr BP and stoneworks such as micro-blade and fine flake mainly occurring at ca.11.2 cal kyr BP were found in the archaeological site XDW1, which can be considered as the first evidence to show the human activities above 4000 m asl in Tibetan Plateau. This study indicates that human beings have migrated to hinterland in the Early Holocene, and evaluated the spacial and temporary population diffusion patterns in northeastern Tibetan Plateau: 1) human occupying the marginal regions with 3000-4000 m asl in northeastern Tibetan Plateau, such as Lak Qinghai basin and Gonghe basin during the Last Deglaciation; 2) expansion to the regions above 4000 m asl during the Early Holocene; 3) further diffusion toward hinterland with higher elevation during the Holocene Climatic Optimum. The three stages of human migration and diffusion in Tibetan Plateau are closely related to the improving climate conditions from the Last Deglaciation until the Holocene Climatic Optimum.

### Key words:

Early Holocene; Qinghai-Tibet Plateau; Human activity

## Cosmogenic Radionuclide Exposure Dating Constrained on Glacial Fluctuations on Xuebaoding from 12 Ka B.P., Northeast of Tibetan Plateau

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### Abstract

The Xuebaoding, of which the main peak is 5588 m, located at the northeast of Tibetan Plateau. It developed glacial moraine and cirque as well as other glacial landforms around the peak, but ice expansion remained constricted to valleys. We sample sites from the north and south slope based on field investigation and satellite image. Combine with  $^{10}\text{Be}$  exposure dating we identify that the onset of glaciation is about 12 ka B.P. The glacier advance during Younger Dryas cold interval is poorly defined due to lack of a large number of dates (11919±2063 ka and 12748±1897 ka) support and needs to be tested in future studies. Nevertheless, a set of dates (~7295 to 10940 ka) for glacier boulder confirm there exist early Holocene glacier advance, minor advances during mid Holocene glacier (5940±608 ka) and the little Ice Age (~1311 to 1899 ka). This work provides new insights into the reason induced the glaciation. It is that the glacier development is more consistent with the climate change than the tectonic uplift. Considering the average uplift rate of Minshan Block is 1.5 mm/a, it can uplift at most 15 m since 10ka. However, this height is not enough to control the glacier development.

### Key words:

Xuebaoding; CRN; glacier evolution

## **Diet of Late Prehistoric Humans Reconstructed From an Analysis of Plant Microfossils in Human Dental Calculus from the Shilinggang Bronze Age Site, Yunnan Province, China**

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### **Abstract**

Plant microfossil analyses of ancient human teeth have shed light on the diet of prehistoric humans. The approach is especially useful in areas with acidic soils, like Yunnan, which are unfavorable for the preservation of plant macrofossils. In this study, we report analyses of starch grains and phytoliths preserved in the dental calculus of adult humans preserved in tombs and the results of radiocarbon dating at the prehistoric Shilinggang site in Yunnan province, southwest China. As a result, we show that Bronze Age settlers in Nujiang area ate a wide range of plants, including various underground storage organs (tubers, roots, bulbs, and rhizomes), rice, millet, palms and acorns at about 2500 cal yr BP. What's more, a wide variety of plant food founded here suggest that the human adopted a broad-spectrum strategy although when crop cultivation developed in some extent in northwest Yunnan Province during late prehistoric times.

### **Key words:**

Human diet; archaeobotany; starch grain and phytolith analysis; Bronze Age; Yunnan Province

## Prehistoric Human Dispersal to the Tibetan Plateau and Adaptation to the High Altitude Environment

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### Abstract

Human history of the Tibetan Plateau and human adaptation to the high altitude environment is hotly debated in the past decade among archaeological, anthropological, genetic, and even past climate change studies. Based on previous studies on the Tibetan Plateau and our own archaeological studies in northeastern Tibetan Plateau (NETP), we propose that human migrated to the Tibetan Plateau from the last Deglacial period to late Holocene mainly from North China via Yellow River valley and its tributary valleys in NETP. This migration is constituted of four stages (Upper Paleolithic, Epi-Paleolithic, Neolithic and Bronze Age) when human adapted to the high altitude environment and climate change with different strategies and techniques. Particularly, the prevail of microlithic technology in North China provoked hunter-gatherers' first visit to the NETP in relatively ameliorated last Deglacial period, and the quick development of millet farming and subsequent mixed barley-wheat farming and sheep herding facilitated farmers and herders permanently settled down on NETP, even above 3000 masl, during mid- and late Holocene.

Key words:

Tibetan Plateau; Prehistoric human adaptation

## Spatial Distribution and Agglomeration Characteristics of Prehistoric Settlement around Songshan Mountain

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### Abstract

Spatial distribution and agglomeration characteristics of prehistoric settlement around Songshan Mountain were studied and compared by using GIS point pattern analysis method combining the kernel density (Kernel), standard deviation ellipse, Ripley's K (R) function. The prehistoric period included four stages, i.e. Pei Ligang, Yangshao, Longshan, Xia and Shang. The results of the study show that: the settlement sites of the four periods were aggregated. Settlement site distribution was gradually decentralized from Pei Ligang to Yangshao and Longshan. The distribution of settlement sites tended to focus from Longshan to Xia and Shang Dynasties. The spatial distribution pattern of settlement sites from Peiligang to Yangshao changed from Northwest-southeast to northeast-southwest direction. The spatial distribution pattern of settlement sites from Yangshao to Longshan and Xia and Shang changed from Northeast-southwest to Northwest - Southeast direction. The characteristics of prehistoric settlements distribution density spatial variation were expanding from Pei Ligang to Xia and Shang Dynasties. The settlement distribution of the period of Peiligang was the most dispersed with multi core. The Yangshao period, settlement density ratio compared to the period of PeiLigang, had greatly increased with three typical centers, settlement density in Longshan period slightly increased. Settlement nuclear density in Xia and Shang Dynasties was the largest in the four periods.

### Key words:

Spatial distribution; agglomeration characteristics; point pattern analysis; prehistoric settlement; around Songshan Mountain



## Study on Academician Shi Yafeng's Academic Thought

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### Abstract

Shi Yafeng, academician of Chinese Academy of Sciences, is an outstanding geologist, and glaciologist, known as the "father" of Chinese glaciology. He was engaged in Chinese glacier and geographical environment research, and led numbers of research projects, which played an significant role in their research fields. He is not only a pioneer in Chinese glaciology, but also laid an important foundation for the study of permafrost, mudslide and hydrological in drought zone. Professor Shi made a great contributions to the development of geography in China, such as, guided the research of geographical environment in the west of China, developed a generation of innovative geography researchers. This paper based on Professor Shi's works and contributions, combined with scientific and social environment to discuss his academic thought's formation process and academic spirit. Shi's academic thought is influenced by the social and family environment, education and his own characteristics.

### Key words:

Shi Yafeng; academic thought; glacier; geographical environment

## The Exposure Dating and Formation Mechanism of Hummocky Moraines in Bodui Valley, Southeast Tibet Plateau

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### Abstract

A large amount of hummocky moraines were produced after the Last Glacial Maximum in Bodui valley ,southeast Tibetan plateau .This study process a cosmogenic Be-10 surface exposure dating to the hummocky moraines in Linqiong, Xumu, Yuren, Dana these four hummocky regions. With the analysis of the exposure ages, spreading, geometry and directions of the hummocky moraine in Bodui valley.We indicate that the hummocky moraines in Bodui valley were primarily produced by the supraglacial debris. The forming of hummocky moraines are immediately after the forming of the lateral and end moraines. The scatter of the ages among the lateral and end moraine with the hummocky moraines, are caused by a long lasting instability condition on the dead ice. As a consequence it lengthen the period of ice decay. Our study demonstrated that the hummocky moraines in Bodui Valley were forming at 17.6~14.9 ka BP, and the totally melt of the dead ice in Bodui Valley were at 2.7~1.6 ka BP.

### Key words:

Tibet plateau; hummocky moraine; TCN;

## C12.09 Environment Evolution

### Climate Change and Human-Environment Interaction From Neolithic to Historical Periods



Home

#### Oral

1. [Archaeobotanical Study of Ancient Food and Cereal Remains Alongside the Silk Road of Xinjiang, China](#)  
Hongen Jiang (University of Chinese Academy of Sciences, China)
2. [Assessment of Pollution and Health Risks of Heavy Metals in Surface Dusts from Driving-Schools in a City of Henan, China](#)  
Yinan Chen (Henan University, China)
3. [Climate Change, Social Rise and fall in China over the Past Two Millennia](#)  
Yin Jun, Su Yun, Fang Xiuqi (School of Geography, Beijing Normal University, China)
4. [Climate Events in Transforming the Urbanscape of Athens during 500 BC - 1200 AD](#)  
Liang Yang, Mara Weinelt (Kiel University, Germany, Germany)
5. [Climate Push or Climate Pull? Human Migration under Climate Change in Ancient China](#)  
Qing Pei (The Hong Kong Institute of Education, HongKong SAR, China)
6. [Holocene Climate Fluctuations and Artificial Hydraulics in the Faiyum Lake of the Lower Nile River, Egypt: Evidences from Quartz Roundness in Core FA-1](#)  
Xiaoshuang Zhao, Qianli Sun (East China Normal University, China), Leszek Marks (University of Warsaw, Poland), Fabian Welc (Cardinal Stefan Wyszyński University, Poland), Zhongyuan Chen (East China Normal University, China)
7. [How Did Early Cities Affect the Environment: Geoarchaeological Investigation at the Dongzhao Site, Zhengzhou, China](#)  
Xiaolin Ren, Duowen Mo (Peking University, China), Tristram Kidder (Washington University in St. Louis, United States), Xingshan Lei (Peking University, China)
8. [Interpretation of Low-Carbon Tourism Value and Reconstructing the Developing Model](#)  
Ma Yong (institute of Tourism Development in Hubei University, China), Yang Yang (Hu Bei University, China), Li Na (Xi'an International Studies University, China)
9. [Modeling the Spread of Agriculture to the Tibetan Plateau](#)  
Jade d'Alpoim Guedes (Washington State University, United States)
10. [Mountainous Vegetation Response to Late Holocene Monsoon Climate Variability and Possible Human](#)

## [Impact of Southeast China](#)

Chunmei Ma (School of Geographic and Oceanographic Sciences, Nanjing University, China), Kam biu Liu (Louisiana State University, United States), Chaohao Ling (Jiangxi Normal University, China), Lin Zhao (School of Geographic and Oceanographic Sciences, Nanjing University, China)

## 11. [Navigable Rivers Facilitated the Spread of Plague in Pre-Industrial Europe](#)

Pak Hong Yue, Harry Fung Lee (The University of Hong Kong, China)

## 12. [Perceived Changes in Climatic Attributes and Impacts on the Gaddis \(Transhumance\) in Chamba, Middle Himalaya](#)

Himanshu Mishra, B.W. Pandey Pandey (University of Delhi, India)

## 13. [Pollen Evidence to Interpret the Vicissitudes of Rice Farming History of the Hemudu Site on the Ningshao Coast, Eastern China](#)

Yan Liu (Tongji University, China)

## 14. [Prehistoric Human-Environment Interaction in Hexi Corridor, Northwest China](#)

Guanghui Dong, Fahu Chen (Lanzhou University, China)

## 15. [Sky, Spate, and Soil: Agricultural Intensification and Environmental Evolution in the Central Plain, China](#)

Zhen Qin (Washington University in St. Louis, United States)

## 16. [The Paleoenvironment of the Taoshan Site and Its Implications for Human–Environment Interaction during the Paleolithic –Neolithic Transition in Northeastern China](#)

Guannan Zou, Jiafu Zhang (MOE Laboratory for Earth Surface Processes, Department of Geography, College of Urban and Environmental Sciences, Peking University, Beijing 100871, China, China)

## 17. [Was Population Collapse Caused by Overpopulation in Late Imperial China?](#)

Harry F. Lee (The University of Hong Kong, HongKong SAR, China)

## Poster

## 1. [Human Impact on Landscapes and Land Use History of the Meshchera Lowlands \(European Russia\) - Reconstructions by Palaeoecological and Historical Data](#)

Viktor Matasov; Elena Novenko (Russian Fed, M.V. Lomonosov Moscow State University, Faculty of Geography)

## 2. [Impact of Holocene Environmental Change on the Ancient Cultures of Chaohu Lake Basin, East China: A Geoarchaeological Perspective](#)

Li WU; Xinyuan WANG; Lin LU (China, College of Territorial Resources and Tourism, Anhui Normal



University)

3. [Pre-historical Clustered Geo-disasters Recorded at the Neolithic Ruins : A Reflection of the Early Human-environment Interactions over the Northeastern Tibetan Plateau](#)

Guo Yongqiang; Huang Chun Chang (China, Department of Geography, Shaanxi Normal University)

4. [Thermo Luminescence Dating of Seymareh Dam Lake Terraces According to the Archaeological Site Patterns Located in the Southwestern of Iran](#)

Mojtaba Yamani (Iran, University of Tehran, Faculty of Geography); Siyamack Sharafi (Iran, PhD of geomorphology and researcher at Iranian academic center for education)

## Archaeobotanical Study of Ancient Food and Cereal Remains Alongside the Silk Road of Xinjiang, China

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### Abstract

Starch grain, phytolith and cereal bran fragments were analyzed in order to identify the food remains including cakes, dumplings, as well as porridge unearthed at the Astana and Yingpan Cemeteries in Xinjiang, China. The results suggest that the cakes were made from *Triticum aestivum* while the dumplings were made from *Triticum aestivum*, along with *Setaria italica*. The ingredients of the porridge remain emanated from *Panicum miliaceum*. Moreover, direct macrobotanical evidence of the utilization of six cereal crops, such as *Triticum aestivum*, *Hordeum vulgare* var. *coeleste*, *Panicum miliaceum*, *Setaria italica*, *Cannabis sativa*, and *Oryza sativa* in the Xinjiang during the Jin and Tang dynasties (about 3<sup>rd</sup> to 9<sup>th</sup> centuries) is also presented. All of these cereal crops not only provided food for the survival of the indigenous people, but also spiced up their daily life.

### Key words:

Astana Cemetery; Yingpan cemetery; Ancient food preparation; Plant macrofossil; Starch grain; Phytolith; Cereal bran

## Assessment of Pollution and Health Risks of Heavy Metals in Surface Dusts from Driving-Schools in a City of Henan, China

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### Abstract

Twenty-nine surface dust samples were collected from driving-schools in a city of Henan. Concentrations of Cu、Zn、Pb、Cd、Cr、Ni and Co in dust samples were measured by inductively coupled plasma mass-spectrometry, while Hg and As were analyzed using atomic fluorescence spectrometry. The pollution of heavy metal in surface dusts was assessed by pollution load index, and the health risks exposed to heavy metals in dust, which are carried out in three different scenarios (working for 10a, 20a and 30a in driving-school), were estimated using the health risk assessment model developed by US EPA. The results show that concentrations of the most heavy metals in dusts are higher than their background values except Co and Ni. Average *PLI* of nine metals in dusts is 2.38 with moderately pollution. And the accumulations of Zn, Cd and Pb in dusts are the most serious with heavy pollution. Pb is the major non-cancer risk factor, and non-cancer risks of metals are lower than their thresholds ( $HI > 1$ ) except samples J20 and J26; As is the major carcinogen risk factor, and carcinogen risks of metals are lower than their thresholds ( $> 1 \times 10^{-1}$ ) in four different scenarios except sample J20 in scenes of 2 and 3. The concentrations and health risks of heavy metals in dusts are not significantly related to the operation time and densities of coach car densities in driving schools, but closely related to the surroundings around driving-schools and the previous land use status.

### Key words:

Heavy metal; pollution assessment; health risk assessment; surface dust; driving-school

## Climate Change, Social Rise and fall in China over the Past Two Millennia

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### Abstract

The relation between climate change and historical rhythms has long been discussed; however, this type of study still faces the lack of high-resolution data concerning long-term socio-economic processes. In this study, we collected 3378 items of direct and proffered evidence from 25 Chinese history books. We used semantic analysis to reconstruct a quantitative series of the social rise and fall of the past 2000 years with a 10-year resolution to express the phase transition of the social rise and fall of the dynasties in China. Our reconstruction demonstrates that social vicissitudes have obvious cyclical feature in multiple time scales. Next, the association of social rise and fall with climate change was analyzed. The results indicate that social rise mostly occurred in the centennial-scale warm periods, whereas social decline mostly occurred in the centennial-scale cold periods. Temperature displayed more significant effects on the social fluctuation within the long term, while precipitation displayed more significant effects on the social fluctuation within the short term. Under warm-wet conditions, the social rise was over 57%; under cold-dry conditions, the social decline was over 66%. Thus, social crisis, social unrest and dynastic collapse in China usually appeared during the centennial-scale climatic cooling phases.

### Key words:

climate change; social rise and fall; past two millennia; China

## Climate Events in Transforming the Urbanscape of Athens during 500 BC - 1200 AD

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### Abstract

Abrupt paleoclimate changes in a long period (millennium scale) have received wide attention among natural and social scientists, also because of today's rapid climate changes and their extensive impacts on our society. In the eastern Mediterranean area, coherent patterns and synchronous events in history suggest obvious link between urban development and climate forcing. The city of Athens as the origin of ancient Greek civilization experienced many periods of prosperity and decadence. Though the transitions were mostly dominated by wars and power changes between empires, severe climate events and natural disasters may also considerably drove the process of Athens' development. Among many natural disasters, earthquake, tsunami, flood and wildfire were the main forces that stressed the development of Athens. To recover from and respond to the disasters, the city had taken some strategies and measures which either changed the ever existed city patterns or guided its further development to specific directions. The possibility that these transitions may have been response/resilience strategies triggered by abrupt climate events has so far hardly been explored.

With extensive literature review, existing archaeological records and paleoclimate reconstruction modelling results, this study analyses the climate variations in large scale, environment changes in mesoscale and the local natural disasters in Athens and its surrounding areas over the period 500 BC - 1200 AD. The study treats a number of important climate events in the area and urban transitions of the city, of which the integration of all these elements and insights from recent analysis throw some new light on understanding the forcing-transition process. The preliminary results indicate a weak link of climate forcing and urban transition over the whole city, but several links are recognized at specific blocks of Athens. Along with the population growth and land sprawl, more areas and more sections of the city were becoming susceptible to climate events and increased consideration of disasters in their development. The findings have significance for our in-depth understanding of the ancient city construction and development, as well as for the future urban development in facing of global climate change.

### Key words:

Climate change; natural disasters; urban transition; pre-industry; Athens

## Climate Push or Climate Pull? Human Migration under Climate Change in Ancient China

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### Abstract

Unique agricultural practices engender regional variations in cultural customs, variations which pave the way for diverse regional migration patterns at discrete geographic levels. In the present study, we base on fine-grained historic migration records, together with statistical analysis, to explore the relationship between land carrying capacity and migration in China at the sub-national level over the past two millennia. Our results quantitatively demonstrate that in the pastoral region, climate change has a major role in triggering migration. The study further has quantitatively verified the causal pathway “climate change → nomadic migration → conflicts between pastoralists and agriculturalist” in China over past two thousand year. In the rice region, migration is more influenced by population pressure. The wheat region, located between the pastoral and the rice regions, displays the combined patterns of the two regions. Our findings also reveal the importance of regional cultural and geographic context in shaping migration patterns in various agro-ecological zones in ancient China. Based on our results, the application of a “Push–Pull Model” in interpreting historic Chinese migration is revisited with quantitative evidence. This study provides timely empirical proof of a “nature–human” interaction founded on diverse cultural traditions over an extended period which other scientists and policymakers can use as reference in initiating actions that can prevent agriculturalist–pastoralist conflicts.

### Key words:

climate change; human migration, China; agro-ecological zones; push-pull model

## Holocene Climate Fluctuations and Artificial Hydraulics in the Faiyum Lake of the Lower Nile River, Egypt: Evidences from Quartz Roundness in Core FA-1

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### Abstract

The migration of the Intertropical Convergence Zone (ITCZ) in eastern Africa was resulted in different intensity of summer monsoon, which had largely shaped the basin-wide environmental setting through runoff and hydrodynamics. A sediment core FA-1 taken from Faiyum Lake of the lower Nile River provided a record of the Holocene climatic changes and altered hydraulics of the lake. Quartz roundness, angular or rounded shape, is applied to this study to distinguish the sources of sediment. The angular quartz indicated riverine source of sediment, mostly contributed by river flooding of the lower Nile when ITCZ moved northward during the Early and Middle Holocene. The rounded quartz, an indicator for airborne sediment source from the Sahara Desert, implied an arid climate setting when ITCZ shifted to south. On this base, our quartz evidence indicated a wet climate prevailing in the lower Nile during the Early to Middle Holocene, when ITZC moved northward. The lower Nile, including Faiyum Lake was in severe drought owing to the southward shift of ITCZ after ca. 5000 years ago. Furthermore, our quartz evidence revealed two important time periods at ca. 3700-3300 cal yr BP and 2250-2100 cal yr BP, when Faiyum Lake was connected to the Nile River by artificial channels, a hydro-engineering made by the ancient Egyptian.

### Key words:

Quartz roundness; ITCZ; Holocene climate; artificial hydro-engineerings; Nile River

## How Did Early Cities Affect the Environment: Geoarchaeological Investigation at the Dongzhao Site, Zhengzhou, China

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### Abstract

Contemporary research produces divergent views of urbanism and its environmental consequences. One view proposes that because of their dense populations, cities come with an “urban penalty”. The other view is that densely settled cities provide an “urban advantage” because they are environmentally efficient with positive feedbacks from social interactions that generate more economic value than proportionate growth in resource consumption. There are few archaeological studies about the relationship of cities and their environments in China. Dongzhao site is appropriate for this research. It was an important settlement in Zhongyuan area from late Neolithic to Bronze age. Since the excavation beginning in 2012, three early cities dated from Xinzhai, Erlitou culture to Eastern Zhou period have been found within 100 km<sup>2</sup>, as well as many storage pits, artificial reservoirs, wells, canals and big building remains. A geoarchaeological survey around the site has been conducted to study the geomorphic evolution, human-environment interaction, and the relationship between the ancient cities and local stream network. Applying soil micromorphology, particle size distribution, OSL dating, pollen analysis, basic geochemistry and GIS, this paper presents the results of the geoarchaeological investigation and the reconstruction of site formation processes in relation to the hydrologic processes and water management. Exploring the relationship between early cities and environmental conditions at ancient Zhengzhou area provides archaeological evidence to test the “urban advantage” and “urban penalty” models, which helps us refine our concepts of urban sustainability.

### Key words:

early cities; geoarchaeological investigation; Dongzhao site

## Interpretation of Low-Carbon Tourism Value and Reconstructing the Developing Model

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### Abstract

As the new way to upgrade tourism industry, the practices of low-carbon tourism are challenged by many factors. Most of the existing low-carbon resorts are still in the transition to a low-carbon destination--"gray" stage, which is not conducive to the sustainable development of scenic spots. In the first place, the article analyzes the connotation of low-carbon tourism, and then extract the four core values that is functional value, symbolic value, experience value and social value, from the perspective of production and tourism consumption. After that, according to the highlighting extent of low-carbon tourism, the paper divides the model into the original ecological developing model and sub-ecological developing model, what's more, basing the comparison of the two developing models, the paper build low-carbon tourism development model called "driving force - state - response - potential" model on the basis of DSRP reconstruction framework, which promotes the low-carbon area by the "passive, controlled" original mode to the "active, attack type" sub-ecological upgrading model. As a result, we can realize the low-carbon tourism value overflowing to promote low-carbon build tourist destination.

### Key words:

low carbon tourism; the value of developing model; reconstruction

## Modeling the Spread of Agriculture to the Tibetan Plateau

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### Abstract

The need to construct locally and historically contingent models of food resources was a central concern of “New Archaeology”. However, data and computational limitations meant that archaeologists were unable to go beyond describing coarse patterns of effective temperature, rainfall and net primary production on a global scale. Advances in ecology and computational modeling mean that archaeologists have at their disposition new computational tools and big data that allows us to build frames of reference with a higher level of spatial and temporal precision. This paper describes the creation of ecological niche models for predicting the constraints placed on ancient agriculturalists as they moved crops outside of their homelands of domestication. This paper describes the application of a 5000-year model of changing crop niches on the Tibetan Plateau and describe how the use of this models has elucidated the reasons underlying a major transition in subsistence regimes during the second millennium cal. BC.

### Key words:

Tibet; Geospatial Model; Archaeology

## Mountainous Vegetation Response to Late Holocene Monsoon Climate Variability and Possible Human Impact of Southeast China

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### Abstract

Two 4000 yr palynologic records from mountainous peatland of Tianmu and Daiyun mountains, southeast China, are assessed to investigate changes in terrestrial vegetation in response to the late Holocene monsoon climate variability and possible human impact. The two palynologic records show almost synchronous changes. Though the monsoon climate became cool and dry in the late Holocene as a whole, during about 4000-1200 cal. yr, trees and shrubs were dominant with vegetation type of evergreen broad-leaf forest. From about 1200cal.yrBP to present, trees and shrubs declined dramatically in accordance with expanding of Pinus, upland herbs (dominant by Poaceae, Artemisia, Composite etc.) and ferns. During the Medieval Warm Period, the warm temperature might lead to drier mountainous climate, but the human activities should be the most important impact. According to the history archives, with the population growth, war destroy and economic development, more and more frequent human activities, like clearing land for potatoes, pick tea-leaves and over-cutting forests for marketing, exacerbated virgin forests decline. In recent years, percentage of forest cover grows notably, which may caused by establishing natural reserves for revegetation.

### Key words:

Pollen; peatland; late Holocene; Medieval Warm Period; human impact; southeast China

## Navigable Rivers Facilitated the Spread of Plague in Pre-Industrial Europe

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### Abstract

Infectious diseases have become a rising challenge to mankind in a globalizing world. Yet, little is known about the transmission of infectious diseases across different spatial domains in history. In this study, we based on the spatio-temporal information of 5559 plague (*Yersinia pestis*) outbreaks in Europe and its neighboring regions in AD1357–1760 to statistically examine the connection between navigable rivers and the spread of plague. Our results showed that 95.5% of plague happened within 10km proximity of navigable rivers. Besides, the count of plague outbreak was positively correlated with width of river and negatively correlated with distance between river and city. This association remained robust in different regression model specifications. An increase of 100m in width of river and a shortening of 1km distance between river and city resulted in 9 and 0.96 more plague outbreaks, respectively in our study period. We concluded that trade and transportation brought by river was an important medium for the spread of plague in pre-industrial Europe.

### Key words:

Plague; River; Pre-industrial; Europe; Spatial analysis

## Perceived Changes in Climatic Attributes and Impacts on the Gaddis (Transhumance) in Chamba, Middle Himalaya

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### Abstract

Gaddi community whose subsistence livelihoods directly depend upon the utilization of natural resources are vulnerable and fragile to the impacts of climate change, and can yet be unaware of actual and possible change. Changes in rainfall, temperature and seasonality could undermine traditional systems built in Gaddis experience. In one such system in the middle Himalaya, some herders practice vertical transhumance whereby they ascend in stages to high-altitude pasturelands for summer and similarly descend in winter. Several climate change models have predicted increasing temperature in the Himalaya but there is no significant information on whether or not Gaddis are aware of any changes in climate. In this study, rainfall and temperature data for the surrounding stations were collected and analyzed, 100 transhumance practitioner and herders were interviewed and 4 focus group discussions were conducted in Chamba district of Himachal Pradesh. Perceptions of herders communicated with the trends of climatic attributes but with some exceptions. The majority of Gaddis reported early onset of summer and rapid melting and receding of snow, early availability of grasses, early maturing of crops, vegetation and the appearance of new grass and plant species in the pasturelands. They also reported decreasing status of water availability and the appearance of new livestock diseases. Findings suggest that the perceptions and indigenous knowledge of Gaddis towards changes in crucial climatic attributes and other bio-physical indicators are useful in understanding of climate change in hostile and remote mountainous region of middle Himalaya.

### Key words:

Chamba; climate change; impact; perception; transhumance method

## **Pollen Evidence to Interpret the Vicissitudes of Rice Farming History of the Hemudu Site on the Ningshao Coast, Eastern China**

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### **Abstract**

A 3.12-m sediment core named HMD was retrieved at the west margin of the famous Hemudu Neolithic site to decode the rice farming process and its connection to the environment change at the site since mid-Holocene. Pollen-spore results showed a large amount of dinoflagellate and Chenopodiaceae with foraminifera and rootlets appeared in the basal brownish clayey silt dated at >6500 cal yr BP, indicating a supra-tidal flat deposition. Aquatic herbs peaked as dinoflagellate declined at ca.6500-6200 cal yr BP, indicating a desalinized setting that would have favored human occupation and rice farming by clearing and firing. This then followed by a significant increase of Pinus and fern spores, indicating the enhanced freshwater inflow and continuing desalination until ca. 5500 cal yr BP. High freshwater inflow from the adjacent hills might have weakened rice farming at the site as both Poaceae (>40  $\mu\text{m}$ ) and charcoal decreased during this time period. Intensive rice farming returned at ca.5500-5200 cal yr BP, accompanying a climate amelioration. From 5200 cal yr BP, fern spores and freshwater algae peaked as charcoal decreased, suggesting wetland expansion due to increasing inflow that made the site less favorable for human occupation, but rice farming would remain at adjacent sites.

### **Key words:**

Pollen analysis; Environmental changes; Hemudu culture; Rice farming; Ningshao coastal plain

## Prehistoric Human-Environment Interaction in Hexi Corridor, Northwest China

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### Abstract

The process and impact of prehistoric food globalization has been increasingly concerned in recent years. The Hexi Corridor of Northwest China was an important area for cultural exchange between west and east parts of the Eurasia since prehistoric times. Here we present new dataset of archaeobotanic, zooarchaeological and bone isotopic analysis, and radiocarbon dating from late Neolithic and Bronze sites in Hexi Corridor, combined with paleoclimatic researches, we discuss human-environment interaction during prehistoric period in the area. Our results revealed the chronology of Neolithic and Bronze cultures, the accurate timing of the introduction of millet crops domesticated in north China, and wheat and barley domesticated in west Asia, the transition of subsistence strategies, the impact of climate change on culture evolution, and human metal-smelting activities on environment during late prehistoric period in Hexi Corridor. These works provide valuable insights to understand the process and regulations of human-land evolution in key region of the ancient Silk Road, during the period of increasing prehistoric cultural exchange among different parts of the Eurasia.

### Key words:

prehistoric agriculture spread; cultural evolution; human activity; subsistence transition; climate change; Hexi Corridor

## **Sky, Spate, and Soil: Agricultural Intensification and Environmental Evolution in the Central Plain, China**

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### **Abstract**

Although a wide variety of new understandings concerning agricultural origins have been gained in the past few decades, there is a huge intellectual gap between the extensive agriculture soon after the earliest domestication and intensive agriculture practiced by early states. Why did early farmers continuously invest various resources to intensify food production? How did environmental factors function behind the progress of agricultural intensification? Questions concerning the relationship between agricultural intensification and environment have been attracting but also puzzling researchers for a long time.

Deeper understanding of these questions may be gained through research at Sanyangzhuang in the Central Plain, China. Sanyangzhuang is a rural settlement in present Henan Province in central China. Many agriculture features, such as ridge-and-furrow fields, have been recovered in three strata (dated to the late Neolithic, the late Bronze Age, and the early Iron Age respectively). Additionally, a complete history of the Yellow River floods has been recorded in the stratum around Sanyangzhuang site. All these features enable our further exploration of interactions between agricultural intensification and environmental evolution.

By use of data from Sanyangzhuang site, this paper will mainly focus on two dynamic environmental factors in this region: The East Asia Monsoon determined paleoclimate and the alluvial process of the Yellow River (notably, alternate periods of stability and inundation from flooding). By integrating these two lines of evidence, the local paleoenvironment will be reconstructed and environment-induced risk management will be investigated as one of the potential driving forces of agricultural intensification.

### **Key words:**

agricultural intensification; environmental evolution; East Asia Monsoon; Yellow River; central plain of China

## The Paleoenvironment of the Taoshan Site and Its Implications for Human–Environment Interaction during the Paleolithic–Neolithic Transition in Northeastern China

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### Abstract

The Taoshan archaeological site located in northeastern China was found in 2011, and excavated in 2013 and 2014. The archaeological deposits interpreted as aeolian in origin was divided into four layers (designed as Layers 4–1, from bottom to top), and a lot of stone artifacts and pottery fragments were excavated. The chronology of the site was constructed using optically stimulated luminescence technique (OSL) on sediments and radiocarbon technique on charcoal fragments. Its paleoenvironment was reconstructed from multiple paleoclimate proxies (including grain size, magnetic susceptibility, total organic content and pollen). The dating results showed that the OSL technique is of great utility for such archaeological deposits, and the three cultural layers were dated to 16.5–13.4 ka for Layer 4, 13.4–8.7 ka for Layer 3, and 8.7–5.6 ka for Layer 2, respectively. The climate proxies indicate that the local climate is cold and dry for the period of 16.5–13.4 ka, warm and wet for the period of 13.4–8.7 ka and warm and dry for the period of 8.7–5.6 ka. The Taoshan site sheds an interesting light on basic processes which took place during the very late Pleistocene and early Holocene, such as the human colonization of this region and the 'Neolithization' process. Results of this research also reflect about the effects of changing climatic conditions on human adaptation and the development of social and cultural mechanisms.

### Key words:

Taoshan site; Paleoenvironment; Paleolithic–Neolithic transition; Human–environment interaction; Northeastern China

## Was Population Collapse Caused by Overpopulation in Late Imperial China?

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### Abstract

There is a continuing debate over whether the series of population checks in late imperial China were caused by overpopulation or not. The debate may be rooted in the absence of quantitative estimates of population pressure. In the present study, fine-grained historical socioeconomic and population datasets together with statistical methods were utilized to estimate quantitatively the population pressure in China in the period 1730–1910. The possible paths through which population pressure was translated into demographic catastrophes were also examined. Statistical results show that (1) the frequency of various population checks was positively correlated with subsistence pressure, (2) food strain and its associated demographic catastrophes were driven by the synergistic work of climate-induced agricultural shrinkage and population growth, and (3) the synthesis significantly determined population growth dynamics across China at various geographic levels. To conclude, overpopulation in late imperial China is not a myth, and the series of population checks and eventually population collapse were caused by subsistence pressure during the period. When examining historical Chinese demography, the adverse effect of climatic forcing on human carrying capacity should be considered.

### Key words:

climate change; human carrying capacity; population pressure; overpopulation; population checks; demographic catastrophes; China

## **Human Impact on Landscapes and Land Use History of the Meshchera Lowlands (European Russia) - Reconstructions by Palaeoecological and Historical Data**

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### **Abstract**

The analysis of land use history of the Meshchera Lowlands since the Neolithic has been realized on three key areas, located in the north of Ryazan region in different natural conditions. The first area is located at the lowest part of the Meshchera Lowlands, with many lakes, wetlands and poor sandy soils. The second one is situated at the junction of low, largely swamped area, with poor sandy soils and better drained territory, with loamy soils. The third study region includes elevated eroded karst plateau with loess fertile soils and a part of the Oka River valley with sandy terraces and meadows on floodplains. The archeological and paleobotanical data (Middle and Late Holocene), maps of the General Land Survey (XVIII century), Atlas of Mende maps (XIX century), satellite imagery Corona (XX century) and modern satellite images (XXI century) were used to reconstruct long-term anthropogenic influences on landscapes.

The obtained results show that the first key region was characterized by early human settlements on shores of lakes (Neolithic-early Bronze Age), the lowest percent of arable land and a relatively low population density. The second area was populated later, the share of arable land was permanently low, and the population was concentrated along the main road. The forestry dominated in land use structure. The third area, so called "Kasimov Opolie", was intensively used by human since the Neolithic up to now. The territory is marked by highest population density and share of arable land.

The study was supported by RFBR, project №14-05-00568-a

### **Key words:**

Holocene; land use; historical maps; human impact; Meshchera Lowlands

## Impact of Holocene Environmental Change on the Ancient Cultures of Chaohu Lake Basin, East China: A Geoarchaeological Perspective

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### Abstract

Based on the temporal-spatial distribution features of ancient settlement sites from the middle and late Neolithic Age to the Han dynasty in the Chaohu Lake Basin of Anhui Province, East China, using the methods of GIS combined with the reconstructed paleoenvironment by the records of lake sediment since Holocene, the transmutation of ancient settlements with response to environmental changes in this area has been discussed. Studies show that the main feature of transmutation of ancient settlements from the middle and late Neolithic Age to the Han Dynasty was that the distribution of settlements in this area changed from high altitudes to low ones and kept approaching the Chaohu Lake with the passage of time. These could be a response to climate change from warm-moist to a relatively warm-dry condition during the middle Holocene, leading to the lake level fluctuations. The large area of exposed land provided enough space for human activities. These indicate that the above changes in geomorphologic evolution and hydrology influenced by climate conditions affected the transmutation of ancient settlements greatly. The distribution pattern of settlement sites was that the number of sites in the west was more than in the east. This pattern may be related to the geomorphologic conditions such as frequent channel shifting of the Yangtze River as well as flood disasters during the Holocene optimum. Therefore, climate change was the inducement of transmutation of ancient settlements in the Chaohu Lake Basin, which exerted great influence on the distribution, expansion and development of settlements.

### Key words:

Chaohu Lake Basin; Holocene environmental change; ancient culture

## **Pre-historical Clustered Geo-disasters Recorded at the Neolithic Ruins: A Reflection of the Early Human-environment Interactions over the Northeastern Tibetan Plateau**

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### **Abstract**

Pre-historical clustered geo-disasters were investigated by multidisciplinary approach at the Neolithic Ruins over the northeastern Tibetan Plateau. The palaeo-earthquakes recorded by loess fissures and palaeo-mudflow recorded by red clay were first found in the Machangyuan Ruins along the Huangshui River valley. The pre-historical clustered geo-disasters were dated to 4.8 ka BP by OSL dating,  $^{14}\text{C}$ , and the archaeological record. Based on the geological landscape of the Machangyuan Ruins, palaeo-earthquake events are associated with the major active faults (e.g., Lajishan faults) and local faults (Bazhougou fault). The source of the catastrophic mudflows was traced upslope to the gully heads behind the ruins, where the enormous scars left by mass wasting on the hillsides behind the ruins are clearly visible. A great number of pre-historical settlements such as Majiayao Culture (6.4–4.2 ka BP) were distributed at the foot of the northeast Tibetan Plateau. The distribution suggests that the region have been impacted by human activities during the past 6000 years. Prehistoric land use including farming actives, cooking, heating and making pottery related to deforestation produce erosion power at the heads of gullies in the loess landscape. The Mid-late Holocene climate change (~5.0 ka) was identified by this palaeo-mud flow marker in combination with other palaeoclimate archives. Human and climatic impact on the environment as derived from landscape evolution and earth surface process. The mudflows layers overlay the palaeoground around the Neolithic Ruins suggests that pre-historical clustered geo-disasters were partly created by early-human themselves.

### **Keywords:**

Palaeo-earthquake; Palaeo-mudflow; Climate event; Human activity; Machangyuan Ruins; Tibetan Plateau

## Thermo Luminescence Dating of Seymareh Dam Lake Terraces According to the Archaeological Site Patterns Located in the Southwestern of Iran

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### Abstract

Seymareh landslides, as the world's largest landslide, has blocked the Seymareh River and formed a dam lake. Field studies along with laboratory experiments led to detect a four staged landslides and also to detect the formation of a quadruple lakes. Using thermo luminescence dating of the lake sediments, the occurrence of the landslide and the formation of the primary Seymareh lakes are estimated to occur about 85,000 years ago and it has been discharged 17,600 years ago. Second Lake with an area equal to 145 square kilometers was formed 16500 years ago and discharged 14,500 years ago, third lakes with an area of 67 square kilometers was formed 10500 years ago and discharged 10300 years ago, and the fourth lake with an area of 47 square kilometers was formed and discharged 10100 and 9967 years ago, respectively. Furthermore, this research indicates the relation between settlement patterns of the archaeological sites from Paleolithic to Islamic period with the formation of lakes. The results show that the main reason of the absence of the Paleolithic sites is that they may have been destroyed by the Seymareh landslide and then buried under thick layers of lake sediments. The oldest known sites (Epipaleolithic period) have settled after the formation and discharge of the first lake and on the surface of the rocky bed in the margins of the lake. From the Neolithic to Islamic period, the sites have been formed after discharge of the lakes and on the surface of lake sediments.

### Key words:

paleogeomorphology; geoarchaeology; landslide; dam lake; settlement patterns.

## C12.10 Gender and Geography

### Mapping Changing Landscapes of Care in Asia: Towards Gendered Theoretical and Empirical Frameworks



Home

#### Oral

1. [Commercial Assistance for 'Aging in Comfort': Slices of Reality - City of Kolkata, India](#)  
Anindya Basu (Women's Christian College, University of Calcutta, India)
2. [Inter-Embodied Infant Agency/Subjectivity and The Everyday Technologies of Infant Feeding](#)  
Louise Holt (Loughborough University, United Kingdom)
3. [Negotiating Gender, Migration and Everyday Multiculturalism: Transnational Healthcare Workers in Singapore's Nursing Homes](#)  
Shirlena HUANG, Brenda S.A. YEOH (Department of Geography, National University of Singapore, Singapore)
4. [Teachers' Care Work: Balancing Pregnancy and Modesty in the Ultra-Orthodox Jewish School](#)  
Orna Blumen, Elka Freedland (University of Haifa, Israel)
5. ['Womonomics', Care Workers, and Feminism in Japan](#)  
Milena Urszula Janiec Grygo (School of Geosciences, University of South Florida, United States)

## Commercial Assistance for ‘Aging in Comfort’: Slices of Reality - City of Kolkata, India

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### Abstract

Aging of population can be viewed as an end product of demographic transition which is common in developed nations where governmental or insurance-driven medical aid is common. But in Indian scenario, the senior citizens who account for about 8.5 percent of total population have no or very little official social security and state-sponsored geriatric care system to fall back upon and the legal framework supporting their needs is also very frail. The traditional joint-family system of Indian society has given way to nuclear ones giving little significance to the elderly. Particularly, the modern ‘Bong’ i.e. the representatives of the Bengali community of Kolkata to pursue their dreams of academic and professional excellence have been forced to shift base mostly overseas leaving their vulnerable, aging parents behind. Through the study it surfaced that given the increasing longevity, high population growth and the present societal scenario the budding commercial geriatric care industry, largely unorganized involving home-health segment has carved a niche in the City of Joy with agencies like Portea, Tribeca Care, Health Care at Home, Deep Probeen Porisheba by means of their interesting packages and sound business models. Several professional care-giver centres, old-age homes are also in the picture. With chronic ailments, reduced strength, agility and decline in sensory capacity and cognition the lonely senior citizens have to dabble with the harsh, mundane daily chores of life. Elderly care involves periodical monitoring of physical and psychological well-being encompassing emotional support, security needs and counselling involving male and female care-givers as required. From the interactions with the commercial care-giving agency representatives and their clientele it surfaced that though apparently these commercial solutions to deal with aging and related insecurities seem to be effective and satisfactory there are certain drawbacks like steep charges, lack of professionalism, dearth of trained staff which needs to be addressed. Especially the ones having weak financial standing and the ones who do not have any near relatives to act as the liaison between them and the service providers are seen as burden and they find it impossible to avail these services.

### Key words:

geriatric care; Bong; home-health; senior citizen; care-givers; old-age homes

## Inter-Embodied Infant Agency/Subjectivity and The Everyday Technologies of Infant Feeding

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### Abstract

This paper argues the need to explore the role of the inter-embodied agency/subjectivity (Lupton, 2013) of infants with their carers and a range of human and non-human others in the adoption and use of everyday technologies. The paper focuses upon the material geographies of infant feeding. Alongside reproductive technologies, everyday, mundane technologies can be used to optimise feeding and nutrition. Since food becomes matter, the food provided to infants becomes the material corporeality of infants' bodies. The accounts of parent infant feeding practices from a qualitative study of the geographies of infant feeding in the UK are drawn upon to explore the ways parents/carers use a range of everyday technologies to support their 'healthy' feeding choices: from the Internet to specific 'healthier' infant formulas, to vitamin supplements, blenders and feeding apps. However, the accounts also identify that infants are themselves agents in feeding processes who influence the extent to which these 'healthy' infant feeding technologies can be used to promote what parents consider to be healthy feeding practices. The agency of infants can only be understood as inter-embodied with their parents/carers and a range of human and non-human 'others': including food and technologies. The paper considers how new technologies are enabling to parents and yet act as a mechanism for the governmentality of young children and their parents. The potential implications for new smart cities is also explored.

### Key words:

technology; cities; babies and food

## Negotiating Gender, Migration and Everyday Multiculturalism: Transnational Healthcare Workers in Singapore's Nursing Homes

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### Abstract

Growing numbers of transnational care workers crossing borders within Asia contribute to the social and cultural diversity of their affluent but ageing neighbouring societies. This paper examines healthcare workers from Burma, China, India, the Philippines, and other less well-off countries in Asia employed in the nursing homes of multicultural Singapore, where structural modes of inclusion insert these transnational workers into the lower segments of the urban service sector. These workers are subject to inferior status ascriptions based on gender (the devaluation of care work as women's work), ethnicity/culture (the undervaluation of work done by migrant workers from the South) and legal status (as temporary work permit holders with negligible hope of permanent residency or citizenship). Adding to their challenging situation is the physically and emotionally demanding nature of their jobs, as well as their need to communicate across cultural and linguistic divides, both with one another and with their culturally diverse patients. Together, these factors create circumstances that are potentially ripe for misunderstandings, resentment and even discord across the local-migrant divide, as well as among the various migrant groups. The paper adopts a feminist perspective of care which emphasizes both love and labour and the relationality of human beings, to first, understand how migrant healthcare workers negotiate the subordination and stereotypes they face in their everyday culturally-diverse working environments and second, raise ethical and policy questions relating to migration, care labour and citizenship.

### Key words:

Gender; migration; multicultural; transnational healthcare work; feminist perspective; Singapore

## Teachers' Care Work: Balancing Pregnancy and Modesty in the Ultra-Orthodox Jewish School

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### Abstract

In the ultra-orthodox Jewish community pregnancy undermines modesty – a prime, gendered value. This study asks how pregnant teachers care for the modesty of young girls in the presence of this challenge. For ultra-orthodox women modesty is the only means that can equalize them with men religiously. Thus modesty is vital for girls' socialization and teaching and cultivating it in female pupils is essential for the care work of teachers. The body and its appearance are central to feminine modesty which primarily aims to protect men from erotic temptations. Whereas females' social body oppresses sexual connotations, pregnant bodies are indicative of a woman's sexual activity and a challenge to the imperative of modesty.

The social meaning of pregnancy is a growing interest in current socio-cultural research and only few have noted that beside women, pregnancy is experienced also by others, mostly partners and passersby. This study locates pregnancy outside the family privacy, in the workplace. More precisely, it situates pregnancy in ultra-orthodox, elementary and junior high- schools for girls, recognizing the girls/pupils as partners who too live through parallel, distinct experiences.

In-depth interviews with 24 ultra-orthodox pregnant teachers, divulge their struggle to maintain the code of modesty, how they manage their pregnancy in the classroom, the reactions expressed by their female pupils and how they tackle the approaching separation their maternal leave entails.

### Key words:

teachers; care work; pregnancy; ultra-orthodox Jewish; modesty; school-girls; qualitative methods

## 'Womenomics', Care Workers, and Feminism in Japan

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### Abstract

In order to promote economic growth, Japan's government is seeking to create surplus labor by moving women out of the household economy and into the capitalist marketplace. Recently, the ruling party proposed reforms seemingly aimed at easing the burdens that women face at home caring for children and seniors. Labeled as 'Womenomics' in popular discourse, these reforms are celebrated for providing opportunities for women to work outside the home. As a part of the implementation process, the government is proposing to increase the number of migrants seeking certification as care workers under the Trainee and Technical Internship Program.

Based on interviews conducted with NGOs, labor unions, and politicians, this study seeks to critically examine national debates on care. Groups opposed to the reforms question the lack of participation of Japanese men in homemaking and providing care. Further, they argue that the reforms do not advance the rights of all women, but rather, exclusively promote only the rights of Japanese women at the expense of migrant women. Overall, this study seeks to set these debates within a broader context of neo-liberalization processes in Japan that require surplus labor to maintain economic growth.

### Key words:

aging population; Asia; childcare; homemaking; surplus labor

## C12.10 Gender and Geography

### Gendered Rights: Space, Culture and Society



Home

#### Oral

1. [Formation of Entertainment Districts Around the U.S. Military Bases After the War in Okinawa: The Politics of Gendered Space](#)  
Yoko Yoshida (Nara Women's University, Japan)
2. [Gender Issues in Haryana](#)  
Rajeshwari Jaglan (Kurukshetra University, India)
3. [Gendered Rights in The Countryside: Educated Women in Rural Communities in Spain](#)  
Maria Dolors Garcia Ramon, Mireia Baylina (Montserrat Villarino (Universidad de Santiago de Compostela, Spain)
4. [Gendering The Financing Regional Development in South America: The Case of Red De Articulacion Feminista Marco Sur](#)  
Marcelle Vaz, Alena Profit (University of Brasília (UnB), Brazil)
5. [Geographical Environment, Gender Political Participation of Leaders in Panchayat Raj Programme in Maharashtra, India](#)  
Arun Bhole (M J College Jalgaon, India)
6. [Health Status of Adolescent and Young Tribal Females and Its Effect on Education](#)  
Debjani Roy, Dr.Sr.Jyoti Kispotta (Nirmala College, Ranchi University, India)
7. [Living on the Edge: Crisis in the Tea Industry and Consequent Maternal Health Risk Among the Tea Plantation Workers of India](#)  
Saraswati Kerketta (Nistarini College, India)
8. [Regional Pattern and Contemporary Challenges to Education of Tribal Girls in Jharkhand](#)  
Vijay Kumar Baraik (Discipline of Geography, School of Sciences, Indira Gandhi National Open University, New Delhi 110068, India, India)
9. [Spatiotemporal Analysis of Female Billionaires Geography in China Since 2003](#)  
Dongfang WANG (1 University of Chinese Academy of Sciences, Beijing, China, 100101, 2 Institute of Urban Environment, Chinese Academy of Sciences, Xiamen, China, 361021., China), Jie HUANG (Institute of Geographic Sciences and Natural Resources Research,
10. [The Dynamics of Gender-Differentiated Assets in the Wake of Natural Disasters in Indonesia](#)  
Evita Hanie Pangaribowo (Department of Environmental Geography, Gadjah Mada University,

Indonesia, Indonesia)

11. [The Population Change in Women Friendly City](#)  
Yeji Lee (Seoul National University, South Korea)
12. [Violation of Human Rights of Women in India](#)  
Sahab Deen (Jawaharlal Nehru University, India)

## Poster

1. [Customary Right of Women to Inherit Property: A Study of Mirzapur District Uttar Pradesh in India](#)  
Sher Singh (India, Ram Lalit Singh Post Graduate College Kailahat, Chunar, Mirzapur, Uttar Pradesh-231305)
2. [Socio-Culture Right to Education and Consequences on Women Empowerment: A Review of Indian Historical Discourse](#)  
Mahendra Pratap Singh (India, Ram Lalit Singh Post Graduate College Kailahat, Chunar, Mirzapur, Uttar Pradesh-231305, India)
3. [Visual Expression of Gender Equality: the Application of Women Map and Gender Map](#)  
Dongmei Yu (China, Qingdao University)
4. [Women's Empowerment among Youth and Their Human Rights.](#)  
Dalia ElAbady (Egypt, Central Agency for Public Mobilization and Statistics)

## Formation of entertainment districts around the U.S. military bases after the war in Okinawa: the politics of gendered space

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### Abstract

Generally, entertainment districts are found in close proximity military bases. In Okinawa prefecture, there are some entertainment districts that emerged around the U.S. military bases here. A part of these districts played the role of a red-light district until Okinawa's return to Japan in 1972. On the one hand, USCAR (United States Civil Administration of Ryukyu Islands) did not officially permit prostitution in Okinawa's entertainment districts; on the other hand, USCAR contributed to prostitution through the adoption of an A-sign system which gave business licenses to certain shops (so-called A-sign shops); these involved strict hygienic regulations for restaurants, including cabarets, dance halls, and so on. However, when American soldiers contracted a sexual disease, A-sign shops and the entertainment district were specified as off-limit zones. It can be said that the A-sign shops and the entertainment districts, as well as the local economy in Okinawa, were unstable under the U.S. occupation. In my presentation, I select Kin-cho in Okinawa, where the U.S. military base (Camp Hansen) is located, to uncover how the power relations, which were reflected in the entertainment district, supported Kin-cho's local economy. Moreover, my challenge is to explain the spatial politics that appeared in this district as a space for prostitution in which gender, sexuality, ethnicity, class, and so on were reflected.

### Key words:

postwar; U. S. military bases; entertainment district; local economy; power relations; gender; spatial politics; Okinawa Japan

## Gender Issues in Haryana

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### Abstract

There are commonalities in the challenges faced by women all around world. The difference arises due to varied circumstances in which they live. Their struggle for equality becomes more challenging if they live in with strong patriarchal norms, when they have limited opportunities and choices in decision making, and when their age of marriage is low, or when they are overworked; or when their educational levels are low, or they live in society where there is strong son preference and there is violence against them. The existence of any of these pose serious challenge in women development, and if any of these exist in combination, then challenges for women reach a level of great discomfort and gender issues calls for greater attention.

In this context, the present paper raises certain gender issues in the state of Haryana, India. Haryana is situated in north-western part of India, a small state in terms of area and having 2 percent of India's population. It may however, be noted that this state is one of the economically developed states of India with highest per capita income and also as granary (bread basket) of country. Paradoxically, the level of economic development does not get reflected in parameters of women and child population. Within this framework, five major gender issues have been discussed with the help of primary and secondary data vis-à-vis their rights and cultural codes enforced in this part of country, i.e. Haryana.

### Key words:

Patriarchy; gender issues

## **Gendered Rights in the Countryside: Educated Women in Rural Communities in Spain**

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### **Abstract**

Until very recently educated women in rural Spain who wanted to develop their own professional project did not have the options of staying in the rural milieu due to gendered social norms and traditions. But globalization processes that create new relations between many places around the world have allowed that some women decide to stay at the countryside and develop their own life projects. This is a relatively new phenomenon taking into account the steady process of female migration from rural areas to the cities that has taken place in Spain for many past decades. Taking as starting point their life experience we try to set out how these women perceive their rights in these new ruralities in relation to their life project, lifestyle, etc. Through in-depth interviews in two contrasting regions (Catalonia and Galicia) we attempt to study women's critical perceptions of ruralities and of themselves as rural women. These narratives frequently transgress other discourses and meanings attributed to rural space and, therefore might constitute a significant document about daily life, agency and gendered rights, since it may become a mirror for younger female generations.

### **Key words:**

women; rurality; daily life experience; in-depth interviews; Spain

## **Gendering the financing regional development in South America: The case of Red de Articulacion Feminista Marco Sur**

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### **Abstract**

Gender mainstreaming and regional development have been discussed internationally since the 1980s, particularly since the Conference of Nairobi (1985) and Beijing (1995). In this context, the debates have highlighted the persistent funding gap for gender equality in the development agenda. The aim of this paper is to offer a panorama regarding the action of a transnational South American feminist network (Articulacion Feminista Marcosur – AFM) and the dilemmas for the construction of a regional fund for the development of the equality of women. The challenges and possibilities faced by AFM are related to the institutionalization of the levels of participation of feminist organisations in international organizations and the general challenges concerning resource allocation and investment for gender equality. In the broader context of the recognition of the social society organisations as strategic actors of development not only the changes in the field of international aid but also shifting state – society relations, influenced by the market globalization in the 1990s and the penetration of economic liberalization, implied reforms and triggered a reduction of the role of the central governments and transferred more responsibility to private sector and non-profit organizations, must be emphasized. Hence, regional development includes diverse processes involving different forms of collective action within local-national and international dimensions marked by the various political arenas involved. Given the complex dynamics of transnational feminist networks and their interaction between the different actors of development, the relevance of this paper is in its contribution to analyse financing for gender equality in the South American context with a special focus on regional development.

### **Key words:**

South America; Gender mainstreaming; Regional networks; Feminism;

## Geographical Environment, Gender Political Participation of Leaders in Panchayat Raj Programme in Maharashtra, India

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### Abstract

In the constitution of India there are equal rights for male and females living in India. In 2nd October 1959 at Nagour in Rajasthan the first panchayat raj programme was started by Prime Minister of India. Regional variations in geographical environment play vital role in gender political participation in panchayat raj programme in India. In this study investigator has studied the role of geographical environment on gender political participation in Jalgaon District of Maharashtra state in India. Active participation in political organization as candidates, voting process campaign, election duty, party meeting. Spatio temporal variations of gender political participation in rural, urban and tribal environment has studied. In this research paper primary and secondary data has intensively used. In this research paper statistical methods, computer software are the tools. Gender political participation in the study region is increasing.

### Key words:

Political participation; Panchayat Raj; Gender; Environment

## Health Status of Adolescent and Young Tribal Females and Its Effect on Education

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### Abstract

There is a Chinese saying “If you wish to plan for a year sow seeds, if you wish to plan for a decade plant trees but if you wish to plan for a lifetime educate people”

India is going through one of the most significant demographic transitions that have ever taken place. Nearly 30% of its total population of 1.23 billion is under the age of 18 and nearly half under the age of 24. Tribals constitute the second largest social group in India. Health and education are necessary to achieve the full potential of the nation’s human capital. A developing country like India has already entered into the fourth stage of demographic transition by addressing these two issues with great seriousness. Tribals have for long been marginalized and inspite of consistent efforts by the Government their health and educational status needs a lot to be desired. Adolescent and young tribal females are malnourished, wasted and stunted. This has a direct effect on their education. This paper is an attempt to study these two important correlates of human development amongst the tribal population of Jharkhand. The study is based in urban areas where gender bias and societal apathy prevent tribal females from achieving what is rightfully theirs. The study tries to address the larger issue of how poor health and low level of education can impede a country’s progress and suggests ways of mitigating the same.

### Keywords:

Tribals; malnourished; educational status; human development

## Living on the Edge: Crisis in the Tea Industry and Consequent Maternal Health Risk among the Tea Plantation Workers of India

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### Abstract

This paper intends to study the reproductive health scenario through the narratives of women tea plantation workers in India. Tea industry is one of the oldest organized sector industries in India and has very high concentration of female workforce. Maternal health forms an integral part of reproductive health of women. Pregnancy and childbirth is a period of elevated risk for the life of a woman. Utilization of skilled intranatal care services depends upon availability and accessibility of the health care services. There are various legal provisions safeguard the interests of women workers. Plantation Labour Act of 1951 compels tea estates to provide health care services to the workers. After initiation of globalization process, Indian tea industry is facing unprecedented crisis which has its bearing on the health care services provided to the women workers. Plantation workers are the lowest paid workers in any industry in the world. They rely on additional benefits from plantation which including medical facilities. These have been effective means of enslavement of laborers by the owners. Economic determinants restricts these women to use poor quality of health care services provided by the plantations. Besides socio-cultural factors are crucial in determining the utilization of intranatal care services among women laborers.

The results reveal that in the study in Darjeeling hills and Dooars Region incidents of premature delivery, underweight births and miscarriage are common among the women workers. Besides utilization of intranatal care services is substantially low which is closely associated with spatial and socio-cultural inaccessibility of these workers.

### Key words:

tea plantation; women workers; intranatal care; socio-cultural factors; spatial inaccessibility; crisis in tea industry.

## Regional Pattern and Contemporary Challenges to Education of Tribal Girls in

### Jharkhand

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#### Abstract

Jharkhand is a region of vast physical and cultural diversity with wide regional disparity. The region possesses full of contradiction with coexistence of glaring paradoxical situations. Education, an important means of empowerment and progress of the weaker sections and among best indicators of development is yet to reach the tribals effectively. The educational level among tribal girls is in general low added by a wide disparity across the state and various communities. There are high drop-out rates as well lead by various reasons including outmigration of girls to major cities as bread winners by becoming domestic workers, which has been of a major gender concern in recent times. Overall, the challenges to education among girls pose challenge to the development of the society as these are supposed to be the first teachers of children. In this background, this paper maps the regional pattern of education among tribal girls in the backdrop of various regions of Jharkhand. The paper also highlights the contemporary challenges to education among tribal girls in Jharkhand focusing outmigration also. The study is based on the secondary data obtained by various government sources and supplemented by the field work based report on the subject. It will be a base for addressing some of the above issues related to education for corrective measures for future.

#### Key words:

Regional pattern; challenges to education; tribal girls; domestic worker

## Spatiotemporal Analysis of Female Billionaires Geography in China Since 2003

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### Abstract

With China's rapid economy growth since 1978, female billionaires which stand for the gendered rights of owing higher economic status have become a unique group. And the spatiotemporal pattern of female billionaires in China could reflect the characteristics of the change of gendered geography on female economic rights. *Forbes rich list of China* was initiated in 2003 and ranks the billionaires who own the highest economic status. Mainly based on the top 100 people of *Forbes rich list of China* since 2003, the key features of women including *number, industry type, age, family backgrounds and enterprise location* are analyzed to summarize spatiotemporal distribution features of the female billionaires using GIS tools and discuss the key factors influencing the geography change. The results showed that: (1) with the rate of 175%, the number of female billionaires increased from 3 in 2003 to 17 in 2015 which is still small compared with the number of male billionaires. (2) Since 2003, Chinese female billionaires showed a younger trend and the main industry type is real estate. (3) The geographic distribution of female billionaires are uneven which relates to China's uneven economic pattern. Almost above 90% of female billionaires are in *Beijing, Guangdong and Hong Kong* while none of them are in the central and west provinces of China. (4) Family background and cultural factors greatly impact on the geography of female billionaires. The study will be helpful for the central government and local authorities to make effective strategies on the fair rights of Chinese women development.

### Key words:

Female billionaires; gendered rights; gender inequality; China; Forbes rich list

## The Dynamics of Gender-Differentiated Assets in the Wake of Natural Disasters in Indonesia

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### Abstract

Asset holdings are seen as means of coping with various circumstances, particularly the bad ones. Within the households, husbands and wives both accumulate and own assets individually or collectively and they use these assets differently. Using Indonesia, one of the most susceptible countries to climate change and disaster prone, this study investigates the dynamics of assets owned by the household head, his spouse, or collectively by both of them in response to natural disasters. The asset dynamics, particularly those of female household members are important as emphasized by a growing amount of literature on the role and contribution of female's asset in promoting household welfare. This study takes advantage of a longitudinal and nationally representative data set; the Indonesian Family Life Survey (IFLS) to rigorously explore the impacts of natural disasters on the dynamic of gender-differentiated assets in the household. The findings show that asset ownership was male dominant for every category except for jewelry. The gap of asset shares between men and women in the household was almost 2:1, which clearly indicates male dominance in asset holding. Controlling for socio-economic variables such as education, household size, and income, experiencing one of natural disasters (flood, landslide, earthquake and volcanic eruption) affects the jointly asset holdings. Flood and earthquake reduce female's liquid asset holdings, particularly livestock and jewelry. Selling these assets is considered as part of planned mechanism for coping with crises. This finding embraces the importance to female's asset holding to facilitate households recovering from the natural disasters.

### Key words:

Gender; asset; natural disasters; Indonesia

## The Population change in Women Friendly City

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### Abstract

The woman's right has improved more than any other time. Starting from the right to vote, now women begin to fill the higher level position and have been competed others to show good performance. The role of women in society is different from the past while the role as minority and duty as mother stay same. This is a long time conflict. Many try to solve this problem and this applies to urban planning lately in Korea that named as "Women Friendly City." Currently there are 56 areas practicing Women Friendly City; 31 cities and 25 districts. Many innovative policies, funds, and designs have implemented to make women's living more convenient. Focusing on reproduction and motherhood discipline, the research conducts how effective these implementations have been. Using the 31 cities, the birth rate, the increase of population, the age distribution ratio of women, and the environment of raising children including number of day care, low crime rate, solid education opportunities, and affordable residential price are analyzed between before and after the declaration of Women Friendly City. Since the idea and policy have been introduced only seven years, there are not many significant differences found. The number of recipient and the type of service have increased gradually and it attracts women live the specific city. It needs to work on more, but can be very tiny step to solve population problem in shrinking city, high unemployment rate, discrimination due being a mother, late marriage, and low birth rate.

### Key words:

Women friendly city; birth rate; population

## Violation of Human Rights of Women in India

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### Abstract

In India, women's spheres of life are innate in the hierarchal social structure. Indian society is a highly patriarchal and caste-based in which realms of women are extremely gendered i.e. place, right and freedom. Women, in India bear the burden of gender, caste and class. Being women, they suffer from many forms of violation of human rights, including sexual oppression, violence and socio-economic disempowerment. The violation of human rights of women has increased rapidly (NCBR, 2012). The key objective of the paper is to study the violation of human rights women in India. The paper is a quantitative work based on secondary data extracted from NCBR 2000-2014. An index has been constructed for mapping the violation of human rights of women to examine the levels, patterns and linkages among socio-cultural dynamics among the social groups. Firstly, it discusses the evolution of social attitudes towards women in academic literature. Secondly, it analyzes the status of violation of women's human rights across the Indian states. The literatures indicate that the women have been treated as slaves in view of their unfair position to men. This subjugation of women is underscored and justified in well-known sanctity of religious texts. The current status of women reveals that they are continued to be discriminated and face violation of their human rights. The magnitude of women's human rights violation varies among the social groups and regions. Thus, the patriarchal socio-cultural practices are still prevails in the society which are encouraging the violation of women's human rights.

### Keywords:

Human right; Patriarchal society; Socio-cultural practices; Violation; Women

## Customary Right of Women to Inherit Property: A Study of Mirzapur District Uttar Pradesh in India

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### Abstract

In India, women's location of life-course is inherent in the hierarchical social order. Indian society is a highly patriarchal and caste-based hierarchical society in which domains of women are highly gendered i.e. place, rights and freedom. The gendered domains are the most crucial for women to inherit property in her father's as well as in-laws' family. Thus, the main objective of the research paper is to analyze the socio-cultural right to inherit property for women and try to find out the causes of demoralizing the right to inherit property for women in Indian society. The research paper is based on quantitative and qualitative work of primary data; total 50 samples have been interviewed from different locations in the villages of district Mirzapur, Uttar Pradesh, India. There are two major sections of the present research study. First section explains the socio-cultural customs in the available literature which underscores the secondary status of women and discourages the customary right to inherit property in their father's family and in-laws' family. Second section has tried to explore the present social and economic factors engrained in the psyche of the society in the form of customary laws which debar women's right to succeed to property in their respective families. Findings of the study reveal that there is an existence of several social and cultural customary laws entrenched in the psyche of the highly patriarchal Indian society which are playing a major role in depressing the women's right to inherit property in their respective families in India.

### Keywords:

Customary Right; Patriarchal Society; Right to Property; Socio-cultural Customs; Women

## **Socio-Culture Right to Education and Consequences on Women Empowerment: A Review of Indian Historical Discourse**

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### **Abstract**

A subordinate attitude towards women in India goes to long historical course of time. Women have been treated as slaves in view of their unfair position to men. This subordination of women is underscored in a well-known verse in Manusmriti: "In childhood a female must be subject to her father, in youth to her husband, when her lord is dead to her sons; a woman must never be independent" (The Laws of Manu (Trans.G.Buhler, 1964). This leads to impoverishment of women in terms of education and self-development. Thus, the main objectives of the research paper are i) to analyze the social attitude for educating women and its consequences, ii) to explore the causes of sluggish progress in women's education in India. The research paper is based on available historical literature along with supplemented by qualitative primary data collected from different locations of Mirzapur district of Uttar Pradesh, India. Firstly, the paper has discussed the social attributes towards women education available in different historical, religious and social laws books. Second section has tried to explore the socio-economic factors engrained in the psyche of Indian society which devaluates women education. The analysis of the study reveals that during the decades since independent, there is very slow progress in educational development of women at National level as well as regional. Moreover, there are several socio-economic and cultural practices prevailing in the patriarchal Indian society which creates obstacles to educational development of women despite the fact that government provisions to promote women empowerment.

### **Keywords:**

Education; Empowerment; Right to Education; Socio-Culture Right; Women

## Visual Expression of Gender Equality: The Application of Women Map and Gender

### Map

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#### Abstract

Gender equality is an important national policy for the development of politics, economy, culture, environment and society of the country in China. Time and space distribution of gender equality and women's development penetration in all aspects of society, social all walks of life and all areas, and change with the development of the times, any population distribution area are the distribution of gender equality and women's development elements. Through the quality and quantity characteristics description of gender equality and women's development elements, constitute description and analysis of the features and dynamic changes, asses the effect and process in every field and level of men and women. Gender equality and women's development data are mainly based on statistical data, which has the characteristics of continuity in time and the integrity of the area. On the basis of gender equality and women's development features and characteristics of data, research on the representation method of the gender equality and women's development elements, discussing a variety of gender equality and women's development representation method uses, the map as an important methods of comprehensive analysis and evaluation for sex situation and a new strategy to promote the gender equality and women's development.

#### Key words:

women map; gender map, map visualization

## Women's Empowerment among Youth and their Human Rights

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### Abstract

Women face much discrimination against evaluating their rights. The research problem can be crystallized in three questions: what is empowerment, why we want to influence the extent of women's domestic empowerment as a concept for evaluating their rights, how we can measure it and judge according to their rights. Take in consideration that young women represent the future generation, and the back bone of any development in the society. The study aims to empower the Egyptian young women (18-29) and to investigate what are the young women's human rights as well as they represent the future generation in Egypt. More specifically, the study meets the following objectives: Identifying the empowerment level they achieved (18-29) compared by the age (30+) and to explore various levels and types of empowerment measures in the household level, related to their rights. Identifying the recent differentials of Young women empowerment aged (18-29) compared by the women (aged 30+) in the context of their rights through some demographic and socio economic indicators. Identify factors determining women's empowerment and their rights regarding education, employment, place of residence, wealth status and circumcision. The study uses raw data mainly from (EDHS,2014) The study is based on both a descriptive analysis technique is employed to assess the levels, and differentials to reach the objectives of the study. An index has been used to measure the level of empowerment through SPSS and an analytical procedure of Geographic Information System or GIS data to represent results on maps.

### Key words:

Women's empowerment index; differentials; determinants of women empowerment; GIS analysis.

## C12.10 Gender and Geography

### Addressing Gendered Insecurities in the Urban Global South



Home

#### Oral

1. [An Analysis of Gendered Urban Insecurities and Implications for The Sustainable Development Goals](#)  
Linda Peake (York University, Canada), Karen de Souza (Red Thread, Guyana)
2. [Landscapes of Women's Fear in Tehran](#)  
Ali Baniasad (Shahid Beheshti University, Iran), Tiam Mohammadzade miraki (Shahid Beheshti University, Iran)
3. [Negotiating Neoliberal Urbanism in Ibadan, Nigeria](#)  
Grace Adeniyi (Carleton University, Canada)
4. [Women's Economic Insecurities and Strategies in Iran](#)  
Azam Khatam (Independent Researchers on Women's Issues, Iran)

## **An Analysis of Gendered Urban Insecurities and Implications for The Sustainable Development Goals**

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### **Abstract**

In the current era of neo-liberal development, framed in the global south by high levels of movement into urban areas and the new development efforts of the Sustainable Development Goals (SDGs), there is a paradoxical occurrence. On the one hand, there are increased efforts to lift people out of poverty and, on the other, increasing levels of insecurity in urban places. Insecurities are deeply gendered and defined here as having five dimensions: (i) social insecurity: one's place in the city, according to racialised ethnic hierarchies; (ii) economic insecurity: the condition of not having a stable income or other resources to support a standard of living now and in the foreseeable future; (iii) physical insecurity: condoned norms of (often unchallenged) practices of gender-based violence against women and girls; (iv) emotional insecurity: a sense of vulnerability or instability, underpinned by a lack of hope; and (v) environmental insecurity: the ability to cope with environmental risks or changes (including climate change) and access to resources, including food and water. These insecurities are explored in relation to the ways in which women use and give meaning to urban space, with analysis focusing on the insights these findings provide for the SDGs relating to gender equality and empowerment and inclusive and sustainable cities.

### **Key words:**

Cities; urbanization; gender; women; Sustainable Development Goals

## Landscapes of Women's Fear in Tehran

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### Abstract

In an urbanized world, women are playing a crucial role in the development of cities more than ever. Gender equality is a factor that shows the extent to which they can actually take part in such a process. City managers and planners are seeking to create urban spaces for all citizens in order to improve their quality of life. Fear of crime is a concept affecting women's interaction with public spaces, hindering their equal access to city; hence lowering their living standards. Tehran, the capital of Iran, is experiencing rapid urban growth and women's place in its constantly changing built environment is a matter of concern. By conducting a series of quantitative (survey questionnaire) and qualitative (face to face interview and diary recording) researches from a specified sample group of female university students and reviewing city policies, we have tried to overcome ambiguities around fear of crime and its related concepts to address how fear of crime shapes the everyday lives of women in the city. It appears that the state's ideological system of government along with women's perceptions of crime, generate fear of crime which in turn restricts women's ability to move freely in public spaces and prevents their access to their full rights in the city.

### Key words:

fear of crime; urban space; spaces of fear; gender

## Negotiating Neoliberal Urbanism in Ibadan, Nigeria

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### Abstract

In the past five years there has been an intense focus on making Ibadan, Nigeria a world-class city. While the plans are aesthetically pleasing to many residents, there have also been resistances to the exclusionary nature of the urban projects taking place. This presentation will focus on women's gendered urban insecurities, particularly economic, social and environmental, which are currently exacerbated by neoliberal urban projects. Women's analyses of their gendered urban insecurities reveal the ways in which they negotiate religion, culture and colonial legacies in their daily lives. Their analyses also highlight their awareness of patriarchal impositions, which facilitate their exclusions from decision-making processes. I argue that contrary to survivalist accounts about African women, the Ibadan women in my research often frame their issues within a positive and negative rights discourse and do not view themselves as victims but rather subjects with entitlements. Women's rights discourse enables them to call into question the government's limited and gendered approaches to women's issues that often tend to shy away from feminist politics of gender and socio-economic equalities in attempts to label such social transformation projects as "un-African". However, rather than overtly agitate against patriarchy, women use cultural understandings of their gendered roles to strategically make rights claims to the neoliberal city and envision a more just city.

### Key words:

Neoliberal urbanism; gendered urban insecurities; Ibadan; decision-making process

## Women's Economic Insecurities and Strategies in Iran

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### Abstract

Iran has one of the lowest rates of women's participation in the formal labor market in the Middle East. According to the official census, this rate has not changed much since 1966. Two decades of authoritarian modernization before the 1979 revolution did not change the overall rate of women's participation in the labor market in cities: the increased number of middle class women in public employees and social services like education and health was accompanied by a decline of working class women active in the handcrafts and traditional textile industry. Conservative efforts to marginalize women in the public spaces and social life in the post Islamic revolution forced secular female experts to seek early retirement, or shift to family businesses. The women policy of the Islamic Republic remained contradictory as significant efforts to improve women's education and health in the last three decades coupled with dramatic backward shifts in women's legal rights and status.

This research examines women's economic (in) securities in terms of access to economic resources, including formal job market, property ownership and participation in the household's important economic decisions. Based on my interviews with women in working and middle class families in three cities in Iran, this paper suggests that women have adopted ownership strategies, in forms of dowry, share of home ownership, personal jewelry and bank deposits to face existing and future economic insecurities which are intensified by legal and political system.

### Key words:

Women and labor market; women's economic strategies.

## C12.10 Gender and Geography

### Gendered Aspects of Migration and Multiculturalism



Home

#### Oral

1. [A Gender Analysis of Post Resettlement Transformation in Livelihood and Spatial Mobility at Sardar Sarovar Project Resettlement Sites, India](#)  
Gaurav Sikka (PhD Research Scholar, Department of Geography, Delhi School of Economics, University of Delhi, India), Vinita Mathur (Associate Professor in Geography, University of Delhi, New Delhi, India, India)
2. [Demystifying the Gendered Aspects of Migration and Multiculturalism in South Korea](#)  
Hyunjoo Jung (Seoul National University, South Korea)
3. [Does Government of Uganda Emergency Plans and Strategies Taking into Account Different Needs and Social Roles of Women and Men, Before, During and After Forced Displacement?](#)  
Mushomi John (Makerere University, Department of Population Studies, Uganda), Esau Atwongyeire (Reality Inc., Uganda), Adrian Ssessanga (Makerere University, Center for Population and Applied Statistics, Uganda), James Wokadala (Makerere University, Depar
4. [Drought and The Copying Strategy of Migration Among the Maasai People of Kenya: A Gendered Analysis](#)  
Thomas Kibutu (Department of Geography, Kenyatta University, P. O. Box 43844 – 00100, Nairobi, Kenya)
5. [Empirical Analysis on Marginalized Experience and Negotiation Process of Spouses of High-skilled Migrants in Singapore](#)  
Cindy Si Yeon Rim (Korean National Commission for UNESCO, South Korea)
6. [Home Away from Home: Lived Experiences of Taiwanese Women in Hong Kong](#)  
Nora Chiang (Department of Geography, Taiwan Univisity., Taiwan, China)
7. [Hong Kong is not China!’ Glocal Articulation of ‘China Threat’ Discourses in Hong Kong](#)  
Murat Es (Chinese University of Hong Kong, HongKong SAR, China)
8. [Marriage, Migration and Multiculturalism: Arranged marriages in Britain](#)  
Raksha Pande (Newcastle University)
9. [Multiculturalism and Gender: Challenges Posed by New Migration and Diversity](#)  
Elaine Lynn Ee Ho (National University of Singapore, Singapore)
10. [Skilled P.R. Chinese New \(Im\)migrants in Singapore: Negotiating Gender Identities with Sense of](#)



## [Belonging in a Multicultural Society](#)

Yunting Qi (Department of Geography, National University of Singapore, Singapore)

11. [The Multi-ethnic Islamic Society in Guangzhou and The Daily Practice of New Chinese Muslimahs](#)

May LI (Yokohama City University, Japan)

## **A Gender Analysis of Post Resettlement Transformation in Livelihood and Spatial Mobility at Sardar Sarovar Project Resettlement Sites, India**

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### **Abstract**

A gender perspective on displacement and associated resettlement is less common, since the traditional discourse has categorised the development refugees to be a homogenous undifferentiated people - without gender, age or other defining characteristics except ethnicity. Many studies are being done to analyze the impacts of displacement caused by development projects on the resettled communities. But the differential impacts of displacement on men and women have only been considered very recently. Gender has been missing in the impact assessments of large development projects like dams. This paper, based on an ongoing research work, is an attempt in this direction to analyse some post resettlement impacts of Sardar Sarovar Project on the tribal communities from a gender lens.

The first part of the paper dwells upon the changes in livelihood opportunities and their impacts upon men and women at the new sites. The second part shows how the spatial mobility of both men and women has undergone a change at these resettlement sites. The manuscript ultimately attempts to highlight the transformations in gender roles and gender relations due to displacement and resettlement by providing empirical evidences from resettlement sites. The research has adopted mixed methods in data collection. Data has been collected through household surveys, focus group discussions and in-depth interviews with key informants.

### **Key words:**

Gender Analysis; Displacement; Post Resettlement; Livelihood; Spatial Mobility

## Demystifying the Gendered Aspects of Migration and Multiculturalism in South Korea

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### Abstract

Feminist approaches to migration have captured complicated dynamics of contemporary international migration, which is gendered, power laden, and intersectional. In spite of their innovative contribution to this field of research, the feminist approaches tend to be clustered around particular types of migrants, namely the third world women migrated to the first world as care givers. This paper provides a case that apparently goes against the feminization of migration, using an example of South Korea, and makes an argument that the impact of feminization is not limited to the “women’ works,” and needs to be considered with other processes including ethnicity and nation. South Korea, which has rapidly turned to a migrant receiving country shows bipolarized patterns: feminization in marriage migration and masculinization in labour migration. The former draws heated spotlight of government-led multiculturalism discourses, while the latter is dealt with economic discourses rarely touched by gendered perspectives. Female workers in the latter group mostly consist of Korean Chinese who are entitled to take over service jobs not allowed to other ethnic groups according to the visa policy for diaspora. This policy accelerated gendered and ethnic division of migrants’ labours producing male young workers salient in industrial pockets, which accounts for almost 90% of males under working permit system. This research criticizes too much “gendered” multiculturalism discourses in South Korea proposing intersectional approaches and argues that apparently masculinized labour migration is not a symptom of de-feminization but a part of feminization, which combines nationalistic discourses into gendered migration.

### Key words:

South Korea; feminization of migration; multiculturalism; intersectionality

## **Does Government of Uganda Emergency Plans and Strategies Taking into Account Different Needs and Social Roles of Women and Men, Before, During and After Forced Displacement?**

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### **Abstract**

The influx of internally Displaced Persons in Uganda is still a negative point of contention and the issues of gender in relation to forced displacement continue to be eminent points of challenge due the fact that the analyses of the available refugee plans, strategies and policy have not been given a priority. The paper seeks to investigate a) the gender oriented specific needs of current displaced persons in Uganda by place of origin. b) The resources provided c) The available emergency plans, policies and strategies and how they treat issues of gender. d) The level of involvement of main stake holders in responding to gender issues before, during and after forced displacement. e) The impact of gender specific needs and social roles to displaced populations and to host communities in Uganda are presented.

### **Key words:**

Gender; Internally Displaced persons; Forced Displacement; Uganda

## Drought and The Copying Strategy of Migration Among the Maasai People of Kenya: A Gendered Analysis

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### Abstract

The Maasai are well-known pastoralist and their photographs dominate tourist guidebooks about East Africa and its wildlife. They are one of the main selling points of Kenya's tourism industry and their culture is commercialized and exploited the world over. However, this high degree of visibility obscures the fact that over time, they have become increasingly exposed to processes of marginalization and destitution. Historically, this has been a result of socio-economic dynamics during the colonial and post colonial periods that have lead to diminishing range resource base. However, in the recent past, the Maasai way of life has also been increasingly adversely affected by climate change, and more so, increases in the severity of drought. This paper presents the findings of a research on a group of Maasai families who migrated with their livestock to a village in the outskirts of the city of Nairobi (Naserien) to escape the ravages of drought in the nearby rural Kajiado County. The paper shows that their reactions to dislocation appear to be gendered experiences. The majority of the men got employed as either *askari-wa-usiku* (night watchmen) in the nearby middle-class residential estates and business premises or as *ocekut* (herdsmen) or, in some instances, both. The majority of women on the other hand are engaged in the businesses of beadwork and milk. Indeed, women seem to have taken up more of the men's traditional obligations as they now take care of much of the family budget from their engagement with the market. In some sense, the changes that are happening can be viewed as empowering to both men and women. The paper concludes that there are now more complex and layered identities among the Maasai as a result of this migration.

### Key words:

Drought; Migration; Climate Change; Gender; Drought; Migration; Climate Change; Gender

## **Empirical Analysis on Marginalized Experience and Negotiation Process of Spouses of High-skilled Migrants in Singapore**

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### **Abstract**

In response to the challenges of globalization, an ageing population and a low fertility rate, Singapore government has adopted an aggressively liberal immigration policy to attract high-skilled migrant known as 'foreign talent'. As there is a growing negative sentiment about foreign talent that accuses many of them of only taking advantage of Singapore, its citizens' anti-immigration anxiety is prevalent and only worsening. To mitigate the anxiety, the government has started to take the restrictive policies on the migrants such as strengthening the regulation for qualification of EP visa and PR, which foremost affected the migrants on the margins such as women. This article examines the case of female spouses of high-skilled migrants in Singapore who, in many cases, are as well-educated and skilled as their partners in their home county. Whilst researches on high-skilled migration were mainly focused on male, and researches on female migrant were concentrated on low-skilled workers such as foreign domestic workers, these dependent spouses have not been given sufficient attention in the scholarship despite their importance. Confronting the transition status from independent career women to dependent housewives to their male spouses, these women are trying to negotiate their situation by getting their own job, pursuing further degrees, or actively participating in community work. Host country's recent policy change deeply affected the migrant on the margins and narrowed the employment opportunity for those women and they tried to negotiate the situation by making different decisions accordingly. This article explores the marginalized experience and negotiation process of dependent spouses of high-skilled migrants in Singapore, relying on in-depth interviews and participatory observations.

### **Key words:**

Spouses of high-skilled migrants in Singapore; marginalized experience

## Home Away from Home: Lived Experiences of Taiwanese Women in Hong Kong

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### Abstract

The 1980-1990s saw a significant wave of emigration of Taiwanese to developed countries where they seek political stability, social security, children's education and better quality of life. By using in-depth interviews of 35 women who are aged 40-75, this study focuses on female migrants who went to Hong Kong to join their husbands, or have married Hong Kongers, and have developed their own businesses successfully. Starting as early as the 1960's, some have made Hong Kong their homes, while encountering various difficulties in adapting to a different kind of Chinese culture at the beginning. Through belonging to various organizations, they have developed female friendship networks over the years, enabling them to relate closely to other Taiwanese in Hong Kong society. Despite successful efforts in planting new roots/becoming Hongkongers over the last few decades, respondents talked about returning (*luo ye gui gen*) to Taiwan. Connections maintained with their Taiwan homeland has enabled them to be aware of developments, and transnational linkages with their parents and relatives in Taiwan have strongly affected their desire to return. This study concludes that frequent contacts with their first homes have triggered their desire to return, while a hospitable environment with a good quality of life in Taiwan have all been part of their intention to leave their host community.

### Key words:

Marriage migration; cultural adaptation; Hong Kong; *luo ye gui gen*; home

## **‘Hong Kong is not China!’ Glocal Articulation of ‘China Threat’ Discourses in Hong Kong**

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### **Abstract**

Hong Kong is a rather quiescent place to discuss issues regarding cosmopolitanism, difference, and conviviality, despite Hong Kong S.A.R. Government’s reluctant embracing of multiculturalism and attempts to brand Hong Kong as “Asia’s world city” where “East meets West.” Relatively muted public discussions of ethnic difference and multiculturalism generally revolve around the problems faced by local South Asian communities and foreign domestic workers, yet nowadays some of the greatest cultural anxieties of Hong Kongers stem from their city’s conflictual reintegration with mainland China. The tensions between increasingly vocal localist activists and the daily visitors from mainland has reached new heights in the wake of 2014’s Umbrella Movement. This paper investigates the articulation of global discourses of ‘China threat’ to local struggles over belonging by looking at the ways in which negative images of, and narratives about China and the Chinese circulate, get appropriated, and reworked in Hong Kong. To this end, I explore the gendered representation of mainlanders as ‘heartless mothers, greedy gold-diggers’ as well as ‘uncivilized masses’ in various media and online platforms. The paper deploys the concept of ‘narcissism of small differences’ to explain the construction and reproduction of cultural boundaries through everyday encounters between the mainland visitor and the Hong Kongers.

### **Key words:**

multiculturalism; Hong Kong; Chineseness; belonging

## Marriage, Migration and Multiculturalism: Arranged marriages in Britain

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### Abstract

This presentation looks at the practice of arranged marriage among women of Indian, Pakistani and Bangladeshi origin resident in Britain. It examines the conflation of arranged marriages with forced marriages and the assumption that arranged marriages are examples of cultural practices that thwart individual agency. Drawing upon original empirical data, I will argue that in the practice of arranged marriage, some South-Asian women are able to exercise agency while choosing their marriage partner. They adapt traditional arranged marriage practices to navigate their way around strict cultural expectations and to negotiate with their family members the choice of a match that is favourable for them. I provide a corrective account of arranged marriages by challenging the stereotype of the 'oppressed third world women' and their experiences of such marriages. I will do this by employing the idea of post-colonial feminism and by highlighting two long standing issues in feminist debates; the notion of agency and the conception and role of power in the struggle for women's rights. Finally, I will make a case for a post-colonial approach to feminism as one way of reconciling feminism with the politics of multiculturalism.

### Key words:

Arranged marriages; British-Asian; post colonialism; feminism; multiculturalism

## Multiculturalism and Gender: Challenges Posed by New Migration and Diversity

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### Abstract

This paper examines the multiplication of difference evinced through new migration in Singapore and its intersection with gender difference. Singapore is a site of both 'old' and 'new' migration trends. The arrival of new migrants from the same ancestral homelands as Singaporeans of Indian and Chinese ethnicity has resulted in an increasingly diverse social fabric that defies the multiculturalism model upheld by the Singaporean state for five decades. This multiculturalism model, which seeks to promote racial equality, is premised on categorisations corresponding to the ethnic groups considered 'pioneer' in Singapore. In popular parlance, this is known as the CMIO model (i.e. 'Chinese', 'Indian', 'Malay' and 'Others') and it informs the formulation of a range of policies in Singapore, including housing and education. However, new migrants from China and India trouble the state's compartmentalised approach towards ethnic relations. Despite being co-ethnics with Chinese- or Indian-Singaporeans, they are considered socially inferior by locally born Singaporeans. This paper highlights the gendered aspects of the multiplication of difference manifested in Singapore today by drawing attention to the gender subordination of Indian migrant brides and the derogatory stereotypes attached to Mainland Chinese female migrants in Singapore. In so doing the paper reflects critically on the majority-minority relations paradigm that has characterised multiculturalism debates so far, including within feminist critiques of multiculturalism (e.g. 'minority patriarchy'). It argues that the multiplication of difference through new migration necessitates new approaches towards living in/with diversity.

### Key words:

Gender; migration; multiculturalism; diversity; Singapore

## Skilled P.R. Chinese New (Im)migrants in Singapore: Negotiating Gender Identities with Sense of Belonging in a Multicultural Society

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### Abstract

Researchers have given much attention to examining the case of transnational migrants negotiating their 'fit' into a culturally different society. In these cases, transnational migrants have to deal with a huge cultural gap with host society, among other related problems. In this paper, I focus on a less examined case, in which migrants share a similar cultural background with the host society. Taking skilled P.R. Chinese (im)migrants in Singapore as an example, I interrogate how they negotiate their sense of belonging to their homeland alongside the development of a new sense of belonging to host society, paying attention to the dimension of gender. Drawing on semi-structured interviews with 12 females and 13 males, as well as 6 participant observation of organized group events involving P.R. Chinese (im)migrants, the research finds that both female and male (im)migrants do not engage with the multicultural environment in Singapore, although female (im)migrants keep a more open-minded attitude towards multiculturalism than males. However, while generally lacking social integration with their hosts, female (im)migrants show a stronger belonging to Singapore, especially to local everyday life, than males. These findings suggest that first, similar cultural background can help to generally strengthen the (im)migrants' sense of belonging to multicultural host society; second, gender can make a difference of sense of belonging due to the gendered geographies of everyday life. By providing the less examined case, the research furthers the knowledge of transnational migrants in a multicultural society from a gendered perspective.

### Key words:

gender identity; sense of belonging; multiculturalism; P.R. Chinese new (im)migrants; Singapore

## The Multi-ethnic Islamic Society in Guangzhou and The Daily Practice of New Chinese Muslimahs

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### Abstract

Guangzhou, situated in the southern tip of main land China, has a long history of embracing foreign merchants and migrants including Arabic and Persian Muslims. In the first two decades of the “open door” era, many Chinese Muslims including “Hui” and “Uyghur” came to Guangzhou in chase of business chance. Around the ancient mosques new Islamic society came into form. Since late 1990s, along with China’s economic growth and the improvement of the degree of freedom of religion, more Muslims, both Chinese Muslims from northwest China and Muslims from Middle East, Southeast Asia, Africa and other foreign countries, joined Guangzhou’s Islamic society and made it a highly diversified multi-ethnic place.

The author did a two-week fieldwork in Guangzhou’s Muslim society in the summer of 2015. During the fieldwork, the author met and interviewed Muslims from different areas and countries, including a group of New Chinese Muslimahs who converted to Islam out of marriage with Muslim migrations or other reasons. This study shows how contemporary Muslim Migrations contribute to the diversification of Guangzhou’s Islamic society. Also through a gender perspective these study exams how the New Chinese Muslimahs empower themselves by means of daily practice such as learning Arabic and Islamic knowledge.

### Key words:

Multi-ethnic culture; Islamic society; migration; New Muslim; Practice; Guangzhou

## C12.10 Gender and Geography

### Island Bodies

#### Oral



Home

1. [Lot: A Poetic Memoire of Girlhood in the Colonial Island Landscapes of Haida Gwaii in Northwestern British Columbia](#)  
Sarah de Leeuw (UNBC/UBC, Canada)
2. [Paradise Island for able bodies?](#)  
Marcella Schmidt di Friedberg stefano malatesta, Roberta Garbo (university of Milano Bicocca)
3. [Resorting The Island in The Maldives: From The Bali Syndrome to The Kurumba Game](#)  
Elena dell'Agnese (Università di Milano Bicocca, Italy)
4. [The Sexualization of the Coastal Female Body: The Case of Young Women](#)  
Nélyda Solana Villanueva (Colegio de Postgraduados, Mexico)

## Lot: A Poetic Memoire of Girlhood in the Colonial Island Landscapes of Haida Gwaii in Northwestern British Columbia

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### Abstract

Haida Gwaii (the Queen Charlotte Islands) holds a unique place in Canada's historic and contemporary colonial imagination. Romantically constructed since late 18<sup>th</sup> century contact through to late 19<sup>th</sup> and early 20<sup>th</sup> century geological and anthropological exploratory expeditions, and arguably into the present day through discourses of eco-tourism and new-age spiritualism, Haida Gwaii (and the Haida First Nations Peoples who have lived on the islands since, in their words, 'time immemorial') have consistently been positioned as a faraway yet accessible, savage yet civil, island geography. Named by surveyor Captain George Dixon in 1787, whose ship was *Queen Charlotte*, the islands were formally renamed from The Queen Charlotte Islands to Haida Gwaii in 2010 as an alternative to the colonial-era name – emblematic of complex and gendered colonial relationships, however, removal of Queen Charlotte erased one of the few references in settler colonial British Columbia to what may have been Britain's only Black monarch, Charlotte of Mecklenburg-Strelitz. This paper, in conversation with a growing series of literatures, popular cultural references and even tourist guides, is a poetic memoir about growing up on Haida Gwaii. The paper (a poem) grapples with the tense and overlapping narrations and presences inherent to the islands and is extracted from a poly-vocal long poem that combines colonial journals, geological surveys, tourist bogs, and ethnographic records with personal memoire-esque reflections about growing up 'white girl' on Haida Gwaii.

### Key words:

Poetry; Colonialism; Indigenous Geographies; Haida Gwaii/Queen Charlotte Islands

## Paradise Island for able bodies?

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### Abstract

The Maldivian Resort is, “par excellence”, a place created to stress the exoticness and sensuality linked to the tropical island geographical imaginary. The illusion of living an exclusive experience, surrounded by the “perfect tropical setting”, has been based on the selection of suitable places, norms, practices and actors. This “place making” process can be read even as a mechanism of inclusion of the human and natural bodies allowed to “inhabit” this paradise. In fact, beyond the well-known “commodification of places” as principle of production of the tourist sites, this mechanism helps us to reflect on the spatial exclusion of those who, due to economic, cultural and physical status, are not suitable as actors of this “scenario”. By quoting Chris Philo (1992), in this contribution, we read this spatial mechanism by discussing the geographies of “other than” abled-bodied tourists and by analysing both the materiality (in term of accessibility) and the imaginary (in term of inclusion) that define the Maldivian Resort as a place.

### Key words:

Island; Imaginary; Exclusion; Maldives; Abled-Bodies

## Resorting The Island in The Maldives: From The Bali Syndrome to The Kurumba

### Game

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#### Abstract

The Bali syndrome (Minca 1996) refers to the dynamics of enclavisation of tourism destinations. The spatial delimitation of purified enclaves, in apparent contrast with the tourists craving for Otherness, is usually explained with the desire to provide services of high standards and beautified landscapes, avoiding social and cultural clashes in the same time. In the Maldives, the process of tourism enclavisation has been pushed further. Since the establishment of first resort, Kurumba, in the Seventies, tourism activities have been promoted under the logic of “one island, one resort”. So, tourism islands have been designated as “spaces of exception”, operating in a Time Zone different from the one of the State, and consenting the infringement of all the rules concerning the body (about eating, drinking, wearing swimming suits or having sex outside the marriage), imposed by the State religion. Inside the island-resort, other spaces of difference are delineated; beside the beach, the Spa and the other tourism areas, where the “certified” bodies of the tourists can move without restrictions, there are the areas for the staff and the maintenance, where the tourists cannot enter and the Maldivian rules are still operating. Inside the tourism spaces of the resort, the recent trend of Halal tourism and the need of Arab women of enjoying their privacy, while sunbathing, demand private swimming pools and restricted access. In this way, new spaces of exception are created, like a set of Chinese boxes, which turns the Bali Syndrome in the much more articulated Kurumba game.

#### Key words:

tourism; Bali syndrome; Maldives

## The Sexualization of the Coastal Female Body: The Case of Young Women

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### Abstract

The experience of young women<sup>3</sup> in Lagunillas<sup>4</sup>, a coastal community in Tabasco, Mexico, is related to the daily tensions motivated by the sexualization of their bodies. Stereotypes associated to place strengthen this perception, as it naturalizes “girl’s behavior”, showing them as savage and immature women.

There is a series of representations about the teenagers’ sexuality in this coastal area, which impersonate them as uncontrollable bodies. These representations limit their mobility and opportunities. It also motivates adult control mechanisms such as rumors and gossip impacting the prestige of these girls.

One explanation for these representations of gender and sexuality, are associated to the articulation of the categories of race and ethnicity in that area. There is a relationship between the historical construction of sexualization of young girls and the process of miscegenation in the coast. This construction is related to the sexualization of black, indigenous, mestizo and low class women too, which started with Colonial period. The narrative discourse about honor and decency of the privileged impacts the construction of those women not belonging to this class, and have facilitated a type of family organization which favours cohabitation, rather than marriage.

The sexualization of the coastal female body, shows that this stereotypes has been built from the idea of the naturalization of the body. This idea essentializes the mestizo and other racialized human groups, and shows the association to the geographical origin and cultural consumption of the region.

### Key words:

gender; geography; interseccionalidad; race; sexuality

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<sup>3</sup> It refers about women between 15 and 18 years old.

<sup>4</sup> I change the real name of the community in order to maintain the anonymity of this place.

## C12.10 Gender and Geography

### Gendered Inequalities and Empowerment: Men and Women in the Public and Private Sphere



#### Oral

1. [Gender and Geography of Spatial Mobility: The Role of Women's Education and Work](#)  
Anindita Dey (Jawaharlal Nehru University, India)
2. [Increasing Female Participation in electioneering Process in Bihar: A Study in their Empowerment \(Assembly Election: 2010,2015\)](#)  
Purna Bharti (Patna University, India)
3. [Reconstruction of Retirees' Masculine Identity in Japanese Suburban Communities: An Examination of Their Life Stories](#)  
Orie SEKIMURA (Gunma Prefectural Women's University, Japan)
4. [Status of Women in A Border State of Indian Territory: A Case Study of Jammu District](#)  
Anuradha Sharma (University of Jammu, India)
5. [Where Is the Retirement for Elderly Women in India? An Analysis Based On Census, 2001 And 2011](#)  
Dipika Subba (Jawaharlal Nehru university, India), Dr. Bhaswati Das (Jawaharlal Nehru University, India)
6. [Women Rights in Marital Life Course](#)  
Nilima Sopanji Nagrale (Jawaharlal Nehru University, India), Motikapur Manikrao Moon (Jawaharlal Nehru University, India)

## Gender and Geography of Spatial Mobility: The Role of Women's Education and Work

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### Abstract

Women's physical mobility is one of the most important aspects of women's autonomy. In India women are often restricted within the household domain and they are not allowed to go outside alone. This is more a result of patriarchal and patrilocal society where social customs and norms have a firm grip on behavioral pattern of women. However, studies reveal that there is a spatial difference in women's status in India where women in southern India experience higher autonomy than North. The present paper is an attempt to analyse if education and work status of women have any bearing in improving their spatial mobility and whether the impact is similar across regions using National Family Health Survey -3 data. Pearson's Correlation Coefficient and Binary Logistic Regression has been used. The result shows a direct relationship of women's education and work on their physical mobility in terms of their freedom to go: market, to health care and to relative's house. Women having higher level of education and those who work outside home enjoy more freedom of movement than others. Though it has been seen that in case of urban areas, some of the north Indian states like U.P., Rajasthan, and Bihar etc, which are considered to be more restrictive in terms of women's freedom, show higher mobility among women who works outside home than southern states, the overall analysis indicates that the impact of education and occupation is not independent of the socio-cultural setting of India.

### Key words:

women; freedom of movement; education; year of schooling; work

## **Increasing Female Participation in electioneering Process in Bihar: A Study in their Empowerment (Assembly Election: 2010,2015)**

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### **Abstract**

It is argued that women need to be empowered in the realm of political decision –making so as to facilitate their real empowerment. The growing participation of women in elections indicates a silent movement of women empowerment. The process of this empowerment is neither abrupt nor have similarities with western countries. There is a growing idea among women in the region that social transformation is much slower than political change so they prefer to play a decisive role in elections. Bihar is economically backward region and male migration to rich state of the federation is a common phenomenon. This factor gives female a responsibility to look after herself and her family in the absence of male members.

The objective of the study as (i) To find out an overall spatial pattern of participation of women in assembly elections held in 2010,2015 in Bihar. (ii) Nature and extent of participation of women in both elections.

The entire study has been conducted using secondary data obtained from election office, and then it is statistically and cartographically treated and represented. The study reveals that the women’s participation has precedence over male participation. Although spatial variation in women’s participation have been observed in both the assembly elections. It is also observed that women from rural area have more concern about their voting right in comparison with urban women.

### **Key words:**

social transformation; political change; spatial

## **Reconstruction of Retirees' Masculine Identity in Japanese Suburban Communities: An Examination of Their Life Stories**

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### **Abstract**

This study examines the transformation process of the masculine identity of male retirees residing in the suburban community of Sakuragaoka, Tama City, Tokyo, who opted for voluntary retirement, by analyzing their life stories. After 1990, it was established that gender is not an essential structure but is shaped by social and cultural differences. Femininity and masculinity are not axiomatic and can be modified. The author used a surveying technique to understand the subjects' identity, culture, and societal background from their life stories and experiences. Their narratives included reflections about their masculine identity, which they took care to maintain especially in their respective offices. From their narratives, we learnt that masculinity is not a monolith but instead is contextually and dynamically constructed. In suburban communities, residents have various roles beyond modern, fixed gender roles. Men who are part of a community need to construct a new masculine identity, which can positively undertake the changes of a flexible gender role. To achieve this, men should share housework and caring with women and restructure their masculine identity to collaborate with women.

### **Key words:**

masculine identity; retirement; life stories; gender; Japanese suburban community

## Status of Women in A Border State of Indian Territory: A Case Study of Jammu

### District

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### Abstract

In the course of history, the status of women has changed from time to time depending on socio economic and political structure of society. Women have enjoyed higher status during Vedic age in home and outside in India. They were well educated and had right to study Vedas and participate in all vital decision making processes. Later they lost opportunities. Today women are at disadvantageous position due to the wide gender gap which remained unabridged since centuries. The present study is an attempt to understand the phenomenon associated with gender. There are serious questions related to gender gaps especially in India and particularly in bordering states like Jammu and Kashmir where the political unrest and social convictions make the problem more complex. With no authority or power to live with confidence they have lost their control of their life and choices. Cropping gender issues in society clearly indicate the existing inequality in gender hence the concern calls for response and mature understanding. This study focuses on the components which are necessary to empower women for making choices for their better future and making this world a better place to live. a

### Key words:

Status, Vedic age, gender gap, inequality, empower

## Where Is the Retirement for Elderly Women in India? An Analysis Based On Census, 2001 And 2011

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### Abstract

Later life is a transition from active life to retirement, health to functional impairment, independence to dependence. Work, in India's context is complex. There is a large group of workers whose work does not generate sufficient sustenance for their livelihood. This paper analysed population Census data 2001 and 2011 to address the query pertaining to the work status of elderly women. Our enquiry also extends to understanding economic and non-economic activities of the elderly by gender.

The data is extracted from Economic tables, Census of India 2001 and 2011. Mostly rates and ratios are employed to understand gendered nature of the process over the years. ArcGIS has also been used to understand spatiality of the process of withdrawal/retirement.

An interesting dynamics of main activity of the marginal workers and non-workers has been revealed. It is identified that in Andhra Pradesh and Chhattisgarh relatively more women receive pension in their old age. However, dependency among women remains high even though the pension status of women in these states is better. It suggests that pension is quite insufficient in amount for women. It has also been observed that work participation rate among working age individuals (15-59) and among elderly (60+) varies widely for males but not so for females. Comparison between 2001 and 2011 reveal that pension receivers have increased substantially among women but dependency status did not improve at all. The data suggests irrespective of the source of pension; it is insufficient to relieve women from dependent status.

### Key words:

work status; elderly women; retirement; dependent

## Women Rights in Marital Life Course

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### Abstract

The present paper focuses on subordination of women's rights in marital life. Gender is now understood to be a social status and a set of relationships between women and men. Gendered rights are social construct of the culture imposed on a particular individual/gender especially to women in almost every society. However in many societies women's rights are ignored or suppressed. Gender inequality is built into the organization of marriage and families, work and the economy, politics, religions, the arts and other cultural productions, and the very language we speak. The key objective of the study is to explore the causes of subordination of women in marital life. The paper has adopted analytical and descriptive approach to examine the issues related women's rights in their marital life. It analyzes feminist theories about why women and men are unequal? Further, it explore the causes of violation of women's right in marital life and presents the possible solutions of the problems through merging thoughts from different feminist perspectives. Findings of the research reveals that feminist argument about gender inequality is that it is not an individual matter, but is deeply ingrained in the structure of societies. The group of feminist arguments against biological determinism suggested that gender rights result from cultural practices and social expectations. Being a woman is not natural fact, she is not only product of history but also long history of socialization in order to civilization. Making women and men equal, therefore, necessitates social and not individual solutions.

### Keywords:

Feminist; Gendered-Right; Marital-Life; Society; Women

## C12.10 Gender and Geography

### Women in Rural India

#### Oral



Home

1. [Does Access to Inheritance Rights Really Matter? Insights from Population Based Study of Elderly Women in Rural India](#)  
Niharika Tripathi (International Institute for Population Sciences, India)
2. [Educational Attainment and Participation of Women in Rural Occupations: A Case Study of Haryana \(India\)](#)  
Rajesh Kumari (Govt College Badali, India)
3. [Female Exploitation in Bt Cottonseed Cultivation; A case study of North Gujarat, India](#)  
Nishu Kumar (Jawaharlal Nehru University, India)
4. [Gender Equity and Empowerment: Role of Native Women in Conservation and Management of Natural resources in Himalayan regions of India](#)  
Pallavi upreti (HNB Garwal University, India)
5. [Socio-Economic Characteristics of Migrants Rural Households: Feminization in agriculture](#)  
Sarda Prasad (Jawaharlal Nehru University, India)

## Does Access to Inheritance Rights Really Matters? Insights from Population Based Study of Elderly Women in Rural India

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### Abstract

**Context:** Increasing evidences from both developed and developing societies underscores the pervasive phenomena of feminization of ageing process. It suggests that most of the issues related to economic support, provision of health care and social support will be largely challenges of elderly women. However, lack of appropriate data and poor understanding about the issues and concerns of elderly women in resource poor societies hamper sound policy formulations.

**Objective:** This paper examined socio-demographic variations in the access to property rights and its association with the economic dependence, social status and well-being/life satisfaction among elderly women in rural areas of India.

**Data and Method:** Using a mixed-method approach, data on about 300 women aged 60 years and above was elicited on range of demographic, socioeconomic and health related characteristics including inheritance/property rights, decision making agency, status within family and community, wellbeing and life satisfaction etc. Cross tabulations, Chi-square test and adjusted logistic regression models were fitted to examine the association between access to inheritance rights and economic, social and wellbeing of elderly women.

**Findings and Conclusion:** Data indicate that only about one-third of elderly women inherited some property (essentially land or house) from either biological parents or husband. In fact, majority of elderly women inherited property from deceased husband as per prevailing cultural practice in rural societies of northern India. Often, the actual maintenance and rights rested with the children mainly the son of elderly women. However, it emerged that elderly women who accessed inheritance rights had relatively lower economic dependence, better decision making agency and reported improved well-being/life satisfaction than their counterparts. These results re-iterate the call for addressing the economic support for women in general, and elderly women in particular.

### Key words:

Inheritance rights; Older women; Agency; Economic Dependency; Well-being; Rural India.

## **Educational Attainment and Participation of Women in Rural Occupations: A Case Study of Haryana (India)**

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### **Abstract**

Women and rural women in particular, play many social and economic roles inside as well as outside the home. In addition to her daily work routine, consisting of, cooking, cleaning, and other domestic chores, rural women are also heavily involved in all aspects of state's agricultural sector. From crop production to livestock rearing, rural women are expected to regularly engage both domestic and commercial aspects of society. Despite such a huge contribution, her role has yet not been recognized. They have been excluded from the various training and rural development programmes which usually involve the menfolk, being offered only programmes related to child health, nutrition and so on. It indicates the invisibility of the majority of women, who act as unpaid workers on the family farm. Care of livestock is a female domain but as dairy work is becoming modernized, women are losing control of both management and economic returns. Training of women in animal husbandry is found to be totally neglected. The level of improved household technology, too, is very unsatisfactory, more especially in backward regions where the majority of women are still working with age-old tools. The paper examines the participation of rural women in home and farm activities with educational attainment in the state of Haryana (India). This paper highlights also impact of educational attainment on women occupation in rural areas. The study is based on data from the B & C Series, Census of Haryana (India), 2011. Above 15 years of the age group is the specific age group for observing the data. The statistical tool of correlation and cartographic technique (GIS, bar & pie diagram) has been used in the study.

### **Key words:**

Development; Occupation; Attainment; management; education.

## **Female Exploitation in Bt Cottonseed Cultivation; A case study of North Gujarat, India.**

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### **Abstract**

With the advent of modern technology, especially after globalization and market liberalization period, the entire Indian agricultural sector has witnessed several structural changes from production related mechanism to new system of labour arrangement in the agribusiness sector led by Contract farming. Contract farming for Bt Cottonseed has developed and emerged immensely with its own positive as well as negative externalities. Many labourers are trafficked and are held captive by the contractors or rich farmers to assure the uninterrupted supply of labour force. Since most of the work done by manually, an intensive labour force is required more particularly the female children play a crucial role in it. Although in Bt Cotton seed cultivation, labourers constitute the major part of commodity chain process, but they are the weakest beneficiaries from the value chain. They are highly exploited even at the risk of their education, health care, family bonding and other safety guard protection measures in the hazardous work. The work activity creates inter-generational transfer of poverty, misery and bleak future for their socio-economic development. Majority of girl child are forced to leave education and work in the farms. Thus, creating conditions of bondage and slavery like situations.

Thus, there is a strong urge to address the whole question of a changing agrarian production structure under contract farming from a gender perspective, especially issues related with the labourer's nature of participation and working conditions.

### **Key words:**

Globalization; Agri business; Externalities; Contract farming; Commodity Chain; Labour force; Gender; Exploitation; Health; Trafficked; Wages; Poverty; Hazardous work; Bondage.

## **Gender Equity and Empowerment: Role of Native Women in Conservation and Management of Natural resources in Himalayan regions of India**

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### **Abstract**

Women are considered integral to conservation and management of natural resources especially in mountain regions. Socio economic dependency of local communities on local natural resources is much higher in mountain ecosystems. This paper tries to contemplate the role of native women folks in natural resource management by highlighting their roles in management of forest, land, water, agriculture, livestock, etc. The paper is based on the findings from the case studies of Mountain villages in Rudrapryag District of Uttarakhand (India). Taking women as primary respondents; empirical work used participatory techniques, focus group discussion, and field observations. Findings suggest that involvement and interaction of women in utilizing ecosystem service in the region is much more than men, in terms fodder-fuel wood collection, agro-forestry activities etc. Yet they face exclusion in terms of economic benefits and social equity. However, both mountains and women have begun to receive more global attention in the last two decades. There is a remarkable convergence of policy objectives between the themes of sustainable development, environmental conservation, and the advancement of women. Therefore, the paper also aims to identify ongoing natural resource management strategies, conservation benefits with women as major stakeholders and how these practices strengthen their socio economic capacities for better livelihood. In order to ensure sustainable use of natural resources the article recommends that policy makers, planners, local government and local communities must realise the predominate role of women in decision making, preserving traditional indigenous knowledge, daily livelihood practices, managing and monitoring economic activities in the region.

### **Key words:**

Gender equity; Mountain ecosystem; Community based natural resource management

## **Socio-Economic Characteristics of Migrants Rural Households: Feminization in agriculture**

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### **Abstract**

Migration is socio-economic process and it is one of the important demographic factors. At present rural out-migration is major factor that influence rural development. It has both positive and negative impact in rural economy by receiving remittances and loss of productive member from the village. Therefore, this study has been planned with two specific objectives- to study the factors rural out-migration and to examine the impacts of remittances on rural economy and agriculture. Study is based on primary survey that was conducted during May to October 2011 in two districts of Bundelkhand region, Uttar Pradesh. There were 360 households has been selected equally migrant (MH) and non migrant household (NMH). Study reveals that economy of migrant household is better than non-migrant households. MH has leased in and leased out of their land more than NMH. Cropping intensity among MH was higher. MH are more exposed about the health seeking behaviour, new agriculture technology and conscious about the time management. Female participation in home management has increased in the study areas. They are empowered by taking decision in household management and expenditure on household as well as on agriculture.

### **Key words:**

Feminization in agriculture; Rural out-migration; Socio-economic status; remittances

## C12.11 Geographical Education

Research which examines the value and values of  
a Geographical Education



Home

### Oral

1. [Development Interlinkages between Geographical Competencies and Value Education: Implications in the Teaching- Learning Scenario](#)  
Seema Agnihotri (Amity Institute of Education, Amity University, Noida,U.P, India)
2. [Enhancing Scientific Literacy with Primary Geography Curriculum in China: An International Perspective](#)  
Xiaowei Xuan (East China Normal University, China), Qingna Jin(University of Alberta, Canada), Mijung Kim (University of Alberta, Canada), Yushan Duan (East China Normal University, China)
3. [Geography and Music – Enhancing Cultural Approaches to People and Places in Values Education](#)  
Christiane Meyer (Leibniz University Hanover, Germany)
4. [Geography Education in Bangladesh: Emerging Need in National Development](#)  
Muhammad Abdur Rahaman (ADAMS, Bangladesh)
5. [The Preliminary Study of Assessment about the Geography Practical Ability](#)  
Weiguo Zhou (East China Normal University School of Geographic Sciences, China), Yushan Duan (East China Normal University School of Geographic Sciences, China)

### Poster

1. [A Tracer Study on the Graduates of a Popular Bachelor Academic Program in Tourism Industry: Geography of Tourism](#)  
Simona Malaescu (Romania, Babes-Bolyai University)
2. [Effects of Collaborative Learning on Student Creativity Training in Geography](#)  
Parvin Ahmadi (Iran, Alzahra University)

## Developing Interlinkages between Geographical Competencies and Value Education: Implications in the Teaching- Learning Scenario

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### Abstract

The current century can be easily marked by dichotomies where on the one hand humanity is experiencing dense connectivity through advance technology and on the other feeling isolated and alone at the individual level. Due to all these, our value system is on hold. Many disciplines are addressing these issues according to their expertise and nature but no discipline can help us better than the geography which over the two centuries has tried to understand the intricacies of the physical and human relation through different approaches in a scientific manner. Geographical competencies not only enable us to remove our spatial biases but also curtail down the existence of stereotypes, prejudices and biases, emanating from spatial ignorance. Further, it also holds the key to transform our perception about the resources which under the materialistic outlook seems to be infinite.

With this background, this paper is attempting at the theoretical level with slight empirical evidences to inter relate geography with the value education. The main objective of this paper is to signify the geographical competencies as value laden software to promote the peaceful and harmonious world by minimizing the negativity prevailing while interacting with the spatial environment. In order to vindicate the objective, data was collected from the pre-service teachers to observe their geographical competencies regarding different places of the earth by abiding the norms of standard geographical competencies in mind. The paper concludes by evolving the framework where geographical competencies will be interlinked with the specific values, to be used in the classroom transaction to promote peaceful world.

### Keywords:

Geographical competencies; value education; integration of geographical competencies with value education

## Enhancing Scientific Literacy with Primary Geography Curriculum in China: An International Perspective

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### Abstract

In China, geography is a basic subject with the nature of both science and social studies in elementary schools (Grades 1 to 9). This subject plays a key role in developing children's scientific literacy. In China, geography curricula (grades 3 to 6) are separately included in Science and Morality & Society subjects in primary schooling. In this study, authors look into the Chinese primary geography curriculum from the respective of geography as key part of developing scientific literacy. This study includes two parts: 1) it is to develop a framework of scientific literacy suitable for Chinese situations, by reviewing different definitions and interpretations of scientific literacy from an international respective; 2) based on the framework, it is to develop a primary geography curriculum in China in order to strengthen scientific literacy with geography themes in the curriculum. In this study, authors construct a geography curriculum evaluation framework for scientific literacy based on responsive model, by conducting interviews and survey questionnaires with the different groups who are related to primary geography curriculum (e.g. primary geography curriculum standards makers, scientific literacy researchers, geography educators, and primary school students). This research will bridge the gap between geography curriculum and scientific literacy in the current elementary education and provide possible suggestions for the coming primary geography curriculum reforms.

### Key words:

Primary geography; scientific literacy; curriculum evaluation

## Geography and Music – Enhancing Cultural Approaches to People and Places in Values Education

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### Abstract

In the Anthropocene, humans are the most influential factor behind transformational processes, as demonstrated by the phenomena of industrialization, globalization and climate change. The outer world is a mirror of the inner world and therefore of cultural awareness and values. If we want to ensure that the outer world has a sustainable future, we have to develop the consciousness necessary for achieving sustainability.

Geographical education is predestined to increase cultural awareness and values education. Since music works holistically on humans, it is particularly capable of reaching the inner world. Thus, music can enhance cultural approaches to connect the inner and the outer world. Furthermore, music can make a major contribution to values education beyond cognitive judging, because values arise in personal, affective experiences characterized by self-transcendence. Three interconnected stages of values education can be identified.

- 1 To be touched and deeply moved means having feelings which connect us with people and places. For example, the soundtrack of the documentary HOME evokes such feelings and experiences of self-transcendence.
- 2 Being involved and connected means empathizing with people and understanding their perspectives. For instance, “Beds are burning” advocates the rights of the Aborigines and asks the public to regard their history and cultural beliefs.
- 3 To be confident and committed means being self-aware and acting responsibly. The video “TckTckTck – Time for Climate Justice – Beds are Burning” by way of example seeks to raise public awareness about the impact of climate change and to make this planet a better place.

### Key words:

Geography and music; cultural awareness; consciousness; values education

## Geography Education in Bangladesh: Emerging Need in National Development

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### Abstract

Bangladesh faces the constant challenges of rampant poverty, high population density, and increasing population rate. Poor people are victim of a lot of problem including anthropogenic and natural disasters, underserved urban development, rural economic backwardness etc. It is one of the poorest country of the developing world, with a low resource base, a very low land-man ratio, and is threatened by both natural hazards and overexploitation. However this resource base is under see threat and environmental planning is necessary to regional and national land use planning, local development plan, local climate adaptation plan, geographical resource base appraisal and utilization planning. Moreover, in order to maintain a modern, scientific and effective education system including environmental education, Bangladesh need more emphasize on geography education. But in every sphere of education, geography education is lying under marginal level. The study aims to illustrate the present scenario of geography education in different level of education in Bangladesh and urgency of improvement of geography education in all level. With this objective, the study was conducted in primary to university educational institutional level with reviewing existing curriculum, sociometric analysis of geography education personnel, KII among education expert. The study reveals that geography is under marginal level and there is a high potentiality of geographic education to ensure national socio-economic and regional development.

### Key words:

Geography; regional development; national development; risk management; land use planning



## The Preliminary Study of Assessment about the Geography Practical Ability

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### Abstract

Geography practical ability is one of the key literacy about the secondary geography discipline. Compared with the previous test contents and methods, the assessment of the geography practical ability has some unique features. Based on this subject's literature review and referred to other subjects' assessment methods, this paper proposes the essential requirements of the assessment about the geography practical ability: scientific principle and geographic principle are the basic principles; the assessment is based on the geographic knowledge points, and, the assessment goal is to assess the level of students' geography practical ability; to test the students' language expression and operation ability is the characteristic of this assessment model. Based on above statements, this paper put forwards to make an assessment model by use of the paper and pencil test, question and answer test, operation and practice test to assess the students' geography practical ability.

### Key words:

Geography Practical Ability; Assessment; Paper and Pencil Test; Question and Answer Test; Operation and Practice Test

## **A tracer Study on the Graduates of a Popular Bachelor Academic Program in Tourism Industry: Geography of Tourism**

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### **Abstract**

Recent reviews report that issues pertaining employment in tourism are still superficially analysed, including not related to wider social, economic or political considerations. This paper aims at addressing these shortcomings, analysing the broader context of the insertion rates in the tourism industry for 1558 graduates of 4 tourism bachelor programs (graduating between 2008 and 2014) from one of the largest university from Romania. We found that Geography of Tourism offered by the Human Geography and Tourism Department proved to be the most popular program (1058 graduates), frequently chosen as a secondary bachelor program (33,6%) after graduating another first Bologna system bachelor program. The percentage of graduates of this program employed in tourism industry was 36,6% measured earliest at 1 year after graduation (in comparison with 35,2% in the case of the Economy of Commerce, Tourism and Services Program and 44,8% for the Business Administration in Hospitality program). 35% of the graduates (21% from the Geography program) declared that more specialised courses have to be included in the curricula and that internship or practical training should be more extensive than they are now. Graduates from other tourism programs reported the need for more extensive Geography training (Geography of Europe, Regional tourism Geography etc.). Furthermore, the study revealed that the National Quality Assurance Agency as well as other educational stakeholders seem to be consistently interconnected and permeable in what concerns feed-forwarding of information from several fields, but possibly under-connected with the most important ones: namely the employment market and the graduates' feedback.

### **Key words:**

Tourism tracer studies; tourism academic programs; Babes-Bolyai University; tourism training

## Effects of collaborative learning on student creativity training in Geography

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### Abstract

This study was conducted to evaluate effects of cooperative learning method on Fostering Creativity of SHAHR-e-REY's daughter sophomore is in tenth grade students in Geography lesson. Research way was semi experimental and statistical population were included all SHAHR-e-REY's daughter sophomore is in tenth grade students in humanities field. This study was conducted in the 1391-1392 academic year and using purposeful sampling method selected 27 daughter sophomore is in tenth grade students from REYHANE high school in geography lesson. Data gathering tool in this study was ABEDI's creativity standard test. To analysis obtained data, we have used Descriptive and inferential statistics. Measures which presented in descriptive section indicated that there are differences between student's average scores of creativity test and its sub measures in pre test and post test. We had used Paired- sample T Test (random selection of subjects, existence of a similar group, normalized frequency distribution of scores and Interval scale measures). Results showed that geography education by cooperative method had significant effect on elevating creativity of student (fluidity, development, Initiative, flexibility) in this lesson.

### Key words:

Cooperative learning; Creativity; Geography

## C12.11 Geographical Education

Research in ways geographical education may contribute to sustainability and environmental awareness



Home

### Oral

1. [Challenging Pupils to Explore Sustainability to Help them Develop Global Understanding](#)  
Johan Aart Van der Schee (Vrije Universiteit Amsterdam, Netherlands)
2. [Contribution of Geography Education for Learning to Combat Desertification: Pilot Results of the Desertification Watch Program](#)  
Batchuluun Yembuu, Uranchimeg Getsel, Khadbaatar Sandag (mongolian state university of education, Mongolia), Munkhbadar Tsendsuren (Tumentsog school, Mongolia)
3. [Ideas of Sustainable Development in Geography Education in Russia, China and the Ukraine \(Middle School\)](#)  
Olga Khlebosolova (The Russian State Geological Prospecting University, Russian Fed), Laura Tsareva (“Geography at School” magazine, Russian Fed), Fengtao Guo (School of Geographic Sciences of East China Normal University, China), Nella Munich
4. [Planning to Call Their Own: the Teaching of Urban Flooding in the Light of Paulo Freire Method](#)  
Murilo Noli da Fonseca (University of Porto, Portugal)
5. [Preferences to Heritage Environment Interpretation of Middle School Students in Honghe Hani Rice Terraces](#)  
Zhilin Liu (Yunnan Normal University, China)
6. [Refuting Persistent Misconceptions in Climate Change Education – a Lesson Study Approach](#)  
Chew Hung Chang (National Institute of Education, Nanyang Technological University, Singapore)
7. [The Implementation of an Environmental Management System to Enhance Education for Sustainable Development](#)  
Barry Richter (North West University, South Africa), Luiza De Sousa (North West University, South Africa), Alex Kanyimba (University of Namibia, Namibia), Schalk Raath (North West University, South Africa)
8. [The Vision of Wangari Maathai in Geographical Education – “Taking Root” and “Replenishing the Earth”](#)  
Christiane Meyer (Leibniz University Hanover, Germany)
9. [Young Children Learning about Evaporation - Conceptual Change in Primary School](#)

Daniela Schmeinck (University of Cologne, Germany)

## Poster

1. [Botanical Gardens as Spaces for Discovery: Fieldwork in Geography Teaching](#)  
Antonio Carlos Castrogiovanni; Bruno Batista (Brazil, Universidade Federal do Rio Grande do Sul)
2. [The Development of Visual-Spatial Abilities in Children \(5-10 Years old\) through the Preparation, Response & Recovery \(PR2\) Simulation Game: A Mitigation Strategy In the Face of Increasing Vulnerability to Natural and Anthropic Risks in San Juan, Puerto Rico](#)  
Michelle Cabiya; Maria Del Carmen Zorrilla (United States, University of Puerto Rico)

## Challenging Pupils to Explore Sustainability to Help Them Develop Global

### Understanding

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#### Abstract

The International Year of Global Understanding (IYGU) aims to raise the awareness of the global embeddedness of everyday life. Bottom-up movements that relate to this aim are welcome. The main fields of action are research, education, and information. The focus is on connecting the local and the global, sustainable ways of living and sustainable actions and technologies for local use.

Students at the VU University in Amsterdam developed teaching materials for secondary geography education about waste, energy and water. The idea was to stimulate secondary pupils' learning about sustainable living. The question is whether these teaching modules are good practices of what the IYGU stands for. In this paper we analyse the choices made by the students that developed the teaching modules as well as the reaction of an expert group of geography teachers that studied the modules and the reaction of some secondary school pupils.

Although the teaching materials seem to offer good input on the road of global understanding, the research results also show that the role of the teacher and group of pupils are vital for a successful module. An international exchange of teaching modules about global understanding can be a way to build a range of good practices. However, the approach will only work if a clear framework is available and if these teaching modules consist of more than texts and assignments. Teaching modules for global understanding should include joint research projects, exchange of story maps, virtual fieldwork and examples of discussions.

#### Key words:

Geography education; global understanding; sustainability; international co-operation; futures education.

## **Contribution of Geography Education for Learning to Combat Desertification: Pilot Results of the Desertification Watch Program**

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### **Abstract**

This article provides the pilot results of the “Desertification-Watch” program development project which implemented by Geography Department of the Mongolian State University of Education with the UNESCO. “Desertification Watch” is geography education oriented extra learning program which based on the needs assessment baseline survey and includes activity-based booklet, videos and web sites or online learning. These include the need to find convincing expression of geography's contribution to the education for sustainable development of all young people in arid areas and coping with desertification and climate change. “Desertification-Watch” piloting had covered in two Soums (administration unit) where severe affected by desertification in Gobi region of Mongolia, because here, strong vulnerability for climate changes and desertification (including, e.g., the water scarcity, rapid mining industry, overgrazing, loss of traditional and indigenous knowledge because of social changing). Within the framework of the “Desertification Watch” program development had conducted the needs assessment baseline survey which covered the target students, teachers and local communities as well as field research. The project also attempts to respond in new ways to combat desertification and enduring challenges facing community in arid/semiarid areas and also hopes to contribute in development of the Project Based Learning in schools through geography in Mongolia.

### **Key words:**

Project based learning; Climate Change Education; Combat Desertification

## Ideas of Sustainable Development in Geography Education in Russia, China and the Ukraine (Middle School)

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### Abstract

Geography education has the unique opportunities in shaping pupil's knowledge and skills in sustainable development. To what extent are they used in middle school? This question was the key point of the international program "Future for Geography Education: Ideas of Sustainable Development in Middle School of Russia, China and the Ukraine". Comparison of the main directions and issues of introduction the ideas in geography education became a purpose of this research. It was based on principles, approaches and concepts of the international documents in Education for Sustainable Development, Charter and Declarations by the International Geographical Union Commission on Geographical Education. Research program included the following steps: (1) Description of geography content of standards, programs and textbooks for middle school of the three countries; (2) Questioning of geography teachers and authors of textbooks about implementation of sustainable development in school subject, their needs and suggestions; (3) Comparison of final results and key ways of geography education in the three countries. Results of this research help to understand the unused opportunities, the main directions of teacher education, concept and skills for the school subject that pupils should be able to use by the completion of geography education in middle school.

### Key words:

sustainable development; implementation of basic concept in school subject; middle school; geography content of standards; teacher education

## Planning to Call Their Own: the Teaching of Urban Flooding in the Light of Paulo

### Freire Method

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#### Abstract

Reflect on the cities of the past, analyze the cities of the present and think about the cities of the future and the conditions which will enable these populations inserted in them necessarily permeates debates, studies and risk analysis and vulnerability, and especially discussions in schools. In this context it appears that the traditional dictates education has offered students a learning resulting in mechanical memorization act of a set of theories that are taken from textbooks, which, in turn, has the tendency to present the courses content isolated, that is this, there isn't interconnection with the reality of the world. Given this, the present work aims to develop a lesson plan on urban flooding in the face of extreme weather events, from the method developed by Paulo Freire (1996). This issue gains importance as it appears that at the end of the decade more than half the world's population will be living in urban areas. This planning should be carried out with students aged between 15 and 17 years and will cover four classes, three in the classroom and school yard (2 hours each) and a field in class (lasting 5 hours). It is expected that this plan allows students to exercise sensitivity and perception of the relationship of man in and with the world, by exposing the debate about climate change, the urbanization process, and the debate around the concepts risk and vulnerability and presenting the distinction between floods, mudslides and flooding.

#### Key words:

Floods; Education; Climate Change; Paulo Freire; Planning.

## Preferences to Heritage Environment Interpretation of Middle School Students in Honghe Hani Rice Terraces

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### Abstract

It has a very important practical significance for students, who are the future heir and owner of the world heritage, to establish environmental interpretation system meeting their demands to take the heritage education for sustainable development and heritage conservation. This research analyzed the environmental interpretation needs of students at Yuanyang first high school, using methods of questionnaire. The results showed: there was a little difference in the need of interpretative contents, the order with environmental knowledge (4.05), environmental awareness (4.00) and environmental skills (3.95). The median and mode were both 4, which illustrated that students were in need and urgently in need for various interpretation knowledge. In the way of interpretation: narrator (69.2%), audio-visual media (36%) the need to highlight; In the way of joining the environmental activities: mainly personally experience (83.3%), game (63.5%), followed by touch (53.1%), observation (51.2%). In the way of interpretative space: the dispersed explanation (80%) had great advantages; in the interpretative way on the environmental issues: most students chosed field study (87.7%); in the activities: student had great interesting in participation local Festival activities (84.3%), activities participating in observing terrace and ditches (81%). In short, high school students were eager to environmental interpretation at heritage, significantly with a way of firsthand experience and field trips. Therefore, the interpretation for high school students had better in participatory.

### Key words:

environmental interpretation; world heritage; students' need

## Refuting Persistent Misconceptions in Climate Change – a Lesson Study Approach

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### Abstract

Misconceptions in climate change have been well documented among youths in several international studies. This study, which was conducted in Singapore, aimed to correct students' persistent climate change misconceptions by using refutation texts. Adopting a Lesson Study approach, the materials and pedagogical approach used were developed in close collaboration with Geography teachers, taking into consideration the unique characteristics of their classrooms and student profile. The aim of the study was to monitor how children learn through refutation texts and to document how teachers process the experience. A pre-test and delayed post-test comparison showed that there was significant improvement in the students' climate change conceptual understanding. The presentation will also discuss implications on the teaching and learning about climate change.

Key words:

climate change education; refutation text; misconceptions; lesson study, Singapore

## The Implementation of an Environmental Management System to Enhance Education for Sustainable Development

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### Abstract

Rapid population growth combined with the increase in economic growth world-wide, has led to concerns as to whether natural resources on the earth can support future development. These concerns create a challenge for all governments, especially those in developing countries. One way of creating awareness among the youth to protect the environment is the development and implementation of Education for Sustainable Development (ESD). All school subjects as well as schools' management systems need to be taken on board for the implementation of an ESD. The purpose of this quantitative case study is to determine how selected schools in South Africa and Namibia developed their unique Environmental Management System (EMS) within their context to implement the aims/objectives of ESD, after attending a training session on the integration of ESD in school management. A checklist was used to generate data from ten schools (n=10) on the research problem and this data was analyzed by using descriptive statistics. The results of the research showed that with effective support and assistance, schools can develop and implement environmental management systems that support education for sustainable development.

### Key words:

Education for Sustainable Development (ESD); environmental management of schools; whole-school approach; effective delivery of ESD; Environmental Management Systems (EMS).

## The Vision of Wangari Maathai in Geographical Education: “Taking Root” and “Replenishing the Earth”

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### Abstract

“Taking Root” is the title of a documentary about the vision of Wangari Maathai (1940-2011) who was awarded the 2004 Nobel Peace Prize for her contribution to sustainable development, democracy and peace. Along with the foundation of the Green Belt Movement (GBM) in Kenya, Maathai was convinced that the Kenyan people had to identify the roots of the disempowerment that plagued them and to assume personal responsibility for improving their quality of life. These attitudes are further associated with the four core or spiritual values of GBM outlined in “Replenishing the Earth” (Maathai 2010): 1. Love for the environment; 2. Gratitude and respect for Earth’s resources; 3. Self-empowerment and self-betterment; 4. The spirit of service and volunteerism. “Such values are not unique to the Green Belt Movement. They are universal (...). They define our humanity.” (ibid., 16)

In “Taking Root” Maathai stated: “I’m a child of the soil.” (40:07-40:11) Hence, her vision was far more than only planting trees and protecting Kenya from desertification. She argued that a shift in consciousness and a change in “perspective” is necessary: “We need to reflect more thoughtfully on our responsibilities to the planet and to one another (...).” (ibid., 55)

What do students think about Maathai’s vision, the meaning of “taking root” and the spiritual values? Selected results of two different studies with questionnaires in 10<sup>th</sup> grade classes of secondary schools in Lower Saxony (2012: 140 students; 2015: 80 students) and some suggestions for geographical education will be presented (Meyer 2016).

### Key words:

taking root; values; responsibility; shift in consciousness; change in perspective

## Young Children Learning about Evaporation - Conceptual Change in Primary School

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### Abstract

During the last decades a growing interest within the Science and Geography education community has been on children's ideas about scientific concepts. Additionally, results of actual research raise questions about the efficacy of 'conventional teaching strategies'.

The presentation shows the various dimensions of primary school children's concepts as well as on their conceptual responses to special developed teaching sequence on evaporation.

As a result the presentation points out the need for using teaching strategies that explicitly take into account misconceptions children bring to the classes and/or acquire during teaching-learning processes.

### Key words:

conceptual change; evaporation; water cycle; education; primary school

## Botanical Gardens as Spaces for Discovery: Fieldwork in Geography Teaching

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### Abstract

Fieldwork represents a vital instrument for understanding our world through direct experience, for gathering data about it, and as a fundamental method for fomenting geographical education. The investigation of the relationship between Geography teaching and public spaces by fieldworks is the issue of this research. Moreover, constructing competencies in Botanical Garden through Geography is possible or not? Thus, we conduct a case study in a Botanical Garden located in Porto Alegre, southern Brazil. Our methodology is based on the Paradigm of Complexity and Qualitative Research. Our first goal is the comprehension of the representations that Botanical Garden brings on Geography teachers. From that, we propose a set of pedagogical activities supported by Geography teaching theories and Critical Pedagogy related to the Genetic Epistemology. Outdoor learning is the basis of the pedagogical activities developed with public High School students. This work indicates the necessity of constructing a reflexive thought in the school oriented to citizenship considering students as subject in changing society processes. Fieldworks allow an approach to reality showing that everything is connected to everything. Exploring student previous knowledge is the major source of meaningful teaching and learning possibilities. Thence, fieldwork represents a challenge element on the subjects pressing them to act on Geographical Space in a competent way.

### Key words:

Botanical garden in Porto Alegre; Geography teaching; Complexity; Fieldwork; Competencies.

## **The Development of Visual-Spatial Abilities in Children (5-10 Years old) through the Preparation, Response & Recovery (PR<sup>2</sup>) Simulation Game: A Mitigation Strategy In the Face of Increasing Vulnerability to Natural and Anthropogenic Risks in San Juan, Puerto Rico**

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### **Abstracts**

In 1983, American psychologist, Howard Gardner, developed his theory of Multiple Intelligences, which correlates visual-spatial capabilities. This theory suggests that human beings have the capability to recognize and elaborate visual images, distinguish specific traits of objects, create mental images, reason through spatial dimensions and handle & reproduce external & internal images. Most mayor cities around the world have an array of variables associated with natural and anthropological risks that expose their population to high levels of risk & vulnerability. With climate change becoming a mayor threat to the island of Puerto Rico and the increasing crime rates in San Juan, adaptability measures should be taken to assure the survival and recovery of the Puerto Rican population. For this reason, this research project has developed the Preparation, Response & Recovery (PR<sup>2</sup>) simulation game, an educative experience, targeted at children between the ages of 5-10, that seeks to develop their visual-spatial abilities to effectively respond to high levels of stress caused by immediate natural (Floods, Hurricanes, Earthquakes, Tsunamis etc....) or anthropic (assault, robbery, potential school shootings etc.....) disasters. This game will serve as a mitigation strategy to adequately prepare Puerto Rican children to respond to life-threatening situations through visual-spatial awareness decision-making.

### **Key Words:**

Spatial Abilities; Spatial reasoning; visual-spatial intelligence; spatial games; simulation games

## C12.11 Geographical Education

Research in geographical education, geo-spatial technologies  
and information communication technologies



Home

### Oral

1. [An Interactive-GIS-Tutor and Integrational Framework: a GIS teaching solution for developing countries?](#)  
Elfrieda Fleischmann(Cedar College of Education,South Africa)
2. [Assessing the Effectiveness of Digital Learning Tools for Outdoor Learning Processes](#)  
Mihkel Kangur, Jaanus Terasmaa, Grete Arro, Liisa Puusepp, Elina Malleus, Priit Tammets, Airi Kukk  
(Tallinn University, Estonia)
3. [Augmented Reality in Earth Observation Education – An Example with the High Definition Earth Viewing Experiment from the ISS](#)  
Andreas Rienow, Valerie Graw, Sascha Heinemann, Annette Ortwein, Johannes Schultz, Fabian Selg  
(University of Bonn, Germany)
4. [Building Students’ Spatial Skills through a Sequential Technology-Enabled Curriculum Design Towards Work-Ready Planners](#)  
Yan Liu, Derlie Mateo Babiano, Sébastien Darchen (The University of Queensland, Australia)
5. [Designing an Inquiry-Based Fieldwork Activity to Investigate the Impacts of Tourism on a World Heritage Site in South Korea](#)  
Jongwon Lee, Sun Min Oh (Ewha Womans University, South Korea)
6. [Geographic Knowledge Representation Based on Digital Resources Integration and Information Technology Fusion](#)  
Ping Chen, Zhong Tian, Jianjun Tang, Jinsong Wu, Ke Li, Chunmei Li, Huilin Ye (SinoMaps Press, China)
7. [Geospatial Analysis and Geospatial PDF Visualisation of School Students’ Performance](#)  
Nik Dahlia Nik Abd Kadir, Nor Aizam Adnan (University Teknologi MARA, Malaysia)
8. [International Online Geographical Education with Geospatial Technologies](#)  
Osvaldo Muniz (Texas State University, United States)
9. [Learning Progressions for Geographic Core Literacy in China---A Case Study of “Regional Identify”](#)  
Li Ya, Yushan Duan (School of geographic sciences, East China Normal University, China)
10. [Learning Spatial Thinking with Web-Based Geospatial Technology: High Spatial Ability Learners Are](#)

## More Positively Affected

Xi Xiang (East China Normal University, China)

11. [Spatial Thinking and Geography Education: The Effect of Digital Atlas Implementation in The Classroom](#)  
Rafael Miguel Gonzalez (University of Zaragoza, Spain), Isaac Buzo Sanchez
12. [Technology, Pedagogy and Content: Perceptions of Innovative Geography Teachers as “Early Adopters” of Geospatial Technologies in Secondary Geographical Education](#)  
Bianca Bowman, Peter Brett, Andrew Fluck, Rosemary Callingham (University of Tasmania, Australia)
13. [The Role of Augmented Reality \(AR\) in New National Curriculum of Geography, Japan](#)  
Yoshiyasu Ida, Satoru Itoh, Yoshihiro Ugawa, Jun Tsutsumi, Koji Ohnishi (Toyama University, Japan)

## Poster

1. [Development of Open-access E-learning Material for GIS Education](#)  
Hiroyuki YAMAUCHI; Takashi OGUCHI (Japan, Center for Spatial Information Science, The University of Tokyo)
2. [Improving a Summative Assessment in Geography Education Through the Use of a "Tasks Designer" Theoretical Model](#)  
Olga Khlebosolova; Laura Tsareva; Nikolina Iurchikova (Russian Fed, The Russian State Geological Prospecting University)
3. [Mobile Geo-Location Logging and Analysis for Enterprise Customers](#)  
Liangmin Hu (China, College of Environment & Planning of Henan University); Yanke Hu (United States, IBM); Xiwang Zhang (China, College of Environment & Planning of Henan University)
4. [Research Progress on Application of Mobile Technology in Geography Teaching](#)  
Liu Shirui (China, Henan university)

## **An Interactive-GIS-Tutor and Integrational Framework: a GIS teaching solution for developing countries?**

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### **Abstract**

Because of the emerging importance and demand for Geospatial Information Systems (GIS), educational GIS has become significant. Despite the growing interest in GIS, the majority of teachers worldwide still struggle to find suitable ways to introduce GIS practice in their classrooms. Consequently, uncertainty regarding GIS practice integration, have arisen worldwide and also within South Africa.

The South African Department of Basic Education (DBE) has phased GIS into the FET-phase school curriculum from 2008 to 2010 and has re-introduced GIS in the South African Curriculum and Assessment Policy Statement (CAPS). The slow diffusion of GIS practice through the South African education system suggests that GIS educational policy developments in South Africa have outpaced supportive academic research of GIS practice within the South African context. This I-GIS-T project started with a pilot study conducted during 2012 and continued with the rest of the project during 2014. This study focuses on filling this research gap in the academia with the provision of GIS integration guidelines to the DBE by means of an Interactive-GIS-Tutor (I-GIS-T) integration framework.

The research design of this concurrent mixed research study was tailor-made in order to best answer the research questions, with pragmatism as the underpinning philosophy. This study, divided into two parts, includes a national online FET phase teacher survey (Part 1) which investigated current GIS integration barriers and a multiple-case study (Part 2) which evaluated the I-GIS-T and its preliminary framework within seven schools (which include control classes).

Quantitative data was generated through the teachers' survey, attitudinal and knowledge pre- and post-tests as well as questionnaires. Qualitative data collection included open-ended questions in questionnaires, one-on-one teacher interviews, focus group interviews, photographs and observational notes which provided a thick description regarding the viability of the I-GIS-T and its framework within the natural class setting. SPSS® version 22, SPSS® AMOS and ATLAS.ti™ software were utilised with analysis of quantitative and qualitative data.

Findings indicated that key GIS practice barriers, globally as well as in this study, were lack of support, low

teacher TPACK abilities, learner differences and lack of resources, especially in classes with large learner numbers, as found in this study. All the grade 11 Geography teachers and a very large majority of the learners evaluated the I-GIS-T framework to a large extent as workable and viable. Findings further suggest that the I-GIS-T and its framework also surmounted the main GIS practice barriers. GIS attitudinal tests revealed an overall positive shift on attitudinal questions, while knowledge tests also showed a positive shift in most schools. Structural Equation Modelling (SEM) showed that according to the Technology Acceptance Model (TAM), the I-GIS-T application is very likely to be accepted. Future I-GIS-T development would recommend incorporation of a multi-language choice component, more exploratory activities and enhanced sound quality and screen resolution.

The final proposed I-GIS-T integration framework is supported by the TIP model, which made use of Roger's innovation diffusion and TPACK. A learner workbook, I-GIS-T PowerPoint and teacher guide were developed for teachers, supporting flexible GIS integration within their classes.

**Key words:**

barriers; education; GIS; framework; learning; multimedia design principles; multiple-case study; teaching; Technology Acceptance Model; Technology Integration Model

## Assessing the Effectiveness of Digital Learning Tools for Outdoor Learning Processes

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### Abstract

Digital learning tools are more widely used in learning processes but there is lack of studies assessing effectiveness of such tools. The current study is based on digital learning tool Avastusrada (Discovery Trail) ([www.avastusrada.ee](http://www.avastusrada.ee)), prepared by Tallinn University for Estonian Environmental Board in 2015 for centres of environmental education. The application allows to integrate the subjects of natural sciences and humanities through practical activities and inquiry learning and to enhance general competencies. To assess the effectiveness of the Avastusrada it is needed to understand its functioning in the broader context of environmental education and contemporary knowledge about learning processes. Through the learning process it is essential to achieve flexible reflection of environmental topics both individual as well as an abstract level. The studies have shown that this process is time-consuming and during this synthetic concept may occur when student uses complex terms but do not understand their meaning. Using the different set-ups and trail designs (exercises, questions, tasks etc.) and measuring instruments of educational psychology it is possible to control the effectiveness of the digital learning tool for substantive understanding of complex problems and concepts. The results of the current study would give input for designing of more sophisticated e-learning tools.

### Key words:

Environmental education; digital learning tool; learning processes

## Augmented Reality in Earth Observation Education – An Example with the High Definition Earth Viewing Experiment from the ISS

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### Abstract

"Man must rise above the Earth – to the top of the atmosphere and beyond – for only thus will he fully understand the world in which he lives". Considering famous quote by the Greek philosopher Socrates, the project 'Columbus Eye – Live-Imagery from the ISS in Schools' aims at the sustainable integration of earth observation in schools. It implements the footage of NASA's High Definition Earth Viewing Experiment (HDEV) at the International Space Station (ISS) for secondary education material published online and free of charge ([www.columbuseye.uni-bonn.de](http://www.columbuseye.uni-bonn.de)). Applications of geographic information build the canvas for explaining physical curricular knowledge. Background information, quizzes, and informative animations encourage pupils to solve geographic problems in order to foster their methodological competences. This contribution presents the shift of didactical paradigms from computer aided e-learning to smartphone supported m-learning. Exemplarily, it will be demonstrated how regular topographic maps are augmented by the HDEV footage and linked with maps of isobars to explain the origins and dynamics of the typhoon Maysak. The tangible dimensions of pens & papers are virtually lifted into the fascinating environment of space and improve everyday teaching reality.

### Key words:

High Definition Earth Viewing, Augmented Reality, ISS, Remote Sensing in Schools

## Building Students' Spatial Skills through a Sequential Technology- Enabled Curriculum Design towards Work-Ready Planners

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### Abstract

Spatial skills, including spatial thinking, spatial planning, spatial modelling, spatial reasoning and visualisation, are key graduate attributes in the fields of geography, planning and other related fields. However, the key challenge students face is the difficulty to spatially design or 'plan for' an environment which may be different from the real environment they live in, or assess the impacts of new development prior to it being developed, or visually communicate a planning output with professionals and the general public. This paper reports a learning design transforming three core but discrete courses in the Bachelor of Regional and Town Planning (BRTP) program at the University of Queensland into a sequential scaffolding of courses through the introduction of a virtual dynamic learning platform in order to develop students' spatial skills. Using ESRI's CityEngine we developed a computer based three-dimensional (3D) model of a living city – Brisbane's inner suburb of West End – for students to visualise, plan, assess and communicate existing and new developments in planning. West End is a rapidly evolving suburb with active urban renewal and redevelopment occurring, making it an excellent case study area for planning students to evaluate new development in relation to planning theory, principles and regulations, or to design and assess their own planning scenarios. The sequential learning design and implementation helps to enhance students' capacities for transition from being students to skilled practitioners, matching the skills requirements by industry and community.

### Key words:

spatial skills; technology-enabled curriculum design; 3D city model; work-ready planners

## Designing an Inquiry-Based Fieldwork Activity to Investigate the Impacts of Tourism on a World Heritage Site in South Korea

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### Abstract

The focus of the current study is to design inquiry-based fieldwork activity to investigate the impacts of tourism on a World Heritage site (Yangdong Folk Village in South Korea), where students are expected to detect and map land-use changes at the building level and conduct a survey to ask residents and businesses what's changed and what should stay the same in the village. Since it has been argued that mobile devices can support learners by allowing the learners to maintain their attention to the context and by offering appropriate assistance when required, two versions of the fieldwork activity with/without a mobile GIS solution are developed to determine the advantages and disadvantages of incorporating the mobile GIS solution into the fieldwork. Video observation and student work are collected and analyzed using various indicators, including the types of talk, the nature of collaboration among team members, how the students engaged in the fieldwork, and advantages and limitations.

### Key words:

Inquiry-based fieldwork; mobile GIS; World Heritage; sustainable development

## Geographic Knowledge Representation Based on Digital Resources Integration and Information Technology Fusion

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### Abstract

With the development and application of information technology in educational field, the traditional geography teaching mode is being transformed in China. Many middle schools have an attempt to construct a new geography teaching mode, which is based on systematic digital resources and mature information technology. In order to meet the immediate needs of geography teaching, and to improve the informatization level of geographical education, we have done deep explorations of the representation of geographic knowledge by new techniques, which include new products of digital geographical resources and new teaching mode. These explorations are based on full investigation of geography teaching mode and middle school teachers and students. In this study, a systematic set of digital resources, which matches abundant geographical teaching materials accumulated for 60 years by Sinomaps Press, and a whole-flow intelligent platform are established by advanced digital visual techniques such as virtual reality technology, geographical information technology and augmented reality, through resource integration, data mining and technique innovation.

The integration of resources and the fusion of technology are beneficial to improving the quality of teaching and learning under the support of visualized geographical digital resources, realizing the personalized teaching, improving the pertinence and effectiveness of teaching; and to improving the balance and fairness of the allocation of national educational resources.

### Key words:

digital resources integration; information technology fusion; geographical knowledge representation

## Geospatial Analysis and Geospatial PDF Visualisation of School Students' Performance

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### Abstract

The information of school students' performance is made publicly; however further analysis was not able to be done due to restricted education information dissemination by the government policy. The existing school student's performance data was prepared by the Malaysian Ministry of Education with a geographical information system (GIS) school database format. However, the data are not further studied and not presented in the spatially mapping format. Mapping has emerged as a communication tool and also becomes effective way to publish the digital and statistical data to be more attractive and user friendly. The state of Kelantan is a part of Malaysia was chosen as a study area to perform the analysis of student's school performance in science and mathematics scores of the Sijil Pelajaran Malaysia (Malaysia Education Certificate, MEC) Examination for the year 2014 using the inverse distance weighted (IDW) method of spatial analysis in GIS software. In addition, the second objective of this study is to produce the Geospatial PDF of Education Map for MEC student's performance result in the year 2014. Overall, this study will be able to provide better representation in a spatial view of student examination performance to the Malaysia education management as well as to the public.

### Key words:

Geospatial PDF; science; mathematics; Education Map



## International Online Geographical Education with Geospatial Technologies

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### Abstract

Online interaction and cooperation in geography education has revealed important results from several international research experiences conducted during the recent decade. However, research on how geospatial technologies (GST) can be utilized remain an uncharted theme.

In this paper, we present the experience of Red-Online ('Red' is the Spanish translation for Network), a research project funded by the Pan American Institute of Geography and History (PAIGH) in 2015. The objective is to measure international online collaboration practiced by high school teachers who are working in several Latin American countries. Teachers do not have international interaction to improve their geographic knowledge and Red-Online allows them to be part of an online network to learn. For this purpose, they use Interactive Digital Maps, Google Earth, ArcGIS Online and Story Maps – Cloud, to study global climate change in the Americas. The results illustrate that interaction and cooperation among teachers during three months of online activities were enhanced with the exposure to GST within Cloud environment. We also discover that collaboration through problem-based learning (PBL) is better performed when GST are available with the application of various tools. Finally, it is necessary to recognize that progressive learning is absolutely required to reach a good level of practice with GST. For that purpose future research should consider mentorship as a critical key for success during online practices.

### Key words:

Online geography education; geospatial technologies; global climate change; PBL

## Learning Progressions for Geographic Core Literacy in China----A Case Study of “Regional Identify”

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### Abstract

Learning progression is a hot research area in international education. However, there have not been any proper studies on the learning progressions for secondary geography education. This study is a localized learning progression research centered on core literacy which is intend to promote current geography education reform in middle school. Based on systemizing the situation of literacy education from a international view, analyzing the constructing process of core literacy system of geography and literature overview for learning progression in U.S. and in China, a method of learning progressions for geographic core literacy is been constructed Then, there is a case study of learning progression for “regional identify”, including making the hypothesis of Lps for regional identify and constructing the assessment instrument of “regional identify”. According to the framework of this literacy and Rasch model, we design the items and chose a middle school in shanghai to do the pre-test. Then, we use the Winsteps software to analyze the quality of the assessment instrument and point out some suggestions for optimization. This is the first more in-depth exploration of the application of learning progression for geography education in China. The experience and deficiency can be reference for later researchers at home and abroad.

### Key words:

core literacy; learning progressions, regional identify, assessment instrument

## Learning Spatial Thinking with Web-Based Geospatial Technology: High Spatial Ability Learners Are More Positively Affected

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### Abstract

This study aims to verify the learning effectiveness of using Google Earth (one type of web-based geospatial technology) in geography classroom on the development of spatial thinking, and to investigate the effects of Google Earth based lessons on learners with different spatial abilities. A quasi-experiment design was employed in two Singaporean secondary schools. A total of 122 students (aged 15) participated in this study where they were randomly assigned to either experimental or control groups based on intact classes. The results indicate there was significant difference between the two groups with students made greater improvements in some spatial skill areas completing Google Earth based lessons. Besides, a significant interaction effect was found between the learning approach and learners' spatial ability. Statistical analysis shows a significant difference in spatial thinking of high spatial ability learners in the experimental and control groups, but no significant difference was documented for low spatial ability learners in the two groups. Findings signify students with high spatial ability benefited more from utilizing the web-based geospatial technology in developing spatial thinking as compared to the low spatial ability students. The possible explanation is that high spatial ability learners have enough cognitive capability to extract spatial information from geo-visualizations in Google Earth and then to reconstruct their existing mental model. This study highlights students' learning abilities as a factor that influences the impact of geospatial technologies to promote spatial thinking and could help geography educators to facilitate individualized learning.

### Key words:

spatial thinking; web-based geospatial technology; learning ability

## Spatial Thinking and Geography Education: The Effect of Digital Atlas Implementation in The Classroom

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### Abstract

Technological advances have revolutionised lecture halls and classrooms alike facilitating new ways of learning. The cloud can be very easily integrated in daily lessons and research. Active methodology improves spatial and digital competencies. In this context the School Digital Atlas (ADE) is created on the ESRI platform ArcGIS Online. It contributes to motivating students in Geography Sciences and skills, encouraging efficiency in quality open geodata management in order to improve learning results. ADE deals with the current secondary school Geography curriculum. Therefore it is transforming a descriptive character into GIS competencies so as to achieve critical and smart geospatial thinking, which are very necessary elements for the future work of 21st century citizens.

Within such a transformation framework the Digital School Atlas (ADE) emerges. It is an interactive atlas on the ArcGIS Online (AGOL) platform of geospatial ESRI technology. In the end the AGOL platform has been adopted for Atlas implementation based on its easy interaction with ArcGIS Desktop, which is a useful tool for making and improving content and for a final data visualization, so it integrates interactivity and usability.

The ADE is an innovative material for curriculum objectives and a new resource that enhances and expands on the possibilities offered by print atlases for teaching and learning Geography in secondary education. Although scheme and organization may be similar, its digital nature allows great interaction among students as well as a process development of spatial learning by discovery. It also has functions of a GIS, and its layered organization allows students to understand the complexity of the elements involved in the organization of territory (physical, social, economic, political and cultural) resulting from their interaction. All this is made possible through a simple update of information at a very low cost. Wide dissemination of ADE will take place in Spanish secondary schools, with the support of the Spanish and international leaders in geographical education, both cited throughout this work.

Paper will combine theoretical debate in geospatial technologies and spatial thinking education, with research method for implementing ADE in schools as a best-practice experience to obtain results to improve geography education.

### Key words:

School Digital Atlas; WebGIS; geodata; Geographical Education; spatial thinking

## Technology, Pedagogy and Content: Perceptions of Innovative Geography Teachers as “Early Adopters” of Geospatial Technologies in Secondary Geographical Education

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### Abstract

While research literature continues to report on a range of significant and persistent challenges which have thus far constrained the wide-spread adoption of geospatial technology (GST) in K-12 geographical education, innovative geography teachers are nonetheless making progress in their endeavours to embed the technology within their teaching practice. These “early adopters” recognise the relevance and utility of GST for teaching geographical concepts and skills and have envisaged a space for GST within the boundaries of current curriculum requirements and their own pedagogical practices. Utilising qualitative data drawn from semi-structured interviews with six innovative Australian secondary geography teachers, we report on the perceptions of these early adopters with respect to the role they envision for GST in geographical education (technology), their beliefs about how GST support and enhance their geography teaching practice (pedagogy) and their use of GST as a reflection of their fundamental philosophies about the nature and value of geography (content). These findings provide the foundation for an on-going research study which aims to examine the intentions and experiences of early GST adopters in Australian schools. By understanding how and why early adopters embed GST in geographical education, recommendations and conclusions can be made as to how teachers and schools can be supported in developing their GST use.

### Key words:

geospatial technologies; geographical education; geography teachers

## The Role of Augmented Reality (AR) in New National Curriculum of Geography, Japan

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### Abstract

New high school curriculum will be implemented from 2022 in Japan. Currently, geography remains as option-subject in Japanese high schools, which causes a problem that some high school students cannot take geography even if they want. In addition, school geography has not the continuity from elementary to high school in national curriculum. However, geography will become a compulsory-subject by new national high school curriculum. In the new curriculum, the active learning is adopted to all subjects, and the learning of GIS becomes more important in geography of high schools. In this situation, not only geography teachers, history and citizen teachers would be engaged in geography due to the shortage of geography teachers. Therefore, development of simple-operate GIS is an urgent matter. Augmented Reality (AR) is the possible tool in this situation. Given supplementary explanations by AR system, students could realise the contents of geography class more clearly in our example high schools. In this presentation, the role of AR in Japanese high school geography is discussed.

### Key words:

new national curriculum; high school geography; compulsory subject; gis; augmented realty; Japan

## Development of Open-Access E-Learning Material for GIS Education

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### Abstract

Many projects related to GIS education have been conducted in Japan. As a result, a basic core curriculum and teaching materials for university lectures were developed. However, materials usable for GIS practice courses in universities have been limited, although education of practice is necessary to provide human resources for future development of GIS. Therefore, we launched a project “Development of Open-access E-learning Material for GIS Education Based on the Existing Core Curriculum and the Body of Knowledge”. The purpose of this project is to develop GIS learning materials for practical classes of university departments and graduate schools.

This paper presents the background and current situation of the project. Materials to be developed by this project support GIS-related 1) indoor use of software, 2) field surveys, and 3) utilization of the internet. Materials to learn the indoor use of GIS software concern basic operations of free GIS software such as QGIS. Materials to learn field survey methods related to GIS include videos showing the operation of equipment such as UAV. Materials for utilizing the internet include the creation and publication of GIS data using WEB GIS.

These learning materials are provided in the form of PowerPoint files and Markdown files with easy-to-understand descriptions. They will be published in the GitHub platform to obtain supports from users particularly to update the learning materials to efficiently deal with a version-up of software. After the materials are improved, they will be open to the public for e-learning of various people including students and civilians.

### Key words:

GIS; education; practice; learning material; open access; GitHub

## Improving a Summative Assessment in Geography Education Through the Use of a "Tasks Designer" Theoretical Model

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### Abstract

According to the Russian State Federal Educational Standard and a new Program, a summative assessment in the 5th – 9th school classes is an important part of controlling geography education results. The purposes of a summative assessment are different: (1) comparison of the actual results and the programs' requirements, (2) analysis of the long-term dynamic trends, (3) analysis of pupils' achievements and difficulties they face, (4) description of an individual educational trajectory, (5) improving of teaching and learning.

These purposes can be achieved by using of so called "tasks designer" theoretical model. This is a table with description of tasks' difficulty each pupil may face, geographical content of every course, task and procedure types. The table includes three elements of a geographical content for the 5th – 9th school classes: (1) theoretical knowledge (geographical approaches, theories, hypotheses and concepts), (2) empirical knowledge (the geographical facts, place names, etc.), (3) methods of geographical research (methods of the geographical description and comparison, the cartographical and statistical methods, the methods of geographical modeling and forecast). The "tasks designer" contains the five levels of difficulty for pupils: (1) knowledge (learning and recall), (2) understanding (explanation and interpretation), (3) application (on a model or in a new situation), (4) generalization and systematization, (5) values and meanings.

The "tasks designer" theoretical model can be used by teachers for creation of their own estimation tools. It includes also the examples of different geographical tasks.

### Key words:

geographical education results; summative assessment; pupils' achievements; tasks designer

## Mobile Geo-Location Logging and Analysis for Enterprise Customers

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### Abstract

With the rapid development of mobile and cloud technology, improving and optimizing business mobile apps' customer experience is unprecedented important. Geo-location data is probably the most important and interesting data that vendors or researchers care about when their designed apps are being used. There are many application scenarios involving Geo-Location data. If an organization maintains several apps, and it wants to monitor the geo-location trend of each app's usage, it will be chaotic and redundant to implement geo-location logging module for every individual app. Instead, it's much cleaner to encapsulate geo-location logging component into SDKs, and centralize the reporting portals into the same cloud service. In this paper, we propose an approach of Mobile SDK and Cloud reporting architecture, to enable Mobile apps with Sensor information logging and reporting by inserting one single line of code. We also use Geo-Location Logging as an example and explain how it works on iOS and Android platforms. Our approach can bring several advantages including removing redundant implementation of function modules and bringing more scalability on backend reporting.

### Key words:

Mobile; Geo-Location; Enterprise; iOS; Android; Cloud

## Research Progress on Application of Mobile Technology in Geography Teaching

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### Abstract

With the rapid development of mobile Internet, mobile technology has penetrated into the field of education, mobile devices are getting more and more popular, its portability, mobility and flexibility can access to data and information fast and convenient. It is imperative to study the application of mobile technology in geography teaching, under the trend of education informationization. Through the literature review in order, the teaching software based on mobile technology is increasing day by day, and from the teaching case with used of mobile technology, proved the technology have a unique advantages and adaptability in geography teaching.

### key words:

mobile technology; Field practice; geography teaching

## C12.11 Geographical Education

### Research on pedagogy in Geographical Education



Home

#### Oral

1. [A Brief Overview about Research in Cartography and Children in Brazil](#)  
Fernanda Bauzys, Rosemy Nascimento (Universidade Federal de Santa Catarina, Brazil)
2. [A Longitudinal Study of Geography Student Teachers' Perceptions of Their Self-Directedness in Learning with the Implementation of Integrated Problem-Based Learning Experiences. A South African Case Study](#)  
Aubrey Golightly (North West University (Potchefstroom campus), South Africa)
3. [Assessment of Community of Inquiry Principles in Online Problem-based Learning Activities for Geography Education Modules in Blended Learning Classrooms](#)  
Christo Van der Westhuizen (North West University, Potchefstroom Campus, South Africa, South Africa)
4. [Developing Geographical Data Interpretation and Analysis Skills: Drawing from Mathematics and Scientific Inquiry](#)  
Gillian Kidman, Jeana Kriewaldt, Niranjana Casinader (Monash University, Australia)
5. [Did They Read It? A New Approach to the Use of Novels in the Geography Classroom](#)  
Joseph Manzo (Concord University, United States)
6. [Discussion on the Necessity and Existing Problems in the Transition from High School to College in Geography Teaching](#)  
Ye Zaoyin (Kunming No.1 Middle School, China)
7. [Experiments of Map Literacy Training for Preparation of the College Entrance Examination of High School Students with Special Talent](#)  
Xiaoping Huang (Nanning Yucai Experimental Middle School, China)
8. [Pictures and Images of a Slum in Nairobi – The Potential of Hermeneutic Photography for Geographical Education](#)  
Andreas Eberth (Leibniz University Hanover, Germany)
9. [Practitioner's Perspectives of using Bring-Your-Own-Device for Fieldwork](#)  
Derek France, Katharine Welsh, Alice Mauchline, Brian Whalley (University of Sheffield, United Kingdom), Julian Park
10. [Subject Specific Pedagogy and Subject Didactics: Lessons for Geography Education](#)  
Clare Brooks (UCL Institute of Education, United Kingdom)

11. [Teachers' Understanding and Teaching of Geographic Concept in Elementary Geographic Education of Korea](#)  
Okkyong Yoon (Cheongju National University of Education, South Korea)
12. [The Suggestopedic Geography Textbook – a New Generation Textbook](#)  
Soultanova, M., Soultanova (Center for Control and Assessment of the Quality in School Education Ministry of Education and Science, Sofia, Bulgaria, Bulgaria)
13. [Urban Gardening as a Curriculum Artefact for Students with Asperger Syndrome](#)  
Don MacKeen (City of Glasgow College, United Kingdom)

## Poster

1. [Assessment of Geographical Thinking Quality](#)  
Shi chenxi (China, The National Education Examinations Authority)
2. [On the Need for a Complex Thinking in Geography Teacher Training](#)  
Antonio Carlos Castrogiovanni; Bruno Batista (Brazil, Universidade Federal do Rio Grande do Sul)
3. [The Research of Geography Field Practice Teaching System at Three Gorges](#)  
Zhao Xuelian (China, China University of Geosciences (Wuhan))
4. [The Teaching Practice on Geographic Education](#)  
Maria Francineila Pinheiro dos Santos; Xose Manuel Souto Gonzalez (Spain, Universidad de Valencia);  
Iris Lisiê Gomes Neto (Spain, Universidade Federal de Alagoas)

## A Brief Overview about Research in Cartography and Children in Brazil

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### Abstract

This article aims to present a brief overview about scientific production on cartography and children in Brazil. This kind of research comprises the theoretical and methodological process in cartography and maps education. This area of knowledge makes an effort to provide students a different treatment with regard to the cartography teaching, taking into consideration their cognitive development. It's of fundamental importance the adequacy of cartographic products for the public to which it is intended, in order to ensure there is no gap between the maps makers work and their user. The cartography and children research has established itself as a knowledge built in the interfaces between cartography, education and geography. The representative geographical space process used by the teacher in the study of spatial phenomena should be increasingly complex, evolving each year of elementary school, to accompany mental development of the child and therefore also the level of abstraction. In Brazil, Livia Oliveira's thesis habilitation, published in 1978 and entitled "Methodological and Cognitive Study of Map", is considered a pioneering milestone in research in this knowledge area. Since this thesis publication, to the present days, much has been investigated in relation of cartography and children in academia. In our country have been published several studies on this subject. The main national scientific event focused specifically on this theme is the "Colloquium Cartography Children and School", to be held in October 2016 in its ninth edition.

### Key words :

Cartography and children; Brazil; geography; education; research

## **A Longitudinal Study of Geography Student Teachers' Perceptions of Their Self-Directedness in Learning with the Implementation of Integrated Problem-Based Learning Experiences. A South African Case Study**

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### **Abstract**

Problem-based learning (PBL) is a teaching and learning strategy that could be implemented in teacher education to foster Geography student teachers' self-directed learning skills. In this study an integrated PBL approach was integrated over a three-year period in the Geography modules offered in the Baccalaureus Educationis curriculum. During the ensuing PBL experiences the first- to third-year Geography student teachers had three weeks per module to formulate solutions to the stated problem. In the first- and second-year Geography modules the PBL tutorial sessions were presented in contact sessions, but in the third year the students had to execute the PBL experiences on-line on the university's learning management system. The purpose of this longitudinal mixed method case study was to explore Geography student teachers' (n=45) perception of their self-directedness in learning in integrated problem-based learning experiences over the three-year period. Guglielmino's (1978) Self-Directed Learning Readiness Scale was used as research instrument. Semi-structured interviews with participants (n=8) were employed to gain a deeper understanding of the results of the quantitative data. The results indicated that the students' SDL scores increased in the first year, followed by a decrease in the second year and then a steep increase in the third year of their Geography studies. Female students had slightly higher SDL scores than their male counterparts. Participants indicated that the implementation of PBL experiences developed their SDL skills.

### **Key words:**

Geography education; self-directed learning; integrated problem-based learning; learner-centred instruction

## **Assessment of Community of Inquiry Principles in Online Problem-based Learning Activities for Geography Education Modules in Blended Learning Classrooms**

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### **Abstract**

It has long been recognised that meaningful and worthwhile learning is associated with collaborative communities of inquiry (CoI), inevitably being described as the ideal learning environment for higher education. The most prominent model to ensure or measure effective blended learning is the CoI framework developed by Garrison, Anderson and Archer (2000). It is a valid and dependable instrument to measure the quality of the online part of learning by focusing on three important presences, namely, social, cognitive and teaching presences. These principles can, therefore, be used by Geography lecturers to design and evaluate effective online learning environments.

The pedagogical principles of a CoI mould well with problem-based learning (PBL) as a teaching and learning strategy in the Geography classroom. From literature it is evident that PBL can help develop problem solving, critical thinking, self-directed learning, decision-making, reflection, collaborative and interpersonal skills.

This paper reports on the 3<sup>rd</sup> year Geography student teachers perceptions on the use of PBL as teaching strategy in an online learning environment managed in a learning management system (LMS) in an attempt to establish a sound CoI. Both quantitative and qualitative data were collected and the results indicate that the Geography student teachers held positive views of the online PBL strategy supported by a simple usage of the university's LMS.

### **Key words:**

Blended Learning; Problem-based Learning; Community of Inquiry; online learning

## Developing Geographical Data Interpretation and Analysis Skills: Drawing from Mathematics and Scientific Inquiry

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### Abstract

It is increasingly important for the geography student to appreciate that the acquisition of skills in statistics and data analysis is as much part of modern geography as work in the field, laboratory or library. In this respect, data analysis aims to link the use of statistical techniques by means of computer software, to the acquisition of geographical-knowledge and the scientific method of inquiry. This paper will describe how one Australian teacher used techniques drawn from mathematics and science inquiry, to develop the data interpretation and analysis skills of her Year 6 (11 years of age) students. Using data from Word Bank eAtlas of Global Development, nominal data relating to life expectancy in years at birth in years was collected. Most teachers would simply compare a small number of countries and discuss the data in terms of health and wealth. However, to develop the data interpretation and analysis skills of the students, an excel spreadsheet was introduced where the countries were grouped according to their geographical locations (base continent). Graphs were created showing the relationship between life expectancy and continent as a scatterplot for the countries. The teacher was able to use scatterplot printouts to have the students identify data outliers and data clusters. From the data clusters, means were approximated, and dispersion around the means were investigated. Further, comparisons of the size of the clusters, and their overlap led to class discussions that provided a foundation of analysis of variance (ANOVA) statistical tests.

### Key words:

geographical inquiry; data interpretation; graphical analysis; science inquiry; life expectancy; ICT

## Did They Read it? A New Approach to the use of Novels in the Geography Classroom

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### Abstract

Literature has long been used in the geography classroom. A current grant from the Benedum Foundation to the Concord University Geography Department was used to encourage English teachers and geography teachers to share the same students in high schools. The main goal was for teachers to extract environmental processes from novels and explain them to the students. The purpose of this paper is to present a strategy for using novels now that students read less and the essence of many novels can be gleaned from websites that summarize the story, describe the characters, and explain the symbolism found in the work. This paper suggests a test based on obscure, but fair, questions that require students to have read the book in a thorough manner in order to pass it. The test is then followed by a three-page essay that allows students to express their views of the work under consideration. Data collected from student evaluations indicate most students liked the books and most thought they were better prepared to understand the environmental processes extracted from those novels. Most realized, when asked, that the quiz forced them to be more focused readers. Moreover, they believed the quiz led them to earn a better grade on the essay that followed.

### Key Words:

Novels; Environment Process; Quiz; Assignment



## Discussion on the Necessity and Existing Problems in the Transition from High School to College in Geography Teaching

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### Abstract

The issue on how to bridge the gap of teaching practice at different academic stages has long been regarded an essential part of geography education and research, not only because it plays a significant role in connecting all the components of geography, but also because it helps students form a complete knowledge system of this subject while current emphasis has been placed on how to link secondary school teaching to high school geography pedagogy by researchers, little attention has been paid on the link between high school geography teaching and geography education on the college level. Thus, the necessity of bridging the gap of high school and college geography education is elucidated in this essay, and the current problems of this issue in teaching practice are also explored.

### Key words:

necessity and existing problems; geography teaching; high school; college



## **Experiments of Map Literacy Training for Preparation of the College Entrance Examination of High School Students with Special Talent--Take School-based Research of Geography of Art Class for Example**

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### **Abstract**

This paper, according to latest research achievement of psychological studies on geographical education and theory foundation for Constructivism, multiple intelligence and etc., combining school-based research of geography for liberal arts students of art class under the guidance of geography curriculum standard of our school, from view of first-line geographical teaching of instructional design of geography, specialized training on cultivating map literacy, and etc., explores effective ways and related approach of improving geographical literacy of high school students with art talents.

### **Key words:**

Students with special talent; map literacy; college entrance examination

## **Pictures and Images of a Slum in Nairobi – The Potential of Hermeneutic Photography for Geographical Education**

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### **Abstract**

The presentation focuses on results of interviews with 19 groups of young people, aged between 15-24. All of them were born and raised in Korogocho, one of Nairobi's informal settlements. Due to their place identification the youth started different bottom-up activities for transforming Korogocho and create better urban conditions. Using hermeneutic photography as research method, the study from 2014/2015 shows how the test groups in Korogocho identify with this place as their home.

In this study the task for the groups was to take three photos of situations or places which were important and meaningful in their everyday life. After they had chosen their motives they communicated their reflections about the meaning they allocated to them. The outcome shows community awareness creating an atmosphere of responsibility and caring for self-empowerment contributing to community development.

Based on the geographical concepts Space and Place as theoretical frame the presentation shows selected pictures and interview sequences of the data analysis and discusses the potential of this research approach for geographical education. How to use pictures in a critical way and with regard to changing perspectives is the leading question for discussing self-reflexive geographies in this context. Furthermore, the results may also contribute to think about different and differentiated images about 'Africa', and life in slums often stigmatised as hardship and poverty in a marginalized place.

### **Key words:**

Youth in Slums (Nairobi); Place identification; Hermeneutic Photography; Pictures in Geographical Education

## Practitioner's Perspectives of Using Bring-Your-Own-Device for Fieldwork

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### Abstract

The Bring Your Own Device (BYOD) concept is a growing trend in Higher Education and is the idea that an individual makes use of their personally owned technological device rather than using an institution owned device to perform work or education related tasks. Much of the BYOD research in recent years has focused on the use of devices in classrooms. This study presents the first piece of research into practitioner's perspectives of using BYOD for fieldwork, a method of teaching used in a variety of disciplines including geography, bioscience and archaeology. Research from 6 UK and international fieldtrips from two Higher Education Institutions indicates that practitioners like to use BYOD for fieldwork as the students are more familiar with their own devices and therefore more engaged, it reduces reliance on limited or unavailable university devices and reduces the cost to the department or institution. The research showed that whilst some of the challenges practitioners faced when trying to implement BYOD were similar to that in the classroom e.g. inequality between students, supporting a range of operating devices, concerns such as distraction by their own devices was not such a factor during fieldwork as it is in a classroom. Practitioner's cited a lack of time, lack of knowledge and overcoming student inequality as reasons why they have not implemented BYOD.

### Key words:

Fieldwork; Geography Education; Technology-enhanced learning; Practitioner; BYOD

## Subject Specific Pedagogy and Subject Didactics: Lessons for Geography Education

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### Abstract

The northern European tradition of subject didactics has remarkable similarities to the Anglo notion of curriculum making. In this paper I explore what messages both approaches have for a subject specific pedagogy in geography education. Underpinning this paper is an understanding that geography education is about promoting deeper geographical understanding (after Bennetts 2005). Geographical pedagogy should be more than exploring geospatial technologies or the learning potential of fieldwork. This paper takes a broader approach, considering pedagogy as both the art and science of teaching, but also an expression of relational and cultural values within the classroom. This raises issues about the relationship between the students (and their cultural experience) and the ways they are taught geography. The question is how can the two approaches of pedagogy and didactics (each with a different perspective on culture and the classroom) bring us to a deeper understanding of geography education. Both traditions have highlighted the value of exploring the relationships between content, teacher and student. However, the didactics approach explores this in a relational way, emphasising how each of the components interact. The curriculum making approach (from the Anglo tradition of pedagogy) sees them as overlapping, emphasising commonalities and points of intersection. The origins of the models also emerge from deductive and inductive reasoning. Whilst these findings have profound implications for geography education researchers, the paper highlights the lessons for geography teachers, and explores an example of how relational pedagogy can lead to deeper geographical thinking and better conceptual understanding.

### Key words:

Subject didactics; geographical pedagogy; relational thinking; curriculum making

## Teachers' Understanding and Teaching of Geographic Concept in Elementary Geographic Education of Korea

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### Abstract

There are many topics to cover geographic facts and phenomena in geographic education. The concepts and terminologies to describe them have frequently appeared in the text book. Some of these concepts and terms are often constructed through the quantitative measurement in general, e.g. average annual precipitation. In the side of students, it isn't easy to recognize what's the meaning, how to measure and calculate, due to the storage of experiences that the knowledge. In addition, a more serious problem is that teachers are not familiar with these concepts. Surprisingly, teachers suffer from teaching these concepts because they don't major in geography in the elementary geography education. Moreover, students are unlikely to know the concept of measurement.

This research is looking for ways to address concerns how to deal with these concepts in any level in elementary geographic education. It is important to reduce the gap between students and teachers to acquire the concept.

### Key words:

geographic concept; elementary geographic education

## The Suggestopedic Geography Textbook – a New Generation Textbook

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### Abstract

As every textbook, the suggestopedic Geography textbook is a tool that supports the educational process. The new in this type of textbook is that it is created according to the principles of the suggestopedic educational method. The approach was based on the power of suggestion in learning, the notion being that positive suggestion would make the learner more receptive and, in turn, stimulate learning. Lozanov holds that a relaxed but focused state is the optimum state for learning. In order to create this relaxed state in the learner and to promote positive suggestion, suggestopedia makes use of music, a comfortable and relaxing environment, and a relationship between the teacher and the student that is akin to the parent-child relationship. Music, in particular, is central to the approach. In this method the textbook has a crucial role, more so than in the traditional educational setting, in two aspects: its required use in the educational process and its increased volume of content compared to a traditional textbook. The suggestopedic textbook is structured in several large informational blocks, that are being read during a (the reading of new material accompanied by classical music in a comfortable and relaxing environment). Therefore, in the suggestopedic textbook there is a unity between geographic information and art. This makes the textbook multilayered and multifunctioned, enriches the discourse of the textbook making it more communicative. Its purpose is, together with the other educational means, trained teacher, suggestopedic boards, games, etc., is to create an environment of interactive learning.

### Key words:

suggestopedic educational method; multilayered and multifunctioned; large volume of content; concert sessions

## Urban Gardening as a Curriculum Artefact for Students with Asperger Syndrome

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### Abstract

This paper addresses the need for students with Asperger syndrome (AS) to gain social understanding in order to learn. Students with AS have difficulties understanding other people's points of view and this can often be a barrier to learning. In this paper I discuss how geographical concepts offer a means to help students with AS understand the world they live in, other people's situations, points of view and how the student can think of and create alternatives. Lefebvre and Harvey's argument for the Right to the City provides a framework for an active citizenship that challenges the dominant message of neoliberalism. By encouraging students to actively engage with a physical place that they have helped create and maintain, geographical concepts can be discussed in a more concrete manner, and the value of abstract concepts can become more obvious and less obtuse. The desire on the part of young people for learning to be "relevant" is more likely with a curriculum artefact that is both productive and compelling and can be part of a "GeoCapabilities" approach that meets the needs of Scotland's Curriculum for Excellence. It is recommended that further study be carried out to assess the value of a GeoCapabilities approach for students with AS.

### Key words:

pedagogy, teacher role, curriculum artefact, urban gardening, Curriculum for Excellence, GeoCapabilities

## Assessment of Geographical Thinking Quality

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### Abstract

Geographical subject ability can be roughly divided into geographical thinking ability, field work ability and geographical expression ability. But under the condition of large scale, written examination, the evaluation of geography ability can only focus on the geographical thinking.

Geographical methodology accords geographical thinking fundamental characteristic, such as synthesis, area, space, correlation, criticism, and the pursuits of new conclusions. The geographical thinking, from remembrance to integrated applications, is classified into distinct levels. Every level has distinctive value to evaluate.

The paper introduces how to set situations which close to real life, progressive layers of questions, with the items of the National College Entrance Examination in geography. These items show students' geographic thinking process, evaluate students' geographical thinking quality.

### Key words:

Geographical Thinking; Education measurement; The National College Entrance Examination

## On the Need for a Complex Thinking in Geography Teacher Training

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### Abstract

What could be the foundations that support epistemologically the contemporary Geography teacher training? Our current context experiences an educational crisis that is also a part of a civilization crisis. Moreover, both the school and the information society play role in knowledge transmission. In this uncertain scenario, we ask how can scholar Geography become relevant to this young generation students? In face of neoliberalism requirements, which ways can provide a Geographical education that leads to a political subject that can deal with a wide range of differences in a common earth? Once we are teachers, we are committed with the search for all the possible answers to these concerns and we consider that the principles of Edgar Morin's complex thinking may support us in this task. The Morin's principles encourage us to teach Geography as an open system that belongs to a entirety. This entirety can be known only by knowing each one of its parts. According to them, uncertainties and dialogical actions are substantial since opposed ideas don't compose a synthesis but a complementary and antagonistic complex phenomenon. Applying Morin's idea to education means that scholar relationships should be taken as auto-eco-organizational. In other words, the exchanges between teacher and students are essential to engender a both dependent autonomy as well as an authorial and creative way of thinking. Finally, we argue that a questioning education could become a practice that connects separated parts and brings knowledges together by assuming Morin's principles as key-ideas in Geography teacher training.

### Key words:

Geography Teaching, Teacher Training, Complex Thinking, Teaching Method

## The Research of Geography Field Practice Teaching System at Three Gorges

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### Abstract

Teaching practice in the field of physical geography teaching is one of the important parts of the teaching work, the students could have deep understanding of theoretical knowledge obtained from books through the field practice.

It is very important part of the practice for students whose major are natural geography and resources environment, The field geological practice teaching in our university 's practice base at Three Gorges. After analyzing the existing field practice base-- Beidaihe base and Lushan base, We analyze the natural resources of geography at our university 's practice base at Three Gorges. Then, we discuss how to build the Field Practice Teaching System in the Three Gorges and try to build the modules of the practice of teaching content.

The modules of the practice of teaching content mainly cover several aspects: 1. the geologic teaching routes, 2. Tourism Geography and observation of Quaternary landforms teaching routes, 3. resources and environment teaching routes, 4. natural and man-made disasters teaching routes.

### Key words:

Geography Field Practice Teaching System; Practice base at Three Gorges

## The Teaching Practice on Geographic Education

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### Abstract

The teaching practice is considered an essential moment in initial docent formation in geography. Thus, the research of how the teaching practice has been discussed, as well as topics related to it in the magazines Cuadernos de Pedagogia and Didáctica de las ciencias experimentales y sociales, is the objective of this work. The analysis we'll do is focused, at first, on to evidence the articles present in the cited journals, which deal with teaching practice in initial docent formation in the interval of ten years, between 2005-2015; and then to investigate which topics related to it are present in those articles; and, lastly, to analyze the existing proposals in those articles for the practice of teaching. We understand that the moment to discuss the teaching practice is appropriate due to the current discussions about this subject in Spain and in Brazil (after the implementation of the latest curriculum reforms in universities). The analysis of articles shows experiments and proposals that aim a better development of teaching practice. Therefore, we consider important an analysis of the contributions displayed in these articles, in order to apply them in teaching practice seeking a significant initial docent formation committed to the aspirations of Geographic Education in contemporaneity.

### Key words:

Teaching practice; Initial docent formation; Geographic education

## C12.11 Geographical Education

### Research on comparative standards and National Curricula in international Geographical Education



#### Oral

1. [A Comparative Perspective on Intended Geography Curriculum at the Middle Level Schools in India and Pakistan](#)  
Thiruvadanthai GEETHA (Department of Education, University of Delhi, India)
2. [Comparative Research on Cambridge International Education \(IGCSE\) Geography and National Curriculum of Mongolia \(in case of theme Population and Settlement\)](#)  
Bayarmaa Zogsoosuren (New Era international laboratory school of MECS, Mongolia)
3. [Curriculum Making in National Settings](#)  
Péter Bagoly Simó (Humboldt Universitaet zu Berlin, Germany)
4. [Initial Teacher Training of Geography: Comparative Study of Models between the Lisbon University, Portugal and the Ceará State University, Fafidam Campus](#)  
Maria Nascimento (IGOT, University of Lisbon, Brazil), Maria Esteves (IGOT, University of Lisbon, Portugal)
5. [The Cognitive Demands of the Intended Geography Curriculum in China and Canada: An Analysis Based on Revised Bloom's Taxonomy](#)  
Qingna Jin (University of Alberta, Canada)

#### Poster

1. [Geography Curricula in Mongolian Secondary School](#)  
Enkhjargal Purevsuren; Uranchimeg Getsel; Bat-Erdene Tsedev (Mongolia, Mongolian National University of Education)
2. [Positive Effects of In Our Students, Teachers and Administrators after the European Union Comenius Projects In Kadıköy-Intaş High School](#)  
Gülçin Ayhan Ertek (Turkey, Kadıköy-Intaş Kız Anadolu I.H.High School); Topçu Ahmet Ertek (Turkey, Istanbul University)

## A Comparative Perspective on Intended Geography Curriculum at the Middle Level Schools in India and Pakistan

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### Abstract

Texts are parts of actual social relations- written in specific time and read in specific circumstances thereby realising concrete social transactions (Bazerman, 2006). The interpretive mode of analysis of curricular text (content!) attempts to increase the meaning of the text, wherein the content analysis treats the meaning as unproblematic and directly revealed through text. In this study, the comparative perspective of intended geography curriculum in Pakistan and India has focussed more on the nature of the discipline, specified objectives and content in terms of its sequencing at the middle level of the school and less on the social and political factors. Geography curriculum has been conceptualised at different levels of generality depending upon where structures involves micro or macro elements. Micro elements were directly derived from list of objectives and major ideas; and macro elements (categories of micro elements) from textbook content. The Study analyses (a) the representation of geographical knowledge as specialised or as generic/ integrated, (b) the application of the 'classification' concept propounded by Bernstein to categorise knowledge statements or texts as either strongly or weakly integrated and (c) the treatment of geographical knowledge as propositional or procedural as referred by Schweb (1978). In both the countries, the content of physical geography and human geography was treated as differentiated branches of the discipline. Further analysis has given some implication for the restructuring of geography curriculum as both the countries share the physical continuum and the people (human beings) shared the freedom struggle at certain point of history. This comparison may help the planners to revisit the structure and the content of geography curriculum and thereby help the learners to connect at the human level.

### Key Words:

intended geography curriculum; structures; micro or macro elements; classification; propositional or procedural knowledge

## **Comparative Research on Cambridge International Education (IGCSE) Geography and National Curriculum of Mongolia (in case of Theme Population and Settlement)**

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### **Abstract**

The aim of this study is to compare the National Curriculum of Mongolia and Cambridge international education's IGCSE level syllabus. The Mongolian government, through its Ministry of Education and Science (MEDS) seeks to address the Education challenges through implementation of an Education Quality Reform project with objective of rapidly improving learning outcomes for all children. According to the Government Action Plan (2012-2016), the Ministry has been initiating and implementing primary and secondary education core curriculum reform through designing, piloting and implementing the curriculum in all schools of Mongolia. MEDS established "New Era" laboratory school to implement the Cambridge international education program in 2010. Methodologically, this is a comparative study quantitative and qualitative approaches. The main data collection tools are the curricula and geography textbooks of the Mongolian and CIE, so that document analysis is the methodological technique to be utilized in this research. The data is analyzed by math statistics. The result of analysis, assessment objectives different from each other and specification grid is non-existent in Mongolian national core curriculum. It is argued in conclusion that comparative research needs to make clear core curriculum objectives released to assessment objective and assessment specification grid.

### **Key words:**

national core curriculum; syllabus; objectives; assessment; specification grid

## Curriculum Making in National Settings

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### Abstract

The curricula of the individual German federal states have experienced a progressive transition towards a skill-based curriculum. Following the main framework of moderate constructivism, several curricula emphasise generic sets of skills over subject-specific competencies. In light of this development geographical knowledge experienced diverging patterns of change in different national settings. The aim of this paper is to analyze the subject-specific knowledge of geography in international comparison. Content analysis served to map the individual models in the geography curricula of several European and Latin American countries. The main objective was to critically explore the extension of concepts, such as curriculum making, skills, or knowledge inherent to the above mentioned discourse. Therefore, the paper also sets its focus on classroom curricula or curriculum making in terms of lesson planning practice in light of curricular frameworks.

### Key words:

Curriculum making; knowledge; international comparison

## **Initial Teacher Training of Geography: Comparative Study of Models between the Lisbon University, Portugal and the Ceará State University, Fafidam Campus**

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### **Abstract**

The following research aims at analysing in a comparative study the models of initial teacher training in Geography in two universities (University of Lisbon, Portugal and State University of Ceará, Brazil) involved in pedagogical formation. In both countries initial teacher training is undergoing some key changes and it is important to understand which are the recent objectives and contexts of training, to analyse differences between the models of training and learn from each one's specificities. Considering that Geography Education is guided by reports and recommendations issued by international educational organizations such as the UN, UNESCO and International Geographic Union, it is interesting to analyse how different universities incorporate these recommendations both in initial teacher training and in the definition of a model of Geography teacher arising from this training. Since 1996, Brazil is undergoing general curricular reforms with the publication of the New Law of Nacional Education and more specific ones in 2001/2002 with the National Curricular Orientations. Important changes have been introduced in the field of teacher training and a new conception of initial teacher training has resulted. These changes are present in areas such as hours in training and practical activities, In Portugal the adaptation to Bologna Process also implied a recent and new organization in initial teacher training programmes, being now a second cycle formation (conceived as a disciplinary formation both in History and Geography), This model has now been replaced by a single area formation.

### **Keywords:**

Geography; Initial Teacher Training; Portugal; Ceará; Brazil

## **The Cognitive Demands of the Intended Geography Curriculum in China and Canada: An Analysis Based on Revised Bloom’s Taxonomy**

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### **Abstract**

While there has been an increasingly remarkable worldwide convergence in the emphases of geography curricula over the past few decades, the cognitive demands that they make on learners have not been well-researched. Without knowing these intellectual or epistemic requirements when learning geography in school, issues concerning curricular alignment and access to spatial thinking and abstract geographic understanding are likely to occur. To highlight the value of such forms of analyses, we examine the whole intended geography curricula (K-12) from China and Canada (Alberta Province) using revised Bloom’s taxonomy as analyzing tool, as well as describe some of their general features for teaching and learning. The results confirm “the phenomenon of curricular similarity”, which is proposed by some contemporary curriculum scholars, at the same time, contribute insights into the complexities of the whole geography curricula among two similar yet different educational systems.

### **Key words:**

intended geography curriculum; K-12; cognitive demands; China; Canada

## Geography Curricula in Mongolian Secondary School

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### Abstract

In the 1990s Mongolia moved into new political system and the change has been a constant theme in all sectors of the society including education. In the education sector structural, organizational, technological and curriculum changes have been ongoing ever since. Among these areas, curriculum renewal is a key factor in education system change. In this regard learning objectives are being redefined, new core curriculum, standards, textbooks and support materials are being developed, and pedagogical methods, assessment systems and learning environment are being improved as well.

In relation to adoption of 12-year general education system, new core curriculum, textbooks, and teaching handouts are being developed. Since the beginning of 2015-2016 academic year, a new curriculum of Geography has been used. Thus, the article focuses on historical changes in curriculum of Geography, comparative studies of old (2012) and new (2015) curriculums (structure, content, continuity, relation, etc) and presents the result of the research. Research methods used are primary source analysis, comparison and induction.

### Key words:

curriculum; core curriculum; curriculum history

## Positive Effects of In Our Students, Teachers and Administrators after the European Union Comenius Projects İn Kadiköy-İntaş High School

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### Abstract

The European Union Education and Youth Programs have entered a new period in 01.01.2007. Since 1 April 2004 "Turkey" participated as "full membership" to Lifelong Learning Programme, until 7 years covering periods. The main objective of the Comenius program, "School Education" in the field is to improve the quality of education through cooperation with European countries and to promote language learning by providing cultural dialogue.

Our school has been an international school projects by 3 units between the years 2006 to 2013, became a model for other schools and influenced them in a positive way in our district. These three projects name's; Society Growing Old? Fun for Future-Lets Love Learning and The European Cultural World in Children's Folk and Fairy Tales. Results of these 3 projects conducted the study with 11 countries. These countries together with the presentation, poster, brochure and catalog promotions were made. Language and cultural unity was made. At the moment, some of our students currently studying in college and the other part are specialized in professional university degree. Some parts of our teachers are still continuing education and some of them were retired. The project aim is to take the best aspects of seeing each other's differences in education and implement our own country. Partner school students and teachers in the EU has made the exchange of information from interaction also, Turkish culture was introduced to them and toured in İstanbul. Students and teachers have gained a lot of cultural point of view. So, 72 people (students, teachers, administrators) have gone abroad.

The aim of the Comenius project expands students' horizons, develop foreign language (English) skills, compare their own culture with new cultures, and for our teachers to be more beneficial to innovation in education for its students. It was an international school for school administrators, education in how the world is progressing as we can see it. Guests witnessed the different cultures by foreign students for the first time made it home for parents and children 1-week parenthood.



## 33rd International Geographical Congress

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As a result, three different EU projects by students, teachers, administrators, parents and our school has been in a great development.

### **Key Words:**

Education in the European Union; The European Union Education and Youth Programmes; Comenius Projects; Educational and cultural exchange; Kadıköy-İntaş High School

## C12.11 Geographical Education

Research on the current status of Geographical Education across the world – can goals and objectives be harmonised internationally?

### Oral



Home

1. [25 Years of the All-Russian Geography Olympiad: Didactical Conclusions](#)  
Alexey Naumov (Lomonosov Moscow State University, Russian Fed)
2. [Dispositions toward Teaching Spatial Thinking through Geography: A Case of Chinese and Korean Preservice Teachers](#)  
Injeong Jo (Texas State University, United States), Jinhee Lee (Texas State University, United States), Xiaowei Xuan (East China Normal University, China), Weiguo Zhou (East China Normal University, China)
3. [Geography as a Basis for Training Specialists of Tourism in Ukraine](#)  
Olga Liubitseva (Taras Shevchenko National University of Kyiv, Ukraine)
4. [Internationalization of Geography Education with Special Reference to Tertiary Education in India: Issues and Challenges](#)  
Ravi Shankar Singh (Dept. of Geography, Institute of Science, Banaras Hindu University, Varanasi (UP), India, India)
5. [The Direction of Geography Curriculum in Thailand](#)  
Chudech Losiri (Lecturer/Department of Geography, Faculty of Social Sciences, Srinakharinwirot University, Thailand)

## 25 Years of the All-Russian Geography Olympiad: Didactical Conclusions

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### Abstract

In 2016 The All-Russian Geography Olympiad celebrated its 25<sup>th</sup> anniversary. This Olympiad story has started ever earlier – in 1950s, when first competitions were organized by the Faculty of Geography at Lomonosov Moscow State University. Nowadays, more than 200 secondary school students from the whole country compete annually for achievements and possibility of free (no exams) admission to the most prestigious Russian universities. They are selected through all-national hierarchical system of competitions, e.g. in 2016 more than 5.500 students have competed on regional level. Long-term experience of managing the Olympiad provides important data for measure level of geographical knowledge of Russian secondary school students, evaluate their interest in the subject in general, and analyze professional career of the winners. Olympiad requires specific methodology and contents of the tests, which are reviewed. Presentation is based on samples of ‘theoretical’ and ‘field’ tasks from recent years tests of The All-Russian Geography Olympiad. Special attention is paid to use of classical heritage and modern achievements of geographical science and techniques in the Olympiad tasks.

### Key words:

geographical education in Russia; geography olympiad

## Dispositions toward Teaching Spatial Thinking through Geography: A Case of Chinese and Korean Preservice Teachers

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### Abstract

This study aimed to examine Chinese and Korean preservice teachers' dispositional characteristics related to implementing aspects of spatial thinking into their future classrooms. "Teaching Spatial Thinking through Geography Disposition Inventory," developed by Jo and Bednarz (2014), was administered to over 1,200 pre-service teachers recruited from various geographic areas of the two countries. The relationships between gender, grade level, geography course experience, and geospatial technologies experience of participants with specific dispositional characteristics under five categories: (1) teaching thinking skills; (2) teaching spatial thinking skills; (3) spatial thinking in geography; (4) explicit teaching of spatial concepts; and (5) adopting spatial representations and geospatial technologies in instruction, were examined. In this presentation, both similarities and differences in dispositional characteristics between Chinese and Korean pre-service teachers will be reported. Implications of the findings and recommendations for preparing teachers to incorporate spatial thinking into classrooms will be discussed in the context of each country's education and teacher preparation systems.

### Key words:

Spatial thinking; Teacher education; Preservice teachers; Teacher disposition

## Geography as a Basis for Training Specialists of Tourism in Ukraine

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### Abstract

High education and training for tourism in Ukraine, in fact, evolved since the country gained its independence. Existing at that time organizational approaches to tourism during Soviet times yet did not require a large number of staff and their special training. The formation of the contemporary system of education and training for tourism was pioneered by the Chair of Regional Geography and Tourism. From then till now the chair and its scholars actively participate development of professional training, research on tourism and practice of tourism industry in the country. Intensification of social developments and changes in the economy influenced the tourism market improvements and its civilized forms. Contemporaneously, high education institutions started to introduce corresponding specialty. The curricula followed the basic branch of the high school: geographic, technical, economic, humanitarian basis. The Ministry for Science and Education licensed over 100 high schools around the country to educate tourism bachelors, among those 23 institutions provide for master degree programmes. Geography, however, maintains its position in tourism managers training. Together with the conventional geographical disciplines, like Recreation Geography, Tourism Geography, Medical Geography and basics of Balneology, it enriches curriculum introducing Regional Tourism Studies, Theory and Practice of Recreation and Tourism Nature Management, Regional Problems of Sustainable Tourism Development. The particular geographical essence refines Methods of Tourism Research.

### Key words:

geographical education of specialists in tourism; sustainable tourism



## Internationalization of Geography Education with Special Reference to Tertiary Education in India: Issues and Challenges

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### Abstract

Globalization is taking place all over the world, whether we are for or against it, and India is no exception. It has resulted into unprecedented international flow of people, services and goods. The volume of international movement of students seeking higher education (degrees) from a country other than of their origin attests such a growing trend in the (tertiary) education sector. In the recent past, there has been good amount of discussion on why and how to internationalise (tertiary) education and what role can geography play with this respect (e.g., Shepherd et al. 2000, Haigh 2002, Pandit 2009, Ray and Solem 2009). In the broader perspective, through this process we can aim at intercultural exchange and improvement in competence of our graduates in different fields. In a way, this process may also ensure quality education and training which in turn contribute immensely to the larger process of development. Education and training exports in one hand can generate direct economic value; and, on the other, create positive role as far as international relations and diplomacy (from national perspective) are concerned. India with a large tertiary education system/structure, comprising of the network of both public and private institutions, can vie to take advantage of it. The available statistics however reveal that so far we have not been able to reap this potential benefit. The present paper looks into issues, opportunities and challenges with respect to internationalization of geography education in India.

### Keywords:

Geography education; Globalization; Internationalisation; Tertiary education

## The Direction of Geography Study in Thailand

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### Abstract

Geography has been teaching in the bachelor degree curriculum of Thailand for a long time. Initially, this subject was divided into four branches; system geography, regional geography, techniques in geography, and philosophy of geography. However, the content of the subject as well as techniques for spatial data enquiry have been developing in order to analyze and solve geographical problems. As a result, the Geography curriculum in Thailand has been changed dramatically. The Geographic Association of Thailand (GAT) is taking this change into an account; therefore, the GAT conducts a survey to all institutions, who are running the bachelor degree in Geography, across country. An 18-curriculum from eighteen universities is sent back to the GAT. Results from the survey found that the bachelor degree in Geography can be divided into three main curriculums. First is a Bachelor of Arts in Geography and Geography and Geoinformatics. Second is a Bachelor of Science in Geography and Geography and Geoinformatics. Third is a Bachelor of Science in Geoinformatics. The structure of subjects from these curriculums comprise of five main themes; physical geography, human geography, regional geography, map and geographic techniques, and philosophy and integrated geographic knowledges. These themes have been revised from time to time and reflect to the geography curriculum in Thailand.

### Key words:

geography; curriculum; bachelor degree

## C12.11 Geographical Education

Research in the preparation of geography teachers at all levels,  
including evidence of their effect on affective goals such  
as shaping a harmonious world



Home

### Oral

1. [A Grounded Theory Approach on the Typological Process of How Primary Geography Teachers' Professional Identities Are Formed and Developed](#)  
Dong min Lee (Catholic Kwandong University, South Korea)
2. [Challenges of Teaching Geography Education in High School: A Case Study of Nigeria](#)  
Salisu Lawal Halliru (Federal College of Education Kano Nigeria, Nigeria)
3. [Chinese Pre-service Geography Teachers' Competency on Spatial Thinking](#)  
Lianfei Jiang (East China Normal University, China), Osvaldo A. Muniz (Texas State University, United States), Yushan Duan (East China Normal University, China)
4. [Exploring Teachers' Geographical Identities: Why It Matters?](#)  
Emma Till (University of Winchester, United Kingdom)
5. [Future Teachers' Dispositions toward Teaching with Geospatial Technologies](#)  
Injeong Jo (Texas State University, United States)
6. [GeoCapabilities: Teachers as Curriculum Leaders](#)  
Michael Solem (American Association of Geographers, United States)
7. [Impacts of the Program PIBID in Teacher Training and Geographical Education, in Brazil](#)  
Maria Nascimento (University of Lisbon, Brazil)
8. [Pedagogical Strategies and Practices Collaborative for an Ethical Living](#)  
Hindenburgo Pires, Yan Navarro da Fonseca Paixão (Geography, Brazil)

## **A Grounded Theory Approach on the Typological Process of How Primary Geography Teachers' Professional Identities Are Formed and Developed**

Dong-min Lee

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### **Abstract**

Primary teachers are the central agent of geography teaching in primary schools. This means that they are professionals at teaching primary subjects, including primary geography. In other words, "primary teacher" needs to be the primary geography-teaching profession. This requires primary teachers to have a strong primary geography teacher professional identity. However, cultivating a geography teacher professional identity for primary teachers may be more difficult, complex, and complicated than for secondary geography teachers. This is because primary teachers major in primary education, not geography education, and they teach several subjects in primary schools. Some advanced research notes that these problems probably impede primary students' achievements in and satisfaction with primary geography education.

Based on the awareness of such matters, this study attempted to analyze and categorize the processes behind how primary teachers form, develop, and change their professional identities as primary geography teachers. To conduct this typological research, Straussian grounded theory, a qualitative method, was used with approximately twenty-five primary teacher participants. The interim findings of this study imply a rough sketch of the process. The findings and discussions of this study will contribute to a more systematic and sophisticated understanding of primary geography and primary teachers and help to improve primary geography teacher training.

### **Key words:**

primary geography education; primary teacher; professional identity; grounded theory; teacher training

## Challenges of Teaching Geography Education in High School: A Case study of Nigeria

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### Abstract

Geography which is widely recognized as very essential in making a child to appreciate his environment, and learn how to live peacefully with it, has however, being substituted with social studies for long. The consequences of such shift on the overall teaching and learning of Geography in general and the depth of knowledge of even those that study it remain generally not documented for many years. This paper examined the consequences of this change. This study was conducted during the 2011/2012 academic session in FCE Kano, Kano state and involved 360 students that graduated from senior school between 2003-2011. The result obtained indicates that for Human Geography pass and fail 36% and 64% respectively. For Physical, it was 32% and 68% respectively for pass and fail. For Regional it was 33% and 67% for pass and fail while for Map work only 28% of them passed and 72% failed. It was concluded that the student's depth knowledge was generally weak and most probably reflect relatively shorter period over which they were exposed to the discipline during the last 3 years of secondary school period. Likewise, it's appears that long period of learning social studies have not equipped the student's fundamental thematic Geographical issues. It's recommended that the teaching of Geography in Nigerian schools should be re-introduced back at the very 1<sup>st</sup> year of primary school education. A model for such re-introduction has been proposed, and is referred to as GEOPYRAMID.

### Key word:

Geography; Teaching; Ninth; Nigeria; Challenge

## Chinese Pre-service Geography Teachers' Competency on Spatial Thinking

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### Abstract

Spatial thinking is a collection of cognitive skills comprised of knowing spatial concepts, using tools of representation, and reasoning processes (NRC,2006). It is a powerful way of problem solving in our daily lives, at the work place, as well as in science. So spatial thinking should be a systematic and integral part of the normal education system (Bernarz, 2004a). While Geography is the best subject to develop students' spatial thinking skills in view of its subject contents and characteristics. Boehm and Sharma (1994) assert that teachers can not teach what they themselves do not know. The pre-service teachers of today will be charged with the responsibility of teaching geographic concepts in the future. In this paper, we mainly focus on the current situation of pre-service geography teachers' competency on geospatial thinking in China via a case study in East China Normal University. Through The Spatial Thinking Ability Test and sketch maps which are taken by the last year students who prepare to be geography teachers in the future in East China Normal University to get the result. We will analyse this result by t-tests to draw the conclusions and suggestions for Chinese geography pre-service teachers' preparation.

### Key words:

Chinese; pre-service teacher; geography; Spatial thinking

## Exploring Teachers' Geographical Identities: Why It Matters?

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### Abstract

Teachers have multiple identities. Teachers' professional identities are the result of the many different ways in which teachers see themselves including as subject and pedagogical experts. In the UK, non-specialist teachers usually teach geography in primary schools as a discreet subject. It is also the case that in some secondary and high school's geography is taught by individual teachers who do not have a background in the subject. It is therefore likely that the relationship that individual teachers have with the subject will be significant in relation to their practice. This paper outlines the rationale behind empirical research, which focuses on the relationship that a sample of teachers who are enthusiasts for the subject and identified as experts in their classes and their schools has with geography and which examines the *essence* of 'being' a geographer for each individual. It is contended, that understanding the relationships that individual teachers' have with geography, can start to explain some of the influences on these individuals motivation and the way that they teach the subject. With regard to the training of new teachers, it is argued that facilitating opportunities for trainees to explore aspects of their overall professional identity including their *subject-identity*, will lead to an improvement in the teaching of geography and also benefit individuals as practitioners.

### Key words:

Geographical identities; subject-identities; teaching; professionals; relationships

## Future Teachers' Dispositions toward Teaching with Geospatial Technologies

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### Abstract

Much of the literature on teacher preparation for successful integration of technology into classrooms has focused on enhancing technological, pedagogical, and content knowledge (TPACK), and slow and ineffective technology implementation has often been attributed to a lack thereof. However, studies also have identified a positive relationship between teachers' personal beliefs and dispositions and their classroom integration of the technology. Therefore, effective implementation of innovative technologies in education, like geospatial technologies (GST), will require preparing teachers to develop not only the necessary knowledge and skills for but also positive dispositions toward using them as a tool for teaching. This study examines the effect of a minimal Web-based GIS experience within a semester-long methods course on enhancing preservice teachers' dispositions regarding the use of GST in their future classrooms. Fourteen preservice teachers enrolled in a senior-level methods course, offered in geography department at a large-sized state university in the US, participated in the study. The findings of the study indicate that Web-based GIS activities had a positive impact on participants' beliefs, attitudes, and confidence in GST implementation and teaching spatial thinking in their future classrooms.

### Key words:

Web-based GIS; teaching with geospatial technologies; teacher education; teacher preparation; teacher disposition

## GeoCapabilities: Teachers as Curriculum Leaders

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### Abstract

The GeoCapabilities project has produced an online teacher training platform that draws on principles of human capability development as an approach to preparing teachers as future curriculum leaders. This paper will present an overview of the motivation, theory, exemplary materials and questions for reflection that compose the four modules in the platform. Collectively, the aims of the modules are:

- Enable critical reflection on the teaching of geography at the level of goals and purposes
- Develop ideas of disciplinary rigor in geography education and to link this effectively with enquiry pedagogies
- Empower in teachers with new understandings of the significance of their role in ‘enacting’ the curriculum
- Inspire teachers of geography internationally to take responsibility for ‘curriculum making’ and to learn from each other
- Provide examples of curriculum leadership

The GeoCapabilities project argues that the absence of geographical knowledge in formal education deprives young people of some vital perspectives, ultimately undermining their capabilities as global citizens. One important outcome of the GeoCapabilities project will be the means to communicate effectively (and internationally) how the development of geographical knowledge and understanding in young people contributes to the fully educated person.

The GeoCapabilities platform is designed to provoke and stimulate creative and committed responses from teachers. The platform’s four modules are intended to be enjoyed and to be professionally rewarding and motivating, contributing to teachers’ lifelong learning as curriculum leaders.

### Key words:

Powerful disciplinary knowledge; capabilities; curriculum making; curriculum futures; teacher leadership

## Impacts of the Program PIBID in Teacher Training and Geographical Education, in Brazil

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### Abstract

This paper presents the impact of a policy to initiation to teaching on teacher training of geography, in Brazil. The Institutional Program of scholarships to Initiation to Teaching (PIBID), started in the mid-2000s, covers currently more than 90,000 students distributed among more than 300 projects developed in 05 regions of Brazil. The main goals of this program are to search the quality of teacher training, the integration of educational institutions, public schools of basic education and post-graduate programs and expand the production and dissemination of knowledge produced from the projects. Through some results with geography projects linked to this program we can list important aspects such as: the connection between theory and practice, respect for regional and local characteristics in the production of knowledge and the relationship between education, research and extension. These conclusions are the result of the PhD thesis developed by this author. The thesis is focused on the relationship between the university and the school in initial teacher training in Brazil and Portugal. The Pibid is one of the empirical and analytical elements of the research. Interviews, fieldwork and surveys are some of the data collection instruments. In addition to improving the initial training of teachers for basic education in Brazil, an important also achieved dimension is the induction to the continuing education of teachers who are in the work environment of professional practice and who have returned to university to reflect their practice.

### Key words:

teacher training; Pibid; geographical education; Brazil

## Pedagogical Strategies and Practices Collaborative for an Ethical Living

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### Abstract

In the 21st century, the knowledge obtained through learning methods based on innovations sustainable, and critical pedagogy, tends to favor the development of practices collaborative for an ethical living and new experiences educational communicative.

The aid of technologies for learning and communication; the use of technological interfaces (virtual learning environments, blackboard digital, social networks, blogs, multimedia projector, internet, learning objects); and the implementation of strategies critical pedagogical, based on narratives transmedia, are contributing to that students and young learners have a more active and constructive role for an ethical living, in the discussion and development of new content and didactic materials directed to environmental education.

Educational strategies aimed to promote a better world in didactics of teaching Geography, are producing changes in the school, in the classroom and in new environments of pedagogical mediation.

The objective of this work is to discuss, through the geography teaching, as in small actions, we can contribute with our students, to maintain more sustainable the environment, and promote ethical values within our home, school and room class and also revolutionize the didactics of geography teaching in the current period.

### Key words:

Didactics of geography teaching; practices collaborative; teaching strategies; innovations sustainable; ethical living

## C12.11 Geographical Education

Research in the development and effects of curriculum in Geographical Education  
addressing global geopolitical and ideological conflicts:  
towards a harmonious world



Home

### Oral

1. [The Commission on Geographical Education: An Historical Analysis](#)

Joseph Stoltman (Western Michigan University, United States), Norman Graves (Institute of Education  
London, United Kingdom)

## The IGU Commission on Geographical Education: An Historical Analysis

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### Abstract

Scholarly organizations are living organisms, and as such, they develop unique attributes that represent their academic and societal relationships and contributions. The International Geographical Union (IGU) Commission on Geography Education (CGE) came into being in 1948, and was officially recognized by the IGU in 1952. At that time, the world's leaders were searching for a means to counter the effects of war and social upheaval, and especially the consequences of conflict for school-aged children. There was agreement among the academic and political leaders that geography provided the means. The Commission became the instrument with which to reach out to the global educational community regarding international understanding between and among people and governments. The accomplishments of the IGU-CGE became evident as it collaborated with Unesco in providing the growing populations of young people globally with the concepts and challenges of international understanding. Curriculum materials, books, resource papers, and workshops for teachers were among the most celebrated activities. The common memories of senior members of the Commission regarding those activities were captured during symposia and conferences well into the 1970s. Much of the early activity of the Commission did not appear in print, so this paper is attentive to those aspects of the Commission's early years that were captured verbally. The record demonstrates the transition from international understanding to a much broader focus on the attributes geography and their contributions to a comprehensive geographic education.

### Key words:

Geography education; Commission on Geography Education (IGU); geography education history

## C12.11 Geographical Education

Towards a Harmonious Geographical Education community:  
aspects of research conducted in Geographical Education  
not otherwise included above.

### Poster



Home

1. [A Research Coordination Network for Transformative Research in Geography Education](#)

Michael Solem (United States, American Association of Geographers)

## A Research Coordination Network for Transformative Research in Geography

### Education

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#### Abstract

This poster illustrates the components of a new research coordination network (RCN) for transformative research in geography education. The National Center for Research in Geography Education (NCRGE), co-headquartered at the American Association of Geographers and Texas State University, is serving as the coordinating hub of this RCN.

NCRGE was established in 2013 to build a RCN whose members carry out bold, visionary and innovative research that has significant potential to improve geography education. Through its Transformative Research grant program, NCRGE will strengthen geography education research processes by creating the networks and opportunities for interdisciplinary conversations that ultimately result in sustainable lines of research. The long-term vision is to produce research findings that inform the work of teachers, curriculum developers, professional development providers and organizations supporting geography education.

The NCRGE Transformative Research program supports network-building through 1) research fellowships for interdisciplinary collaboration, 2) travel funds for research meetings and site visits, and 3) contributions of datasets, instruments, literature and other resources to the NCRGE research clearinghouse. Examples of RCN activities supported by this program will be provided.

#### Key words:

Transformative research; research networks; research clearinghouse; educational research

## C12.11 Geographical Education

### A Comparative Geography of China and the U.S.



[Home](#)

#### Poster

1. [A Fresh Approach for Freshmen: Exploring an Integrated Method of Teaching the History of Geographical Ideas](#)

Chao Ye (China, East China Normal University)

## A Fresh Approach for Freshmen: Exploring an Integrated Method of Teaching the History of Geographical Ideas

Chao Ye

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### Abstract

It is vital for undergraduates majoring in geography to learn the history of geographical ideas. Although the cultural and educational backgrounds of China and the West are very different, teaching methods such as teaching through texts, student presentations and group learning are common and without borders and so are appropriate for use by most teachers and students even if from different countries and regions. The integrated method is helpful as a way to popularize the history of geographical ideas and improve the standard of teaching and learning. Due to lack of specific classes on geographical history in countries such as China, the authors of this article have explored a more integrated method for the teaching of first-year geography undergraduates and have assessed the effects of this teaching through questionnaires. The students have identified different benefits and the responses to this class have been mixed. A special learning group consisting of one teacher and several undergraduates was involved in the research and have the status of coauthors of the paper through the compilation of the questionnaire, interviewing and analyzing materials from 67 freshmen, in China, majoring in human geography and geographical education. For undergraduates, especially from countries like China, it is well worth the effort of making geographical history both a necessary and an interesting class.

### Key words:

the history of geography; teaching methods; text teaching; group learning; China

## C12.11 Geographical Education

### Educational Value of Geography

#### Oral



Home

1. [Core Ideas of Geography in Basic Education in China](#)  
Zaozao Zeng (Beijing Institute of Education, China)
2. [Educational Values of Geography in Secondary School](#)  
Guo Fengtao, Yushan Duan, Lizhong Yu, Lizhi Shi, Weiguo Zhou (East China Normal University, China)
3. [Geographical Core Competences in the High School of China](#)  
Yushan Duan (East China Normal University, China)
4. [Social Classes and Geography: A Study amongst Brazilian Textbooks](#)  
Paulo Amorim (Instituto Federal de Santa Catarina, Brazil)
5. [The Geographical Key Competencies Division Research of Senior High School in China](#)  
Qian Gong (East China Normal University, China)



## Core Ideas of Geography in Basic Education in China

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### Abstract

Core ideas of geography originate from the geographical thought and the academic tradition, which have value for geographical education in basic education. This paper focuses on core ideas of geography, such as human-environment interaction, space, earth system, etc. in order to build a conceptual system of core ideas, which can provide a method of learning progression for core ideas in geographical teaching, to help teachers to understand values of geography.

### Key words:

core ideas of geography; geographical education

## Educational Values of Geography in Secondary School

Fengtao Guo, Yushan Duan, Lizhong Yu, Weiguo Zhou, Lizhi Shi

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### Abstract

Recently, geography education in China puts more attention on test score rather than the value of geography. This research focus on what are the educational values of geography and how to promote geography education to be itself. Through literature review, analyzing scholars' viewpoints, comparing six different national geography standards and field survey, this research put forward eight educational values of geography which includes system thinking, sense of man-nature harmonization, view of space-time, sense of place, interdependence, spatial and technological capability, appreciation ability and comprehensive practical ability. Furthermore, regarding the problem of the investigation, there are eight suggestions including remodeling teachers' and students' recognition of geography, examination evaluation of fair use, Increase in geography experiment and fieldwork, developing problem-based geography textbook and teaching resource suitable for Digital Native, etc. In a word, the realization of educational value not only need theoretical study of values of geography, but also a variety of method applied in practice of teaching geography.

### Key words:

educational values; geography; secondary school

## Geographical Core Competences in the High School of China

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### Abstract

Geography in high school of China is one of basic courses connecting with geography in compulsory education, content of which links knowledge social science and natural science.

Geography standard for high school is under revision now. The new geography standards pay more attention to cultivate students' core competences. Consequently, we mainly deal with two question, 1) what is geographical core competence? 2) how to identify and judge students' competence? Geographical core competences for student, developed by learning geography, is essential character and morals and key skills with geographical characteristics. Core competences include sense of man-nature harmonization, holistic thinking, regional recognition and geographic practical skills, which corresponding to three dimensions basic values, basic ideas and methods, basic activity experience. Moreover, in order to identify students' competences, each competence was classified into five performance levels from simple to complex in term of cognizant law of student.

### Key words:

core competences; performance levels; geography;

## Social Classes and Geography: A Study amongst Brazilian Textbooks

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### Abstract

Considered as a Human Science in Brazil's national guidelines for middle school curriculum, Geography has as one of its tasks the development of the comprehension of societies as results of the agency of different social subjects in time and in space. One of the core concepts historically related to the identification of the role of human groups in history is social class, a theoretical tool developed by, but not only, historical materialism and widely discussed along the XX century. The present work aims to determine if Geography textbooks dialogue with the concept of social class to achieve this discipline's goal and, in addition, it searches for the ways in which it shows social classes to students. For this, in addition to reviewing classic texts about social classes and about the history of textbooks in Brazil, were analyzed 12 out of 14 textbooks distributed by Brazilian State to public schools. Their texts were sorted in themes and evaluated according to conceptual levels established with bibliographical review. The result shows that those textbooks have strong points, but still it is possible to improve in order to promote a general and complex understanding of social classes' action.

### Keywords:

Geography; Teaching; Textbooks; Social Classes; Brazil

## The Geographical Core Competencies Division Research of Senior High School in China

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### Abstract

With the advent of globalization, the information age and the knowledge society, the competition among the countries has converted from the surface level of productivity to deep and talent-centric competition. Making economic development as the core, committed to the promotion of civic competencies, it has become a common theme in development around the world. The students cultivated by Chinese education have shown the incomplete of their competencies development such as the decline of their physical quality, the lack of ability to adapt to the society, the promotion of negative emotion and the lack of practice and innovation ability. The current situation and problems are urgently need the change of education quality concept, setting up the "core competencies of students" as the basic framework of education quality evaluation and curriculum system, to deepen and implement the promotion of "quality education". In order to comply with the world development trend of education and enhance the international competitiveness of Chinese education, the research integrate qualitative and quantitative methods and take a top-down and bottom-up combination comprehensive ideas. The research focus on identifying the structure of geographical core competencies of Chinese secondary school students, selecting the index of geographical core competencies of Chinese secondary school students, defining and dividing the connotation of the index and proposing the ways to implement and promote the geographical Core Competencies related work.

### Key words:

Geographical Core Competencies; Division; Senior High School

## C12.11 Geographical Education

### Geography Education for Sustainability

#### Poster



[Home](#)

1. [Development of Sustainable Campus, Concepts, Development and Implementation](#)

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## Development of Sustainable Campus, Concepts, Development and Implementation

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### Abstract

Sustainability has been increasingly introduced in university curricula and programs to enrich and educate students on this concept and its implementation. Parallel to pedagogical work, many universities, as teaching laboratories where concept is put into practice, have also established sustainability related offices to promote the concept of sustainable campus and implement it within the campus. The scope varies among universities but most would focus on energy conservation, waste management, food and water security, ecological conservation, green building design, green procurement and even smart city development. Various standards have been established to benchmark on activities and performance. Consortia are formed to promote and share among institutions on similar development. This paper attempts to trace the development of the concept of sustainable campus, scope of its development and ascertain how it is related to geographical education.

### Key words:

Sustainable Campus; Sustainability

## C12.12 Geographical Information Science



Home

### Oral

1. [A Dynamic Construction Mechanism of Thematic Symbol under the Aspect of Semiotics](#)  
Fei Zhao; Ming Meng; Lixun Ding (Yunnan University, China)
2. [Assessment of Solar Energy Resources in Ethiopia- Modeling Solar Radiation and GIS-Based Multi-Criteria Analysis](#)  
Fikremariam Teshome Tekle (Addis Ababa University, Ethiopia)
3. [Diffusion of Verbal Maps for People with Visual Impairments by Volunteer Group in Japan](#)  
Masahiro Tanaka (Tokyo Metropolitan University, JSPS Research Fellow, Japan)
4. [Evaluation of Fire Ignition Probability Model by Using Spatial Autocorrelation Method: A Case Study in Yunnan Province](#)  
Wei Wang; Zhanqiang Chang; Mi Chen; Jie Zhu; Wen Yu; Chao Zhao; Xiangxing WAN (Capital Normal University, China)
5. [Explore Spatiotemporal and Demographic Characteristics of Human Mobility via Twitter: A Case Study of Chicago](#)  
Guofeng Cao (Texas Tech University, United States)
6. [Introduction of Asia-Oceania GEOSS Initiative](#)  
Xiang ZHOU; Xingfa Gu (Institute of Remote Sensing and Digital Earth, CAS, China)
7. [Load Balance Strategy for Parallel Geo-Computing among Heterogeneous Parallel Platform](#)  
Manchun Li; Chen Zhou (Nanjing University, China)
8. [Mapping Complex Urban Activity Spaces](#)  
Daoqin Tong; Ran Li (University of Arizona, United States)
9. [Mapping the Altitudinal Vegetation Belts on the North Slope of Changbai Mountain](#)  
Hongyan Zhang; Dan Guo (School of Geographic Science, Northeast Normal University, China)
10. [Remote Sensing based Investigation on the Vegetation Recovery after the “5.12 Wenchuan Earthquake”](#)  
Li Jingzhong (Institute of Applied Ecology, China)
11. [Repeated Structure Detection for 3D Reconstruction of Building Façade from Vehicle-borne LiDAR Data](#)  
Yanming Chen (Nanjing University, China)
12. [Socio-Geographical Research in the Republic of Kazakhstan Using Geographic Information](#)

## Technologies

Gulnara Nyussupova; Laura Kenespayeva; Damira Tazhiyeva (Al Farabi Kazakh National University, Kazakhstan)

13. Temporal and Spatial Analysis of Industrial Competitiveness in Anhui Province

Jie ZHU; Zhanqiang CHANG; Mi CHEN; Chao ZHAO; Xiangxing WAN; Wei WANG; Wen YU (Capital Normal University, China)

## Poster

1. A Hybrid Approach to Determine Runoff Directions Based on DEMs

Xia Yuling; Wang Tao ; Li XiaoJuan (China, Capital Normal University)

2. A Subwatershed-Based Approach to Parallel Computing for Hydrologic Terrain Processing

Ling Jiang (China, Chuzhou University); Guo'an Tang (China, Nanjing Normal University); Chun Wang (China, Chuzhou University)

3. Augmented Reality and Perception of Analogue and Digital Images and Maps

Piotr Werner (Poland, Faculty of Geography and Regional Studies, University of Warsaw)

4. Design and Implementation of Beibu Gulf Scientific Database Sharing Platform and Decision Support System

Baoqing Hu (China, Guangxi Teachers Education University)

5. Evaluating the Use of SPOT-5 Satellite Imagery in Extracting Small-sized Archaeological Sites Along Palaeochannels in the Chaohu Area, China

Li WU; Xinyuan WANG; Lin LU (China, College of Territorial Resources and Tourism, Anhui Normal University)

6. Information Extraction from Landsat TM Data for Alteration Mineral Mapping and Target Identification in the Gejiu Mining District, China

Tan shucheng; Zhao Zhifang; He Xiaohu (China, School of Resources, Environment, and Earth Sciences, Yunnan University, Kunming, China)

7. Overview on Spatial Data Partitioning Method Research in Parallel Computing Environment

Liangyi Jin (China, Information Engineering University)

8. Remote Sensing Data Storage Based Hilbert Curve and Hadoop

Yuan Guobin; Li Xia (China, Faculty of Information Engineering, China University of Geosciences)

9. Remote Sensing Monitoring of Surface Subsidence in Longkou Mining Area Based on D-InSAR

Rifei Kang (China, Shandong Normal University)

10. [Research on Coupling Coordination Degree between Tourism Industry and Ecological Environment of Changshan islands](#)  
Weiquan Gao (China, Liaoning University of International Business and Economics)
11. [Research the Personalized Recommendation Model Based on Geographic Information Service](#)  
Po Li (China, Information engineering university)
12. [Road Network Topology Automatic Change Detection Based on GPS Spatial temporal Trajectories](#)  
Luliang Tang; Chen Jin; Zihan Kan (China, Wuhan University)
13. [Spatial Patterns of Population Change in the 23 Special Wards of Tokyo after the Period of the Bubble Economy](#)  
KOIZUMI Ryo (Japan, Kanagawa University); WAKABAYASHI Yoshiki (Japan, Tokyo Metropolitan University)
14. [Spatial-temporal Distribution of Net Primary Production and its Influencing Factors in Guangxi Xijiang River Basin](#)  
Yan Yan (China, Guangxi Teachers Education University)
15. [Spatio-temporal Trajectory Fusion and Road Map Generation Based on Cognitive Law](#)  
Chang Ren; Zhang Liu; Luliang Tang (China, Wuhan University)
16. [Study on Urban Spatial Information Integration Platform in Network Environment](#)  
Xianlin Shi (China, Chengdu University of Technology); Xing Chen (China, Chengdu University of Technology)
17. [Temporal and Spatial Distribution of High Efficiency Passengers Based on GPS Trajectory Big Data](#)  
Fei Sun; Luliang Tang (China, Wuhan University)
18. [The Common Edges Extraction Algorithm Research of Non-Topology Remote Sensing Image Vector Data](#)  
Liangyi Jin (China, The PLA Information Engineering University)
19. [Urban Land Use Change Using RS and GIS techniques: A Case Study in Ulaanbaatar, Mongolia](#)  
Bat-Erdene Tsedev (Mongolia, Department of Geography, Mongolian National University of Education); Amarsaikhan Damdinsuren (Mongolia, Institute of Geography-Geoecology, Mongolian Academy of Sciences); Ser-Od Tsevdorj (Mongolia, Department of Geography, Mongolian National University of Education)

## A Dynamic Construction Mechanism of Thematic Symbol under the Aspect of Semiotics

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### Abstract

The construction of thematic map symbols is a very complex and intellectually demanding process, but thematic symbols can be automatically generated and easily shared on the web using the syntactic structure of semantic symbols. In this paper, the symbol types, inner structure, and design pattern are discussed. A syntactic construction theory based on letter (thematic maps primitive) - word (single thematic symbol) - sentence (combined symbols or complex symbols) structure model is proposed to automate the construction of thematic map symbols. As a result of this research, symbols can be defined using cartographic primitives which are arranged according to syntactic principles. A semiotic model and word-centered construction theory can be integrated into interactive cartography as represented by the technology of Internet. Finally, the concepts and schema of this theory are discussed, and some examples are presented based a web thematic cartographic system to verify its utility.

### Key words:

thematic map; symbol; syntax; linguistics; web cartography

## Assessment of Solar Energy Resources in Ethiopia- Modeling Solar Radiation and GIS-Based Multi-Criteria Analysis

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### Abstract

The sun is the ultimate source of energy for life on earth, and hence the knowledge of solar radiation is essential for hydrological, climatological, biological modeling and utilization of renewable energy resources. Solar radiation can be measured from ground meteorological stations. Installations of instruments that directly measure global solar radiation are quite expensive, and thus spatial density of instruments is low. For instance, in Ethiopia there is only one Pyranometer, which is currently not functional. Unlike rainfall and temperature that can be measured at a few locations and interpolated for other areas within reason, solar radiation cannot be interpolated with any degree of confidence due to its high dependence on topography and surface features. Digital Elevation Models (DEMs) are important to derive these topographic characteristics that affect the amount of incoming solar radiation. Estimation of solar resources in a complex topography and remote areas where ground measurements are not available and/or expensive to measure over large areas from DEM is fast, cost effective and reliable. Ethiopia is located in the tropics and thus highly endowed with an abundance of solar energy. However, exploitation of solar energy is much underutilized and the energy sector is the least developed. The aim of this study is to calculate available solar energy resources and mapping the most suitable sites for large-scale PV installations in Ethiopia. The monthly and annual global solar radiations of Ethiopia were calculated from 30 m resolution ASTER DEM using ArcGIS solar radiation analysis tools. Solar radiation potential of Ethiopia ranges from 0.2 MWh/m<sup>2</sup>/year in the lowlands (peripheral area) to 2.6 MWh/m<sup>2</sup>/year in the central highlands. Large portion of Ethiopia receive solar radiation above 1.8 MWh/m<sup>2</sup>/year. Using GIS-based multi-criteria analysis, about 195 sites mainly in the eastern part of the country or 6000 km<sup>2</sup> in total, were selected as ideal locations for large-scale PV installations in Ethiopia. The selection process takes various topographic, economic, social and environmental factors into consideration. If selected sites could be exploited properly, they can generate more than 65 GW which is about to 1/6 of electric power of all nuclear power plants in the world assuming 10 percent PV efficiency. Finally, a sensitivity analysis was performed to verify selected sites. It is hoped that this study will promote investments in solar energy and encourage researchers for further studies in Ethiopia.

**Key words:** Solar energy; Digital Elevation Models; Geographic Information Systems; MultiCriteria Analysis

## Diffusion of Verbal Maps for People with Visual Impairments by Volunteer Group in Japan

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### Abstract

Whereas previous studies of public participation GIS (PPGIS) and volunteered geographic information (VGI) have mainly considered the diffusion of information within a single administrative district, few studies have examined activities across administrative borders. Hence, I examined the process of VGI diffusion from the perspective of “politics of space,” with a focus on PPGIS carried out across administrative borders. The subject of my study is a non-profit organization called *Kotoba-no-Michiannai*, established in Tokyo and managed by people with visual impairments. Collaborating with local residents, they make “verbal maps” that facilitate travelling for people with visual impairments all over Japan. The organization also lobbies administrative authorities to improve road conditions. In the organization’s early days, an area around the Kita ward in Tokyo was a “space of dependence” for the organization because they made maps using analogue techniques. In addition, they created “spaces of engagement” through public relations with local administrative organizations and the mass media. Subsequently, development of web-based mapmaking software through a joint project with a national administrative agency started the spread of “spaces of dependence.” They began to coordinate the development of “spaces of dependence” in other administrative districts every one to three years and to use “spaces of engagement” established in each new location. Through this process, verbal mapping has been spread throughout Japan.

### Key words:

public participation geographic information systems; volunteered geographic information; spaces of dependence; spaces of engagement ; people with visual impairments; verbal map

## Evaluation of Fire Ignition Probability Model by Using Spatial Autocorrelation

### Method: A Case Study in Yunnan Province

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#### Abstract

Yunnan Province is a region with frequent forest fires due to its dense virgin forest and special climate type. A fire probability model with excellent performance is crucial for forecasting forest fires and formulating emergency plan. There are ten models generated with two modeling methods by previous researchers. In this paper, we applied the spatial autocorrelation method to analyze and evaluate the performance of fire ignition probability models. The results show that: 1) the models generated by geography weight logistic regression method are superior to the ones created by binary logistic regression method; 2) compared with other models, Model 7 is the optimal one analyzed by using the global and local spatial autocorrelation methods. The results are of significance for establishing early warning systems in Yunnan Province.

#### Key words:

spatial autocorrelation analysis; fire ignition probability model; Yunnan Province

## Explore Spatiotemporal and Demographic Characteristics of Human Mobility via Twitter: A Case Study of Chicago

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### Abstract

Characterizing human mobility patterns is essential for understanding human behaviors and the interactions with socioeconomic and natural environment, and plays a critical role in public health, urban planning, transportation engineering and related fields. With the widespread of location-aware mobile devices and continuing advancement of Web 2.0 technologies, location-based social media (LBSM) have been gaining widespread popularity in the past few years. With an access to locations of hundreds of million users, profiles and the contents of the social media posts, the LBSM data provided a novel modality of data source for human mobility study. By exploiting the explicit location footprints and mining the latent demographic information implied in the LBSM data, the purpose of this paper is to investigate the spatiotemporal characteristics of human mobility with a particular focus on the impact of demography. To serve this purpose, we first collect geo-tagged Twitter feeds posted in the conterminous United States area, and organize the collection of feeds using the concept of space-time trajectory corresponding to each Twitter user. Commonly human mobility measures, including detected home and activity centers, are derived for each user trajectory. We then select a subset of Twitter users that have detected home locations in the city of Chicago as a case study, and apply name analysis to the names provided in user profiles to learn the implicit demographic information of Twitter users, including race/ethnicity, gender and age. Finally we explore the spatiotemporal distribution and mobility characteristics of Chicago Twitter users, and investigate the demographic impact by comparing the differences across three demographic dimensions (race/ethnicity, gender and age). We found that, although the human mobility measures of different demographic groups generally follow the generic laws (e.g., power law distribution), the demographic information, particular the race/ethnicity group, significantly affects the urban human mobility patterns.

### Key words:

Human mobility; Geodemography; Social media; Twitter; Name analysis; Chicago

## Introduction of Asia-Oceania GEOSS Initiative

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### Abstract

In Asia-Oceania region with large population, climate change drastically and natural disasters occur frequently, it features most complex geography ecological environment and unbalanced socioeconomic development. The region specially needs to strengthen earth observation ability and promote various applications under the framework of Group on Earth Observations (GEO) /Global Earth Observation System of Systems (GEOSS). Through establishing Asia-Oceania GEOSS (AO GEOSS) with effective cooperation at national and regional levels, the ability of earth observation and efficiency of information services in Asia-Oceania countries are expected to be improved remarkably.

With support of bilateral and multilateral cooperation, it is necessary to coordinate the observation resources, infrastructure, cooperation base and joint application projects, capacity building and other resources of all the participants in Asia Oceania region. The initiative will persist with its efforts in the following aspects, seamlessly regional observation network with extensive participation, earth observation data and information processing system, comprehensive earth observation data sharing platform, earth observation technical supporting network. It aims to guarantee the connectivity of earth observation information and service coverage in Asia-Oceania region.

The AO GEOSS will cultivate spatial information processing technology and earth observation application of member countries and participating organizations in the field of social and economy development, such as food security, sustainable agriculture, water resources safety, disaster warning, ecological environment and major infrastructure construction. With support of high quality spatial information service, implementation of AO GEOSS will further increase power of Asia-Oceania region to jointly cope with the challenges of sustainable development.

### Key words:

Asia-Oceania; GEOSS; spatial information service; data sharing platform; regional cooperation

## Load Balance Strategy for Parallel Geo-Computing among Heterogeneous Parallel Platform

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### Abstract

With the advent of multi-core clusters and GPUs, heterogeneous parallel platforms have become popular platforms for parallel computing. Because of the complexity of geographic data and algorithms, parallel geo-computing suffers a lot from the load balance. In this paper, we present a strategy to balance workload for parallel geo-computing among heterogeneous parallel platform. Our strategy includes task allocation and redistribution among processes. During task allocation, an adaptable decomposition method is employed to decompose dataset into subsets according to the computing capabilities of available processes. When parallel tasks are performed, the manager process monitors the progress of processes and evaluates whether task redistribution is required. If one process finishes its current task, the manager process finds the process that has the maximum quantity of data to handle. The manager process then examines whether the progress of this process is below the threshold. If it is, then the manager process adjusts parts of its task to the idle process. We implement a parallel algorithm for geographic data conversion using our strategy. The results show that the conversion time of experimental data was reduced from 1362.36 to 165.78 s and that a desirable speedup with the maximal value of 8.23 was achieved.

### Key words:

Load balance; task allocation; task redistribution; parallel geo-computing; heterogeneous parallel platforms

## Mapping Complex Urban Activity Spaces

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### Abstract

Activity space represents an important concept for understanding human activity-travel. The ellipse-based approaches widely used for delineating activity spaces are limited in fully characterizing real-world travel behaviors. To address the issue, this research proposes a new approach to more accurately portray activity spaces of urban travelers by incorporating the full complexity of real-world travel and underlying urban structures. Results of an empirical study are presented based on the 2008 Add-on National Household Travel Survey conducted in Tucson, Arizona. Activity spaces of 1164 sample travelers are delineated and analyzed. Results show the effectiveness of the new approach in more realistically depicting urban activity-travel.

### Key words:

Activity-travel; Activity space; Transportation; GIS

## Mapping the Altitudinal Vegetation Belts on the North Slope of Changbai Mountain

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### Abstract

Topography is the leading factor that affects mountain vegetation distribution. The control mechanisms of topography on altitudinal belt are critical to understanding altitudinal belt dynamics and future changes. These mechanisms have not been understood quite well enough because of increasing human disturbance, without proper method and low data resolution. In this study, we developed a method to present the relationship between the altitudinal belt and topography based on high spatial resolution remote sensing data and a digital elevation model in north slope in Changbai Mountain with little human disturbance. The results showed that the altitudinal belt pattern has heterogeneous changes in the horizontal direction, controlled by topography. Different types of topography have different vegetation composition. In each elevation range, the vegetation pattern is determined by topography composition and vegetation proportion of various topographic type. At the same time, topography controls the altitudinal belt pattern by affecting environmental factors. In each elevation range, the vegetation pattern is a function that depends on environment factors controlled by topography. Slope affects the altitudinal belt pattern by redistribution of solar radiation and soil moisture. Aspect affects the altitudinal belt pattern by redistribution of soil moisture and snow cover. In alpine zone, the extreme environment cause by slope-aspect combination limit tree distribution. At the Changbai Mountain alpine belt, snow cover is the most common extreme environment.

### Key words:

Changbai Mountain; Altitudinal Belt; Topography; Climate Change; Geo-informatic Graphic Methodology

## Remote Sensing based Investigation on the Vegetation Recovery after the “5.12 Wenchuan Earthquake”

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### Abstract

Investigation on the vegetation recovery during post-disaster reconstruction is a critical basis for evaluating the efforts. In this study, 5.12 Wenchuan Earthquake was taken as a case, and both qualitative and quantitative analyses by using MODIS-NDVI time-series data are performed to evaluate the vegetation change as well as figure out the year with the largest vegetation destruction degree before the Earthquake which was determined as a referable baseline for further comparison. Then, proper Landsat data was applied to perform the vegetation recovery rate, by calculating the normalized difference vegetation index (*NDVI*) and computing the vegetation coverage based on dimidiate pixel model. Herein, the vegetation recovery rate was calculated according to the following equation:  $VCRR = (FC_2 - FC_1) / (FC_0 - FC_1)$ . The results showed that the response of vegetation coverage to earthquake showed the lag phenomenon; the recovery rate of damaged vegetation was closely related to its distance to surrounding river, elevation, slope, and aspect. This research outcomes may provide a decision basis data for improving vegetation recovery and rebuilding the ecosystem service in post-disaster after earthquake.

### Key words:

Post-disaster reconstruction; MODIS; Landsat; vegetation coverage; vegetation recovery rate

## Repeated Structure Detection for 3D Reconstruction of Building Façade from Vehicle-borne LiDAR Data

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### Abstract

This study proposes a new method for repeated structure detection and the three-dimensional (3D) reconstruction of building façades from vehicle-borne LiDAR data. The method consists of four steps: the unfolding of façade points, the detection of façade structure, the restoration of façade points, and the 3D reconstruction of building façade. Firstly, the building façade is unfolded to improve the automation of structure detection and building reconstruction. Subsequently, the unfolded façade is decomposed into tiles by analyzing the repeated structures. Tiles with strong similarities are matched and merged to restore the imperfect façade points. Based on this data, a 3D building façade can be reconstructed with a complete structure and fine detail. An analysis is conducted to compare the constructed 3D model with the LiDAR points of actual façade. The results of this analysis demonstrate that the proposed method can effectively deal with missing areas caused by occlusion, viewpoint limitation, and uneven point density, as well as realizing the highly complete 3D reconstruction of a building façade.

### Key words:

Vehicle-borne LiDAR; Building reconstruction; Façade unfolding; Structure detection; Data restoration

## Socio-Geographical Research in the Republic of Kazakhstan Using Geographic Information Technologies

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### Abstract

The aim of this research is to analyze regional characteristics of social and demographic processes of the Republic of Kazakhstan on the basis of established geographic database using GI technology. Digital vector map is compiled for 14 regions of Kazakhstan and Astana, Almaty cities. Geodatabase was created using ArcGIS10.2 for the following social and demographic indicators: dynamics of population, natural movement, sex and age composition, life expectancy of population of Kazakhstan in the view of regions taking into account type of locality and gender structure. Series of thematic socio-geographic maps in dynamics for 1990-2015 are compiled on the basis of formed geodatabase of social and demographic indicators of Kazakhstan. Social and demographic situation which is currently formed in Kazakhstan is characterized by high intensity of population reproduction, life expectancy increase and aging population. Assessment of indicators in the view of regions is also made. Analysis of life expectancy of population in the country for period 1991-2015 has shown an increase of this indicator from 67.6 to 71.6 years. Problems of demography, gender equality, problems of lifespan and health status of population are quite relevant for our country. Kazakhstan, being a small nation, should focus more at improving of qualitative and quantitative indicators of social and demographic processes. Creation of information system based on use of GIS technology allowed to make spatial-temporal monitoring of evolving geo-demographic situation of Kazakhstan's regions, provide analytical support at making managerial decisions by authorities to develop measures aimed at regulating of social and demographic processes.

### Key words:

geographic database; GI technologies; social and demographic indicators; Kazakhstan

## Temporal and Spatial Analysis of Industrial Competitiveness in Anhui Province

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### Abstract

Regional industry competition is a momentous aspect of regional economic competitiveness. It is quite vital to investigate industrial competitiveness in both theoretical and practical fields. In this paper, the principle and procedure of principal component analysis (PCA) were respectively introduced in detail. The empirical study and comparative analysis of the regional economic competitiveness from 2003 to 2013 was conducted by setting some economic indicators. At the same time, SPSS software was applied to extract several available parameters which indirectly reflected the enhancement of industrial competitiveness. By analyzing and comparing the economic development of the 16 cities in Anhui Province during 2013, we sought out the primary factors affecting the growth trend, and then calculated the overall score of each city according to comprehensive evaluation model. The results of spatial analysis indicated that the overall score was consistent with each city's economic strength. The analysis in this paper certainly makes sense to provide theoretical reference and practical value for the improvement of overall economic strength and sustainable regional construction.

### Key words:

industrial competitiveness; evaluating indicator; principal component analysis.

## A Hybrid Approach to Determine Runoff Directions Based on DEMs

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### Abstract

Determination of water runoff direction based on DEMs is a key part in distributed hydrological modelling. Single direction flow algorithm (D8) and various multi-direction algorithms have been implemented. D8 algorithm tends to generate artificial and parallel drainage lines. Multi-direction algorithms distribute water flows in a divergent way and generate drainage information more naturally. However these algorithms introduce uncertainties in upslope areas where surface runoff paths are prone to be convergent. They also present difficulties to trace deterministic upstream areas for most downslope areas.

In this paper, we propose a hybrid approach to determine flow directions over DEM surface, in which local terrain shape is introduced. First the given depressionless DEM is classified into a shape map according to convexity of local terrain using a template-based detection method. Four types of terrain are extracted including valley, ridge, slope and flat areas. Flat areas are treated using an available algorithm. D8 algorithm is applied in valley and ridge areas. A slope threshold value is then used to classify slope areas, where D8 algorithm is applied to steeper slope areas. And slope areas with smaller slope values are treated by a multiple flow direction algorithm. The threshold value can be determined based on a trial and error process.

The initial results of the new algorithm were compared with those by previous algorithms using two real DEMs. The dispersive effect is apparently suppressed compared to MD8. The occurrence of straight parallel drainage lines is decreased compared to the results of D8 algorithm.

### Key words:

DEM; Drainage information extraction; Flow direction; Distributed hydrological models; spatiotemporal analysis and mapping

## A Subwatershed-Based Approach to Parallel Computing for Hydrologic Terrain

### Processing

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### Abstract

The hydrologic terrain processing from digital elevation models (DEMs) is one of the important tasks in digital terrain analysis (DTA). The computational process augments the content of digital elevation data by removing spurious pits, determining a structured flow routing, and calculating surfaces of hydrologic information derived from the flow routing. With the increase of scope and resolution of DEMs, the traditional serial algorithms have become increasingly difficult to perform and are often very time-consuming, especially for DEMs of large areas and fine scales. In recent years, parallel computing is able to meet this challenge with the development of computer technology. However, the parallel implementation based on the watershed structure, an efficient strategy to reap the best parallel performance and to break the limitation of computing resources in processing massive grid terrain datasets, is hesitated to apply in DTA research field. This paper develops a subwatershed-based approach to parallelize the hydrologic terrain processing. On the basis of the proposed two-phase parallelizing approach of the subwatershed-decomposition strategy, parallel algorithms are designed to extract the stream network of a watershed and calculate drainage densities based on subwatersheds in a watershed. In the process of parallel computing, the key issues are researched in detail, such as subwatershed merger, load balancing and task allocation, and information transmission between subwatersheds. Experimental results prove that, the parallel algorithms based on the subwatershed-decomposition strategy makes the total execution time greatly decrease; meanwhile, the parallel algorithms are under the condition of granularity control and achieve a good parallel performance.

### Key words:

parallel computing; subwatershed-based decomposition; hydrologic terrain processing; digital terrain analysis

## Augmented Reality and Perception of Analogue and Digital Images and Maps

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### Abstract

The idea of combining information from a database with information derived directly through the senses is termed augmented reality. Augmented reality (AR) is that organically, in real-time and dynamically overlaying virtual images created by computers and other information on real environment which the observer sees. And when the observer moves in real environment, virtual information changes according to the movement, just like those virtual information truly exists in real world.

AR is used with the mobile devices with GPS and WiFi connections. The user gives the system information to identify the desired destination, and the system then generates sufficient information. The disadvantages reveal themselves when there is no WiFi connection or there is no space in the storage of mobile device to maintain the image of the whole map. Then the traditional ways of recognition of localization must be used, most often with analogue (paper) map or image.

The presentation of coding of some data and metadata on an image or a map (both in digital and analogue form) permits inter alia the inclusion of e.g. paper map or analogue image into the chain of digital devices use. The prototype is subject of a patent application to EPO.

### Key words:

augmented reality; data; metadata; coding; map; image

## Design and Implementation of Beibu Gulf Scientific Database Sharing Platform and Decision Support System

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### Abstract

The Beibu Gulf Economic Zone is one of the three key economic zones in China's West Development project. However, with the rapid economic development and climate change in this zone, the contradictions among the population, resources and environment are becoming seriously and prominently. In especially, regional environment and ecological security have been adversely affected under these human activities of the urbanization, industrialization, environmental pollution, population growth. In order to regional economic and eco-environment coordinative development, the idea of sustainable development has become inevitable in this economic zone. Hence it has become increasingly emergently in designing and establishing scientific database sharing platform and decision support system for the integration of regional data resources and economic sustainable development. Scientific data as important resources for the sustainable development of modern science, its sharing platform and decision support system has a strong scientific significance and practical significance to maximize the effectiveness of data resources and provide to local governments in the decision-making services, scientific research in earth science-related fields. Taking natural and social economic data in Beibu gulf as a case, this study will built on business-based distributed database platforms, and provide users with transparent access for structured data access and unstructured data access. Specifically, the platform largely used the current advanced technology RS, Web GIS, metadata technology, and build the database frame, classification and standards. Secondly, the geographic database, remote sensing image, ecological data, monitoring data and the methods of 3S, information transfer, visualization, knowledge sharing technology were applied to build the Beibu gulf scientific data information sharing platform. Meanwhile, the dynamic change of resources-ecology-environment-disaster prevention on Beibu gulf will be real-time monitor. Thus, the platform will achieve the researches of ecological vulnerability assessment, risk assessment of natural disasters, land intensive utilization, urbanization, regional development and optimization in the Beibu gulf economic zone.

### Key words:

Database; Sharing platform; GIS; Ecological environment; Beibu gulf economic zone

## Evaluating the Use of SPOT-5 Satellite Imagery in Extracting Small-Sized Archaeological Sites along Palaeochannels in the Chaohu Area, China

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### Abstract

Because of the flourishing vegetation and developed agriculture in eastern China, it is difficult to extract information of small-sized archaeological sites from remote sensing images based only on spectral analysis. By selecting the Zhegao region in the Chaohu area, Anhui, as a research area, and utilizing SPOT-5 satellite image, topographical maps, and other data, this study addresses the extraction and identification of information from small-sized archaeological sites based on the knowledge of spatial relations between ground objects, thus providing a rapid and integrated approach for the third national archaeological survey. Initial studies of SPOT-5 satellite imagery have shown evidence of a prominent palaeochannel river system, buried under land cover in the Zhegao region. Digital 1:50000 topographical maps can be highly effective in determining mound-shaped sites and their elevation in this area. These mound-shaped sites include known and unknown small-sized archaeological sites of the Neolithic and Pre-Qin periods. A database of seven known small-sized archaeological sites imported into a GIS environment can be utilized to help understand their relationship with identified palaeochannels. By integrating above multi-source data, three likely archaeological sites were identified from the many mound-shaped sites and tested by field survey. This integrated method strengthens the use of multi-geoinformation technologies in small-sized archaeological surveys of subtropical agricultural areas. The results also suggest that there is a close relationship between these archaeological sites and palaeochannels.

### Key words:

palaeochannel; SPOT-5 information extraction; Chaohu area

## Information Extraction from Landsat TM Data for Alteration Mineral Mapping and Target Identification in the Gejiu Mining District, China

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### Abstract

This paper presents methods and results of information extraction from Landsat Thematic Mapper (TM) images for mineral mapping and target identification in the Gejiu mining district, Yunnan, China. Based on the understanding of the spectral properties of iron-oxides and hydroxyl-bearing minerals, a Feature Oriented Principal Components Selection (FPCS) method was applied to two sets of Landsat TM bands to extract areas with high iron-oxides exposures and hydroxyl-bearing mineral concentrations. The results from Landsat images were compared with existing geological, geophysical, and geochemical data, and validated through field investigation. Finally, a total of nine target areas under three categories were identified as potential areas for mineral exploration.

### Key words:

Landsat TM; alteration mapping; mineral exploration; target identification

## Overview on Spatial Data Partitioning Method Research in Parallel Computing

### Environment

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### Abstract

Spatial data partitioning is a main issue on distributed storage and parallel computing. The merits and demerits of a partitioning method will directly affect the storage load of parallel nodes directly, and further affect the overall performance of the parallel computing system. In this paper, we summarized three methods of spatial data partitioning as follows. The first is the traditional data partitioning method, which is from the angle of spatial data attributes and very simple to implement. However, it mostly focuses on the equality of the number of spatial objects on every storage node, not considering the size of the object itself, so there will be a serious problem of data balance. The second is the partitioning method using space filling curve, which especially the Hilbert Curve, has a good aggregation behaviour on spatial objects. The method guarantees space-near between two spatial objects on the storage node, and at the same time it can maintain the storage balance on each storage node properly. On the foundation of this method, researchers proposed some methods based on grid and hierarchical classification with the space filling curve. The third is the spatial clustering partitioning method from the perspective of statistics, which is subjected to clustering criterion, different rules or clustering centre selection, causing a very large uncertainty of the partitioning result. At last, combining with the characteristics, advantages and disadvantages of various methods, we pointed out the research trend of the spatial data partitioning method and the next research direction.

### Key words:

Spatial Data; Partitioning Method; Parallel Computing

## Remote Sensing Data Storage Based Hilbert Curve and Hadoop

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### Abstract

As the amount of remote sensing data is increasing, how to store these data efficiently has become a hot topic in the field of geospatial. This paper combines Hadoop with Hilbert curve to store data and puts forward the relevant optimization strategy. It optimizes the policy of data's partition by Hilbert curve to improve the efficiency of storage and partitions the Remote Sensing data into  $n$  subsets on the order of Hilbert spatial ordering code. Each subset has a substantially balanced amount of data and corresponds to a block of HDFS, then it constructs  $R$  index of locality block on the basis of Hilbert curve. This article optimizes for the storage policy of duplicates to save the storage space. It summarizes the number of times of data is accessed in each period, the frequently be accessed data will be stored in multiple copies and the less accessed or mostly no accessed data will be stored in lesser copies than the frequently be accessed data.

### Key words:

Remote sensing data; Hilbert curve; Hadoop

## Remote Sensing Monitoring of Surface Subsidence in Longkou Mining Area Based on D-InSAR

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### Abstract

This paper took Longkou mining area of Shandong Province as the research area, selected three scenes ALOS PALSAR data of L band in 2007, the surface subsidence information in study area was obtained by way of “two pass” D-InSAR technology, such as Settlement spatial distribution, ground settlement, settlement area, dynamic subsidence curve and sinking rate contour, analyzed the status of collapse and regularity of surface deformation in two monitoring period of LongKou mining area. The results show that: ①the settlement areas were mainly concentrated in the western and northern areas of the mining area, located in the North soap Village and the village of Xinglong; ②During 2007/7/10 ~ 2007/8/25, cumulative maximum settlement was 22 mm, settlement total area was about 0.21 km<sup>2</sup>, the average sedimentation rate was 0.32 mm d<sup>-1</sup>, in the vicinity of the North soap village, the mining subsidence profile was the deepest, the deformation of this period was not active; ③Compared with last monitoring period, during 2007/8/25 ~ 2007/10/10, the maximum settlement decreased to 11 mm, settlement total area increased to 1.2 km<sup>2</sup>, the average sedimentation rate was reduced to 0.11 mm d<sup>-1</sup>, it indicated that the settlement depth decreased, but the settlement range increased, the subsidence deformation tended to be more gentle. This study can provide reference for the construction of the surrounding buildings, roads and other infrastructure construction and farmland reconstruction.

### Key words:

D-InSAR; Two pass; Subsidence monitoring; Remote Sensing; LongKou mining area

## Research on Coupling Coordination Degree between Island Tourism Industry and Ecological Environment Based on Changshan islands

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### Abstract

Based on the coordinated development theory and the coupling model, this paper analyses the coupling of tourist industry and ecological environment coordinated development level for quantitative research, by using Changshan islands in 2006-2014 statistics. Research shows that: ①Changshan islands tourist industry and ecological system coupling coordination degree in the promotion stage, the development speed is relatively slow; ②Changshan islands tourism industry and the ecological environment of the coupling coordination degree is poorer, coordination degree is low; ③Changshan islands tourism industry system and ecological environment comprehensive evaluation index system of comprehensive evaluation index is phased development. Before 2011, comprehensive evaluation index of the tourism industry is less than the ecological environment evaluation index, ecological environment is the main driving factor for the growth of the tourism industry. 2011 years later, the tourism industry is bigger than the comprehensive evaluation function of the ecological environment evaluation function, the ecological environment become the restriction factor of the tourism industry development.

### Key words:

Changshan islands; tourism industry; ecological environment; coordinated development

## Research the Personalized Recommendation Model Based on Geographic Information Service Platform

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### Abstract

Aim at how to provide more personalized service for users in geography information service platform. This paper bases on the global Internet data integration and distribution system as the experiment platform, collecting the site registered user data properties and behaviors data, and to filter the collected data, such as convergence, and associated pretreatment. By analyzing the traditional recommendation algorithm was proposed, and which adopts an improved collaborative filtering algorithm based on the user. And combine the characteristics of the geographic information service platform, this paper adopts an improved collaborative filtering algorithm based on the user. This paper statistics and analysis user's needs which is included in the user-group that is similar to the target user and the history requirements of user goals respectively by using the algorithm. And according to certain rules, this paper compares and analyzes the result of the two finally predicts which are the most likely customers' needs. Experimental results show that compared with the traditional recommendation model, this model can more accurately predict the user's individualized requirements.

### Key words:

geographic information; Personalized; Recommended

## Road Network Topology Automatic Change Detection Based on GPS Spatial Temporal Trajectories

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### Abstract

The conventional methods of road change detection extract the differences by comparing two road network data before and after the change, which have disadvantages in the data acquisition period, data cost, algorithmic complexity, calculation difficulty and the update period. In this paper, we propose a new road network topology change detection method based on vehicles' GPS spatiotemporal trajectories. In this method, the similarity between the GPS trajectory vector and the regional topological vector is first measured using the vector similarity measurement model. Then we detect the topological changes of the road network by comparing the road changes of the addition, the deletion and the modification. Experimental results showed that the proposed method can not only detect the changes of the addition, the deletion and the modification of road network, but also realize the real-time change detection of urban road network.

### Key words:

GPS trajectories; similarity; road network; change detection

## Spatial Patterns of Population Change in the 23 Special Wards of Tokyo after the Period of the Bubble Economy

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### Abstract

This study examines the spatial patterns of population change in the 23 Special Wards of Tokyo after the period of the bubble economy in the late 1980s. To this end, we analyze grid square data suitable for time-series analysis between 1985 and 2005. After selecting major indicators representing three dimensions of the social area analysis, we map each indicator and make quantitative comparisons between six zones, classified by distance and direction from the city center. The indicators used in this study are three variables representing family status, three variables representing socioeconomic status, and one variable representing ethnic status. Analysis of the spatial pattern of population change in the 23 Special Wards between 1985 and 2005 reveal that a population recovery has occurred since the latter half of the 1990s in central Tokyo. On the basis of this trend of population change, we examine the spatial pattern of each indicator in the social atlas. Concerning age and household composition, its spatial distribution has gradually shifted from a zonal pattern to a sectoral one. The spatial distribution of socioeconomic status represented by the occupational structure maintained a sectoral pattern characterized by the contrast between the eastern and western parts of Tokyo although this distinction has blurred. In particular, the number of managers and officials has decreased and its distribution shifted to a zonal pattern, which indicates the polarization of white-collar workers. The distribution of non-Japanese shows a zonal pattern in which the highest value appeared in the area surrounding the city center.

### Key words:

social atlas; social area analysis; GIS; grid square statistics; Tokyo

## Spatial-Temporal Distribution of Net Primary Production and Its Influencing Factors in Guangxi Xijiang River Basin from 2003 to 2012

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### Abstract

Based on the MODIS-NDVI time series dataset and corresponding ground based information on vegetation, meteorological data, land use data and solar radiation, an improved Carnegie Ames Stanford Approach(CASA) model was applied to simulate net primary production (NPP) in Guangxi Xijiang river basin between 2003 and 2012. Then, the spatio-temporal patterns of NPP were investigated using spatial statistical analysis. The results indicated that: (i) NPP in the east and north regions were generally higher than that in the west and south parts of the study area. From 2003 to 2012, the average annual total NPP in Guangxi Xijiang river basin was  $1.06 \times 10^8 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ , with the average NPP of  $523.72 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ . (ii) The annual NPP in study area fluctuated from year to year but showed an overall decreasing trend ranging from  $602.48 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$  in 2003 to  $430.05 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$  in 2012, with an overall decrease of 28.62%. The areas of extremely significant decrease, significant decrease, decrease, no significant change, increase, significant increase and extremely significant increase for NPP trends accounted for 25.16%, 30.41%, 33.32%, 9.33%, 1.48%, 0.25% and 0.05% of the total area, respectively. (iii) The correlation between NPP and average annual temperature was positively related accounting for more than 47.47%, of which significantly positively related accounting for 2.79% located mainly in north of the study area, such as Baise, Hechi, Guilin, Liuzhou, Wuzhou. The regions that show a negative correlation accounted for less than 1% of the total area. (IV) The regions where the NPP and precipitation had a significance negative correlation were located mainly in the southeast part, central part, west part, accounted for 17% of the total area ( $p < 0.01$ ). The regions that show a negative correlation are widely distributed in Guangxi Xijiang river basin, accounted for 55% of the total area ( $0.01 < p < 0.1$ ). The regions that show a positive correlation accounted for less than 1% of the total area, at the  $0.01 < p < 0.1$  level. The correlation between precipitation and NPP was not significant in other places of study area, at the  $p > 0.1$  level. (V) Among all vegetation types, evergreen broad-leaf forest, with a NPP of  $760 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ , are the most productive. The mean annual NPP values for evergreen needle-leaf forest, evergreen and deciduous broad-leaf mixed, deciduous forest, shrub, grassland were  $685 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ ,  $653 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ ,  $624 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ ,  $514 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ ,  $443 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ , respectively. While the least productive one is planting crop, with the NPP of  $414 \text{gC} \cdot \text{m}^{-2} \cdot \text{a}^{-1}$ .

### Key words:

Net primary production; Guangxi Xijiang river basin

## Spatio-temporal Trajectory Fusion and Road Map Generation Based on Cognitive Law

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### Abstract

With the rapid development of urban transportation and the worsening traffic environment, people urgently need the fine, high-precision and up-to-date road information when travelling. Meanwhile, people themselves are the sensors which detect the fine and real-time road information by generating spatio-temporal trajectories. It is becoming a great opportunity and challenge to collect fine road map from those trajectories. In this paper, a new approach is proposed for trajectories fusion and road map generation from GPS trajectories. It leverages Delaunay Triangulation and its skeletonization, and is based on progressive cognitive levels of space, perception—cognition—symbol. Experiment and evaluation on the GPS spatio-temporal trajectory data collected by taxis in Wuhan city are carried out, and results indicated that the proposed method is practicable, more accurate than existing methods, especially on the road network topology information extracting.

### Key words:

Cognition law; trajectory fusion; road map; GPS spatio-temporal trajectory

## Study on Urban Spatial Information Integration Platform in Network Environment

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### Abstract

In the process of transformation and upgrading in promoting "digital city" to "smart city", construction of urban spatial information integration platform under the network environment can provide a more comprehensive and in-depth application substrates for the subsequent construction of "digital city" geographical space framework, and provide geographic information resources integration services for the planning, construction, urban management and public services and other areas.

Urban spatial information resources "integration" research is in close combination of application needs according to the current situation of information resources, and it researches and solves the use of a platform to provide users with a variety of map services; to provide users with a variety of ways of positioning by using a benchmark; to provide users with a variety of environmental services by using a set of data.

This paper presents the design and construction of urban spatial information integration platform. The overall framework of urban spatial information integration platform is based on two major security systems which have six levels, including the infrastructure level, data level, service level, interface level, security authentication level and the user application level and two security systems of information resource security system, information resource technology standard and management system. Urban spatial information platform data exchange system as a core component of the urban spatial information integration platform conduct distributed management to data maintenance through the whole sharing platform. To design data sharing service system for urban spatial information platform from the four aspects of metadata sharing services, spatial data sharing services, spatial information application services and spatial data sharing operation management. Urban spatial information resources "integration" technology research is based on the city space information, and it takes the network as the carrier to complete multi-source, multi-temporal spatial data integration and management and to realize the wider and deeper application services of the urban spatial information in the aspects of social public, government office, business management and surveying services, etc.

### Key words:

Urban spatial information; Public platform data; Integrative platform; Data-sharing; Data transformation

## Temporal and Spatial Distribution of High Efficiency Passengers Based on GPS Trajectory Big Data

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### Abstract

The uneven spatial and temporal distribution of taxi passengers not only affects cabdrivers' income-but also has an effect on development and enhance of taxi efficiency. Since taxi is regarded as the supplementation of city public transit, it is important to improve the taxi efficiency. According to many former researches done on taxi driving strategies, the objects always aim to focus on the taxi driver, and researchers merely consider the effects of an empty taxi situation, which may affect the taxi efficiency due to the fuel consumption and time cost. In this paper, in order to improve taxis' profits and efficiency, we used the taxis' GPS big data to optimize the evaluation model of taxi efficiency by taking its empty state into consideration, and proposed the concept of high efficiency passengers for the first time. Then, we defined and quantified the high efficiency passengers, and established a new spatial and temporal analysis method for high efficiency passengers. Finally, we extracted high efficiency passenger source information and its spatial and temporal distribution pattern from taxi driving routs. To further verify this method, we took Wuhan's taxi data asan example, extracted the high efficiency passenger source from different aspects, such as time, space and screening conditions, and found some distribution patterns of the city passengers through comparison and analysis. According to the distribution patterns, the quantity of high efficiency passengers is associated with traffic conditions, and most high efficiency passengers are distributed far from the downtown area. These facts have proved that the studies on temporal and spatial distribution of high efficiency taxi passengers can provide scientific evidence and references for improving cab drivers' income and taxi efficiency.

### Key words:

high efficiency passenger source; GPS big data; spatial and temporal distribution; big data

## The Common Edges Extraction Algorithm Research of Non-Topology Remote Sensing Image Vector Data

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### Abstract

Compared with general non-topology vector data, the non-topology remote sensing image vector data have different characteristics. Such as the nodes on the common edge of the adjacent polygons are not completely consistent. But in the traditional depth search matching method, the consistency of the nodes on the common edge of the adjacent polygons is the premises, so it has insurmountable defects when applying traditional method to extract the common edge of non-topology remote sensing image vector data. However, extracting equivalent data from common edges is the foundation of non-topology vector data simplification. In this paper, aimed at the fault of the traditional methods and combined with the characteristics of non-topology remote sensing image vector data, a new algorithm is proposed based on collinear search matching, to extract common edge and non-common edge of polygon, recording the left and right side information of the public side in the process of extracting at the same time, the algorithm of Douglas-Peucker is used to simplify data. Then data can be reconstructed according to the simplified data. The three key points of the algorithm are the judgment of collinear line, the judgment of polygon edge direction and the construction of the common edge extraction rule. Experimental results show that the algorithm proposed in this paper is accurate and efficient to extract common edge and non- common edge of non-topology remote sensing image vector data, and it can effectively eliminates crack when using the Douglas-Peucker algorithm to simplify data.

### Key words:

Vector Data; Non-Topology; Common Edge; Collinear Search Matching

## Urban Land Use Change Using RS and GIS techniques: A Case Study in Ulaanbaatar, Mongolia

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### Abstract

The aim of this study is to conduct urban mapping and analyze the land use changes of Ulaanbaatar city, Mongolia using very high resolution remote sensing (RS) and geographical information system (GIS) data sets. For the study, the changes that occurred before 1990 are compared with the changes that occurred after 1990 and the socio-economic reasons for the changes are described. For the development of the primary digital database, a large scale topographic map and historical description of the land use elements are used. To generate land use information from the fused RS images, a visual interpretation is applied. Overall, the study demonstrates that during the market economy the central part of the capital city is urbanized very rapidly and became very dense.

### Key words:

RS image; fusion; mapping; urban change study; gis techniques

## C12.13 Geography of Governance

### Environmental Governance – Spaces, Actors and Powers



Home

#### Oral

1. [Analyzing the Urban Goods and Services Delivery through the Informal Sector - the Street Vendors of the Kathmandu](#)  
Puspa Sharma (Tribhuvan University, Nepal)
2. [Assessment of the Environmental Efficiency \(EE\) of Urban Industrial Concentration Areas: The Case Study of Beijing](#)  
Maocheng Zhen, Xiaolu Gao, Haihong Yuan (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Science, China)
3. [Delineating Ecological Red Line at Regional Scale in Jiaxing, China](#)  
Lu Lizhen (Zhejiang University, China), Yongming Mou (Zhejiang Province Environmental Monitoring Center, China), Mei Gao (Environmental Protection Agency of Jiaxing City, China), Yanlin Huang (Zhejiang University, China)
4. [Ecosystem Services as A Factor for Trajectory Strengthening of Region's Development and Well-Being - Environmental Governance](#)  
Marek Degórski (Institute Geography and Spatial Organization, Polish Academy of Sciences, Poland)
5. [Engagement of Forest Protecting Communities to Deal with Climate Change](#)  
Nabaghan Ojha (Bangor University, India)
6. [Engendered dependence and Management of Forest Commons of Gahrwal, India](#)  
Shiv Narayan Sidh (Government College Gairsain Chamoli, India)
7. [Environmental Challenges Associated with Development of Socio Economic Activities in East African Countries Comparative Study with China.](#)  
Sahim Abdalla Juma (University of Science and Technology of China, China)
8. [Floods, Social Vulnerability and Environmental Governance in Argentina: Lujan River Basin as a Study Case](#)  
Alejandra Valverde, Elda Tancredi (UNLu, Argentina)
9. [Gaps of Ukrainian Environmental Governance \(National and Region Level\)](#)  
Leonid Rudenko, Sergii Lisovskyi, Eugenia Maruniak (Institute of Geography of Ukraine NAS, Ukraine)
10. [Governance and Management of Natural Resources in Reserves within South Africa: Neoliberal](#)

## Conservation Vs People Stewardship

Martina Segage (University of Limpopo, South Africa)

11. Governance for Sustainable Transition: Reflection on a Community Recycling Initiative  
Tong Xin (Peking University, China)
12. Governing Delhi's Riverscapes: Conflicts of Interest, Power and Knowledge Asymmetries in Urban Environmental Governance  
Alexander Follmann (University of Cologne, Germany)
13. How Authoritarian is China's Low-Carbon Governance? A Local Perspective  
Kevin Lo (Hong Kong Baptist University, HongKong SAR, China)
14. Insoluble Intergovernment Political issue: Gabčíkovo-Nagymaros Dams  
Zoltan Hajdu (Hungarian Academy of Sciences, Hungary)
15. Land-Use Change and Environmental Governance in Rural and Peri-Urban Wetlands of East Africa: Findings from Rwanda, Tanzania and Uganda  
Clemens Greiner (GSSC, University of Cologne, Germany)
16. Participatory Forest Management Strategies for Enhanced Livelihood in Dehradun Valley, India  
Poonam Kumria (University of Delhi, India)
17. Participatory Natural Resource Management in Rural China: Making Indigenous/Community Narratives  
Ju Han Zoe Wang (The University of Sydney, Australia)
18. Place- Speaking: Attending to the Relational, Material and Governance Messages of Silent Spring  
Robyn Bartel (University of New England, Armidale, Australia)
19. Place- Thinking: The Hidden Geography of Environmental Law  
Robyn Bartel (University of New England, Armidale, Australia)
20. Struggle for Resources or Struggle for Territory? Conflicts Regarding Water and Energy in Southern Chile  
Johanna Hoehl (Heidelberg Center for Latin America, Chile)
21. Study on the Structural Optimization of Land Use Quantity Based on Ecological Land Constraints—  
—A Case Study of Lushui county, Nujiang City  
Huashu Bao, Deming Jiang, Yiming Li (Yunnan University, China)
22. The Mechanism of Social-Ecological Systems Changing in Upper Irrawaddy River Basin  
Wenling Wang, Yan Feng (Asian International Rivers Center at Yunnan University, Kunming 650091,

China)

23. [Water Resource Management for Pre-Monsoon Cultivation through Local Self-Government – Case studies from Sundarbans, West Bengal, India](#)

Tanusree Mridha (Lady Brabourne College, University of Calcutta, India)

## Poster

1. [Study on Spatial Pattern Dynamic Evolution and Driving Mechanism of China's Environmental Regulation Efficiency](#)

Yu Cheng; Jianlan Ren; Yanbin Chen (China, Shandong Normal University)

2. [The Current State of the Climate and Cryosphere of the Arctic in the AMAP Assessment Reports](#)

Mariia Ananicheva (Russian Fed, Institute of Geography RAS); Alexander Klepikov (Russian Fed, AARI)

## **Analyzing the Urban Goods and Services Delivery through the Informal Sector - the Street Vendors of the Kathmandu Valley, Nepal**

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### **Abstract**

The street vendors considered as informal traders spreading across the cities of most of the developing countries are the key agency for offering goods or services to the people. They usually operate their business through fixed locations, or moving from place to place in a way that the people get their household needs conveniently. This invisible economic sector is assumed to contribute to the urban development significantly. This paper intends to analyze the street vendors of the Kathmandu Valley cities in terms of their spatial distribution, location attributes, choices of locations, historical accounts, types of goods and services, and social and economic features by using appropriate analytical techniques including the geographic information systems, simple statistics, mappings and others. Spatial planning of the street vendors in the Kathmandu Valley is provided for better delivery of urban goods and services.

### **Key words:**

Street vendors; spatial location; mobility; spatial planning

## Assessment of the Environmental Efficiency (EE) of Urban Industrial Concentration Areas: The Case Study of Beijing

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### Abstract

Industrial zones have become the driver of urban and regional economic development and the main carrier of industrial clusters. At the same time, however, as the increment of negative external impact of industrial concentration on urban environments, the healthy and sustainable development of the city is seriously hampered. From the perspective of environmental governance of urban areas, it is particularly difficult to cope with the externalities of industrial concentration in built-up areas because they usually contribute to the economy and there is few policy tools to encourage individual companies to improve their environmental performances or take actions to avoid pollution. Based on analysis of the characteristics of the spatial distribution of pollutant industries, we propose the theoretical model to evaluate the environmental efficiency (EE) of urban industrial areas to solve this problem: (1) the concept and evaluation indices of EE are explored, as well as methods to apply the results as the tool of spatial governance; (2) comprehensive assessment system for EE of the urban industrial areas are established considering the economic contribution, external effect and environmental risk of industries; (3) principle and method for choosing the reasonable spatial unit of EE assessment are clarified. The results are then applied to a typical industrial concentration area in Beijing, to comprehending the space feature of pollutant industries, their economic contribution to the city and impacts on ecological system and residential areas. The rationality of EE assessment system in urban industrial zones is validated and policies to cope with the environmental effects of industrial concentration in this area are proposed.

### Key words:

Environmental efficiency; Industrial Zone; Environmental governance; Urban built-up Areas

## Delineating Ecological Red Line at Regional Scale in Jiaxing, China

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### Abstract

Ecological red line (ERL) is a new national eco-environment strategy in China. The goals of ERL delineation is to ensure ecological integrity and sustain ecological security. This study proposes a research framework for ERL delineation at a regional scale. It includes the stages of: (1) data collecting and analysing; (2) ecoenvironment importance assessing; (3) ERL delineating; and (4) eco-environment protection goals making. A study case in Jiaxing, China is chosen for demonstration. By incorporation of multiple planning integration, field surveys, remote sensed imagery and applying dominant eco-environment function identification method, the ERL schema of “1 slice, 1 belt, 7 zones, 31 points and 38 corridors” is determined. The results show that the framework for ERL could allow the ERL zones maintaining or achieving the corresponding eco-environment functions.

### Key words:

Ecological red line; eco-environment function; eco-environment importance assessing; management framework; regional scale

## Ecosystem Services as A Factor for Trajectory Strengthening of Region's Development and Well-Being - Environmental Governance

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### Abstract

Within the field of regions' development and well-being, the environment is becoming increasingly perceived as a factor capable of generating trajectories of development, which can become more compact, and start creating places of their attraction, so called attractors, having their extent, so called pool of attraction, deciding among others about the so-called viscosity of the place. One of the methods of environmental potential valuation, which can influence directions of regions' development, is the provision of ecosystem services. Concept of ecosystem services and landscape has currently become not only widely discussed in the literature, but also more frequently included in the practice. Unfortunately, there are some ambiguities and misunderstandings arisen around the concept, which can be proved by completely different definitions of services, referring either to natural resources and processes, and to the actual material goods acquired from the environment. Aim of this presentation is an attempt to answer some basic questions referring to the essence of ecosystem services in the application context. In the light of past experiences, reasonable and effective use of the concept of ecosystem services in practice plus the comparability of the proposed solutions, require at least three consecutive steps: more precise definition of specific concepts; implementation of proper and standardized measures of services; association of individual measures with practical activities, especially in the field of spatial planning. In the consequence of such an approach, economic valuation is of secondary meaning and results directly from the adopted measures and indicators of supply and demand for ecosystem services.

### Key words:

Ecosystem services; governance; human well-being; region development

## Engagement of Forest Protecting Communities to Deal with Climate Change

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### Abstract

Increasing biotic pressure, diversion of forest for non-forestry purposes and decreasing space for community's rights in public law making process are some the grave challenges that forestry sector in India encounters today. Such processes, on one hand, have fastened the momentum of forest depletion and on the other hand, squeezed the traditional local rights that forest dwellers, especially tribals, enjoyed since time immemorial. Odisha, a State in eastern part, has the unique distinction of offering rich diversity in forest protection and management practices. Large sections of human mass mostly forming into informal groups have been protecting their local forests as a response to forest loss and economic gains. These groups known as community forest management (CFM) groups have subsequently clubbed themselves at different levels to form federations that could demonstrate a collective force for initiating a rights bargaining process. Unfortunately, in Odisha and also in most parts of India where such informal initiatives have existed, public law making process has refused to officially recognize them as viable resource management institutions. However, there is a visible growth of a vertical social capital that has been experienced as a result of networking of forest protecting villages at the cluster, district and state level. These collective forces have provided a platform for negotiation and interface with policy makers at different levels for changes in policies and practices. These institutions have developed time tested tools to coop with different types of environmental shocks which need to be recognized as a strategy to combat climate change.

### Key words:

Community forest management; climate change; forest protection

## Engendered Dependence and Management of Forest Commons of Gahrwal, India

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### Abstract

Does women's participation in management of community forestry make difference in conservation outcomes? Identify gendered, caste-class patterns and seasonality in dependence. Research is based upon 16 weeks of fieldwork, undertaking 160 households from 8 villages covering four agricultural seasons in Chamoli district of Garhwal to capture seasonality in time use (TU). Village communities are highly dependent on forest common hence have high stakes in conservation. However, at micro-level village society is stratified and women do not form homogenous entity. Women's participation in management of "Van Panchayats" has bearing on the environmental outcomes and household food security.

In this study 100% household used village forest commons for the collection of fuel wood and fodder. SC & ST women in entirety depend on the forest commons for fuel wood while 96% women from upper caste are exclusively dependent on it. TU Survey reveals the seasonality in agriculture and gendered patterns of dependence.

### Key words:

Community governance; Women, fodder; fuelwood

## **REVIEW: Environmental Challenges Associated with Development of Socio Economic Activities in East African Countries Comparative Study with China**

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### **Abstract**

The environment is directly or indirectly affected by socio economic issues, contributing to change either positive or negative in human well-being and in the ability to cope with environmental changes (UNEP 2007). Impacts on socio economic activities are highly dependent on the characteristics of the drivers and their variation between developed and developing regions (UNEP 2007). On this paper, I have studied Chinese policies on environmental issues and its five years economic plan. Furthermore, I have studied what Chinese government have done in relation to socio economic activities and what lessons is available for East African countries. Finally, I have proposed possible solutions for East African countries on Environmental challenges associated with development of socio economic activities with the potential of combining economic and environmental interests in East Africa. My proposed solutions are based on the following sectors; demographic Change, agriculture, buildings, cities, energy, fisheries, forests, manufacturing, tourism, transport, waste and water.

### **Keywords:**

Environmental policy; Sub Saharan Africa; Environmental protection

## Floods, Social Vulnerability and Environmental Governance in Argentina: Lujan River Basin as a Study Case

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### Abstract

This writing analyzes the relationship between land management, risk management and public participation, which configures complex scenarios to recurrent floods in the Lujan river basin, (Buenos Aires province, Argentina), especially those occurred between 2012 and 2015

In this scenario, different actors participate actively in discussing and defining key elements regarding land management, giving rise to new ways of environmental governance. Luján city, founded and built in the floodplain of the river, reveals the consideration of flood risks and makes the relationship between water dynamics, topography and relief of the Lujan River basin -which have been shaped naturally by physical processes and, more rapidly, by artificial ones- essential to be understood. The latest floods evidence the inadequate management by state agencies, the lack of urban planning, the decoupling between the production of scientific knowledge and public policies development, as well as solidarity and self-organization in emergency context. The analysis of this study case is approached from vulnerability and uncertainty dimensions. It analyzes, particularly, population responsiveness and the actions of institutions in general, with special focus on the labor of institutions in risk management. It also intends to make a theoretical contribution to local social organizations, which are struggling for the disputed territory in order to find complete solutions to the issues.

### Key words:

Social vulnerability; environmental governance; risk management; public participation; floods

## Gaps of Ukrainian Environmental Governance (National and Region Level)

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### Abstract

Ukraine is among countries where the impact of poor governance in all field of society's life is noticeable, while social, economic and environmental problems are rising. In the sphere of environmental governance Ukraine has undertaken a number of international commitments, which are still not implemented properly. There is no Strategy and indicators of sustainable development. Situation at the regional level, where provisions on sustainable development are poorly integrated into government activities is even worse. In addition, due to the weak interaction between Ministries responsible for spatial planning and environmental policy, the ecology is hardly taken into account in planning decisions. However, the natural environment is constantly getting worse because of the intensive nature use.

On the base of own long-lasting research, cooperation with public authorities as well as NGO's, co-authors conducted a comprehensive analysis of the environmental governance and implementation of sustainable development principles in Ukraine. In particular, approaches, national driving forces, tools, and legal framework for sustainable development were estimated. Moreover, the gaps of Ukraine's international commitments fulfilment were identified as well as appropriate recommendations in the field of environment protection were developed on the example of global conventions (Convention on Biological Diversity, Framework Convention on Climate Change, Convention to Combat Desertification). Concept of integration of ecological considerations into spatial planning system was developed at the regional level (a case of model region). Best practices and participation of Ukrainian NGOs and scientists in the implementation of environmental policy also will be delivered in the presentation.

### Key words:

Governance; sustainable development; Conventions; spatial planning; nature use; indicators

## **Governance and Management of Natural Resources in Reserves within South Africa: Neoliberal Conservation Vs People Stewardship**

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### **Abstract**

Natural resources management in the democratic South Africa has in the late 1980s captivated conservation with a human face largely due to the shift in conservation from fortress approach to community-based management and later, co-management efforts. Such management approach emphasized community involvement embedded by the “people shall govern” narrative. However, in practice, the interface remains scarcely tested. The paper seeks to examine the tensions that exist in the governance and management of natural resources, amidst stark poverty and inequality in South Africa, which continue unabated due to the divisive commercial self-interests of the state and private companies. The entry of commercial interests in resource management has intensified contestations over natural resources. Nature reserves provide a typical example of the manifestation of these contestations. Underwritten by the philosophical motive for inherent valuation of natural resources within reserves, poor people are denied access to natural resources for survival. In practice, nature reserves have served the commercial interests of global business and capital. Consequently, nature reserves in developing countries such as South Africa have circumvented the requirement to serve distributive justice through environmental conservation, notwithstanding pronouncements to the contrary. Given that such nature reserves are established through natural capital in areas inhabited by poor communities, the emphasis on environmental protection tends to exclude these owner-communities from access, thereby creating tensions. The paper concludes that South Africa could avoid such tensions by ceding ownership of natural reserves capital to local communities for intrinsic instrumental socio-economic value.

### **Key words:**

natural resource management; neoliberal conservation; people stewardship

## Governance for Sustainable Transition: Reflection on a Community Recycling

### Initiative

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### Abstract

With a review on the community-based tool developed from common resource management for sustainable development in three perspectives: behavior studies, governance structure evolution, as well as its scale issue, we report our experimental garbage-sorting initiative in Hongfuyuan, a residential community in Changping District of Beijing. We study the behavior of the participating households as response to our garbage sorting promotion from Dec 2013 till now, the impacts of the governance structure among all stakeholders, and the cross-scale interactions among the community action, the urban waste management system and the producer responsibility scheme. In conclusion, we discuss the implications of this research to current urban governance for sustainable transition in China.

### Key words:

Community-based tool; Governance; Garbage-sorting

## Governing Delhi's Riverscapes: Conflicts of Interest, Power and Knowledge Asymmetries in Urban Environmental Governance

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### Abstract

Delhi's riverscapes, referring spatially to the river Yamuna and adjoining areas in the urban limits of the megacity Delhi, represent an ecologically sensitive, yet highly polluted and environmentally degraded environment. For drinking water supply of the megacity, the river's water is completely impounded in the non-monsoon months. Reduced flow and the discharge of untreated sewage from the megacity make the Yamuna in Delhi one of the most polluted rivers in the world. Additionally, urban mega-projects have recently been realized on the river's floodplain resulting in dynamic land-use changes and a wakeup call for environmentalists emphasizing the ecological integrity of the river and the close relationship between the river and the city.

The governance of Delhi's riverscapes is generally characterized by sectoral approaches. A multiplicity of agencies and individuals (state and non-state) is involved in urban environmental policy-making. Based on a discourse analytical approach the paper analyses existing conflicts of interest, power and knowledge asymmetries between state authorities and civil society actors. The paper focuses on the role of local environmental non-governmental organizations (NGOs) in (re)shaping environmental discourses and their influence on environmental regulations and land-use planning, in particular through the courts.

### Key words:

land-use change; urban environmental governance; river pollution; megacity; environmental non-governmental organizations; courts; India

## How Authoritarian Is China's Low-Carbon Governance? a Local Perspective

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### Abstract

Authoritarian environmentalism, defined as a policy process dominated by an autonomous state and the pursuing of environmental outcomes by restricting individual liberty, is commonly used to characterize China's low-carbon governance. This paper challenges this prevailing perception with an empirical case study of Changchun in Northeast China. It shows that while China's low-carbon governance appears highly authoritarian, the situation on the ground is much more ambiguous, displaying a mixture of authoritarian and liberal features. While China's top-down and non-participatory policy environment has been crucial in stimulating a low-carbon transition, the failure of the central government to control local actors has created a situation of de facto neoliberal environmentalism, where local governments and energy-intensive enterprises enjoy a high degree of freedom and flexibility to manage their own energy consumption in spite of the overt authoritarian rule. The findings of this research show that viewing China's low-carbon governance as a clear-cut instance of authoritarian environmentalism should be done with circumspection, and that studying the nature of environmental governance as a complex process requires a thorough understanding of not just national policy but also local politics and the ways the two are connected.

### Key words:

Authoritarian environmentalism; environmental governance; low-carbon governance; China

## **Insoluble Intergovernment Political Issue: Gabčíkovo-Nagymaros Dams**

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### **Abstract**

After some decades of planning and political, technical, environmental etc. discussions the GND was started to built in 1987 cross the Danube, between Czechoslovakia and Hungary. In the processes of systemic changes Hungary has changed her point of view, Czechoslovakia was split up into two countries.

In May of 1993 Hungary and Slovakia agreed to take their dispute to the International Court of Justice in The Hague. The Court found that both Hungary and Slovakia had breached their former leagal obligations. Because of changing of governments, attitudes of national emotions the dispute was not still resolved.

There are different poits of views on necessary of technical measures as a whole contruction, but a joint proposal is under pereparation for identification of mutually acceptable aims in the Danube reach between Sap – Budapest of necessary technical measures. Restricted content can conclude an agreement by the two governments.

### **Key words:**

environmental policy

## Land-use Change and Environmental Governance in Rural and Peri-urban Wetlands of East Africa: Findings from Rwanda, Tanzania and Uganda

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### Abstract

With year-round water availability, high quality resource base and the potential to harvest several times per year, wetlands are emerging production hotspots in Eastern Africa in the face of increasing climate variability, food insecurity and rapid population growth. Wetlands, however, also provide various important ecosystem services and are highly sensitive to disturbance. Sustainable agricultural usage of wetlands, therefore, can only be achieved if good environmental governance minimizes negative effects on environmental health and human well-being. This paper is based on ethnographic and interdisciplinary research in Rwanda, Tanzania and Uganda. To varying degrees, the wetlands in our research areas have been commercialized for cash crop production, building land and other economic activities (e.g. sand and clay extraction, brick production) and conflicts over access to wetlands have increased. Preliminary findings suggest that conflicting interests, weak institutions and high economic needs tend to threaten sustainable use of these fragile resources. In this context, we focus on the nexus between intensified wetland usage and environmental governance efforts at local, national and international scales and explore its outcome for different groups of wetland users.

### Key words:

Wetlands; East Africa; small-scale farming; land-use; governance; institutions; rural areas; peri-urban areas

## Participatory Forest Management Strategies for Enhanced Livelihood in Dehradun Valley

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### Abstract

The trees are primary producers and without them it is just impossible to imagine animal life, including man. But these facts have remained as bits of information; as forests in India have been shrinking for several centuries owing to pressure of agriculture, commercial and industrial uses, urbanization, and meeting the energy requirements of the large section of the population especially in rural India. Forest is an important part for livelihoods especially in rural areas of Dehradun valley. Forest is under immense pressure and valley faces significant energy crises. The forest dwellers represent the societies insist on subsisting on their local resources and the state represents the forces of modernisation, which control the resources. Participatory forest management approaches have a long history in Uttarakhand being rooted in traditional local practices. With this contested realm the community participation has been outlined as an important aspect of forest management in India since 1990s. After a decade the assessment of joint forest management became very important as process of forest degradation is still going on in the valley. The remote sensing and GIS techniques have been used to identify the surveyed villages. The ten villages have been surveyed based on their distance from the urban areas and proximity to forest. The dependence on forest increases tremendously as distance from the urban centers increases. The SWOT analysis of participatory approach has been done to underline sustainable forest management in the valley.

Various parameters have been identified to enhance the livelihood of poor and lower caste farmers. The study also reflects the exploitation of poor women who are much more dependent on the forest resource than their male counterpart. With bold steps, community participation and constructive institutional change; a strong foundation can be laid for total forest management leading to sustainable rural development in the valley.

### Key Words:

Forest degradation; Participatory forest management; SWOT analysis; Constructive institutional change

## Participatory Natural Resource Management in Rural China: Making Indigenous/Community Narratives

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### Abstract

Environmental narratives produce certain environmental knowledge and social orders (Forsyth & Walker, 2008). Environment and development discourses can be categorised into three narrative themes, or motifs, framing human-nature relationships in China's environmentalism: peasant, indigenous and community (Hathaway, 2007). In particular, indigenous and community narratives have emerged and have been adopted by eNGOs in China in the recent years in promoting projects on local communities. This paper aims to analyse the ways various environmental narratives were made through eNGO projects in rural China, and discuss the implications of such narrative-making. Case studies are drawn from a participatory resource management project of a domestic eNGO in Yunnan, where natural resources have been the arena for contest between various actors including NGOs, local communities and the government. The authors argue that neither the indigenous nor the community narrative themes are never fully internalised by the relevant rural communities, although the narratives may be used strategically. The reasons for not internalising the narratives may be because of the incompatibility of Chinese language with the western-oriented concepts, and the lacking of territorial and cultural claims by the rural Chinese communities.

### Key words:

Environmental narratives; indigenous; community; participatory resource management; China

## Place- Speaking: Attending to the Relational, Material and Governance Messages of Silent Spring

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### Abstract

Silent Spring is often credited as having launched the modern environmental movement. Its major arguments concerned the dangers and risks of indiscriminate chemical use, particularly insecticides and their negative impacts on ecosystem and human health. Rather than revisiting this content of Silent Spring, which has been heavily interrogated previously, and considerably extended by other studies since the book's publication, this paper concerns itself with some of the less well-examined elements of the work, including Rachel Carson's foregrounding of place and non-human agency, and validation of lay knowledges and alternative approaches in both science and policy. Specifically, the lens of legal geography is deployed here to illustrate the import of these contributions, as well as their remarkable prescience. In particular, the significance of relational ontologies, the relevance of materiality, and the value of collaborative governance, areas which have only relatively recently formed the subject of wider scholarship and debate, are all scoped by Carson in Silent Spring. These contributions furthermore hold great promise for better appreciating and addressing contemporary environmental and institutional challenges, including those that currently define the Anthropocene.

### Key words:

Silent Spring; legal geography; materiality; place agency; governance; Rachel Carson.

## Place- Thinking: the Hidden Geography of Environmental Law

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### Abstract

Environmental law and its students stand accused of ignoring space. The degree of reflexivity given to law by jurisdiction, social and political change and case-by-case flexibility is chimeric rather than substantive, serving only to further ensure law's hegemonic attempts to conceal spatiality and to silence non-human voices. This paper will draw on a case study to demonstrate how native vegetation laws and species classifications are open to challenge by vernacular knowledge and plant perspectives. The analysis unsettles the universalist, anthropocentric and essentialist claims made by law, while at the same time offering explanatory power hitherto concealed. An alternative relational-material methodological pathway for the interrogation of environmental law, revealing its hidden tenets and consequences, as well as a potential opportunity for reform, is presented. To transform its vision and impact environmental law must interrogate its universalist, essentialist, anthropocentric and also utilitarian assumptions. Such a transformation involves a finer-grained attendance to geographical conditions, including not only spatial diversity but also temporal dynamism, change and emergence, as well as the incorporation of non-human perspectives and a de-centring of the human. Such lessons of contextualization and deep democratization have relevance for law and policy analysis more generally.

### Key words:

methodology; environmental law; materiality; place agency; native vegetation; weeds

## Struggle for Resources or Struggle for Territory? Conflicts Regarding Water and Energy in Southern Chile

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### Abstract

The terms *conflicto mapuche* or *problema mapuche* are commonly used in Chile – the media, politics, enterprises and also the indigenous movements themselves talk about a conflict. The parties involved depend from case to case – the mapuche and different stakeholders – such as the State, Chilean society and entrepreneurs. Also in research on the history of the mapuche the terms conflict or problem appear.<sup>5</sup> Some parts of Chile are even attributed to the „red (and therefore dangerous) zone“. The Chilean state, enterprises and parts of Chilean society pursue certain objectives with this discourse: The mapuche are a threat for national safety and the economic development in Southern Chile. However, the mapuche (re)construct identities and traditions in order to fight for a recognition of the indigenous population in the Chilean constitution and against the neoliberal economic model. Other positions represented by other stakeholders complement this bipolarity in different levels. Hence, what role play the discourses and identities associated to the different scales (local, regional, national) and how do they influence the respective positions (of power)? To what extent are local arguments exploited for national purposes? On the basis of conflicts in the Araucanía region regarding water and energy these questions will be analyzed and discussed, as in these disputes various stakeholders are involved at different levels.

### Key words:

Governance; Water; Energy; Indigenous people; Mapuche; Environmental Conflict; Hydroelectricity; Power relations

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## **Study on the Structural Optimization of Land Use Quantity Based on Ecological Land Constraints: A Case Study of Lushui County, Nujiang City**

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### **Abstract**

With the development of social economy, the ecological environment problem gradually revealed. How to achieve the purpose about coordinate the relationship between human development and ecological protection by changing the human land use behaviour, this is one of the important topics to be solved at present. Defining the concept and the types of ecological land with the present research results and the need of this paper, which laid the foundation of the ecological land calculating and model building. At the meantime, by introducing the concept of ecology priority and the method of ecological security pattern, the paper analyses the constraints of regional ecological land in the target year of land use planning. Then, an optimization model of land use structure is built based on the ecological land constraints and the objective of maximizing land use economic benefit, and a case study in Lushui was taken.

### **Key words:**

ecology priority; ecological land; ecological security pattern; land use; structural optimization

## The Mechanism of Social-Ecological Systems changing in Upper Irrawaddy River

### Basin

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#### Abstract

One of the key issues towards regional sustainability is how to coordinate the nature conservation and economic-social development. The upstream of the Irrawaddy River Dulong river basin is a unique area of Dulong ethnic group living. By using methods of key informant interview, PRA and questionnaire survey, the social-ecological dynamics was analyzed since 1950s. The major results are:

(1) Since 1950s, the settlement fragments changed from the pattern of “big dispersion and small concentration” to the one of “small dispersion and big concentration”. The limited arable and habitable land controlled the settlement distribution; the traditional culture was affecting the choice of settlement location; land ownership limited settlement expansion; grain accessibility and infrastructure construction drove the settlement to become more concentrated and led to a dramatic demographic shift toward fewer but more populous settlements.

(2) The ecosystem provisioning function that has been in place while the slash-and-burn farming replaced by permanent farming, the ecosystem culture function was reduced as well. The policy provided stable drivers to change the farming system. Grain subsidy lowered the demand of the ecosystem food provisioning function, changed the way to use land and market integration and infrastructure construction provided the food security, driving the farmland to produce more economic crops.

(3) The policy only limited the access of the ecosystem without replacement strategy, failed to meet the target and create greater conflicts. The innovation integration of those policies with other compensatory policies drove the system to become more efficient.

#### Key words:

Social-Ecological Systems; Ecosystem Services; Land Use; Landscape; Scale; Dulong Watershed

## **Water Resource Management for Pre-Monsoon Paddy Cultivation through Local Self-Government – Case studies from Sundarbans, West Bengal, India**

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### **Abstract**

Water resource management is extremely essential for successful harvest of pre- monsoon crops in India. By the 73<sup>rd</sup> (Constitution) Amendment Act 1992 in India, Rural Self-Government has been entrusted to look after the small irrigation including its planning, operating, and maintenance as well as collecting revenue at local level. This study aims at evaluating the performance of rural self-government in planning and development of small irrigation. For this purpose, case studies have been conducted at different islands of Sundarbans area in the state of West Bengal. The studied area is absolutely mono-cropped. It is found that potentiality of sub-canals and surface water sources for irrigation are remained under utilized for different reasons. The study suggests how to upgrade the irrigation facility in this area for pre-monsoon crop cultivation through peoples' participation under the leadership of present Rural Self- Government system.

### **Key words:**

pre monsoon; self-government; small irrigation; Sundarbans

## Study on Spatial Pattern Dynamic Evolution and Driving Mechanism of China's Environmental Regulation Efficiency

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### Abstract

Environmental issue is the front-burner and focus issue that influence China's economy and society sustainable development. With the destructiveness of environmental pollution's negative externality to production and living becoming bigger, government and general public's environmental awareness enhancing and environmental value concept converting, environmental regulation has been the inevitable choice of regional economy and environment synergetic development, improving the quality of residents and building harmonious society. Mid-term evaluation results of the 12th Five-Year Plan published by National Development and Reform Commission show that the pace of 4 obligatory targets (the proportion of non-fossil energy in primary energy consumption, unit GDP energy consumption, CO<sub>2</sub> emission intensity, NO<sub>x</sub>) has lagged behind. Hazy weather and human settlement continuously deteriorate, it illustrates environmental management's result is unsatisfactory. So the performance and driving mechanism of government's environmental investment and management need to reexamine. Environmental regulation efficiency evaluation is a key manner that assesses government's environment governance performance. China's Environmental regulation efficiency is measured by Data Envelopment Analysis, its spatial evolution characteristics are analyzed by variable coefficient, Gini coefficient, spatial autocorrelation and Tobit model, and its influence factor and comprehensive drive mechanism are discriminated. Conclusions are as follows: ① different regions' environmental regulation efficiency fluctuated upward trend in 2000-2012, variable coefficient and Gini coefficient presented the situation of "combined efficiency > scale efficiency > pure technical efficiency"; ② environmental regulation combined efficiency, pure technical efficiency and scale efficiency characteristics of spatial heterogeneity are "east region > northeast region > central region > west region", environmental regulation efficiency's situation of spatial agglomeration is obvious; ③ economic development, urbanization, technology input, marketization, globalization had positive correlations with environmental regulation efficiency, industrial structure (the proportion of industrial output in GDP) had positive correlations negative correlation with environmental regulation efficiency. Combining phase characteristics of China's regional



sustainable development, the spatial pattern dynamic evolution's rule and comprehensive drive mechanism of China's environmental regulation efficiency are discussed, environmental regulation's predicament that ecological environment local improvement but overall degradation is solved, environmental regulation efficiency's research framework of spatial evolution's geographical processes and multi-factors driving mechanism are completed, geography's key scientific problems of "process + pattern" and "element + mechanism" are strengthened, this paper can provide decision and reference for regional sustainable development.

**Key words:**

environmental regulation efficiency; spatial pattern; dynamic evolution; driving mechanism ;SE-DEA

## The current state of the climate and cryosphere of the Arctic in the AMAP assessment reports

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### Abstract

The outcomes of the “Climate change and the cryosphere - Snow, water and permafrost in the Arctic” (SWIPA) project of AMAP, are presented. The SWIPA report gave an up-to-date assessment of the state of the Arctic cryosphere, including the Greenland ice sheet, mountain glaciers, sea and freshwater ice, permafrost and snow cover at the background of climate changes in the first decade of our century.

The results of assessment reports show a rapid change of the Arctic climate. The last five years in the Arctic were the warmest over the entire observations. Glaciers and the Greenland ice sheet melt quicker compared to the previous decade. The sea ice cover area decreased (by 25-30%) recently. The snowcover area decreased by 18% since the mid-1960s. The temperatures in permafrost increased by almost 2°C during the past decades. Changes in the Arctic influence the planetary processes. Melting of the Greenland and glaciers contributes to a more rapid sea level rise than supposed before.

Efficiency of the adaptation strategy can be increased by means of further studies of potential challenges and opportunities, the Arctic Council initiated the project “Adaptation Actions for a Changing Arctic” (AACAA) under the AMAP. The AACAA will provide valuable information on how these drivers of change may interact. AACAA will cover three pilot regions: Barents Region, Baffin Bay and Davis Strait Region, and Bering, Chukchi and Beaufort Region. All three regions will cover both marine and terrestrial areas, and will be forward looking with a focus on 2030 and 2080.

### Key words:

AMAP; Arctic; assessment report

## C12.13 Geography of Governance

### In Search For More Inclusive Governance



Home

#### Oral

1. [Assembling the Periphery: Moving out of Resource Curse in Chile and New Zealand](#)  
Warwick Murray, John Overton (Victoria University of Wellington, New Zealand), Johannes Rehner (Pontifices Universidad Catolica de Chile)
2. [Assessing the Implementation of the ‘Coordinating Urban and Rural Construction Land’ Policy in China](#)  
Pingyang Liu (Fudan University, China), Neil Ravenscroft (Brighton University, United Kingdom)
3. [Communities which are not Included in Local Self-Governance: A Case Study of North Caucasus Republics of Russia](#)  
Olga Glezer (Institute of Geography, Russian Academy of Sciences, Russian Fed)
4. [Discourse and Ethical Value Chains - Norway, Chile and New Zealand Compared](#)  
John Overton (Victoria University of Wellington, New Zealand), Arnt Floysand, Stig erik Jakobsen (University College Bergen, Norway), Warwick Murray (Victoria University of Wellington, New Zealand)
5. [Governance of Electricity Delivery for Cost Recovery in a Democratic South Africa](#)  
Mmakgosi Precilla Maloa (University of Limpopo, South Africa)
6. [Local Governance, Non-Governmental Organizations and Vulnerable Groups. A Multi-Scale Approach in Western Romania](#)  
Alexandru Dragan (West University of Timisoara, Romania)
7. [Rethinking the Social Capital in Participatory Planning: The Role of Bridging Social Capital for Ethnic Minority in Collective Decision-Making Process](#)  
Cho Hyunji (University College London, United Kingdom)
8. [Rural Governance and Space Production in the City of Umhlathuze, South Africa](#)  
Nothile Ndimande (University of Zululand, South Africa)
9. [State- Rural Society Relations in the Yellow River Catchment: Voluntary Resettlement, Participatory Governance and Poverty Alleviation](#)  
Kathryn Gomersall (University of Melbourne, Australia)
10. [Technology Diffusion of Agricultural Science and Technology Park](#)  
Li Tongsheng, Luo Yali (College of Urban and Environment Science, Northwest University, China)

11. [The Block 113 dialogue: A Chinese Oil Company's Foray into Participatory Governance in Peru](#)  
Adina Matisoff (UCLA, United States)

12. [The Case for a Geography of Corruption](#)  
Brij Maharaj (University of KwaZulu Natal, South Africa)

## Poster

1. [Diplomatic Actions and Consensus Formulation in the Geopolitics of Internet Governance](#)  
Hindenburgo Pires (Brazil, Igeog/Uerj)
2. [Multiple Subjects and Multi-Governance: A Research On Features of Rural Development Experiments in The Perspective of Governance Structure](#)  
Rui Chen (China, School of Architecture and Urban Planning, Nanjing University); Jian Jiao (China, School of Architecture, Xi'an University of Architecture and Technology); Hui Qian (China, School of Architecture and Urban Planning, Nanjing University)

## **Assembling the Periphery: Moving out of Resource Curse in Chile and New Zealand**

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### **Abstract**

The concept of Resource Periphery was introduced by Hayter et al (2003) referring to the specific role within globalization of areas relying on commodity exports – especially emphasizing the contestation of space that results. This discussion is linked to the analysis of resource abundance and how this perpetuates uneven development as well as producing conflicts (social, ecological, cultural) concerning the extraction and export of commodities. Work in this area has largely ignored the impact of the scale of analysis and has focused on the national level impacts. This paper reports on work on regional resource peripheries in Chile currently evolving and seeks to apply the resultant findings to the case of New Zealand.

### **Key words:**

Resource Periphery, Resource Curse, Chile, New Zealand

## Assessing the implementation of the ‘Coordinating Urban and Rural Construction Land’ policy in China

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### Abstract

Rapid urbanization in China has led to the increasing scarcity of land suitable and available for construction. Concurrently, rural depopulation has resulted in many vacant properties, including farm houses, farm buildings and warehouses that were once part of large collective farms. In order to address this inefficient resource utilization a national policy of “Coordinating Urban and Rural Construction Land” has been widely implemented since the early 2000s. Since implementation started there have been successful schemes that have resulted in benefits for urban and rural development, while there have also been failures, allegedly caused by both local resistance and corrupt practices. As China continues to face major challenges of this type, it is appropriate to consider what components of such schemes tend to result in beneficial solutions, and how individual communities can best organize themselves to achieve these outcomes. Based on a case study of the earliest pilot program in Chengdu, Sichuan Province, we seek to argue that the top down nature of this policy does not mean that it is best implemented in a top down manner, largely because the government officials responsible are not part of the local collective. Informed by Ostrom’s common pool resources theory, we further seek to argue that collective construction land is a typical common pool resource, meaning that bottom up policy implement and effective collective action are crucial to the realization of successful schemes. In particular, the case study indicates that with the empowerment of villagers to participate in the policy process it is possible to achieve a broad consensus on the best approach to addressing the problems, with community interests protected and properly monitoring. We conclude that even in cases where a top down approach appears necessary, policy should be implemented from the bottom up by empowering communities to be able to take strong and collective action.

### Key words:

Collective Action; Rural Construction land; Bottom up approach; Community empowering

## Communities which are not Included in Local Self-Governance: A Case Study of North Caucasus Republics of Russia

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### Abstract

In Russia intension of local self-governance to respond the needs of all citizens is rather nominal. The paper analyzes characteristic deviations with emphasis on North Caucasus republics. While municipalities in Russia were formed top down, existing local communities were not completely considered. Merged rural settlements, urban-type settlements joined to cities or turned into rural ones, and settlements within urban boroughs could not form their own municipalities. Socioeconomic peculiarities of North Caucasus republics which aggravate all-Russia processes are explored. (1) In many rural and small urban municipalities share of personal income tax having small absolute size exceeds 85% of budgetary tax revenues, with almost no other taxes. Such budgets are filled 80–95% with federal and regional transfers, so municipal authorities are not free when managing public affairs. (2) Makhachkala, Nalchik, and Karachaevsk each have incorporated several urban-type settlements. The lack of the independent status contradicts ethnic-rooted identities of these communities. (3) Conflicts of land and ethnic nature emerge in Dagestan in the settlements on the plain dealing with distant-pasture cattle raising. Their inhabitants have no opportunity to influence authorities' decisions where they do live, since they are attributed to mountainous municipalities. The study revealed several relevant types of North Caucasus local communities whose inhabitants have not got access to self-governance in their settlements and loose interest for it. As the solution of this problem, reshaping of territorial model of local governance by development of intercommunal connections and diversification of inner structure of urban boroughs according to their specifics are suggested.

### Key words:

local self-governance; urban and rural settlements; community; territorial structure; municipality

## Discourse and Ethical Value Chains: New Zealand, Norway and Chile Compared

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### Abstract

Resource dependent industries use various discursive techniques in order to justify their activities. These vary across time and space and are contingent on various factors at different geographic scales. In this paper we trace how the salmon industries in Chile and Norway and the dairy sector in New Zealand have altered their legitimising ethical discourse overtime and what this implies in terms of the evolutionary economic geographies of these sectors.

### Key words:

Discourse, ethical value chains, dairy, salmon, Norway, New Zealand, Chile

## **Governance of Electricity Delivery for Cost Recovery in a Democratic South Africa**

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### **Abstract**

Service Delivery in developing countries such as South Africa has become an endemic challenge in the post-apartheid era. With democratisations, services had to be extended to the formally excluded sectors of the population. However, these sections of the population live in poverty and could not afford the cost of consumption. In the same light, the inability to pay for cost of consumption strained the sustainability of the expansion of services and sustenance of quality delivery. These dilemmas are exacerbated by the fact that the excluded and poor sections of the population are the primary voting constituencies of the ruling political party, African National Congress. The apparent impasse of service delivery and cost recovery in a democratic South Africa questions the appropriateness of the regulatory governance regime. This paper examines the societal implications of the continuances of regulatory governance of electricity delivery in a democratic South Africa.

### **Key words:**

Regulatory Governance; Service Delivery; Electricity; Cost of Consumption; South Africa

## Local Governance, Non-Governmental Organizations and Vulnerable Groups. A Multi-Scale Approach in Western Romania.

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### Abstract

After the fall of the Communism, a major challenge was the emergence and the structuring of the civil society. The development of non-governmental organisations (NGO) had a key role in this process. In Romania, we can generally decompose the aim of the NGOs in two main categories: “watchdogs of democracy” and organisations focused on vulnerable groups. Both can have a significant role in local governance. Our paper aims at analysing how NGOs contribute to and involve citizens in the process of local governance, at three different scales. Concerning the large cities, we took the case of Timisoara, university and innovation centre. At medium-sized scale, we focused on Jiu urban Valley, symbol of mining industry, of violent protests and one of Romania’s poorest area. Regarding small towns, we choose Jimbolia, a multi-ethnic town situated at the border with Serbia and Hungary. We addressed 862 surveys to population, 105 to NGOs and 60 interviews to local authorities and NGOs. As results, despite the preoccupation of Romanian NGOs in vulnerable groups, the higher the poverty and the social exclusion are, the less NGOs are present: in Jiu Valley, the NGOs are almost non-existent. In the process of governance, the singularity of public institutions is still visible. This situation blocks the prosperity of the area and sustains the emigration of young population to prosperous cities, especially Timisoara. In the case of Timisoara and Jimbolia, diversity is a keyword in the processes of governance, various ethnic, religious and economic groups becoming actors of local governance.

### Key words:

Civil society, local governance, non-governmental organisations, vulnerable groups

## Rethinking the Social Capital in Participatory Planning: The Role of Bridging Social Capital for Immigrant group in Collective Decision-making Process

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### Abstract

This study explores local governance process of community-led regeneration projects in Seoul, South Korea by examining the contribution of social capital in forming public discourse in the participatory planning. Previous comprehensive government-led developments have been gradually replaced by community-led regeneration projects since the early 2000s in Seoul. However, despite the heterogeneous nature of urban communities, there are challenges within Korean community planning to expand the concept of community to engage different groups.

On the contrary to bonding social capital referring to strong ties within a group, bridging social capital has gained attention as a concept providing the further understanding of relationships between different groups. As researchers started to focus on the dynamics among diverse social members in local communities, the studies on bridging social capital have been expanded to look into the role of social networks for minority groups in building links and providing accessibility to public discourse. Even though open participation is dealt with importantly to achieve consensus including minority viewpoints in recent planning literature, the study of its mechanisms seems to be still limited.

The study focuses on that participatory planning is interwoven with participants' social and cultural contexts. Therefore, it seeks to explore the interplay between local group relations, particularly focusing on the role of bridging social capital for minority groups. The data will be obtained by qualitative methods including in-depth interviews with local communities and the observation on the community meeting, and the document analysis of local policy documents.

**Key words:** community-led regeneration; community participation; immigrant group; consensus building process; social capital; bridging social capital

## Rural governance and Space Production in the City of UMhlatuze, South Africa

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### Abstract

Rural societies across the world have witnessed a shift from government to governance. In South Africa, rural governance has multiple layers consisting of government, traditional leadership and land institutions, farmers and farmers associations. Governance extends beyond formal institutions and actors to include informal or non-institutional actors. This paper examines how rural governance arrangements, actors and power relations shape and produce rural space in the post 1994 South Africa. South African literature on rural governance has focused on local governments, traditional leadership and land reformation. Little has been done to examine governance beyond formal institutions and traditional leadership. I used Halfracree's three fold model (trial by space) to catechize space production and relationships among formal and informal actors in governance within the City of Umhlatuze. I argue that governance arrangements in rural areas are complex and characterized by disconnected and incongruent relationships and that there is a power shift from the formal actors to informal actors.

### Key words:

rural governance; space production; rural space; actors; trial by space

## State- Rural Society Relations in the Yellow River Catchment: Voluntary Resettlement, Participatory Governance and Poverty Alleviation

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### Abstract

Resettlement policy in China has progressed from forced migration for major infrastructure projects to voluntary programs designed to alleviate poverty and fulfil central government industrialisation and urbanisation objectives. Current Poverty Alleviation Resettlement policy is one such program that makes specific reference to community consensus on decisions such as the decision the move, where to move and how to move. To date, the application of neoliberal governance procedures during resettlement implementation in rural China is under researched. This project aims to shed light on the complexities of applying participatory governance measures, given China's hybrid governance system that incorporates socialist and pre-socialist structures.

Case study research in the Yellow River catchment explores the state-rural society relations that emerged during resettlement implementation. A governmentality methodology has been applied to exploring relations between the state, villager leaders and village communities which are important for determining the efficacy of participatory processes in producing inclusive decision making. Entrepreneurial village leaders that are essentially outsiders act as an arm of the state implementing central government policy. Alternatively, village leaders who are part of the community can resist or negotiate space for resettlement outcomes that better reflect the desires of villagers. The result is the need for a more nuanced approach to participatory governance in which informal governance systems embedded in village social relations are taken into account.

### Keywords:

China; resettlement; poverty alleviation; participatory governance; governmentality

## Technology Diffusion of Agricultural Science and Technology Park

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### Abstract

Agricultural Science and Technology Park (ASTP) is the technopole of agricultural development in China, and is a new mode of agricultural innovation diffusion. Based on the comparison on the representative figure, the core thought and methods about different research paradigms of the agricultural technology diffusion in various periods, the study put forward a research framework of ASTP technology diffusion from the perspective of geography. The study showed that the growth process of the agricultural technopole was a process of enhancing the technopole's technology "potential" and the technology "potential difference" between the technopole and its surrounding area. Furthermore, this paper analyzed the internal mechanism of the ASTP technology innovation and diffusion. After analyzing the technology diffusion system elements and characteristics, the paper concluded that the technology diffusion environment may affect the direction, the speed, the way of the technical flow and the effect of technology diffusion. And then it put out the evaluation index system of technology diffusion environment. Following the "basic" paradigm, the paper discussed the spatio-temporal process characteristics, analyzed the influencing factors and mechanism of ASTP innovation diffusion. Finally, it concluded that ASTP innovation diffusion followed the basic rules of "point-axis" diffusion. Following the "adoption" paradigm, the paper analyzed the influencing factors and mechanism of the peasant household's technology adoption; and further researched the difference of the peasant household's behaviour on different technologies under different environment conditions. The studies showed that the technical attributes and the diffusion environment had a significant influence on peasant household's technology adoption behaviour.

### Key words:

agricultural science and technology park; agricultural innovation diffusion; spatiotemporal mechanism; peasant household behaviour

## The Block 113 dialogue: A Chinese Oil Company's Foray into Participatory

### Governance in Peru

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#### Abstract

Corporate social responsibility (CSR) that includes civil society in decision-making about Chinese resource extraction projects challenges China's governance norms. But as Chinese state-owned resource companies go abroad to extract oil and other natural resources, they are investing in countries that favor CSR, rather than regulation, as a means to address environmental and social conflicts that arise. Given that Chinese state-owned companies operating domestically lack participatory governance experience, this case study examines a dialogue initiated by the Peruvian subsidiary of the China National Petroleum Corporation (CNPC) with indigenous peoples federations and environmental NGOs in Peru over conflicting land claims. Drawing on evidence from interviews and field visits conducted in Peru during summer 2012, I argue that despite efforts by the Peruvian government to evade responsibility for disputes that arose, CNPC's CSR efforts ameliorated conflict with civil society. This would seem to suggest that CSR is a viable tool through which Chinese resource companies can mitigate conflict abroad. However, this outcome much depended on the unified, rights-based approach taken by indigenous federations and environmental NGOs. Therefore, this case study ultimately presents CSR as a site of contested governance and questions whether it is an effective tool for Chinese companies to adopt to address conflict abroad if rights-protection mechanisms are absent.

#### Key words:

Chinese overseas investments; civil society; corporate social responsibility; natural resources

## The Case for a Geography of Corruption

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### Abstract

An enduring feature of the 21st century is the rise of corruption as an endemic, international problem, permeating both the public and private sectors, in the global north and south. There is clearly a geographical connection, in terms of territorial distribution of incidents of corruption, the consequent entrenchment of socio-spatial inequalities (especially in south countries), and political implications (weak/strong states and the complicity of politicians), and critical scholars have contended that there is a neoliberal connection. However, with a few exceptions, this has been a neglected area of study by geographers. In South Africa this was linked to political correctness, the retreat of critical scholars and consultancy/policy turn. Also, there are methodological problems relating to access to data. There were great expectations that South Africa, the world's youngest democracy, would be different, with its constitutional commitments to equality, transparency, apartheid redress, and improving the lot of the poor and disadvantaged. Twenty-one years into democracy, corruption has become endemic in South Africa. This paper analyses the escalation in corruption in the public sector in South Africa. Key contentions of this paper are: i) this escalation is related to the ambivalence of the ANC government to act decisively against perpetrators, especially as senior party members are implicated; ii) attempts to restrict public access to information; iii) threats to restrict press freedom.

### Key words:

Corruption; neoliberalism; socio-spatial inequalities; South Africa



## Diplomatic Actions and Consensus Formulation in the Geopolitics of Internet Governance

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### Abstract

This research aims to investigate how the models "multistakeholder" and multilateral influence the geopolitics of representation of the agents involved in the geopolitics of global Internet governance (government, civil society and large capitalist corporations). The term stakeholder, heavily used in the documents of the Clinton Administration, was broadcast in 1984 by Edward Freeman, creator of "Stakeholder Theory". This theory has been applied in the US business environment and the corporate governance activities of private and public enterprises in the US. The stakeholder theory Freeman, used strictly for the management of conflicts in the administrative organization of private companies, was developed in order to strengthen the organizational level. The abandonment process of multilateralism bias in global Internet governance has implications in all aspects in the future development of the Internet, given that it covers a wide range of topics not only related to the issue of technological development, but also to political issues concerning the sovereignty, political representation, security, geography, geopolitics, economy, education, citizenship, privacy, freedom of expression, among others. Therefore, the objective of this study is to analyze the emergence of organization of democratic initiatives and representation of the relevant social actors in civil society, in the Internet Governance Forums - (IGF), organized by the UN, and the Social Internet Forum, organized by the Just Net Coalition (JNC).

### Key words:

Internet Governance Internet Governance Forum; Social Internet Forum; multistakeholdism and multilateralism

## Multiple Subjects and Multi Governance: A Research on Features of Rural Development Experiments in the Perspective of Governance Structure

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### Abstract

The current “government-oriented “rural construction brings prosperity, but risks are also hidden in the unification of rural governance, and pluralistic subjects needs to be cultivated. At present, a series of Rural Development Experiments provides unique materials for researching on rural governance, but little literature has analyzed the governance practices of these experiments in detail. Distinguished from the general rural construction activities, Rural Development Experiments represent these rural construction activities which have clear construction goals and practices with pioneering and innovative approach. This research plans to observe the most representative Rural Development Experiments in the recent years from the perspective of the governance structure. We firstly summarize three main subjects in the rural development experiments, which includes the corporate social capital, NPO and NGO, intellectuals and local elites. After analyzing these three categories of subjects, we will conclude the governance structures into three models: the auxiliary top-down, the intermediate bridge that coordinates interests, and the blood related bottom-up. Finally, by comparing with the unified “government-oriented " model of governance, this paper shall argue that diverse rural governance structures are capable of making up the vacancy lays in the" government-oriented " governance, and avoiding certain risks in the process of constructing. Also, multiple subjects and multi governance will be of great significance and benefit for the diverse rural construction in the future.

### Key words:

Governance Structure; Rural Development Experiments; Multiple Subjects

## C12.13 Geography of Governance

### Citizen e-participation in Local Governance

#### Poster



[Home](#)

1. [GIS Enabled E-Governance Bolorchuluun](#)

Chogsom, Tsogtdulam Munaa (Department of Geography, National University of Mongolia, Mongolia),  
Narantuya Davaa (National University of Mongolia, Mongolia)

2. [Government and Society Mediated by Technology in Pirai \(Brazil\): The Challenges of A Small Town in Context of The Information Society](#)

Aldenilson Costa, Tamara Egler, Lalita Kraus, Fabiana Oliveira (University Federal of Rio de Janeiro, Brazil)

## GIS Enabled E-Governance

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### Abstract

E-Governance has broader area of implications. It can be used in various aspects of governance system. With the advancement in the sector of Information and Communication Technologies (ICT), the Governments of economies have stepped forward to adopt e-governance in different service sectors. The growing application of information and communication technologies and their subsequent use on strengthening interaction with citizens has given rise to a new governance paradigm as E-Governance.

The Government of Mongolia declared ICT as one of the key economically important sectors. Approved in 2005 E-Mongolia National Program missions “enhancing people’s life quality by establishing new economic environment, improving country’s competitiveness and providing sustainable development”. Three frameworks dealt within the program that are government-legislation; business-economy; and human development; and four policies of government-to citizens, government-to-business, government-to-government and infrastructure.

In Mongolia has started applying GIS for the development of city address system, utility management and in planning roads. All of these are being addressed in achieving good urban environment through sustainable use of geoinformation management. Many other supporting initiatives had taken place among which are formulation and approval of MNS 5774:2007 (ISO 19115) Spatial information- Metadata standard, and MNS ISO/TS 19104:2012, Spatial information- terminology standard, and mapping and geodetic engineering norms. E-initiatives in the land administration is supported by legal texts stipulated in the Constitution of Mongolia, Geodesy and cartography law, Land law, Cadastral mapping and land cadaster law, Land fee law, and Land ownership by Citizen of Mongolia law etc.

This paper shall review e-governance initiative, actions and challenges faced in the case of Mongolia and develop recommendations.

### Key words:

e-governance; Mongolia; Information and Communication Technologies

## **Government and Society Mediated by Technology in Pirai (Brazil): the Challenges of a Small Town in Context of the Information Society**

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### **Abstract**

What is the relationship between government and society mediated by information and communication technology (ICT) on the scale of a small town in Brazil? This is the question that interests us and that justifies this investigation because we start from a case study, taking the town of Pirai, within the province of Rio de Janeiro (Brazil). The study of this city is interesting because it is a small town where I had an extensive program of local development, which considered ICT as important elements for development, along with other variables. As methodology we consider on the one hand an uprising on the history of the town and local development policy to make it possible to analyze the scanning process and how this government media relations and society. On the other hand, we present data that were raised through fieldwork in the town of Pirai to comprehend our question. The whole trajectory based on a theoretical framework from the fields of Geography, Urban and Regional Planning and Political Science. As a result, it is possible to say that this local development plan with variable ICT is innovative in the country only has not changed the relationship between government and society. On the contrary, were a modernization of the governance, a governance mediated by ICT without with that mean the consolidation of governance, which is more important and democratic is configured. However, I had a transformation in the economic, educational fields, and has been removed from the impacts of privatization. Only that governance was not reached.

### **Key words:**

information and communication technologies; local development; government and society; Pirai; Brazil

## C12.13 Geography of Governance

### Innovations in Public Sector, Public Administration and Public Services

#### Oral



Home

1. [Changing patterns of local public service provision in Hungary](#)  
Ilona Pálné Kovács (Hungarian Academy of Sciences)
2. [Educational Equality and Accessibility to Community Education Facilities: A case study of Beijing](#)  
Lili Xiang (University of Leeds, United Kingdom)
3. [Going 'Smart' in New Towns: Reflective Tales of Milton Keynes and Nansha](#)  
Qianqing Mai (Durham University, United Kingdom), Harriet Bulkeley (Durham University, United Kingdom), Simon Marvin (Sheffield University, United Kingdom)
4. [Governance of National Positioning Framework in Korea](#)  
Soyoung Park (National Geographic Information Institute, South Korea), Yoonmo Sung (National Geographic Information Institute, South Korea)
5. [Quality of Spatial Structure of Administrative Areas in India: A Case Study of Punjab](#)  
Harbans Singh (Panjab University, India, India)
6. [Technology, Infrastructure and Governance: The case of Smart Cities in India](#)  
Abhishek Dwivedi (South Asian University, New Delhi, India)
7. [Why and when countries implement public administration reform](#)  
Ján Buček (Comenius University, Bratislava, Slovakia)

#### Poster

1. [Construction of Private Cloud on Public GIS Platform of Pearl River Delta](#)  
Hua Xiaoyan; Cao Kunjie (China, Land and Resources Technology Center of GuangDong Province)

## Changing patterns of local public service provision in Hungary

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### Abstract

The evolution of the local government system in Hungary is quite a hectic story. The systemic change brought about a strongly decentralised public service model. Since that time, however, several changes have occurred. The last 25 years can be regarded as a series of mostly unsuccessful endeavours for the correction of structural problems such as the fragmentation of municipalities and the weak role of meso-level governments. Due to the postponement of these reforms, a lot of difficulties have emerged such as financial problems and the deterioration of public service quality, despite the fact that local governments have introduced innovative solutions to cope with these problems.

Structural deficiencies are not the sole factor behind the new wave of governance reforms implemented post-2010. A massive centralisation and nationalisation of many local services has occurred as a result of the new political philosophy of the government, local governments' power and independence have been significantly reduced, furthermore, centralisation is gaining ground in other European countries in the aftermath of the financial crisis.

Based on empirical researches, the paper introduces the changes of local governmental duties in Hungary after the constitutional and administrative reforms. The core question is whether the neoliberal, decentralised public policy paradigm ever fitted the Hungarian public policy system where decentralisation was only a temporal guest.

### Key words:

decentralisation; public services; administrative reforms

## **Educational Equality and Accessibility to Community Education Facilities: A case study of Beijing**

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### **Abstract**

Education is key to reducing polarisation and difference and itself is an important factor of social differentiation. Accessibility to community education facilities not only directly influences residential living standards, but also acts as a critical factor of social mobility. Poor accessibility to community education facilities can result in the spatial deprivation of low-income and disadvantaged groups, thus causing further social and spatial problems. At present, there are few policies to restrict the travel distance to education facilities in China. Coupled with the continuous expansion of cities, the present layout of the education facilities in China is now very chaotic. This paper focuses on geographic and social access to primary and secondary schools in Beijing. The findings can be a reference to guide urban authorities with the distribution and allocation of the different educational resources and opportunities in the city. This will help reduce educational inequality in terms of accessibility to education facilities.

### **Key words:**

Education inequality; Accessibility; Spatial analysis; Deprivation

## Going 'Smart' in New Towns: Reflective Tales of Milton Keynes and Nansha

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### Abstract

Smart city and planned urbanisation resonate as intertwined logics of sustainable development. During urbanisation, designated rural lands on the outskirts of traditional urban conurbations are transformed into new towns. Milton Keynes and Nansha respectively located in the south of England and China are among these planned cities. Despite the temporal differences – Milton Keynes was born and named in 1970 while the construction of Nansha officially started in 1990, the construction pathways of these two urban towns are reckoned with important similitudes. They were both built out of the population pressures in their nearby urban centres but carried on as strategic beacons with ambitions to become “one of the UK's biggest urban areas” for Milton Keynes, and a new regional capital of Pearl River Delta megacity for Nansha. Essentially, they also echo in their institutional arrangements with strong public-led elements, such as top-down master-planning, compulsory purchase and relocating governing resources.

Recent rhetoric of smart city emerges as convenient fit for these newly engineered cities. Comprehensive smart transitions are planned out with systemic goals for transport, water, energy, digital data, and education, in Milton Keynes' MK: Smart programme started in 2014, and in Nansha's New Area Development Plan announced in 2012. Analysing the comparable cases of Milton Keynes and Nansha reflects on the smart urban trajectories in different socio-economic and regime settings. With fieldwork interviews and archival research, this paper critically examines how smartness is configured in planned cities, and how experiments with smart approaches reform the governance of urban sustainability transitions.

### Keywords:

smart city; planned urbanisation; socio-technical transitions; governance; innovations; sustainable development

## Governance of National Positioning Framework in Korea

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### Abstract

Information and Communication Technologies (ICT) have led increasingly fast and various changes in our life. Pursuing smart life increases the need for full interoperability of all systems, and position will be playing a key role as reference infrastructure.

National Geographic Information Institute (NGII), national geospatial information authority in Korea, has its responsibility to develop, manage and provide national geospatial data. As one of main products established and maintained by NGII, Korean geodetic framework is a stable and accurate positioning reference infrastructure based on the world geodetic system and has been mainly used in cartography, land development and disaster management. It consists of 4 grades; Very Long Baseline Interferometry (VLBI), GNSS Continuously Operating Reference Station (CORS), Unified Control Point (UCP), and Triangulation Point – Benchmark – Gravity Control Point.

However, spatial extent broadens from a 2D surface to 3D space, and application field becomes rapidly various such as autonomous vehicles and drones. To support the emerging fields and technologies in much more efficient and accurate environment, advanced positioning system is required.

In this paper, it would be discussed on the current status of Korean geodetic framework and its future direction, called “National Positioning System Initiative” that NGII recently set up for sustainable development of the Korean positioning system. According to the initiative, the current geodetic framework intends to be unified into CORS and UCP for multipurpose. In addition, it is expected to develop advanced positioning technologies based on Internet of Things (IoT) environment in order to determine positions in real-time and active way.

### Key words:

National geodetic framework; Positioning system; Korean positioning system initiative

## Quality of Spatial Structure of Administrative Areas in India: A Case Study of Punjab

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### Abstract

Quality of spatial structure of administrative areas in Indian Punjab has been analysed by picking selected indicators. In case of agricultural developed state of Punjab, the quality of spatial structure of administrative areas such as divisions, districts, sub-divisions and development blocks are judged in terms of their size (area and population), population density, centrality of headquarters and shape efficiency. Based on the assumption that in context of developing areas such as Punjab, administration would be more efficient and more effective if administrative units at any level of hierarchy are small in size, have centrally located headquarter and enjoy high shape efficiency. In such a spatial structure, improved administration would help in achieving higher and faster rate of socio-economic development. In this back drop, analysis of spatial structure administrative areas of Punjab, would be helpful in improving the quality of spatial structure of administrative areas, by way of reorganizing the space administration to achieve higher level of socio-economic development.

### Keywords:

Administrative areas; spatial quality; spatial structure; socio-economic development

## Technology, Infrastructure and Governance: The case of Smart Cities in India

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### Abstract

Cities today witness a compelling link between circuits of mobile capital (Peck and Tickell 2002) and a transnational sovereignty (Ong 2006). In the Indian context, the Smart city project launched in 2015, like its predecessor JNNURM, envisions rejuvenating urban metabolism through an assemblage (McFarlane 2011) of cutting-edge technologies. But such a 'developmental State' paradigm does need look into the role of local authorities and the prospects of putting the market 'back in' as well. Following Osborne and Rose (1999), therefore, this paper scans through the smart cities initiative in India via two key questions, as to: (a) how have corporate and 'governmental' compulsions (Hollands 2014) of a certain order provided the impetus for such a discourse and (b) what potential does the smart city have to 'engineer' development in Indian cities through a collage of technocratic practices (Datta 2015). This paper is based on 20 semi-structured interviews with government officials in the Ministry of Urban Development, Government of India and other stakeholders like architectural firms and urban consultancy groups, who drafted India's new Smart city policy. In so doing, the paper quips, that in a scenario where urban planning in India still seems to grapple with the provisioning of a) an adequate municipal finance regime for infrastructure and b) a healthy local decentralised governance system, as to whether smart cities shall engender revitalization of intra community ties within the city or shall it end up smacking off elitist exclusionary spaces of the 'speculative urbanism' (Goldman 2011) mould.

### Key words:

Smart cities, Urban Infrastructure, Developmental State, Participatory Governance

## Why and When Countries Implement Public Administration Reform

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### Abstract

Main goal of this contribution is in search for relationships among local public administration reforms and set of factors influencing their implementation and timing. Why and when countries prepare and implement public administration reforms is enduring considerable question. Among factors influencing reforms we consider the role of administrative traditions and political legacies. Within political framework, besides political parties' role, we focus on the role of central government, its political composition, or duration in holding the power, as well as international policy framework. More detailed attention is paid to conditionality of local public administration reforms to macroeconomic development and public finance situation. Important is modernization as part of reform motivation. We perceive reforms also as governance based output, with many actors involved and calling for reforms. The role of mentioned factors is discussed on a case of Slovakia between years 1990-2015. Although dealing with reform experiences in one country means particular limits to generalization, it provides interesting knowledge for countries considering reforms e.g. during transitional period of their societal development, or offer knowledge base suitable for comparative studies. It also supposes to contribute to understanding of reforms approaches under dual model of local public administration (with separate lines of state administration and self-government adopted in Slovakia since 1990).

### Key words:

public administration reform; governance



## Construction of Private Cloud on Public GIS Platform of Pearl River Delta

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### Abstract

The public GIS platform of Pearl River Delta is a comprehensive, one-stop platform for basic geography information service in Guangdong Province. It is important to scientifically set up an effective and intensive operational environment for the platform. This paper aims at the basic construction for the operational environment of the platform. A design scheme on construction of private cloud has been proposed based on electric government network. The basic components of the platform are described, such as the physical environment, network topology, safety protection, centralized management platform and so on. The key techniques based on Vmware vSphere are discussed, including virtualized network technique, virtualized storage technique and layered security technique. This work will provide experiences for promoting the construction of provincial land and resource cloud data center.

### Key words:

Basic geographic information; Private Cloud; GIS Platform

## C12.14 Geography of the Global Information Society

### Information Society and Culture

#### Oral



Home

1. [Co-Presence in the Information Age](#)  
Aharon Kellerman (University of Haifa, Israel)
2. [Multichannel Retailing and the \(Re\)Making of Retail Space Through the Lens of Embeddedness – Migros Sanal Market in Turkey](#)  
Alexandra Appel (Institute of Geography, University of Wuerzburg, Germany)
3. [One Hundred and Fifty Years of International Telecommunications in the Globalization of the Modern Japan](#)  
Yoshio Arai (The University of Tokyo, Japan)
4. [Space and Identity in German Regional Broadcasts and Locative Media](#)  
Tilo Felgenhauer (University of Jena, Institute of Geography, Germany)
5. [The Use of Geographical Approaches and Geoinformational Instruments for the Assessment of Bioeconomy Resources](#)  
Yulia Rafikova, Nina Teterina, Tatyana Andreenko (Lomonosov MSU, Russian Fed)
6. [Virtual Space Utilization In The Digital Smes Villages: Implementation Of Smart City And Region](#)  
Rini Rachmawati (Universitas Gadjah Mada, Indonesia)

#### Poster

1. [Research on Urban Spatial Organization Mechanism in information Era Based on Self-organization Theory](#)  
Nina Liu; Jiwu Wang (Urban Planning and Design Institute, College of Civil Engineering and Architecture, Zhejiang University, Hangzhou, China.)

## Co-Presence in The Information Age

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### Abstract

Co-presence in the information age has turned mobile and extensive through widely used mobile information technologies, notably the Internet, for personal use. However, virtual co-presences have been assessed as being less significant than real ones. Information technologies permit veteran and novel patterns of people's co-presences, when encountering five types of attractions/stimuli: fellow people, places, events, information, and things, or when being engaged in combinations among them, notably within urban contexts. Such co-presences differ by their coordination necessities; employed senses; number of involved partners; and by called places. It is now possible, with the pressing of a single virtual button to move from one type of co-presence, for instance among people, to another one, e.g. between a user and information. It is also possible for individuals to be engaged in two co-presences simultaneously, when a screen is divided between two types of reaching out, such as with people and information. Cities are typified, by their very nature, with passive co-presences emerging in their public spheres. However, meaningful and active co-presences require initiation and activation. The contemporary global standardizations of software for all dimensions of reaching out may contribute similarly to global standardizations of co-presence experiencing.

### Key words:

co-presence; mobility; Internet; people; places; events; information; things

## Multichannel Retailing and the (Re) Making of Retail Space through the Lens of Embeddedness – Migros Sanal Market in Turkey

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### Abstract

The purpose of this presentation is to investigate the value of the concept of embeddedness for economic geographers. Alongside the case study of the multichannel grocery retailing brand Migros in Turkey the spatial impacts – in relational and physical terms – of digitalisation and the integration of an online shop into the profile of a supermarket chain are investigated. With applying the concept of embeddedness the paper seeks to understand these complex, diverse and uneven processes of (retail) restructurings that affect different dimensions and dynamics of networks, societies and spaces. In my case study I identify two dimensions of embeddedness processes: (1) embedding the online shop in the firm's routines and practices, whereby processes of transfer of knowledge and technology dominate, and (2) embedding online shopping in the customer's routines and practices, whereby processes of adaption to consumer culture dominate. These dimensions are reflexive and as such mirror ongoing negotiation processes between the two stakeholders. On one hand multichannel retailing thus not only alters 'where' but also 'how' people shop, and can result in new retail spaces like pick-up stores. On the other hand it can be shown, that the 'locations', where online shopping of Migros is available, reproduce spatial variations of socio-economic factors, such as income distribution or population density. As such the concept of embeddedness is useful for economic geographers – also in the realm of e-commerce – to unravel the interconnections of societal, organizational and spatial patterns as well as their variations across space. The findings are based on qualitative interviews.

### Key words:

embeddedness; multichannel retailing; Turkey; e-commerce; retail space; food retailing

## One Hundred and Fifty Years of International Telecommunications in the Globalization of the Modern Japan

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### Abstract

In this presentation, I would like to discuss how telecommunication systems have been developed in the globalization of the Modern Japan. Saskia Sassen pointed out that Tokyo gained a position as a global city in the 1980s based on an analysis of finance mobility in her book, *The Global City*, published in 1991. Certainly, with respect to globalization, Tokyo, the Japanese capital, had been behind London and New York, both of which had been the political and economic centers of the world since the 19th century. However, did the globalization of Tokyo and Japan really start suddenly at the end of the 20th century? A number of studies on the history of the modernization of Japan have found out that numerous efforts targeting the internationalization of the Japanese society and economy had accumulated for more than one hundred years after the Meiji Restoration of 1868. If the globalization of Japan did not start at the end of the 20th century, then when did it begin? In this presentation, I would like to rethink the process of the internationalization or globalization of modern Japan in the context of international telecommunications.

### Key words:

international telecommunications; globalization; submarine cable; Japan; Meiji Restoration

## Space and Identity in German Regional Broadcasts and Locative Media

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### Abstract

In contemporary societies the quest for identity and community appears to be a crucial part of both individual action and public communication. Especially, defining the self and others by referring to spatial concepts (such as place, region, nation) is a pattern deeply embedded in language, discourse, and everyday practice. In particular, media content reflects the manifold practices of spatial reference (orally and visually). Furthermore, in some cases it reveals complex political top-down-strategies of regional identity formation.

In order to show different patterns involved in the process of the formation of the region and its identity, three German examples of Brandenburg, Bavaria and Mitteldeutschland are introduced and discussed. Recurring motifs in this regard are, for example, schemata of spatial containerization, narratives of a regional historic continuity (from ancient times to the present), metaphors of a regional “quasi-organic” unity, and implicit assumptions of a cultural homogeneity of the region.

The conclusion of the talk is directed towards current changes in the main channels of mass media communication. Digital media seem to rearrange the relationship of mediated communication and regional identities – most obvious in the sense of an emancipation of the individual from spatial and material constraints. At the same time, technological innovation broadens the range of opportunities to articulate a sense of belonging. Not only an increasing availability of regional media content, but also new locative (social) media may lead (or already have lead) to a ubiquitous presence of place in everyday action. Thus, the question arises, in which regards digital media promote traditional geographies of spatially defined communities instead of transcending them.

### Key words:

Media; regionalism

## The Use of Geographical Approaches and Geoinformational Instruments for the Assessment of Bioeconomy Resources

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### Abstract

Development of bioeconomy sector in Russia and other countries of the world presents new challenges for Geographical sciences, and especially for Cartography and Geoinformatics. One of the most promising and rapidly developing areas of bioeconomy is bioenergy. The work describes the problem of methodological framework lack for assessing bioenergy resources. The authors developed new technique of the bioeconomy potential regional assessment, based on the creation of a database and a series of maps of the gross resources, technical capacity, as well as maps of geographical factors influencing the use of the resource. During the study we analyzed the bioenergy resource potential for the territory of pilot region in the Russian Federation. The conclusions were based on the collected statistical data, mapping. analysis of resources and factors spatial distribution and evaluation of their relationship. Designed recommendations for the development of the bioenergy field in the pilot region are based on interdisciplinary approaches, including great value of ecological and environmental aspects. (This work was supported by RFBR project №14-06-00385 A.)

### Key words:

Bioeconomy, bioenergy, evaluation and mapping of the resource potential, environmental management, waste recycling

## Virtual Space Utilization in the Digital Smes Villages: Implementation of Smart City and Region

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### Abstract

Discussion of the virtual space has been done by many urban experts associated with the strengthening of the role of information and communication technology (ICT) in development. Among them is strengthening of activity space, economic space, movement space and interaction space (Rachmawati, 2014). Efforts to integrate the use of ICT in various aspects of urban and regional development is the embodiment of the implementation of the smart city and region concept, it has become a new trend of urbanization (Rachmawati, 2016). One of them is in developing smart economy and smart business through Digital SMEs Villages that is launched by Telkom. Furthermore, this research is aimed to; 1) Identify the existence of Digital SMEs Villages, 2) Identify Digital SMEs Villages activities through some cases, 3) Analyze the implications of the use of virtual space on the Digital SMEs Villages activities on the aspects of smart city and region development. Secondary data of this research is related to the existence of Digital SMEs Villages in Indonesia. Meanwhile primary data about case of implementation of Digital SMEs Villages has been conducted through observation and in-depth interview. The results showed that the existence of the Digital SMEs Villages can increase the use of virtual space, make smart economy and smart business opportunities, improve the ability of community in running business and develop advance SMEs. This has contributed to the achievement of the smart city and region.

### Key words:

Virtual Space; Smart City and Region; Digital SMEs Villages

## Research on Urban Spatial Organization Mechanism in Information Era Based on Self-Organization Theory

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### Abstract

As a self-organizing system, the city has certain rules in the process of development. Self-organization leads the mechanism of urban function and space by the way of flow form, which makes influence on urban spatial movement and location selection. Flows are the main performance when self-organization works. The space structure of a city is the outcome of flows of various elements. Information technology has a profound impact on elements of cities, thus its spatial structure has non-traditional organizational mechanism and characteristics. This paper researched on urban organizational mechanism and the stain of structure under the function of information, the concept of “flows” in the self-organization theory as a starting point. The study suggest that the flows driven the process of re-location can be divided into “geographic flows” and “information flows”. “Geographical flows” have the sensitivity to geographical proximity and is the basic mechanism of urban survival and development. “Information flows” are not bound by time and space and is the key driver of urban global network development. “Geographical flows” and “information” flows effect space with “centripetal force” and “centrifugal force”, so that the process of re-location of urban functions present a complex motions. Grasping the new law of development has profound significance to organize urban space effectively.

### Key words:

Self-organization; Spatial; Function; Mechanism; Flow

## C12.14 Geography of the Global Information Society

### Information Society and Quality of Life



Home

#### Oral

1. [Analysis of Spatial Characteristics of Urban Commerce in the Information Era: A Case Study of O2O E-Commerce in Chengdu China](#)  
Kunbo Shi, Yongchun Yang (college of earth and environmental sciences, Lanzhou University, China)
2. [How ICT, Activities and Service Quality Impact High Speed Rail Travel Satisfaction: A Case Study of Shanghai-Nanjing High Speed Rail](#)  
Jia Tang, Feng Zhen (School of Architecture and Urban Planning, Nanjing University, China)
3. [The Application of Icts in Airspace Configuration and Time Alternative Mechanisms](#)  
Zi Lu, Xinru Du (Hebei Normal University, China)
4. [The Internet Use by University Students: Case in Japan](#)  
Wada Takashi, Wenqi HU (Prefectural University of Hiroshima, Japan)
5. [The Role of the Internet for Domestic Migration Policies by Peripheral Areas: A Case Study of Japanese Local Municipalities](#)  
Kenji Hashimoto (Waseda University, Japan)
6. [Thriving Communities Due to E-Health Services](#)  
Andreas Koch (University of Salzburg, Dep. of Geography and Geology, Austria)

#### Poster

1. [Evaluation on Principal Components Analysis of Urban Human Living Environment Quality of LiaoNing Province](#)  
Yongjie Shan; Huayan Zhao (China, Shanxi Normal University)

## **Analysis of Spatial Characteristics of Urban Commerce in the Information Era: A Case Study of O2O E-commerce in Chengdu, China**

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### **Abstract**

The shopping behaviors of China's urban residents and spatial patterns of urban commerce have been influenced significantly by the e-commerce. However, there are few research achievements about the impacts of e-commerce on urban commerce spaces in China. The Online to Offline (O2O) e-commerce combines online stores and bricks-and-mortar stores, and significantly affects the urban commercial spatial pattern. We try to explore the O2O e-commerce bringing the spatial changes to urban commerce by taking the online group-buying in Chengdu as an example. The results show that: The spatial patterns of the O2O e-commerce market clearly tend to be consistent with location theory, which are driven mainly by the distribution of bricks-and-mortar stores and consumer scale, and spatial accessibility. O2O e-commerce is a result of urban commercial informatization, so the physical space has embeddedness effects on the O2O e-commerce, and O2O e-commerce guides the spatial development of urban commerce reversely. On the impacts of O2O e-commerce, the traditional location pattern of urban commerce is broken, and new spatial pattern appears, and there is a process of both agglomeration and scatter. Due to spatial difference of the impacts of time and space on urban commerce, there is a dual spatial structure of urban commerce, to wit, the location of bricks-and-mortar stores in urban center depends mainly on the time cost factor, and the outskirts depends mainly on the physical distance factor.

### **Key words:**

Commercial geography; O2O e-commerce; information era; Chengdu

## How ICT, Activities and Service Quality Impact High Speed Rail Travel Satisfaction: A Case Study of Shanghai-Nanjing High Speed Rail

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### Abstract

Previous researches indicate that service quality has a great impact on high speed rail (HSR) travel satisfaction. However, with the development of information and communication technology (ICT), using electronic devices to undertake activities, such as work, leisure and others, has become a widespread phenomenon. Then this study tries to demonstrate that satisfaction with HSR trip is impacted not only by service quality but also by what passengers do in this phase, especially undertaking activities related to ICT. So this study aims to investigate the factors and their extent impacting HSR travel satisfaction in information society, including service quality, activities and electronic devices. A survey of 500 HSR passengers is made at 6 cities, 13 main stations along Shanghai-Nanjing high speed rail line during the period from Jan 10, 2016 to Mar 31, 2016. The service quality of HSR is evaluated by 19 factors reflecting tangible, reliability, responsiveness and other aspects. Activities in HSR can be divided into 3 types: leisure, work and others. And electronic devices include mobile phone, pad, computer, reading devices, audio-visual devices, game devices and so on. This study may draw the conclusion that ICT has greater influence on HSR travel satisfaction, and then better service assisting ICT activities should be added or improved in HSR. This study has a new insight into HSR travel satisfaction from a new perspective, and makes a contribution to improve HSR travel satisfaction through ICT methods.

### Key words:

high speed rail; travel satisfaction; impact factors; ICT; activities; service quality

## The Application of ICTs in Airspace Configuration and Time alternative mechanisms

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### Abstract

Facing the problems between the air traffic demand and airspace utilization, it's a challenging research topic to optimize airspace configuration in the field between geography and airspace. So there is an urgent demand for new information and communication technologies. The paper is on the basis of overview the information constitution and support of NextGen and the study of the development of technique of airspace collaborative decision-makings to confirm the new features based on ICTs, promoting the study of the interaction between time and space under the social network. It will support the national flexible airspace management (FAM), releasing airspace capacity and improving the utilization of airspace to reduce flight delays and airspace changes. The paper also reveals three mechanisms: dynamic mechanism – from dynamic airspace configuration (DAC) to dynamic airspace sectorization (DAS) and then shift to 3D-DAS and 4D-DAS; division and evaluation mechanism – in condition of risky weather (RW) by using real-time data input and routes output to get the ranks of the routs in the buffer areas; interaction mechanism – cross-border management and real-time information- interaction between countries and authorities. The results not only open up a completely new airspace research field of geography, also lead the world in making full use of airspace research and replace the existing national airspace configuration and management which rely on human and non-dynamic basic form.

### Key words:

Information and communication technologies; Social network; Time alternative mechanisms; Airspace

## The Internet Use by University Students: Case in Japan

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### Abstract

The purpose of this study is to clarify differences of the Internet use by university students living in urban area and those living in rural area in Japan. A questionnaire survey was conducted for 81 students who go to Hiroshima campus at urban area and 127 students who go to Shobara campus at rural area. The both students often use the Internet for content viewing (music, video, game), e-shopping and communication (LINE, Twitter, email, Facebook). They communicate through the Internet, mainly with their family members, their friends from elementary school or high school and their friends of the university to maintain and strengthen the ties with them. The students in the rural campus, who live alone away from their hometown, usually communicate with their family members and their old friends through the Internet and meet with them in real space once or twice a year. On the other hand, the students in the urban campus, who have been living there with their family members for many years, usually communicate with their old friends through the Internet and but they hardly meet with the old friends in real space because they think they can do it at any time. And the students in the rural campus tend to communicate only with the friends of the campus through the Internet. On the other hand, the students in the urban campus tend to communicate not only with the friends of the campus but also with the acquaintance outside the campus.

### Key words:

the Internet; university student; social network; urban area; rural area

## The Role of the Internet for Domestic Migration Policies by Peripheral Areas: A Case Study of Japanese Local Municipalities

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### Abstract

The peripheral municipalities in Japan are confronted with the challenge of long-standing depopulation in the decades after 1960s. What was particularly serious was the high proportion of decline rate among the youth. The biggest reason of such depopulation is a drift of population from peripheral areas to cities caused by the regional gaps of education and employment between cities and rural areas.

In late years, some peripheral municipalities in Japan prepare various support programs for the people who moved from cities, and are encouraging a migration to peripheral areas. This study reveals the role that the Internet achieves in such domestic emigration policy through the analysis of the websites of the local municipalities and the questionnaire survey to them.

### Key words:

depopulation; peripheral area; local municipality; domestic emigration; Internet

## Thriving Communities Due to E-Health Services

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### Abstract

ICT in general and e-health technologies in particular contribute to strengthen geographically remote regions economically and socially. They offer job opportunities in highly qualified labor markets and ensure thriving living conditions by substituting physically present structures and services which are lost otherwise due to a lack of an economic sustainable demand. Socially they provide local communities with basic needs on social (infra-)structures. Like almost any contemporary technology e-health has the potential to decentralize medical services toward the (skilled) individuals. Moreover, it enhances confidence in care services of regions which have to struggle with a decline of tangible infrastructures due to demographic shrinkage. E-health technologies can also support technological progress in general, e.g., the wide use of adapted apps. Apart from having broadband access questions of competence and relevance are therefore critical for a successful implementation of e-health.

This theoretical frame is applied to an empirical case study in the northern Swedish municipality of Storuman, a peripheral and sparsely populated region with approximately 6.000 inhabitants living in an area of 8.300 km<sup>2</sup>. Storuman town is equipped with a hospital that has broadband access to the specialized hospitals in Umeå and Luleå. Their tele-diagnosis facilities are widely appreciated and help people living a self-determined life though living remotely to bigger centers. Doctors and patients do improve their knowledge and skills through the use of sophisticated devices, the danger of a spatial concentration of tangible medical services due to technological replacements seem to play a less crucial role.

### Key words:

health technologies; social services and quality of life; remote areas; demographic shrinkage

## Evaluation on principal components analysis of urban human living environment quality of Liaoning Province

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### Abstract

In order to fully understand and quickly improve the living environment of city of Liaoning Province, this paper adopts the statistical data in 2013, profits from the domestic and foreign research results, build a suitable living environment evaluation index system of liaoning province, from the level of economic development, infrastructure, public services, residents' living standard, the ecological environment, social stability, harmony and six aspects to select indicators for 39. Using SPSS software processing data, using principal component analysis method to evaluate, and according to the grade of evaluation results was carried out on the living environment quality in liaoning province, and puts forward countermeasures according to the restrictive factors of each city. High levels of living environment of the city should step up to the ecological environment, social stability, harmony and infrastructure and investment; Higher level should be paid attention to living environment of urban transformation of the mode of economic growth and optimize the industrial structure; Low, low level living environment of the city should pay attention to make full use of its coastal geographical advantages and by improving the traffic situation, to strengthen the economic exchanges and cooperation with the surrounding region, promote the development of economy.

### Key words:

urban living environment; Index system; Principal component analysis; Liaoning province

## C12.14 Geography of the Global Information Society

### Green Economics and Smart Cities



Home

#### Oral

1. [Impacts of Internet Public Activities on Community Public Life - A Case Study of Nanjing](#)  
Enyu Chang (Nanjing University, China), Feng Zhen (Nanjing University, China)
2. [Innovative City and Technology Clusters: Helsinki Metropolitan Area as a Growth Platform](#)  
Tommi Inkinen (University of Helsinki, Finland)
3. [Smart City in China: a New Agenda for Urbanization](#)  
Feng Zhen (Nanjing University, China)
4. [The Impact of ICTs on Space-Time Use and Urban Quality of Life](#)  
Vladimir Ira (Institute of Geography of the Slovak Academy of Sciences, Bratislava, Slovakia, Slovakia)

#### Poster

1. [A Research on China's High Technology Industry: Spatio-temporal Characteristics and Driving Mechanism](#)  
Bingxin Li (China, Liaoning Normal University)
2. [Implementation of Smart Cities in the Developing Countries](#)  
Shahryar Azharianfar; Ali Noori Kermani (Iran, Islamic Azad University Central Tehran Branch)

## Impacts of Internet Public Activities on Community Public Life - A Case Study of Nanjing

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### Abstract

From the initial period of the network society, the relationship between internet usage and community public life has received much attention. With the popularizing of mobile internet and social networking, people are more willing to sharing and perusing satisfaction via using the Internet. Under this new context, how will internet public activities interfere with the community public life? From two levels of specific internet activities and Internet psychological activities, in this article, we adopt Nanjing China as a case study, and investigate the relationship between the publicity of internet usage and the community public life, using 2SLS regression, which improve the lack of Internet psychology aspect in previous studies. We also propose some suggestions for promoting the engagement of community public life in the information era.

### Key words:

Internet psychology; Internet usage; community public life; Nanjing

## Innovative City and Technology Clusters: Helsinki Metropolitan Area as a Growth Platform

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### Abstract

The change and renovation of urban form has been variously depicted as one of the key challenges in growing cities. Technology has been deemed as one of the enablers of change. Developments in wireless information technologies have affected information distribution on all geographical scales from global satellite transmission to local indoor networks. The notion of the “shrinking of the world” and “time-space compression”, as discussed decades ago in analyses of information networks is as fundamental as ever. Cities, whether thought as physical spaces or administrative structures, have been influenced by the growing demands, and also potential, brought about by technological progress. New solutions providing location-based services (LBS) have been seen as one of the major game changers. The question focuses on enabling direct or indirect knowledge transfer and flows of material or immaterial resources. This paper will reflect on selected theories and typologies used in the analysis of innovative cities and it will address the theories in accordance with interpretations. The data is collected from the Helsinki Metropolitan Area (HMA) representing the most important urban cluster in Finland (Helsinki, Espoo and Vantaa). The paper considers theoretical propositions in the light of the knowledge bases framework and provides a reflective discussion on the current condition of innovative city.

### Key words:

Innovation; city; urban design; urban planning; urban technology; economy

## Smart City in China: a New Agenda for Urbanization

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### Abstract

Smart cities, which apply the new generation information technology in all of urban construction, could promote the efficiency of urban infrastructure and services greatly. They also support the sustainable development of economy and encourage participatory governance through the elaboration management of nature resource, social capital and intellectual capital, so as to realize the high quality of urban life. In China, smart cities and the development of new urbanization have become the national strategies. The construction of smart cities is also thought as a proposed method to accelerate new urbanization, and the way to sustainable development. Firstly, the paper discusses the implication of smart city for Chinese new urbanization. Secondly, the paper analyzes the Smart City Program in Urban China, including smart city strategies initiative, evaluating indicator system, and major project for smart city construction. Thirdly, different development modes for Chinese smart city are explored with developed countries. Meanwhile, problems facing to Chinese smart city construction are also emphasized. Lastly, the paper gives the relative policy suggestions to smart city planning and construction combined with new urbanization strategy.

### Key words:

Smart city; new urbanization; China

## The Impact of ICTs on Space-Time Use and Urban Quality of Life

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### Abstract

A strong renewed interest in time-geography results in substantial recent theoretical extension of its approaches and concepts. The complex of ways in which the information and communication technologies (ICTs) are becoming an integral part of today's society is fascinating and is incorporated into a relatively broad spectrum of the types of research. An emphasis on space-time as being the key understanding the information and communication technology-age phenomena is identifiable in geographical research. Empirical findings indicate the multiple roles that ICTs already play in all aspects of urban (quality of) life. The aim of our contribution is to present a time-geographical approach that enables to explore how people's use of time and urban space is affected by the changing access to the information a communication technologies and to examine the impact of ICTs on everyday lives of citizens in Bratislava (Slovakia) through the integration of space-time budget data and qualitative interviews based on two surveys conducted in the last decade.

### Key words:

ICTs; time-geography; quality of life; city of Bratislava; Slovakia

## A Research on China's High Technology Industry: Spatio-Temporal Characteristics and Driving Mechanism

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### Abstract

High technology industry is important department of national economy and strategic leading industry. It is main power that promotes scientific and technological innovation and technological progress. The development level of high technology industry and international status represent national scientific and technological strength and potential growth in the future.

Based on the level cities as research unit and the relevant data of high technology from 1995 to 2013, measured the agglomeration degree of the high technology industry by Static agglomeration index and Dynamic cluster index, combined with Arc Gis spatial analysis software, this paper analyses the space-time evolution and driving mechanism of high technology industry. The results show that: (1) in terms of time, the output, main business income such aspects of high technology industry present high speed growth. (2) In terms of space, high technology industry exist regional differences and agglomeration trend. It mainly distributed in eastern region, the central and western regions are relatively backward. (3) According to spatial layout of high technology industry, science and technology and the mobility of human resources, government policies, infrastructure, risk investment and environment are main influencing factors of high technology industry agglomeration.

### Key words:

high technology industry; spatio-temporal characteristics; driving mechanism; agglomeration index; Gis

## Implementation of Smart Cities in the Developing Countries

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### Abstract

Developing smart cities, either in the developed or in the developing countries, will help in convergence and interaction between urban agents and will result in sustainability and improvement of citizens' life quality through a long-term plan. Cities in the Third World countries are entangled with several problems such as poverty, various types of pollution, economic downturn, immigration, and environment degradation, thus technology potential based solutions can help them to improve their cities. Among others, several models have been suggested for launching Smart cities which seem proper with the environmental capacities of the developed countries. Thus, the necessity of preparing a framework proper with the special condition of the developing countries can help them to deal with some problem they face with. For this study, poverty, education, infrastructure, healthcare facilities, an integrated governmental system, enabling and promoting public participation, preventing environmental degradation and eventually improving life quality are among the most important and key factors; thus, it tries to offer propositions to improve and solve the problems through information technology in the framework of Smart city projects.

### Key words:

Smart City; Urban Planning; Developing Countries; Geography

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Empowerment Issues in Traditional Communities



Home

#### Oral

1. [A Study on Small Firms' Growth in Ethnic Tourism Village: Sustainable Livelihood Perspectives](#)  
Tong Wen (Department of Tourism Management, Management School, Jinan University, China), Hua Guo (School of Tourism Management, South China Normal University, China)
2. [An Investigation of Establishing the Indicators on Indigenous Subjectivity Ecotourism of the Atayal People in Taiwan](#)  
Yin Jen Chen (Graduate School of Earth Science, Chinese Culture University, Taiwan, China), Su Hsin Lee (Department of Geography, Normal University, Taiwan, China), Jui Hsiang Lu (Department of Tourism and Leisure Management, Vanung University)
3. [Conflict and Coexistence of Tourism Livelihood and Traditional Livelihood in Upland Ethnic Community, Southwest China](#)  
Jing Hu, Yajuan Li (Central China Normal University, China)
4. [Does Tourism Development Reduce Poverty? On Achieving Balanced Stakeholder Relationships](#)  
Xianrong Luo (Sun Yat sen University, China), Jigang Bao (Sun Yat sen University, China)
5. [How Tourism Community Empowerment Influence Resident Attitude? Modeling Role of Life Cycle Perception](#)  
Sha Zhu, Li Tao (Capital Normal University, China)
6. [Preservation of Local Communities' Identity in Italy. The Role of University](#)  
Gian Luigi Corinto, Flavia Stara (University of Macerata, Italy)
7. [Profile and Determinants Of Pro-Poor Tourism Community Residents' Sense of Place in Qinling & Daba Mountain Area of China](#)  
Hao Junqing (Xi'an University of Finance and Economics, China), Jie Li (Xi'an Jiaotong University of China, China)
8. [Research on Minority Community Participation in Tourism Based on Tourist Perspective -A Case Study of Xiao Zhuang Village of Huzhu County in Qinghai](#)  
Yun Ma Huang (Qinghai Normal University, China)
9. [Sacred and Profane: Tourism, Religious Commodification and the Politics of Place in a Tibetan Bon Monastery in Jiuzhaigou National Park, China](#)  
Ying Nan (Sichuan University, China)
10. [The Influence Mechanism of Community Participation in Tourism Development of Ancient Towns](#)

Huan Hu, Jinhe Zhang, Jinkun Sun, Guorong Tang, Yu Zhang (Nanjing University, China)

11. [The Influence of Tourism Involvement on Tourist Authenticity Perception of Dance Performances of the Zang and Qiang Nationality](#)

Ling Mao, Jie Zhang (Nanjing University, China)

12. [Tourism Management through Community Participation in Munhang settlement, Namhae Island, Korea](#)

Okhee Jung (The Association of Japanese Geographer, Japan)

13. [Transferring Land Use Right in Rural Tourism Community: Questions of Sustainable Livelihood and Community Change](#)

Wei Lei, Sun Jiu Xia (School of Tourism Management, Sun Yat sen University, China)

## Poster

1. [Development and Evolution of the Yellow River Great Delta and the Positioning of the Hu-Kou, Tai.Shan and Lao.Shan Tourism Brand](#)

Benxing Zheng (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy); Zhijiu Cui (China, Peking University); Yongping Shen (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy)

2. [Impact of Tourism Development on Rural Households Livelihoods in the Western Poor Areas: A Case of Ankang City, Shanxi Province, China](#)

Jie LI; Peiyang Dang (China, Xi'an Jiaotong University of China)

3. [Study on Modes of Community Participation in Tourism](#)

Jin Yang (China, Nanjing Institute of Geography & Limnology, Chinese Academy of Sciences)

4. [The Construction of Residential Landscape in Tourism Destination Morphology Evolution of Tourism Localization](#)

Guorong Tang (Department of Land Resources and Tourism Sciences Nanjing University)

5. [To Analyze Why Indigenous Tribal Face such Demands and Difficulties After the Development of Indigenous Tribe Tourism](#)

Chung-Liang Kao (China, Taiwan, Kaohsiung Normal University); Yi-Hsien Lin (China, Taiwan, Da-Yeh University); Yun-Sen Chen (China, Taiwan, Kaohsiung Normal University)

6. [Using Ethnic Autonomous to Analysis Taiwanese Indigenous Rights in Traditional Territory](#)

Chung-Liang Kao; Yun-Sen Chen (China, Taiwan, Kaohsiung Normal University); Yi-Hsien Lin (China, Taiwan, Da-Yeh University)

## A Study on Small Firms' Growth in Ethnic Tourism Village: Sustainable Livelihood Perspectives

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### Abstract

Previous research works including Butler's tourism destination life-cycle theory have revealed that in the rapid development period of a tourism district, external capital would flood in and displace local residents as the leading force of tourism development, thereby triggering some problems and conflicts. Meanwhile, some new phenomena were observed from our case study of Longji, Guilin, Guangxi, a rural tourism village mainly inhabited by ethnic minorities of Zhuang. Many migrant young workers in cities are returning to their hometown Longji, starting their own small businesses. Taking tourism as an important livelihood strategy, these young people has showed more significant abilities in entrepreneurial skills and competence in comparison to the elder generation, and has gradually been a new player in the tourism industry. This has challenged the dominant position of external capital and, to some extent, reconstructed the tourism development pattern of this district which is believed of great importance to local communities' autonomous development. This paper aims to figure out why these migrant young workers could be better in entrepreneurial competence and its impacts on the growth of local small tourism firms from the perspective of sustainable livelihood(SL).

Based on field investigation in Longji, clustered random sampling was first applied for purposive selection of interviewees and 30 semi-structured in-depth interviews were conducted. The interviews particularly focused on these sample's livelihood strategies, involvement condition in tourism, their capital assets.

### Key words:

Small Firms' Growth; Small tourism business; Sustainable Livelihood

## An Investigation of Establishing the Indicators on Indigenous Subjectivity

### Ecotourism of the Atayal People in Taiwan

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#### Abstract

Indigenous communities in Taiwan have risen of an upsurge of ecotourism development over the past two decades; ecotourism tends to be used to relive nature, natural, cultural, and environmental education, and create the opportunity to activate economic development of homelands. Although ecotourism provides a more proactive and positive tourism pattern to tribes, what indigenous communities care about are those indigenous cultures and their subjectivities. This study is focusing on establishing the indicators on indigenous subjectivity ecotourism of the Atayal people in Taiwan. The researchers applied Delphi method to collect the opinions from tribal elders, government authority, and local organizations. After three rounds of the Delphi method, nine categories were found: community empowerment, subjectivity, traditional culture, participation, self-identity, communication, nature-based culture, conservation, and commerce; in addition, 38 factors were included within the above nine categories. Therefore, the development of ecotourism in indigenous community must be planned with the subjectivity, broadening the participation, communication and cultural identity to enhance the power of tourism industry in traditional communities in order to lead a bottom-up approach to drive forward the sustainable development of the indigenous communities.

#### Key words:

Indigenous community; indigenous subjectivity ecotourism; Delphi method; the Atayal people

## **Conflict and Coexistence of Tourism Livelihood and Traditional Livelihood in Upland Ethnic Community, Southwest China**

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### **Abstract**

Rice-duck-fish ecosystem, as the traditional and typical agriculture mode, created by upland minorities in southwest China has been selected as the global agricultural heritage, which is a representative coexistence of human and nature in Southwest China (Sun 2013). However, since the late 1970s, this traditional agricultural ecosystem has faced the threat of vanishing (Cui 2009). Focusing on three case-study villages in Qiandongnan Hmong and Dong Autonomous Prefecture, Guizhou Province, we explore the selection of livelihood approaches under the background of urbanization and the impact of tourism development and population mobility on traditional livelihoods. Specifically, we compare the livelihoods of villagers from one village without tourism to date (but slated for tourism development in the near future); one with a 'medium' level of tourism; and one where tourism is in full force. Our analysis of the transitional characteristics of these communities with different level of non-agricultural activities focuses on selection of rice, usage of agricultural tools and facilities as well as raising process of duck and fish to shed light on the conflicts and coexistence of livelihood approaches under different stresses and demands from the socio-economic context. We hope that our findings may provide support for sustainable tourism livelihood and livelihood diversification in upland minority region in the future.

### **Key words:**

rice-duck-fish ecosystem; tourism livelihood; traditional livelihood; conflicts; coexistence

## Does Tourism Development Reduce Poverty? On Achieving Balanced Stakeholder Relationships

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### abstract

It seems worldly accepted that tourism development can reduce poverty. External driving forces, such as government, enterprises and of course tourists, were considered important for tourism to reduce poverty at destinations. However, the issue how they should work and collaborate to achieve positive outcomes for the poor remains mostly unclear. This study therefore adopts a comparative research design and investigates how the key stakeholders, including government, the private sector, the tourist market and locals (including the poor), work together to results in different outcomes. The study is conducted in China given that the country recently has made great achievement in the agenda for both poverty alleviation and tourism development. Three cases are included, respectively Chongdu village in Henan, Li village in Guangxi and Liupan village in Hainan, in which the stakeholders played different roles yet resulted in either different or similar outcomes for the poor. The study primarily found that when the market plays a leading role, tourism can well benefit the poor. Yet, with the locals' ego-orientation, it may also cause the public environment unattended. If the tourism development is mainly driven by government or/and the private sector, it can effectively benefit the poor only if poverty alleviation is made one of the important purposes. By clarifying the work of the key driving forces, this study aims to enrich the understandings of the tourism-poverty nexus, and provide implications for further tourism practices in less developed areas.

### Key words:

tourism development;poverty alleviation;stakeholder;the poor

## How Tourism Community Empowerment Influences Resident Attitude? Moderating Role of Life Cycle Perception

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### Abstract

Empowerment evolved from sociology concept has recently measured by researches from tourism area to explain why resident support for tourism development. But how empowerment influences attitude of resident to tourism is still unclear since significant findings has examined in quantifying empowerment. To solve this question will require diversity evidences and specific perspectives to explain the complexity system of tourism community. Since majority of case studies come from developed countries, it is necessary to fill this gap by evidences from developing countries. As some experts recommend, on the other hand, the life cycle of destination should considerate to explore the relationship between tourism community empowerment and residents attitudes. In recognizing of those two gaps, this study was promote tourism community empowerment to further step by combining Chinese tourism community evidence and moderating role of life cycle perception.

### Method

Unstructured interviews and questionnaires were both administered to residents within countryside of Beijing, China(Fangshan District, Yanqing District, Mentougou District, Pinggu District, Miyun District and Huanrou District). All of sample villages oriented by tourism industry were awarded "Folk tourism village" by Beijing Tourism Development Committee which is government organization devoting to Beijing tourism development.

Unstructured interviews were conducted firstly among resident to accurate the tourism scale of empowerment in Chinese tourism community context before collecting questionnaire data from those who engaging in tourism business. 530 questionnaires were distributed and 496 questionnaires were collected from June 1rd to July 26, 2016. All of data were input to SPSS software and then analyzed by SEM. Confirmation Factor Analysis was firstly employed to examine the validity of construct and model fit, and Path analysis and regression analysis were also used to finally test the hypothesis mentioned.

### Findings

The CFA revealed good model fit indicator: $\chi^2(205)=592.516(P=0.000)$ , GFI=0.906, AGFI=0.873, RMSEA=0.62,

Based upon RMSEA being less than 0.08 and NFI and CFI was around 0.90, it was concluded the model's fit was good and above the standard cut off points. The 14 proposed hypotheses were tested and seven of them were supported by SEM model. It is also highlight that economic, psychological, social and political empowerment has different influence on resident attitude to support tourism in perspective of their different life cycle perception.

## Conclusion

Three reasons could be concluded: Firstly, It is common that political empowerment has little opposite effect in resident attitude to support tourism, which is usually happened in centralized developing countries. Although community power is mentioned on government policies, resident still have no invitation to participate in tourism planning or making tourism decision. Secondly, economy empowerment seems double-edged sword for tourism community in Chinese countryside community due to the tradition concept of "home" meaning for Chinese peasants. They do eagerly desire to change their state by benefitting from tourism industry but, on the other hand, they also have psychological reject for the rich-poor gaps happening on their communities. It is deeply revealed that the self-assessment of Chinese peasants is mainly based on the community they living in, as well as social relationship embedded in this community.

## Contribution

This study is conducted tourism community empowerment to the further step through the life cycle theory. On the other hands, it is fill the evidence from developing countries and explain that empowerment play different role in tourism community through different international context.

## Key Words:

Tourism Community; Resident Attitude; Empowerment; Life cycle Perception

## Preservation of Local Communities' Identity in Italy. The Role of University Research

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### Abstract

In regions of the so called Third Italy, economy has been based on industrial manufacturing, spread in myriads of small and medium sized units (SMEs), within industrial districts scattered in rural areas. Local culture of both entrepreneurs and laborers still maintains distinctive know-how, skills and craft abilities, descending from farming culture fit to be used in production of consumption goods, such as shoes, furniture, household appliances. Incumbent competitors due to globalization put many SMEs in crisis, claiming for designing new strategies both for singular enterprises and territories. National and local policymakers envisaged tourism as leverage capable of giving credible alternatives for reorienting local community economies. Universities has been called to provide education and governance. The paper reports the ten-years lasting experience of the authors in teaching and researching on tourism within a small University immersed in rural-industrial region located in Central Italy. We aim at showing how research and teaching on tourism (and rural tourism) can help local communities to foster traditional skills in reorienting local economy without losing identities, and on the contrary, empowering traditional know-hows. Results show that Universities can effectively participate the governance process designed by national and local public agencies—the National Ministry of Research and the Regions—in helping territories to find new visions for local development. Time horizon is clearly cast in the medium-long period, due to the slow adaptation of entrepreneurial culture to be implemented in the tourism sector. Benefits can be spread in all regions where students come from.

### Key words:

Tourism and Rural Tourism; Education; Local Communities Identity; University Research

## **Profile and determinants of Pro-poor Tourism Community residents' sense of place in Qinling & Daba Mountain Area of China: Based on the investigation of priority Pro-poor Tourism Community in Ankang City of Shaanxi Province, China**

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### **Abstract**

Pro-poor Tourism Community is a major practice way to achieve poverty reduction and sustainable development in Qinling & Daba Mountain Area (Qin-Ba mountain area) of China. Sense of place, including perception attitude and perception behaviors, is an emotional relation degree between residents and their local place, and also a special Man-land relationship. So, we focus on residents' sense of place in Qin-Ba mountain area, analyze profile and determinants of their sense of place, then supply suggestions for the development of Pro-poor Tourism community.

Firstly, we constructed the theoretical model of residents' sense of place by two indexes: tourism participation willingness as the index of perception attitude and tourism participation ways as the index of perception behaviors, and the study framework of determinants with three perception indexes (residents' perception for poverty reduction policies, tour development corporations and environment protection).

Second, based on the investigation 187 residents of 5 priority towns and 9 priority villages in Hanbin county and Ningshan county of Ankang city by semi-structural questionnaires and interviews, we analyzed the different profile of residents' perception attitude and perception behaviors in different Pro-poor Tourism community (the exploration community, the involvement community and the development community).

Third, using multiple regression analysis, we analyzed the correction degree between residents' sense of place and residents' three above perception indexes, and then resulted respectively the major perception index for the three above communities. Therefore, we got the different determinant in different development stage of Pro-poor Tourism community in Qin-Ba mountain area.

Finally, on the view of poverty reduction policies, tour development corporations and environment protection, we supply suggestions for the construction of Pro-poor Tourism community in Qin-Ba mountain area.

**Keywords:** Sense of Place; Pro-poor Tourism community; Poverty reduction; perception attitude and behaviors

## Research on Minority Community Participation in Tourism Based on Tourist Perspective -A Case Study of Xiao Zhuang Village of Huzhu County in Qinghai

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### Abstract

Xiao Zhuang village of huzhu county is typical community of minority participation in tourism in Qinghai province. select it as the research object; make a survey of questionnaire and tourists in-depth interviews; obtain first-hand information; use SPSS statistical analysis method and studies the tourists perspective the village. The result shows that the tourist overall satisfaction is higher; Part of the index gap between expectation and reality; 30 second-grade index survey in four- quadrant diagram is divided into advantage area, improve area, opportunity area and maintain area. From the survey of 7 first-grade index tourists evaluation from high to low is traffic convenience, diet culture awareness, tourism environment, the tourism management of the village, authenticity of minority culture and tourism atmosphere. At last the paper put forward to related suggestions for further improving Xiao zhuang community participation tourism.

### Key words:

tourism perspective;HuZhu county of Qinghai province;tourist

## **Sacred and Profane: Tourism, Religious Commodification and the Politics of Place in a Tibetan Bon Monastery in Jiuzhaigou National Park, China**

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### **Abstract**

There are different kinds of assumptions about Tibetan people's religious life in China. However, limited research has been focusing on the ways in which Tibetan institutional religion exists in contemporary marketised and modernising China. This paper seeks to explore this in a time when religion has been increasingly directly related to market economy worldwide, which is especially evident in China by the rising tourism-induced religious commodification. However, this prominent phenomenon has been greatly ignored or simply taken-for-granted by academics. A Tibetan Bon monastery in Jiuzhaigou National Park, a mature tourist destination was chosen as an empirical case study. I had stayed in Jiuzhaigou for about 8 months from 2009-2012 conducting in-depth interview and participant observation. 65 local Tibetans and 25 monks from older, middle and young generation, and 7 government officials were interviewed.

This paper reveals the ways in which tourism has reshaped the traditional dynamics of institutional Tibetan religion through religious commodification. As a traditionally isolated and sacred place, Zharu Monastery has been given a new quality, a salable tourist commodity with monetary value. Toward this, government and local people have different understandings and attitudes. First of all, rather than determined and uniformed attitudes, both the central and local government actually have ambiguous and ambivalent views toward religious commodification. On the one hand, they want to use tourism to realise economic development, on the other hand they do not want to over-publicise religion which is seen a potential threat to national integration. Here economic development and national integration, as Chinese state's two major principles of ethnic policies, are conflicting when practiced in local scale. Moreover, governments generally tend to consider the monastery as tourist product, minimising its sacredness. For the local people, monastery is more considered as a holy space. Commodification diminishes the sacredness which was taken as the core of the monastery's meaning in their lives.

### **Key words:**

Religious commodification; Ethnic politics; religious politics; Tibet; China; tourism

## The influence mechanism of community participation in tourism development of ancient towns

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### Abstract

Community participation in tourism development plays an important role in sustainable development of tourism destination, and it is also one of the research focuses of domestic and foreign scholars. This paper builds a structural equation model reflecting influences on community participation using four structural variables based on the sustainable development theory, social exchange theory and behavioural geography. Then choose Zhouzhuang, Tongli, Shaobo and Huangqiao to conduct an empirical study. Results of this study are listed as follows: (1) "Participating ability" and "support degree" have a direct positive impact on tourism "participating behavior", in which the former is a main factor. While "the sense of place" and "perception" have an indirect positive impact on "participating behavior". (2) It is demonstrated that in the development stage, the technology and fund is the main factor among the ability of participation. And with the development of tourism industry, access to tourism policy becomes the main limiting factor. (3) "Place identity" exact a much stronger influence on "support degree" in the development stage, While in the consolidation stage, the "support degree" is influenced by "place identity" and "place dependent" together. This paper innovates in the perspective, scale and method. And the structural equation model reflecting influences on community participation is proposed and ancient towns in different life cycles are compared, to provide more effective scientific data for sustainable development in tourism destination.

### Key Words:

Community participation in tourism development, Influencing mechanism, Tourism destination life cycle, Structural equation model, Ancient town

## The Influence of Tourism Involvement on Tourist Authenticity Perception of Dance Performances of the Zang and Qiang Nationality

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### Abstract

The design of cultural tourism attractions means culture presentation of the destination. To some extent, it will be a process of local culture reproduction with the interaction between tourists and local community according to the theory of tourism gaze. How do tourists understand the reproduced culture? Does tourism involvement degree differences significantly influence tourist experience and satisfaction? This paper takes the song and dance performances of the Zang and Qiang nationality of Jiuzhaigou area for example, investigates tourism involvement and tourists' authenticity perception of performance with the method of questionnaire survey, and analyses how tourism involvement influences tourists' authenticity perception. The results show that: tourism involvement degrees among tourists with different ages, nationalities and education backgrounds are significantly different; Tourism involvement degree and authenticity perception has certain positive correlation; Tourism involvement degree differences can explain different tourists' perception, experience and satisfaction to some extent. The research conclusions of this paper give advice to the song and dance performance of national minority: strengthen product image and tourist cognition through much more publicity and marketing work to improve tourist satisfaction and revisit intention.

### Key words:

tourism involvement; authenticity perception; song and dance performance; Jiuzhaigou

## Tourism Management through Community Participation in Munhang settlement, Namhae Island, Korea

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### Abstract

Currently, recreation in rural areas is popular among urban Korean visitors; types of recreation include agriculture, fisheries, and rural life experiences. The Korean government has conducted the tourism experience village project since 2000 to promote regional development through experience tourism in rural regions, especially Munhang settlement, Namhae Island, which is famous for a national policy project pertaining to the tourism experience. Namhae Island is in a coastal area near the southern tip of Korea and Munhang settlement is in the north of the island. This research clarifies how community participation is involved in rural tourism. I gathered data through an attitude survey administered to the experience village committee and residents.

The residents of Munhang settlement make a living through agriculture and fishery. Munhang settlement was an experience village initiated in 2002 and recreated on the tidal flat. The settlement received 60,000 domestic tourists in 2014. The experience village committee demands resident participation for the project and rewards residents who participate as agriculture, fisheries, and parking management instructors. Moreover, the committee distributes a part of the business gains to all households; therefore, the project serves as a settlement community enterprise. Such a management system demanded business participation by residents and had a good effect on Munhang settlement tourism management.

### Key words:

tourism experience village project; community participation; settlement community enterprise; attitude survey; Munhang settlement Namhae Island; Korea

## Transferring Land Use Right in Rural Tourism Community: Questions of Sustainable Livelihood and Community Change

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### Abstract

In different development patterns of rural tourism, the state, market and local community have distinctive impacts on indigenous' social structure and cultural value. By conducting longitudinal quantities research in villages by Lugu Lake located at the border of Sichuan and Yunnan Province, this paper seeks to explore the community change in different stages of tourism development. We found that the villagers would reduce their risks of running and renovating family hotel through transferring usage rights to external investors, leading to breakdown of local moral economy on the one hand, but resulting in intensive conflicts in the land-use contract between local community and external investors on the other. In market-led development pattern, the conflicts also occur in contending the land use rights between local government, villagers and external investors. However, the land-renting based livelihood leads to rural degeneration including community deskilling, decrease of community cohesion and ecological degradation. The overwhelmingly inflowing capital has reinforced the excessive exploitation and disorder development. The Rectification project in illegal land use and building violations by government since 2013 undermined local family structure and social ties and thereby is largely unsuccessfully. In this sense, we claim that autonomous development is an important form of development ideas. In the stage of community-led tourism development, the knowledge and capability of community could be well considered. Indigenous social culture could also be preserved and inherited through Grassroots development. In community-centered development approach, it is also helpful to achieve the development which community defines and establish their sustainable livelihood.

### Key words:

Land transfer; Community change; Grassroots development; Sustainable livelihood

## Development and Evolution of the Yellow River Great Delta and the Positioning of the Hu-Kou、 Tai.Shan and Lao.Shan Tourism Brand

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### Abstract

The Yellow River flows through the Sanmen Gorge into the sea and has developed its piedmont alluvial fan before 1.1Ma BP. During the last glaciation interstadial (30-40Ka B.P.) , the Yellow River flows the Jungong Gorge into the sea, linking the river head (Roige Basin etc.) and its lower reaches together. The northern part of Yellow River great delta plain reaches Tianjin near the Bohai and its east-southern part reaches North Jiangsu near the Yellow Sea. The fluctuation of the great delta scale is controlled by the sea level change. During the last glaciation maximum (20-15Ka B.P.) , the sea level was 150-160 m below the present sea level .The coastline of East China Sea was located at the outer margin of the continental shelf and the coastline is 600 km east of the mouth of Changjiang. About 6 ka years ago, during the Mid Holocene the sea level rise 3-4 m higher than the present sea level. The coastline was located near Tianjin, 80-100 km west of present Bo Hai Bay and the coastline was located at west Yancheng of the north Jiangsu, 60-70 km west of present Yellow Sea. The middle and lower reaches area of Yellow River is the cradleland of the Chinese civilization. There are many famous types of scenery of mountains and waters in this area. Such as Hu-Kou、 Tai.Shan and Lao.Shan. Hence its tourism brand should be positioned on the superior humanistic geographic sceneries and special landscapes of geology and geomorphology , instead of focusing on so-called non-existent palaeoglacial remains.

### Key words:

Yellow River great delta; non-existent palaeoglacial remains.

## Impact of Tourism Development on Rural Households' Livelihoods in the Western Poor Areas: A Case of Ankang City, Shaanxi Province, China

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### Abstract

In recent years, rural tourism is growing rapidly in China, it plays an important role in alleviating poverty and improving rural Households' livelihood. Firstly, within the DFID sustainable livelihood analysis framework, the paper builds an operational system of livelihood analysis, and builds a framework about how rural tourism impact households' livelihoods. Secondly, we use the survey data in 9 rural communities, 5 towns in Ankang City, Shaanxi Province, China, where we adopted the method of semi-structured interviews and collected 187 valid rural household questionnaires during November 15-20, 2015. Some rural households had the income from tourism by running rural hotels, working in tourism-related companies, etc. The paper compares livelihood capitals and outcomes between households participating in tourism and non participating in tourism. Furthermore, the paper differentiates the households into five livelihood types: traditional farming, migrating work oriented, non-farming dependent, tourism participated and tourism oriented. We compare their social and demographic characteristics, livelihood capital of the five types households, and then analyzes the causes and formation of their livelihood. We have the following conclusions: Because of tourism, the rural households' livelihood has some changes. The proportion of traditional farming households and work-oriented households declined, households involving in tourism activities increased. The surveyed households' livelihood had improved after they participated in tourism activities. However, the households' livelihood capitals are still limited, and the livelihood capital differs greatly among the five types households.

### Key words:

livelihood; sustainable livelihood framework; tourism; livelihood capital

## Study on Modes of Community Participation in Tourism

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### Abstract

Community participation has long been a topic of research on tourism in countries outside China. It was not until 1990s, the concept of community participation began to be taken seriously in China. There have been more and more empirical studies concerning community participation in tourism. This paper makes a review of researches on the concept definition and modes of community participation. Based on diversified classification standards from different valuation models of citizen participation both home and abroad, focusing on the roles that local community, government and external capital play in community participation, this paper reduces practices of community participation in different cases to three modes, namely 'community participation which is dominated by outside forces', 'community-driven development without intervention of outside forces' and 'community-driven development with intervention of outside forces'. The most universal mode in China is the former one. Most practice still retains in the tokenism or induced community participation in which community members have chances to participate in project implementation but have no chance to enter decision-making process which would influence distribution of tourism interests and their everyday life. Community participation modes vary from place to place in participants, coordinating mechanism for profit distribution and so on. Due to higher level of local economic development and market development, and more control which local government takes of local development, most community participation in eastern China is under the impact of local government and external capital and therefore it has rich experience in game with local government and external capital. However, informal institution such as local tradition and village rule embedded in minority nationality regions can prevent the practice of community participation from free-riding behavior and properly coordinates and ingeniously solves the imbalance of members' interest distribution for taking part in tourism development and controls external investment.

### Key words:

community participation; modes; tourism; China

## The Construction of Residential Landscape in Tourism Destination Morphology Evolution of Tourism Localization—the Local Oral History Method Based on the Case of Hani Mushroom House

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### Abstract

The impact of tourism on the evolution of landscape patterns of traditional houses, is the current domestic and outside the influence of regional tourism culture research important content. Taking Yunnan Yuanyang Qingkou Hani mushroom houses as a case, using the method of local oral history, local tourism interpretation of Hani the mushroom house form derived construction mechanism. The results are as follows: (1) the three stage in the evolution of the local characterization of Hani the mushroom house morphological differences exist. (2) the regional tourism is the local tourism by weakening the threat of local style reconstruction process, resources, power, capital and knowledge more action the main play function, mechanism, image and knowledge construction effect, tourism impact force between the main direction of residential morphology derivation. (3) in the tourist places in the process of processing required dwelling environment harmony between demand and tourist place construction, avoid because tourism brings beyond local. Study on tourism localization for the local protection of world heritage sites in Yuanyang Terrace Scenic cultural landscape and the development of the problem of keeping the reference of theory and practice.

### Key words:

Tourism localization; Placeness; Residential landscape; Hani mushroom house

## To Analyze Why Indigenous Tribal Face such Demands and Difficulties After the Development of Indigenous Tribe Tourism

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### Abstract

Traditional territory is not only a space for daily life, but also acts an important role to promote tribe tourism as it contains the custom, history and culture of indigenous people. Many studies show that to preserve the autonomy of indigenous territory, the co-management system is necessary in tribe tourism promotion. Nowadays, however, there are many restrictions on indigenous people's autonomy on resources which make tribe tourism promotion difficult. We reviewed literatures from Smagnus Tribe and Mulumugi Tribe and examine their success and failure on tribes' tourism development. This study takes the Adiri Tribe of Rukai people in Pingtung as an example, trying to find out the problems of co-management system in tribe tourism. The results show that the main limitations are: land ownership, indigenous custom commitment, Forest Law, and Wildlife Conservation Act. In conclusion, we can refer Royal Declaration of Canada from its land and ethnic autonomous viewpoint, in return, to reduce the impact of regulations and foreign capitals; thus, establish a sound Tribal management mechanism.

### Key words:

Co-management; Rukai; Indigenous Traditional Territory; Adiri Tribe

## Using Ethnic Autonomous to Analysis Taiwanese Indigenous Rights in Traditional Territory

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### Abstract

Indigenous Traditional territory is a key part of Indigenous cultural heritage, as it is essential to Indigenous cultural identity. In 2007, the United Nations ensured and enhanced the basic human rights of Indigenous People under their resolution entitled "The United Nations Declaration on the Rights of Indigenous Peoples". In 2005, Taiwan's Legislative Yuan passed the Indigenous Basic Human Rights, then, in 2010, the proposal of indigenous ethnic autonomous law was sent to the Legislative for consideration, meaning to make for more comprehensive Indigenous rights. This study organizes how people fight for the indigenous people's autonomy of traditional territories in Canada, United States, New Zealand, and Australia. It also analyzes indigenous people's collective rights on traditional territories from the perspectives of human-environment relationships and national autonomy. The results can be the reference for further discussion on co-management of indigenous resources.

### Key words:

national autonomy; Indigenous Traditional Territory Right; Indigenous Right Law; human-environment relationships

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Violence



Home

#### Oral

1. [Arab Revolutions and their Impacts on Arabian Gulf States Tourism](#)  
Abraham Alfaggy (Institute of Diplomatic Studies, Saudi Arabia)
2. [The Development of Tourism in Ukraine in Terms of Military Action](#)  
Olga Liubitseva (Taras Shevchenko National University of Kyiv, Ukraine), Iryna Kochetkova (Taras Shevchenko National University of Kyiv, Ukraine)
3. [The Plaza De Toros México as an Urban Dark Tourism Space in Mexico City](#)  
Gino Jafet Quintero Venegas (Instituto de Geografía, Universidad Nacional Autónoma de México, Mexico), Álvaro López López (Instituto de Geografía, Universidad Nacional Autónoma de México, Mexico)

## Arab Revolutions and their Impacts on Arabian Gulf States Tourism

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### Abstract

The end of 2010 witnessed the flare of Arab States Revolutions starting from Tunisia through Egypt, Libya, Syria, and Yemen, followed by Political, Economic, Social and Environmental turmoil, which, in turn, reflected on Arab States tourism sector in general and Arabian Gulf States in particular. In the previous period of Arab States revolutions, these countries have been a major destination for Arabian Gulf States tourists, which suffer, in turn, from weakness of tourism potential. Continuation of revolutions, without any military or political solution in the near future, tended Arabian Gulf tourists in search for a new tourist destination outside the Arabian Region. Arabian Gulf States tourists, looking for a new tourist destination in European or Asian countries, which have benefited from the dramatic changes in Arabian countries, where the flow of Arabian Gulf States tourists and their huge spending of money in Tourism Sector of these countries. By contrast, Arabian countries have witnessed a serious setback in their economic sectors, especially tourism sector that is a major source of income in many Arabian countries because of the political unrest.

The research aims to study the effects of the Arab States political and military conflicts, and its political and economic dimensions of tourism on Arabian Gulf States.

### Key words

Arabian States Revolutions; Arabian Gulf States; Tourism - impacts

## The Development of Tourism in Ukraine in Terms of Military Action

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### Abstract

Ukraine's independence provided for the tourism industry regeneration, system was developed tourism education, formed tourism market. Tourism in Ukraine enjoys positive dynamics during the whole period as from 2000. Inbound flows grew by 3.6 and outbound ones by 1.6 times between 2000 and 2012. Thus, tour operators annually render their services to about 2-3 million foreign and some of 1 million domestic tourists travelling abroad together with 1-2 million domestic tourists and the almost the same number of sightseeing visitors. Recreation and tourism provides priority specialization for 10 of 27 administrative units of the country. For two years Ukraine living in military operations in the east. This, and the annexation of the Crimea, badly affected the tourism image of the country. Military action taking place on a small territory in the east, and the rest of life is peaceful. But the flow of tourists to Ukraine during this time decreased (in 1.7 times). The economic crisis has affected the Ukrainian travel abroad - these trips also decreased in 1.1 times. Develop discrete tourist destinations: the capital city of Kyiv, Lviv, Chernivtsi, Kharkov, Odesa and other regional centers. The biggest and most attractive destination is Kyiv where two thirds of flows are concentrated. Carpathians are popular due their springs and mud resorts as well and recently introduced festival and gastronomic tours. In the mountains themselves the ecologic, sports tourism is very widely exercised in summer time and skiing during the winter.

### Key words:

tourism in Ukraine in terms of military action; tourist destinations

## The Plaza De Toros MÉxico as an Urban Dark Tourism Space in Mexico City

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### Abstract

The Plaza de Toros México, situated in Mexico City, is the world's largest bullring. Bullfighting is conceived as a Spanish heritage tradition and thus, the Plaza attracts thousands of tourists yearly during its two main seasons: the first one during April and May, the Novilladas, consisting of fights with bulls smaller than the official size; and the second one during September, the Big Season, with the majority of visitors. Furthermore, as part of the celebrations of the anniversary of the Plaza México, there is one small bullfight performed in February. Beyond the historical and cultural elements that bullfighting represents for Mexican society, visitors are motivated to go to the bullring to watch a show which sole purpose is to enjoy the abuse and violent death of an innocent living being; however, seldom, the bullfighter performing the abuse can get horned, maimed or eventually die during the show. Within the conceptualization of dark tourism, Sharpley and Stone (2009) define it as the type of tourism involving travel to places historically associated with death and tragedy. Nonetheless, their definition implies that only human lives are linked to this kind of tourism. The purpose of this work is to reveal why a tourist attraction involving non-human animal's deaths must be included in this definition as the generated tourist space profits from the death of the animal as an element of recreation.

### Key words:

bullfighting; dark tourism; animal geographies

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism, Heritage and Globalization



Home

#### Oral

1. [An Assessment of The Status of Services in the Rural Areas of Bandar-E Anzali by Means of Taxometric Techniques From The Viewpoint Of Sustainable Tourism](#)  
Pari Mousapour Miandehi (Assistant Professor of Farhangian University, Iran), Morteza Yahyapour Masrouri (PhD Student, Islamic Azad University, Iran)
2. [Balancing Commerce and Culture: On the Situation of Sami Tourism Entrepreneurs in Swedish Lapland](#)  
Dieter Müller (Umeå University, Sweden)
3. [Construction and Validation of A Scale to Measure Individual Heritage Responsibility in World Heritage Sites](#)  
Peng Chen, Chaozhi Zhang (Sun Yat sen University, China)
4. [Cultural Heritage of Ras Al Khaimah: an Unique or an Unified Vision in Reference to United Arab Emirates Heritage Policy?](#)  
Natalia Łukasiewicz (Faculty of Geography and Regional Studies, University of Warsaw, Poland)
5. [Dark Tourism in Mexico: the Simulation of Being an Illegal Immigrant to the USA](#)  
Alvaro López López, Gino Jafet Quintero Venegas (Universidad Nacional Autónoma de México, Mexico)
6. [Heritage City Development and Sustainable Livelihood Perspective: A Case Study of Chandani Chowk-Red Fort Complex \(Old Delhi\)](#)  
Sonali Yadav (Jawaharlal Nehru University, New Delhi, India 110067, India)
7. [Heritage Institutions as Abstract Machines for Producing the Local through Global Idioms](#)  
Mike Crang (Durham University, United Kingdom)
8. [Hybridization of Space by Heritage and Tourism: A Case Study of the “New I-Style Town” in Tianjin](#)  
Yue LU (University of Paris 1 Panthéon Sorbonne, France)
9. [Interests Coordination of World Heritage Tourism from the Perspective of Social Network Analysis --- Case of Hani Rice Terraces in Yunnan](#)  
Shaohua Shi, Yehong Sun (Tourism College of Beijing Union University, China)
10. [Japanese Characteristics of Dark Tourism](#)  
Akira Ide (Associate Prof/OtemonGakuin University, Japan)

11. [Nostalgia Tourism and Heritage Reproduction of Petsamo, Finland's Former Borderland to the Arctic Ocean, 1945-2015](#)  
Maria Lähteenmäki (University of Eastern Finland, Finland)
12. [Ontology Beyond Borders: Tourist Gaze and the Sense of Universal Appreciation in World Heritage Sites in Sri Lanka](#)  
Iraj Ratnayake, Mahesh Hapugoda (Sabaragamuwa University of Sri Lanka, Sri Lanka)
13. [Iconic Houston: Induced Images of Gastronomy on the Official Visitors Site for Houston, Texas, USA](#)  
Velvet Nelson (Sam Houston State University, United States)
14. [Spatial-Temporal Characteristics and Influencing Mechanism of World Natural Heritage Site and the Surrounding Towns—A Case Study of Aba](#)  
Jiang Rong (School of Architecture and Design, Southwest Jiao Tong University, China), Cheng Jing (China City Development Academy, Sichuan Branch, China)
15. [The Inner Struggle of Visiting Dark Heritage Sites: Examining the Relationship between Perceived Constraints and Motivations](#)  
Chunhui Zheng, Jie Zhang, Lili Qian, Honglei Zhang (Nanjing University, China)
16. [Tourism and Ethnic Landscapes: Social and Cultural Strengthening or Disintegration in Postcolonial Spaces?](#)  
Joseph Cheer (Monash University, Australia)
17. [Tourism Spatial Structure and Its Evolution of Star-Rating Rural Tourist Area \(Point\) of Changsha](#)  
Zheng Chen (Hunan Normal University, China), Yaxi Tang (Sun Yat sen University, China)
18. [Tourism to Sites with a Shadowed Past: The Global Production and Consumption of Dark Heritage](#)  
Rudi Hartmann (University of Colorado Denver, United States)

## Poster

1. [The Impact of Tourists Perceived Authenticity of Cultural Heritage on Experience Quality and Behavioral Intention in Macao](#)  
Wen huijun; Li Xi; Shen Huawen (Macao SAR, China, Faculty of International Tourism and Management, City University of Macau)

## **An assessment of the status of services in the rural areas of Bandar-e Anzali by means of taxometric techniques from the viewpoint of sustainable tourism**

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### **Abstract**

One of the most beautiful cities in Guilan Province, Iran is Bandar Anzali, which covers an area of 308.1 square kilometers and has a population of about 138004. It consists of two rural districts named Chaharfarizeh and Lijarkihassanrood and 28 villages. The present research is an assessment of the status of services in the rural areas of Bandar-e Anzali by means of taxometric techniques from the viewpoint of sustainable tourism. The statistical population includes rural households, people in charge of rural districts, and the tourists who paid a visit to this area. The independent variable is the villages of Bandar Anzali and the dependent variable is rural sustainable development tourism. This research aims to study the effects of services on the development of tourism and rural development. It also attempts to determine the degree of development and lack of progress in the study area in terms of the components of sustainable development. To achieve the goal, it makes use of the taxometric model for the development of villages. The villages were classified into three categories: 64.8%, 21.2%, 9.4% and 4.6% fell in levels 1-4, respectively. The data collected by questionnaires were analyzed using descriptive statistics and Chi- Square. It was proved that the hypothesis of improvement of welfare services could lead to the development of tourism was successfully confirmed by 99% certainty and with an SD of less than 0.01.

### **Key words:**

Bandar Anzali; taxometric technique; sustainable tourism; rural development; tourism; villages

## **Balancing Commerce and Culture: On the Situation of Sami Tourism Entrepreneurs in Swedish Lapland**

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### **Abstract**

Not least because of globalization indigenous tourism has become an important product within the cultural tourism sector and its occurrence has been explained both as a result of balancing economic decline in indigenous industries, and a way of creating understanding of the situation of indigenous peoples. Departing from the notion of an indigenous tourism system, it is argued that being a tourism entrepreneur tends to become a balancing act between commerce and the need to gain an income on the one hand, and safeguarding and presenting heritage on the other hand. Being indigenous supplies Sami tourism entrepreneurs of northern Sweden with a unique selling point, but leaves responsibility and interpretation and commodification of heritage to them. Hence they are formatively involved in producing and re-producing images of indigenous heritage but have to do so in a dissonant ethno-political context that affects what can be done and what not. This study presents results of a phone survey among all Sami tourism entrepreneurs in Sweden and demonstrates how above mentioned concerns are valued in relation to other threats and challenges faced by Sami entrepreneurs. The study reveals that Sami tourism is culturally embedded to a large degree. Concern for the indigenous culture is in fact the major driver for getting involved and stay within tourism despite lacking support also from the indigenous community itself.

### **Key words:**

Indigenous tourism; Sami; entrepreneurs; culture; heritage; motivation

## **Construction and validation of a scale to measure individual heritage responsibility in World Heritage Sites**

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### **Abstract**

Although the importance of the role responsibility in heritage tourism has begun to form an academic debate in the last decade, little effort has been invested in understanding the human being's general responsibility in World Heritage in a tourism destination and to develop a measurement scale to measure it. This study adopted the comprehensive procedures of measurement scale development recommended by prior studies. The scale development procedure yielded a five factor measurement scale with acceptable levels of reliability and validity. Five dimensions of heritage responsibility were labelled: respect, duty to remember, learning and education, accountability for self well-being, and care for the other.

### **Key words:**

Responsibility, World Heritage site, Scale development, Heritage responsibility

## Cultural Heritage of Ras Al Khaimah: An Unique or An Unified Vision in Reference to United Arab Emirates Heritage Policy?

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### Abstract

Ras Al Khaimah is the youngest of United Arab Emirates federation. The aim of the presented researches is to define the tourist potential of Ras al-Khaimah. The study will include identification of main tourist attractions in RAK emirate, both natural and cultural, including local events, festivals, historical sites, modern architecture. Maintained elements are in fact components of tangible and intangible cultural heritage. Although Ras Al Khaimah has old traditions it is hard to clarify its internal vision. This emirate is a part of Eastern Arabia historical region where two different cultures were met: hill tribes and seaside settlers. Dual tradition not only describes natural landscape but also refers to Ras Al Khaimah cultural heritage. On the other hand detailed analysis shows some specific manners and elements unique for this emirate. Another issue is the example of different types of architecture from the oldest to the present buildings, if and how national heritage of United Arab Emirates is reflected in RAK's architecture? What is the impact of Islamic, Portuguese, British art and what new brings globalization times? Various methods were used during researches to find what is the cultural heritage of Ras Al-Khaimah and national heritage of United Arab Emirates. The most important were the opportunity to conduct fieldworks, that include stocktaking of tourist attractions, interviewing tourists and members of institutions that offers tourist services. Further methods were comparison of tourist offers, spatial and heritage policy documents of the Ras Al Khaimah and whole United Arab Emirates.

### Key words:

Cultural heritage, tourism potential

## **Dark Tourism is a Recent Research Topic in Geography; it Refers All Kind of Tourism Related to Death, Risk or Macabre Activities Where Tourists are Involved as Both Actors or Observers**

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### **Abstract**

Far from the Mexico-USA borderlands and close to Mexico City, the amusement "Eco Alberto Park" is located. Here, an indigenous community the "Hñahñu" people are involved in a tourism performance, which incorporates three different kind of performers: The Hñahñu act both as "Polleros" (guides for undocumented immigrants to US), and as "Migras" (Immigration police who tries to stop illegal immigrants, mainly Mexicans who want to cross to the USA or officers who are looking for those who have crossed in order to return them back to Mexico). On the other hand, the tourists act as "Mojados" (illegal Mexicans immigrants). The scenario is the countryside, which is crossed by the Tula river (to simulate the Rio Grande which is the real political border with USA). The aim of this presentation is to show how this spatial performance is a representation of dark tourism, because it is based in depict the suffering of illegal migrants who try to get into the USA. This work is based upon the "performance turn", because it "highlights how tourists experience places in more multi-sensory ways [...] as well as the materiality of objects and places and not just objects and places as signs" (Larsen, 2012).

### **Key words:**

dark tourism; illegal migration; performance turn

## Heritage City Development and Sustainable Livelihood Perspective: A Case Study of Chandani Chowk-Red Fort Complex (Old Delhi)

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### Abstract

Tourism development has been perceived as the important source of revitalization for any economy. It is a symbiotic relationship between residents and that place and before developing any place as tourist spot or a major heritage center it is pertinent to look into the goodwill of the residents because the participation of any community is directly related with the development of that place. Idea is look how any place of historic or cultural importance can be converted into important tourist destination and can address issues at the places of branding and creating sustainable livelihoods with safeguarding authenticity, debate goes one level ahead from revival of city in the name of heritage development to the re-assertion of these contested spaces. Delhi being central to the theme of heritage development, being one of the largest urban agglomeration and National Capital Territory Region (NCR) attracts huge chunks of immigration to its old city complex. The study is based on Red fort –Chandni Chowk complex area and the paper aims to analyze Heritage city development and livelihood perspective in the light of stakeholders view and to what extent development of heritage city is positively related with the idea of generating economic returns. Development of the area as important tourist spot requires planning which may include relocation, inclusion or exclusion of certain areas in order to maintain and conserve them. In this case, people earning their livelihood and living in proximity can have short term and long term outcomes, may be positive or negative.

### Key words:

Heritage, revival, livelihood, tourism development, stakeholders, Identity

## Heritage Institutions as Abstract Machines for Producing the Local through Global Idioms

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### Abstract

Far from local heritage resisting erosion by global culture, this paper explores how the regional and the local are produced through global heritage practices. The paper illustrates how shared global norms, practices and standards in heritage institutions serve to perform a notion of local heritage. The cases in point are the performativities and performances in open air museums in Northern Europe and world heritage documentation in China. In both cases it is suggested that globalised norms serve to suppress local histories of movement and entanglements of local cultures with global phenomenon. This suppression is both about the history of the places and the enactment of heritage. Heritage as an 'abstract machine' serves to align various divergent domains, such as environmental, cultural and economic discourses/practices, to produce the appearance and performance of localism. To do so heritage structures then reinscribe a notion of bounded locality and fixity through which downplays historically wider relationships. So in an age of globalisation, heritage institutions downplay past global linkages, in favour of producing a nostalgic notion of an historic and lost (or at least threatened) localised identity which now encounters global forces. To explore this the paper looks at how the cultural/natural environment is mobilised in Northern Europe and China

### Key words:

Heritage, museums, identity, regionalism, locality, open air museum

## Hybridization of Space by Heritage and Tourism: A Case Study of the “New I-Style Town” in Tianjin

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### Abstract

Since the early 2000s, the landscape of tourist attractions in several Chinese metropolises has been modified by the force of heritagization and rehabilitation of former Western concessions. This article goes beyond the well-studied “trivialization” of cities by standardized touristification, and based on the assumption that the Western-style heritage does not involve a simple reproduction of alien space, but the synergy of heritage/tourism contributes to produce a new kind of hybridized consumption space in Chinese territory. This paper focuses on Tianjin, a megalopolis rarely studied and often neglected, but which is striving to tell a particular story based on its own reinterpretation of China’s historical and architectural past through the renovation of formers concessions. From the analysis of the “New I-Style Town” (a tourist center results from the regeneration of the former Italian concession in Tianjin) and based on participant observation and interviews, we propose a triple interpretation of this area. First of all, we will explore how the heritage and tourism are encountered in the strategy of revitalization of the former Italian concession driven by the local government; the second axis will concentrate on the conditions in which the Italian-style heritage is produced as consumption space, showing the hybridization characteristics of tourist products; the third part focuses on understanding how this space are consumed by individuals, exploring the experiential benefits, and the strategy of distinction and identification established by visitors.

### Keywords:

hybridization, tourism, heritage, China, New I-Style Town

## Interests Coordination of World Heritage Tourism from the Perspective of Social Network Analysis: Case of Hani Rice Terraces in Yunnan

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### Abstract

Tourism brought many disputes of different stakeholders like government, tourism enterprises, local community and tourists in heritage sites. As UNESCO world Cultural Heritage and Globally Agricultural Heritage Systems (GIAHS), Hani Rice Terraces is not an exceptional, and the local community is not satisfied with the situation of the company orientated tourism model in this area, which become the hinder of sustainable tourism development. To make the relationship of different stakeholders in world heritage site clear, this study takes Yuanyang Hani Rice Terraces as an example, analyzes the network cohesion, hierarchy and agency index by using the method of SNA(Social Network Analysis), based on the analysis, put forward five suggestions: Firstly, to shape a close interest relation between government, business and local community to form the effective interest coordination mechanism; Secondly, to strengthen the internal relationship among the interest groups to form the effective conservation and development force; Thirdly, to make full use of the high reciprocity, high transmission feature of interest Hani Rice Terraces network, to strengthen the enterprises and government institutions for benefit transfer between the set of vertices; Fourthly, to focus on decision-making power and voice power in the interests relation network in local community, in order to increase the power of the local community; Last but not the least, to cultivate coordinator and consultant role inside the interest groups, and to cultivate enterprise gatekeeper, representative and liaison role between government, communities, pressure groups, gatekeeper, and representative role among communities, government and enterprises.

### Key words:

Social Network Analysis (SNA); World Cultural Heritage Site; tourism development; interests coordination; Yuanyang Hani Rice Terraces

## Japanese Characteristics of Dark Tourism

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### Abstract

Dark tourism is becoming a hot topic worldwide. Within the domain of dark tourism, though, regional characteristics are growing: for example, Chinese dark tourism is often connected to red tourism.

In my opinion, original European dark tourism is analysed in terms of the 'dark' side; however, in Japan, dark tourism is connected to recovery.

In my presentation, I would like to explain the reason for this strong connection, with several examples from the perspective of comparative civilization. Dark tourism has different features according to the country or culture, so there is no definitive answer to what dark tourism is. Rather, it is important to recognize that many different kinds of dark tourism exist across the world, which I will try to categorise.

### Key words:

Dark tourism, culture, civilization, Japan

## Nostalgia Tourism and Heritage Reproduction of Petsamo, Finland's Former Borderland to the Arctic Ocean, 1945-2015

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### Abstract

This geohistorical paper deals with the nostalgia tourism and reminiscence of the arctic community of Petsamo, located in the border region between Finland, Norway and Russia in the European High North. Finland lost the area to the Soviet Union after the Finnish-Russian War in 1944, and about 6000 Finns (including the indigenous Skolt Sami people) had to move from their home places to inner Finland. At the same time Finland lost its position as an Arctic coastal state. The idea of this study is to analyze the ways in which Finns have remembered, described, interpreted, and produced the Finnish heritage of the region, and which way increased tourism has been affected to this reconstruction process. In addition, I will ask how they have used history as an argument, and explained the region's importance to Finland and nostalgic feelings to themselves. In my ongoing study I will use both academic, popular, and newspaper texts published in Finland between 1945 and 2015 as source material. This database contains printed text which I will digitize and analyze by using modern methods of digital humanities (text mining).

### Key words:

European Arctic, border region of Petsamo, nostalgia tourism, heritage, memory sites, geohistory, lost region, reminiscence, use of history, digital humanities, 1945–2015

## Ontology beyond borders: tourist gaze and the sense of universal appreciation in World Heritage Sites in Sri Lanka

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### Abstract

From an ontological point of view, tourism sites which host World Heritage stamp have faced an existential crisis; the reality that sustains its monumental significance gets altered and lost in the face of commercialization. The holistic appearance that attracts the tourist's nostalgia is irreparably damaged by the community who struggles for survival in these sites. However, tourism as a modern cultural phenomenon is possible only when man develops a *generalized* interest that catches the gaze of the tourists (Urry 1999) who are driven to travel beyond his particular habitat (Cohen 2000). For those who present a reality to the tourist must also have a Kantian 'public sense' of universal appreciation, aesthetic judgment and cultural awareness in things that can existentially attract and excite them. The cosmological sense of appreciation that transcends from government agencies to community stakeholders, as this paper reviews, not only preserves the historical and holistic integrity of the site itself, but may advance the tourism industry which can sustainably promote these sites for the alienated tourists (MacCannell 1975). By reviewing the empirical evidence through observations and stakeholder interviews in Kandy City and Galle Dutch Fort in Sri Lanka, where serious site mismanagement issues and stakeholder interference can be found in disturbing holistic aesthetic integrity that caters the tourist gaze, this paper suggests that tourism ontology on holistic universals should be taken into account rather than spatiotemporal particulars such as abstract individual and political interests of those who struggle in the respective sites.

### Key words:

universal appreciation; tourism ontology; aesthetic integrity; Kandy City; Galle Dutch Fort

## Iconic Houston: Induced Images of Gastronomy on the Official Visitors Site for Houston, Texas, USA

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### Abstract

Urban tourism development in the U.S. city of Houston, Texas has been hindered by a negative reputation. This is based on persistent stereotypes, such as a predominance of chain restaurants and a limited choice of cuisine. In the past few years, however, the city has received new attention nationally, primarily based on award-winning chefs and distinctive, locally driven restaurants. Travel guides and magazines have named Houston the country's "newest capital of great food" and its "most exciting food city". With this interest in Houston's gastronomy, the Greater Houston Convention and Visitors Bureau (GHCVB) features food, drink, and restaurants prominently on the official visitors site for Houston ([www.visithoustontexas.com](http://www.visithoustontexas.com)). As the primary marketing organization for the City of Houston, the GHCVB plays an important role in influencing destination image. This research examines the induced images communicated in the fifteen gastronomic-themed pages of the Visit Houston site. Content and narrative analyses are used to identify key themes and to explore the descriptions and images employed to communicate the story of Houston as a gastronomic destination. While previous research indicates that the organic images produced in travel guides and magazines highlight the city's new gastronomic developments, findings from this study show that the GHCVB site provides a history and context for these developments. Using a locally-voiced narrative, these induced images suggest that visitors can now experience what locals have long known.

### Key words:

heritage tourism; memorial museum; slavery; American South; Texas; representations

## Spatial-Temporal Characteristics and Influencing Mechanism of World Natural Heritage Site and the Surrounding Towns—A Case Study Of Aba

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### Abstract

China's world natural heritage site protection has received increasing attention, but there exist many problems between the development of the surrounding towns and the protection of heritage sites, such as disorder development which had damaged heritage site and disharmony between rapid urbanization of towns and the development of the scenic area. Domestic researches are more focused on the protection of heritage sites, but there is little research about the relationship between the evolution of heritage sites and the surrounding towns. Aba state is selected as a pilot area because of its rich natural resources. First of all, this paper use GIS method, remote sensing image and statistical data to analyze the spatial-temporal features of world natural heritage site and the surrounding towns in Aba. Secondly, a further study is conducted on JiuZhaigou scenic area and the surrounding towns as an example. Finally, the interaction and influence mechanism between heritage site and the surrounding towns has been summarized. This paper offers some references for the world natural heritage site and town planning. In addition, this paper also helps to promote balanced development among world natural heritage site and the surrounding towns.

### Key words:

world natural heritage; development of the surrounding towns; spatial-temporal evolution; influencing mechanism

## The inner struggle of visiting dark heritage sites: Examining the relationship between perceived constraints and motivations

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### Abstract

Previous works suggest that the darker attributes of death actually motivate people to visit sites of death, while others argue that death and a fear of ghosts deter people from visiting. This contradiction implies subtle relationships between constraints and motivations, which have received limited attention to date. To fill this research gap, the present study first explores the underlying dimensions of constraints and motivations related to visiting sites of death and later clarifies in detail the relationship between the two. Interestingly, along with a general understanding of negative correlation, the empirical results also reveal significant positive correlations. Particularly, curious visitors with a stronger desire to contemplate death might more likely encounter higher levels of the constraint of taboos, in contrast to findings from previous studies. It is also found that the more people are motivated by social reasons, the more likely they are able to negotiate the constraint of traumatic memory. Understanding this relationship will help to broaden the theory, as well as provide suggestions for tourism marketing.

### Keywords:

constraints; motivations; dark tourism; death; Nanjing Massacre

## Tourism and Ethnic Landscapes: Social and Cultural Strengthening or Disintegration in Postcolonial Spaces?

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### Abstract

Throughout the Asia and Pacific region, ethnic landscapes are central to the expansion of tourism and to the cultivation of the tourist gaze. Ethnic landscapes are defined variously and in this paper it is considered to be the national milieu that is comprised of peoples of fundamentally different ethnic groupings including both first peoples and others introduced or following historical migration or transformational events including conflict and crises. At the core of ethnic landscapes are the legacies of colonisation, particularly European colonisation and its juxtaposition alongside indigenous or local contexts. Typically, narratives of colonisation are centred on dispossession, dominance, atrocity, belittlement and permanent and irreversible disturbance of pre-existing natural and sociocultural settings. In seeking to inject the ethnic landscapes discourse into the geographies of tourism, this paper draws on fieldwork in contexts where ethnic landscapes are underlined by present day jostling between multiple groups in the pursuit of tourism sector opportunities. Particular attention is placed on inter-ethnic relations and how the vestiges of the colonial era has shaped and continues to influence power relations and access to tourism. More importantly, the question as to whether the interrelationship between growing tourism-focused developments within prevailing ethnic landscapes strengthen or rupture social and cultural relations is posed. Fieldwork observations and analysis from Pacific Island and Southeast Asian contexts are put forward. In the main, this paper argues that cognisance of ethnic landscapes and the related latent and obvious undercurrents that emerge are essential considerations in the discourse on the nature and scope of tourism expansion in postcolonial contexts.

### Key words:

Critical Tourism geographies, ethnic landscapes, postcolonial, Orientalism, post-Orientalism

## Tourism Spatial Structure and Its Evolution Of Star-Rating Rural Tourist Area (Point) of Changsha

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### Abstract

Select Taking the 206 star-rating rural tourist area (point) of Changsha as an example, the paper integrates qualitative and quantitative methods and the spatial analysis method of GIS to study the tourism spatial structure and evolution of Changsha star-rating rural tourist area (point). The results are shown as follows. (1) The spatial distribution patterns of the rural tourist area (point) of Changsha are congregating distribution and the spatial structure of tourism spatial distribution is not balanced. (2) Based on time and spatial overlay analysis of star-rating rural tourist area (point), counting the number of each stage, the development of rural tourism in Changsha can be divided into three stages: the early stages (before 2002), the stage of rapid development (2003-2008), the stage of industrialization (since 2009). (3) By the use of Kernel Density analysis, we can draw three different distribution patterns of Changsha star-rating rural tourist area (point). During the early period, Changsha's star-rating rural tourist area (point) presented an initial pattern of "two-center agglomeration, along the axis from South to North of the distribution to a gradient". During the stage of rapid development, the pattern shows that there are three-center agglomeration and along the axis from East to West of the distribution to a gradient. During the stage of industrialization, it presented a pattern of "three-center agglomeration and along three axes gradient.

### Key words:

Changsha; Star-Rating Rural Tourist Area (Point); Tourism Spatial Structure; Evolution

## Tourism to Sites with a Shadowed Past: The Global Production and Consumption of Dark Heritage

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### Abstract

Visitation to places with a dissonant heritage and thus a difficult legacy has become widely accepted across many cultures worldwide. The best illustration for the increased visitation of dark heritage sites are the expanding number of memorial sites of the Holocaust in Central and Eastern Europe. In the last few years a dozen sites have attracted more than three hundred thousand visitors annually including Auschwitz, the Anne Frank House in Amsterdam, the Topography of Terror exhibit in Berlin and the memorial sites of the Dachau and Buchenwald Concentration Camps. The global trend towards a greater recognition of dark heritage applies to sites with a shadowed past in more central locations like the battlefield memorials of WW I in Flanders, Belgium and the Nanjing Massacre Memorial Hall near Nanjing, China as well to destinations in relatively isolated locations. Examples of the latter are the Solovetsky Islands, generally considered the site of the first Gulag of the Soviet Era in the extreme North of Russia and Robben Island where Nelson Mandela spent eighteen years in prison in a peripheral location off Cape Town on the South African coast. Since the mid-1980s, tourism researchers have given attention to this phenomenon denoted and discussed in various ways including in the dark tourism and thanatourism research agenda and a revived geography of memory.

### Key words:

Dark heritage; dissonance; geography of memory

## The Impact of Tourists Perceived Authenticity of Cultural Heritage on Experience Quality and Behavioral Intention in Macao

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### Abstract

The prevalent of cultural tourism may strengthen Macao's historical appeal as well as giving the city a diversified tourism destination image. As an important component of tourist experience of culture heritage, authenticity plays a central role in different aspects of conservation such as cultural tourism and interpretation and presentation of heritage sites. Taking cognizance of the current paucity in this area, this study proposes to identify and evaluate the impact of tourists perceived authenticity of culture heritage on their experience quality and behavioral intention, from which implications for the sustainable development of culture heritage tourism can be derived. Both qualitative and quantitative research methodologies were used. In the first stage, tourists perceived authenticity is identified and explored by conducting relevant literature and in-depth interviews. In the first place, a well-modified scale of tourists' perceived authenticity is expected to develop under the context of Macao. Thus, in view of the current research paucity, this study is expected to enrich existing theoretical knowledge on perceived authenticity of culture heritage through its contextual peculiarities relied by Macao which combines western culture and eastern culture. Research conclusions from this study can shed light on the better management of culture heritage sites in Macao, to such an extent that the sustainability of culture heritage tourism can be enhanced as a special tourism resource.

### Key words:

authenticity; cultural heritage; experience quality; experience quality

## C12.15 Geography of Tourism, Leisure, and Global Change

### Urban Tourism and Tourism Urbanization

#### Oral



Home

1. [A Future for Integrative Urbanization in Val d'Europe](#)  
Anne Marie d'Hautesserre (University of Waikato, New Zealand)
2. [A Study on the Spatial Distribution Pattern of Restaurants in Beijing's Main Urban Area](#)  
Tan Xin, Huang Daquan, Zhao Xingshuo (BNU, China)
3. [Capital City Tourism: The Distinctive case of Pretoria South Africa](#)  
Jayne Rogerson (University of Johannesburg, South Africa)
4. [Chinese Tourism Trends in Spain: Barcelona Experience](#)  
Gemma Canoves (Autonomous University of Barcelona, Spain)
5. [Exploring Experiential Value Perception of Recreation around Metropolis Based on Method of Web Text Mining](#)  
Jiangmin Li, Lijuan Tan (China University of Geosciences(wuhan), China)
6. [Museum as Flagships of Urban Tourism Development?](#)  
Noam Shoal (The Hebrew University of Jerusalem, Israel)
7. [Overuse of city destinations – the example of Munich, Germany](#)  
Philipp Namberger (University of Munich (Ludwig Maximilians Universität München), Department of Geography, Germany)
8. [Public-Private Sector Partnerships for Tourism Development: Evidence from South Africa](#)  
Christian Rogerson (University of Johannesburg)
9. [Spatial Structure and Business Form of Recreational Business District: A case study of Qianmen District](#)  
Zhu He, Liu Jiaming (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
10. [Spatiotemporal Analysis of Urban Residents' Perceived Impacts of Music Festival Tourism: A Case Study of Beijing Strawberry Music Festival](#)  
Jing Han (Beijing Forestry University; Nanjing University, China)
11. [The Impact of Airbnb in the Urban Arena: Towards a Tourism-Led Gentrification? The Case- Study of Palma Old City \(Mallorca, Spain\)](#)  
Ismael Yrigoy (University of the Balearic Islands, Spain)
12. [Tourism Gentrification and Its Social Impact in Jeju Island](#)



Seon Young Lee (king's college london), In Mook Choi (kyunghee university)

13. [Visiting Nantong, Beibei, Canton and Nanjing: Ideal Urban Tourism in Republican China](#)

Antonio Barrento (Faculty of Arts and Humanities, University of Lisbon, Portugal)

14. [What do Recreationists' Experience in City? Exploring Urban Image Contents: A Case Study in Wuhan, China](#)

Yan Li, Shaowen Cheng, Xiang Zhang (School of Urban and Environmental Science Central China)

## Poster

1. [Evaluation and Spatiotemporal Evolution Analysis of Coastal Tourism Efficiency in China](#)

Jingqiu Zhong (China, Liaoning Normal University)

2. [Perception of City Themes for Hong Kong: Tourists vis-à-vis residents](#)

Chung Shing Chan (HongKong SAR, China, Department of Geography and Resource Management, The Chinese University of Hong Kong)

3. [Spatiotemporal Differentiation of Residential Land for Coastal Town under the Background of New Urbanization A Case Study of the Dalian Jinshitan](#)

Jing Sun (China, Liaoning Normal University)

4. [The Study on the Function of Eastern Recreational Belt in Nanning based on the Behavior of Tourists](#)

Xiaoping Huang (China, GuangXi Teachers Education University)

5. [Tourism, Real Estate Development, Degregation and Socio-spatial Conflicts. The Spread of the Iberian Model for the Brazilian Northeast](#)

Maria Fonseca (Brazil, Ufm)

## A Future for Integrative Urbanization in Val d'Europe?

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### Abstract

The French state had accepted the partnership with the Walt Disney Company even though it might offer a neo-liberal approach to land development. The French profess an integrative approach to social relations and urban planning. Do French leanings embody utopian longings against current trends such as the promotion of consumption as a substitute for social engagement? Or does the current development of Val d'Europe (as a major tourism cluster) symbolise a retreat from 'public culture' exemplified in the disappearance of public spaces? Numerous French families, however, have invested in residential areas developed by the Walt Disney Company in Val d'Europe. The Company is cooperating with Pierre Vacances, the largest French builder of holiday homes and centres, to build "Villages Vacances" in the southern part of Val d'Europe. This presentation seeks to understand how the new physical and symbolic modelling of Val d'Europe today when the emphasis is once again on tourism development rather than social urbanisation might transform it into an aestheticized urban space shunned by future urbanites. Tensions have arisen due to the differing socio-economic perspectives of the partners involved, but the project had anchored one of the more successful urban planning efforts in the country and created a major tourist destination. Can such a successful partnership still bear similar fruits into the future?

### Key words:

Walt Disney Company; neoliberalism; social policies; Val d'Europe; urban space

## A Study on the Spatial Distribution Pattern of Restaurants in Beijing's Main Urban Area

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### Abstract

In this paper, we aimed to analyze the space distribution pattern of restaurants in Beijing's main urban area and to interpret the factors that influenced the characteristics of the restaurants' spatial distribution. We explored and analyzed the spatial distribution of the restaurants using methods including data mining technology, geographic information system (GIS) spatial analysis, and statistical and econometric approaches. First, through data mining technology, we found the restaurants of the Beijing main urban area and their attributes from the Internet. Then, we divided the restaurants into five categories of different per capita consumption levels according to the attributes of the price per person. When the price per person of a restaurant was lower than 20 yuan, it was classified as a low-grade restaurant; if the price per person was lower than 50 yuan and higher than 20 yuan, it was classified as a low- to middle-grade restaurant; middle-grade restaurants' price per person was lower than 100 yuan and higher than 50 yuan; middle- to high-grade restaurants' price per person was lower than 200 yuan and higher than 100 yuan; and high-grade restaurants' price per person was higher than 200 yuan. We also divided restaurants into three grades of Internet word of mouth (IWOM) levels according to the attributes of the user ratings. When the user ratings of a restaurant were lower than 1, was classified as low quality, if the user ratings were lower than 4 and higher than 1, a restaurant was classified mid-range, and high-quality restaurants' user ratings were lower than 5 and higher than 4. Afterwards, we detailed, described, and analyzed the overall spatial distribution characteristics, the different per capita consumption levels, and different IWOM levels of the restaurants in Beijing's main urban area using the geographic information system (GIS) spatial analysis method. Our study showed that the distribution pattern of restaurants in the main urban area of Beijing can be characterized as one primary and two secondary zones with multiple centers as a whole, with the number decreasing from the city center to the periphery. The distribution of the restaurant consumption and the IWOM levels was a spindle shape, the characteristics of which can be summarized

as having more factors located in the middle and fewer at the ends. Finally, we put forward 17 indicators from six major systems, the population distribution, the regional economy, transportation convenience, infrastructure convenience, tourism resources, and Internet users' emotions, to explore and the factors that influenced the spatial distribution of the restaurants. Generally, we creatively acquired the relevant data and residents' emotional information from the Internet and applied it to a city planning instance, which was a useful reference for studying commercial and urban geography. Meanwhile, the results of this paper pertaining to the spatial distribution pattern of restaurants and influencing factors could play a positive role in the development of urban planning, the tourism industry, restaurant management, and Internet e-commerce.

**Key words:**

Restaurants; spatial distribution; per capita consumption; dining reputation.

## Capital City Tourism: The Distinctive case of Pretoria South Africa

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### Abstract

Capital city tourism as a specific form of urban tourism has received only modest recognition in the tourism literature. National capitals represent a special case of urban tourism and have distinctive qualities that attract visitors. In many capitals tourism was viewed as a problem to be managed and it is only over the past thirty years that capital cities have started to view tourism as an opportunity and have developed initiatives to encourage it. This paper will examine the specific form of capital cities tourism in one case in the global South which has attracted relatively little attention of tourism scholars of capital cities. An examination is undertaken of the specific characteristic of tourism in Pretoria which is South Africa's administrative and diplomatic capital city. The historical development of Pretoria as a capital city destination was much affected by democratic transition which resulted in a considerable expansion in the numbers of diplomatic missions hosted in the city. This paper tracks the importance of Pretoria as a business tourism destination which derives principally from the city's capital city function.

### Key words:

Urban Tourism; Capital City; Pretoria;South Africa

## Chinese Tourism trends in Spain: Barcelona experience

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### Abstract

Chinese tourism in Spain is growing strongly since 2000. The paper outlines the main features of this new form of tourism, places to visit, interests which presents and motivations that lead to know Spain. At the same time shows that the city of Barcelona is the first city visited by Chinese tourists. In this regard we highlight the interest that introduces the city activities tourists, most visited sites, most popular activities, and the potential of Barcelona to adapt to this new tourist. We also highlight complicated coexistence among tourists and residents in more saturated places by tourists and the recent complaints of the inhabitants of the city with respect to a tourism model that must balance supply and demand, to a stable coexistence.

### Key words:

Chinese tourism, Spain, Barcelona, urban tourism, coexistence between tourists and residents

## Exploring Experiential Value Perception of Recreation around Metropolis Based on Method of Web Text Mining

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### Abstract

As the national tourism leisure demand growth and holiday system implementation in our country, recreation around metropolis develops rapidly, which occupy an increasingly important position in the domestic tourism. Under the background of experience economy era, improving tourist experiential value is a powerful way to improve the competitiveness of recreation around metropolis. Basing on the wide application of network information in tourism industry, the study is to explore the experiential value construction and perception characteristic by web text mining method. On the basis of comprehensively combing previous study on experiential value dimensions and indicators, this study collected 3,938 comments of 50 recreation spots from Shanghai, Chengdu, Guangzhou, Beijing, Wuhan five cities, then using the Rost Content Mining to extract 109 high-frequency words. According Holsti formula, the study takes 109 high frequency words as the analysis unit, arranged three coders who were trained in advance to code the words into six experiential value independently. By analyzing the Holsti coefficients and depth interviewing, we got functional value, emotional value, situational value, cognitive value and economic value 5 dimensions and 26 indicators, which constitute the experiential value system of recreation around metropolis. However, the social value, which is prominent in many other sectors, does not constitute highlights in experiential value of recreation around metropolis. The study also found that situational value is the main attention among the five dimensions and the least attention is cognitive value.

### Key words:

experiential value; perception; recreation around metropolis; web text mining

## Museum as Flagships of Urban Tourism Development?

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### Abstract

The growing importance of culture in contemporary society and the rising importance of tourism in the economic base of post-industrial cities have led in recent years to the construction of new "Flagship-Museums" characterized by their size and spectacular architecture. Their purpose is to capture the public imagination, to attract tourists and to promote the notion that those cities have successfully transformed themselves from centres of manufacture into centres of culture.

These trends have also given rise to a new breed of museums: institutions established by foundations with value-laden educational agendas e.g. freedom, tolerance and human rights. This phenomenon is characterized too by the gigantic public and private investment in the structures that host the "collections," and by the use of signature architecture, along with the idea that the architecture itself helps convey the message of the museum.

This presentation, using the case of the newly established (September 2014) Museum of Human Rights in Winnipeg that cost \$351 CAD million to build, will examine the emergence of this new extension to the "Flagship-Museum Paradigm" of urban tourism development.

### Key words:

Flagship Museums; museums; urban development; tourism; Canada; Winnipeg.

## Overuse of city destinations – the example of Munich, Germany

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### Abstract

All destinations in general can both profit and suffer from tourism and the results depend on the specific content and types of tourism. City destinations are specific forms of destinations above all because they are comparatively densely populated areas, and the inhabitants of a city and the city's tourists share a limited amount of space. This can lead to tensions and conflicts over the simultaneous use of places to live as places to explore. Munich is well known for its capacity to cope with very large numbers of people (as can be seen from the arrivals of refugees in the ongoing European migration crisis), but even in this city the destination's carrying capacity has been at issue. This paper focuses on (event) tourism within the city of Munich, a city which hosts the world's largest Volksfest, the Oktoberfest, a weighty schedule of football matches, and tourist groups from diverse cultures. A survey conducted in 2015 among the inhabitants of Munich identifies how specific aspects of tourism disturb the respondents and the extent to which they avoid places where such events occur. Munich residents see that the city is at its carrying capacity at times during the year and have well developed coping strategies. Based on these findings recommended actions are developed.

### Key words:

city destinations; overuse; carrying capacity; coping strategies

## Public-Private Sector Partnerships for Tourism Development: Evidence from South

### Africa

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#### Abstract

Public-private partnerships (PPPs) are an emerging mechanism for tourism development in several countries. A PPP is instituted when a private sector entity engages with the state in a formalised arrangement for the development or operation of particular infrastructure. For national governments PPPs can offer opportunities to leverage resources through the transfer of commercial risk from the public sector to the private sector. In sub-Saharan Africa much interest surrounds the potential for leveraging PPPs for the development and upgrading of tourism infrastructure and maximisation of tourism assets. This said, the documented experience is limited of PPPs in tourism development in Africa. It is against this background that this paper examines the South African record of using PPPs in tourism development. Special focus is upon the experience of developing the heritage tourism resources of the Cradle of Humankind World Heritage Site which is a tourism product located one hour from South Africa's major metropolitan centre of Johannesburg. It is argued that the unfolding record of this particular mega-tourism project highlights certain limitations of the PPP model.

#### Key Words:

Public-private partnerships; South Africa; urban tourism; heritage tourism.

## **Spatial Structure and Business Form of Recreational Business District: A case study of qianmen district**

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### **Abstract**

Through the analysing of inner spatial structure of urban recreational business district (RBD) can comprehensively study of the spatial structure change and the characteristic of RBD, so as to guide the internal leisure business form, construction, road planning. In this paper, using of space syntax and network data to investigate the relationship of spatial structure and commercial and passenger flow and passengers' satisfaction, to Qianmen area as an example. From three aspects including road, elements and passengers response, the author analysis of urban recreational business district's spatial structure and the characteristics of the business form development. The results show that the spatial accessibility affects the development of formats, and is directly related to customer satisfaction and customer flow. From the core area to surrounding areas gradually formed a "circle change - Retail - catering accommodation", and puts forward some suggestions on the development of the internal format planning and traffic development of the leisure business district.

### **Key words:**

Recreational Business District; Spatial Structure; business form

## Spatiotemporal Analysis of Urban Residents' Perceived Impacts of Music Festival Tourism: A Case Study of Beijing Strawberry Music Festival

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### Abstract

Music festival tourism, as a new form of urban tourism, plays an increasingly important role in improving city image and driving the local economy. However, little academic attention has been paid to quantify the impacts of the music festival tourism. Monitoring local residents' perceptions in time and space is a useful way to trace the real impacts, and residents' perceptions towards the impacts are the key factors for obtaining community-wide support and sustainable tourism development. Therefore, this paper conducted a quantitative research to examine the spatiotemporal changes in residents' perceptions towards Beijing Strawberry Music Festival based on social exchange theory and core-periphery theory. Data were collected before, during and after the event with random sampling from SLA (Statistical Local Area). Results suggest that: there was obvious positive social and cultural perceptions decay while no big change in the low level of negative environmental and social perceptions, indicating that the music festival enjoyed a good reputation while produced a short-term effect; spatial differences existed both in positive and negative perceptions among three groups namely "core district", "transitional district" and "periphery district", while not all differences strictly observed the distance attenuating law, indicating the complex and dynamic impacts in a certain region. This study provides a unique geographical insight into residents' perceptions towards the impacts of music festival tourism, and has significant implications for city planners who wish to retain harmonious relationship with the local community and maximize long-term benefits.

### Key words:

spatiotemporal analysis; urban residents' perception; music festival tourism

## **The Impact of Airbnb in the Urban Arena: Towards a Tourism-Led Gentrification? The case- study of Palma Old City (Mallorca, Spain).**

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### **Abstract**

Kevin Fox Gotham (2005) coined the term 'tourism gentrification', referring to the role of state policy in encouraging both gentrification and tourism development. This paper starts with Gotham's (2005) conceptualization, but it aims to develop it in three interrelated directions. First, it is claimed that one of the foremost ways by which tourism gentrification is taking place is through the Airbnb website. Second, it is argued that the contemporary process of Airbnb expansion in Spain is not exclusively the result of the combination of the flow of capitals and tourism, as the literature suggests, but rather, as a combination of the robustness of tourism and the impact of the crisis on households and real estate agencies. Third, it is claimed that the labour force is progressively being reconstituted as a rentier class, as with Airbnb a significant share of labour income is increasingly coming from land rents.

At a specific level, this paper aims to analyse the impact of the Airbnb accommodation expansion on the dynamics of gentrification in the Old Quarter of the city of Palma, which has become one of the most popular Spanish Airbnb destinations. Indeed, one pressing concern is that due to the expansion of Airbnb the property market is becoming increasingly less affordable in some parts of the city given that many properties are renovated specifically for the tourism accommodation sector.

### **Key words:**

tourism gentrification; Airbnb; Palma; economic crisis; household income.

## Tourism Gentrification and its social impact in Jeju Island

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### Abstract

Jeju Island in South Korea has been the most visited place for a long time, but there has not been significant conflicts between visitors and long-established residents. However, the recent changes Jeju Island has experienced seem different from the past, since Chinese investment has increased over the last ten years. In this context, this paper sheds light on the entwined effects of gentrification and tourism. First, it documents the social impact on neighbourhood and local people by the current changes. Second, it examines the endeavour of local government to attract investment in coalition with tourism and economic growth.

### Key words:

Tourism; gentrification; Jeju Island; Foreign Investment

## Visiting Nantong, Beibei, Canton and Nanjing: Ideal Urban Tourism in Republican

### China

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#### Abstract

In China, during the republican period, the cities of Nantong, Beibei, Canton and Nanjing emerged as multifaceted, overall enactments or visions of an idealized Chinese modernity that incorporated progressive, nationalist and republican characteristics. In this context, it is only natural that these places should have been an important aspect of a tourist culture that was gradually incorporating a set of modern attractions. This was in line with the rising importance of modernity in China, particularly as a result of growing foreign influence and increasing awareness of the need to 'save the nation' in face of foreign encroachment and threat. While these urban areas were not alone in the attraction of tourists by reason of modernity — this was the case also with Shanghai or Tianjin, for instance —, they were viewed as unique in that they represented a set of desired aspects of a modern China. In conformity, they were promoted as national models to be recognized or even followed, and reached out to travellers as places of day-to-day exceptionality and idealness. Seen as special places, and deemed therefore worthy of particular touristic attention, they were even occasionally to be described as touristically preferable to, or more touristically significant than, other touristic sites. Touristic practice did not, however, always follow such a type of touristic discourse. It is the aim of this paper to look into these different realities, which can be seen as confirmation of wider trends and tensions that were present in Republican China.

#### Key words:

urban tourism; Republican China; modernity

## What do recreationists' experience in city? Exploring Urban Image contents: a case study in Wuhan, China

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### Abstract

Both tourists and residents using cities can be viewed as the urban recreationists in terms of their involvement in recreational activities. A little academic attention is attracted on the fundamental questions about what recreationists' experience in city. Based on the framework of man's relationship with his environment in Ekistics, this study identifies a analysis framework within which urban image contents can be explored and distinguished. Taking one of Chinese metropolises-Wuhan-as a study case, this research employed structured interviews (n=743) for collecting data from March to May, 2013, and content analysis has been applied. Four dimensions of urban image contents have been identified, including natural environment, place and landscape, host-social environment and public infrastructure and service. It can be concluded that: 1) increasingly recreational activities in urban environment is the primary momentum transforming a non-recreational space into a recreational place. 2) The most notable elements of urban image experienced and perceived by urban recreationists include sound nature, unique place and landscape, friendly host-community and convenient infrastructure. 3) The urban administration has an important impact on recreationists' urban image. This study is helpful for further research and management practice on sustainable urban tourism development and urban image marketing.

### Key words:

urban image; recreationists' experience; recreational space; sustainable urban tourism; urban administration; Wuhan

## Evaluation and spatiotemporal evolution analysis of coastal tourism efficiency in

### China

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#### Abstract

Based on the role of coastal tourism efficiency in development of tourism industry, using DEA, Global Malmquist combine with the standard deviation ellipse analysis, this paper attempts to analysis spatial-temporal evolution of coastal tourism efficiency in 53 coastal city of China. The results show that: 1) The impulsion of coastal tourism is efficient development of “people” and coastal tourism is based on collaborative system of “land-people-sea”. Coastal tourism has special resource properties in the tourism industry, and it is dominant industry of green economy in the marine industry. Its development is conditioned by the efficiency of human economic activities. 2) The sensitivity and vulnerability of coastal tourism to external economic environment change is stronger. Although government investment has a significant role in promoting efficiency of coastal tourism, investment scale and scale efficiency don't have index effect. The scale efficiency and the space-time development law of comprehensive efficiency to be consistent in coastal tourism. In addition, the pure technical efficiency is dominant factor in promoting development of comprehensive efficiency, and policy efficiency is the main factor that influences the development efficiency of China's coastal tourism. The efficiency spatial distribution is a higher distribution in the south than the north in China's coastal tourism, but the regional disparity is gradually reducing. 3) The drive factors, influence the efficiency of coastal tourism, have the characteristics of restraining each other and coordinated development. So in the future, the coastal tourism development should pay attention to quality of tourism practitioners and professional training, guide the coastal tourist transform direction of development to civilized tourism and ecological tourism gradually, perfect the supporting policies and measures of regional tourism development to improve the efficiency of coastal tourism in the comprehensive development level, carry out targeted efficiency improvement measures to reduce the difference of regional development.

#### Key words:

Coastal tourism efficiency; DEA; Global Malmquist; SDE; Spatiotemporal evolution

## Perception of City Themes for Hong Kong: Tourists Vis-À-Vis Residents

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### Abstract

Thematization is a strategy used for developing positive, strong and distinctive images for cities to compete as tourism destinations and a place for residence. It refers to the patterning of resources and activities to symbolize experiences and senses from a specific time and space. Cities can attract tourists and may even retain them as potential frequent visitors or immigrants through a successful theme.

Tourists and the existing local residents may prefer a particular theme or some of its attributes differently when considering a city as destination or residence. A successful theme can become a valuable brand for different people, but an inappropriate theme may confuse a city image. In Hong Kong, where the government is attempting to develop and position the city under themes such as “green city”, “creative city” and “smart city”, it is important to understand which of these themes best attracts tourists and satisfies local people. However, little research has been done on how tourists and residents perceive the underlying elements of these themes together in a city.

This presentation considers Hong Kong as a case for an ongoing study to bring out sets of attributes for screening and measurement by reviewing the relevant literature in each of the themes of “green city”, “creative city” and “smart city”. The variables are vetted by a number of local experts in academia, government representatives, non-governmental organizations and the private sector. Preliminary results from a questionnaire survey of inbound tourists and local residents in Hong Kong will be presented.

### Key words:

city thematization; creative city; green city; smart city

## Spatiotemporal Differentiation of Residential Land for Coastal Town under the Background of New Urbanization: A Case Study of the Dalian Jinshitan

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### Abstract

Based on SPOT5 satellite remote sensing images and land use data in five time phases covering the period 1988–2012, the distribution characteristics, spatial differentiation processes, and driving mechanisms affecting the residential land of the Jinshitan Tourist Resort were studied. The work included a combination of GIS technology, adoption of the differentiation index  $D$ , and the multi-group differentiation-measure Model  $D(m)$ . The results provided a basis for the following conclusions. (1) From 1988 to 2012, the degree of differentiation of the rural residential land first decreased, and then increased. The general residential, commercial residential, and garden-house land-types all showed declining trends, of which the garden-house type presented the most intense volatility. (2) The overall background of the traditional residential land type was gradually replaced by a new residential land type, and the total area of residential land increased year by year, significantly improve the overall residential conditions. The areas of the new residential land type showed growth, and were increasingly widely distributed in the coastal tourist resorts, transportation corridors, and scenic areas. (3) Government policy, social differentiation, market mechanisms, and individual choices (along with other factors) were mutually promoted, although still restrained. However, all of these factors interacted to constrain the developmental direction and the processes affecting tourism real estate in the Dalian Jinshitan Tourist Resort.

### Key words:

residential space differentiation; differentiation degree; new urbanization; residential conditions; driving mechanism

## The Study on the Function of Eastern Recreational Belt in Nanning based on the Behavior of Tourists

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### Abstract

With the advancing of the social development and living conditions, recreational activities grows on a larger scale as well. The function perfection of the eastern recreational belt may be advantageous in forming the centre status of the Pan Beibu Gulf economic zone, in helping Nanning to further promote its ecological and livable city figure, and in developing related industries of convention, commerce and tourism.

By learning from the related research achievements from at home and abroad, and based on clearing concept and connotation of the belt and recreational value, we adopted related theories such as behavior location theory, core-edge theory and sustainable development to case study eastern recreational belt of Nanning and the behavior of the tourists of the belt. With the tour resort as the centre, places less than 1 hour of transportation are the main source of the tourists. We conclude from the space statistics from related GIS software that rounds of the belts where various tourist resorts (above level A) located has gradually been formed, and the variation course of the related location between the belt and those tour resorts.

To address the problems caused by the contradiction between the recreational belt and tourists behavior, we proposed strategies based on the perfection of tourist resorts from tourists demand so that we may coordinate tourists demand and public transportation, scientifically plan tour resort, choose plants and species suitable for local plantation, positively develop ceremonies and activities and promote brand effects of the recreational belt.

### Key words:

Recreational belt; Recreational function; Recreational behavior; Nanning City

## **Tourism, Real Estate Development, Segregation and Socio-Spatial Conflicts. The Spread of the Iberian Model for the Brazilian Northeast**

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### **Abstract**

Over the last two decades we have witnessed a significant increase in the development of real estate linked to tourism, which has resulted in an expressive urbanization process. The model from Iberian Peninsula spread to the northeast of Brazil in the beginning of the XXI century with emergence of new architectural standards and increased urbanization along the northeastern coast. The following research proposal aims to discuss the process of urbanization generated by leisure and tourism, based on an analysis of the expansion of the real estate market in the production of second home in tourist regions. Analysis will be based on the Costa das Dunas Tourist Pole/RN in Brazil. The central research argument is that while, on the one hand, global processes have contributed to new forms of integration and socio-spatial interactions, on the other hand they have generated new conflicts and certain forms of spatial segregation, demonstrated by urbanization based on leisure and tourism activities. Research procedures will include data collection from official government bodies, analysis of secondary sources, and interviews with three stakeholder groups that are considered key in the process of tourism-driven urbanization: real estate business owners, public administrators, and representatives from civil society associations. Globalization has contributed to bringing places closer together virtually. However, the increased integration of global spaces driven by new tourist/migratory shifts to locations with more amenities, strongly stimulated by the real estate market, have given way to new forms of socio-spatial segregation at a local level, and merit research.

### **Keywords:**

Second Home; Real Estate; Urbanization; Socio-spatial Segregation; Costa das Dunas Tourist Pole/RN/Brazil

## C12.15 Geography of Tourism, Leisure, and Global Change

### Lifestyle Mobility and the Local Community



Home

#### Oral

1. [Empirical Mobility Intentions Analysis and Mobility Research of Social Housing in Xi'an Based on Location Factors](#)  
Yanbo Hao, Xin Dong (The College of Urban and Environmental Sciences, Northwest University, China)
2. [Evaluating Social Tourism and its Linkage to Sustainability Development of Scenic Spots in Taiwan](#)  
Chih Shuo Chen, Yung Seng Chen, Chung Lian Kao (Kaohsiung Normal University, Taiwan, China)
3. [How Accurately do Respondents Report? A Comparison Between Space-Time Diary and GPS Tracking Data](#)  
Ying Zhao (Sun Yat sen University, China), Ying Zhao (Shangdong University, China)
4. [Impacts of Tourism Development on Residents' Welfare in Aba Tibetan and Qiang Autonomous Prefecture, China](#)  
Qiu Xiao ping, Fang Yi ping (Institute of Mountain Hazards and Environment, CAS, China)
5. [Lifestyle Entrepreneurs' Migration: From Imagination to Experience](#)  
Sun Xiaoxia, Xu Honggang (Sun Yat sen University, China)
6. [Livelihood Transition Study of Local Residents in the Tourist Resort Area:A Case of Jinshitan, Dalian](#)  
Xinge Wang, Jianchao Xi (Institute of Geographical sciences and resources reseach, CAS, China)
7. [Research on Interactions in Kailash Ritual Space: Perspective of Study on Tourists](#)  
Qiuju Luo, Mengjiao YU (School of Tourism Management, Sun Yat sen University, China)
8. [Social Integration Structure and Determinant of Tourism Migration in Ancient Village —Taking Hongcun As Example](#)  
Zhang Yechen, Lu Song (College of Territorial Resources and Tourism, Anhui Normal University, China )
9. [Chinese Seasonal Retirement Community and Their Making of Home](#)  
Yuefang Wu (Foshan Polytechnic; Sun Yat sen University, China), Honggang Xu, Lirong Kou (Sun Yat sen University, China)
10. [The Relationship Between the Human and Automobile in Self-Driving Tourism](#)  
Yang Peng, Xu Honggang (School of Tourism Management, Sun Yat Sen University, China)
11. [Unnecessary Old 'New' Friends? Finnish and Polish Second-Home Owners in Local People'S](#)

## Perceptions

Adam Czarnecki (Institute of Rural and Agricultural Development, Polish Academy of Sciences, Poland)

12. Wellness Tourism and Local Landscapes: a Successful Match

Theano S. Terkenli, Eirini Nektaria Kakoulli (University of the Aegean, Greece)

## Poster

1. Cross Cultural Adaptation of Third Culture Individuals Cultural Identity

Peng Zheng (China, Zhengzhou University)

2. Measure the Impact of Tourism on Cultural Security in Ethnic Regions—Taking Kashgar as an Example

You Yanan; Ji Guangmeng; Li Dong (China, Xinjiang University of Finance & Economics College of Tourism)

3. Study on the Process of the Tourism Migrants Social Integration Based on the Theory of Community Filed--Taking Hongcun as example

Lu Song; Zhang Yechen (College of Territorial Resources and Tourism, Anhui Normal University)

## Empirical Mobility Intentions Analysis and Mobility Research of Social Housing in Xi'an Based on Location Factors

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### Abstract

The fundamental difference between social housing and commercial housing is mobility of residents. Only by maintaining the dynamic balance of inward and outward residential flow, can social housing benefit the society to the fullest extent possible.

Detailed information and data of the social housing community in Xi'an has been collected and gradient analysis has been performed by Arcgis to determine the space-time pattern of this community. This study indicates that as time goes on, the location of social housing gradually moves away from the urban center and is always remote. Further investigations prove that the remote location is inconvenient for residents' daily commuting, usage of public service facilities, while increasing their daily expenditure and hindering social communication. Therefore, tenants generally show high mobility intentions in those areas. Based on the findings above, researches used SPSS for PCA (Principal Component Analysis) and multivariate linear regression analysis to study factors which can affect residential mobility, such as housing location and household income. Furthermore, AHP (Analytic Hierarchy Process) was also utilized to evaluate the potential changes of those factors.

The study indicates that level of household income primarily affects people's mobility intentions in Xi'an to a certain extent. Beyond that, the remote location characteristics are likely to become the principal factor of the outward residential flow. In the worst case scenario, those remote social housings would turn into 'vacuum space' or 'slum' in a short period of time.

With significant theoretical and practical values, this study could be a guide to generate effective macro policies of social housing and managements of dynamic construction based on an accurate mobility prediction, so that preventing the waste of land and fund on social welfare.

### Key words:

Social housing; Remote Location; Residential flow; Mobility intention; Location factors

## Evaluating Social Tourism and its Linkage to Sustainability Development of Scenic Spots in Taiwan

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### Abstract

Social tourism has become an important element to democratize public tourism since the 20th century. It not only benefits the individuals, but helps to create a solid family relationship, sense of well-being and fairer human rights (McCabe & Johnson, 2012). Sirgy(2010) claims that tourism is not one's basic need, but a deprived one. In this viewpoint, tourism can be even more important for poor people because of the happiness it creates. In Taiwan, the fact that most elders are supported and waited upon their children prevents the poor elders from experiencing tourism. However, neither the academic field nor the government has any correspondent studies or policies to this situation. The research takes qualitative methods including participant observation and interviews to realize the benefits and patterns of how elder people living in suburban areas in Taiwan participate in social tourism. The study will further figure out the relationship of participation, subjective well-being and quality of life resulted from social tourism to evaluate the sustainable tourism development in Taiwan.

### Key words:

social tourism; sustainable development; suburban area

## How Accurately do Respondents Report? A Comparison between Space-Time Diary and GPS Tracking Data

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### Abstract

The space-time diary of paper-and-pencil-based questionnaires is the basic form used to collect data. Tracking technology could help provide high-quality information to verify the conventional methods. This paper aims to explore the differences between recall using a space-time diary and GPS data in a case study in Ocean Park, Hong Kong. The results show that differences from the data comparison among selected attractions with show-activities exist. The bias in a temporal interval is more representative than that in a temporal locus, and the departure time reported in the questionnaire is more accurate than the arrival time. Based on a multi-level model, we find that the impacts of duration, attraction function, satisfaction and show participation on temporal interval bias are significant.

### Key words:

space-time activity; bias; questionnaire; Global Positioning System; Ocean Park Hong Kong

## Impacts of Tourism Development on Residents' Welfare In Aba Tibetan And Qiang Autonomous Prefecture, China

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### Abstract

Welfare is a concept that includes a wide range of subjective and objective matters, which can be divided into economic welfare, social welfare and ecological welfare. Aba Tibetan and Qiang Autonomous Prefecture was selected as the research areas, which is located in the northwest of Sichuan province, and has abundant resources of tourism. However, due to the poor traffic conditions and the fragile ecological environment, the region has a low residents' welfare. Because tourism has been the major industry in the region, it is crucial to explore the impact of tourism development on residents' welfare and identify effective measures. Based on the economic welfare, social welfare and ecological welfare, an integrated welfare index was defined. The results indicate that from 2000 to 2013, the economic welfare increases from 0.329 to 0.471, the social welfare increases from 0.487 to 0.628, the ecological welfare declines from 0.559 to 0.474, and the integrated welfare increases from 0.519 to 0.648 respectively. Using an econometric model, the effects of tourism development on residents' welfare were analysed. This is a significant positive correlation, more integrated welfare when there is more tourism income and more tourists. The findings show that the shape of sound and robust tourism institutions and policies would matter for increasing the standards of residents' welfare, and the active participation of local communities is also an effective way.

### Key words:

impacts; tourism development; residents' welfare

## Lifestyle Entrepreneurs' Migration: From Imagination to Experience

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### Abstract

The lifestyle migration has been observed rising due to the increasing mobilities worldwide and lifestyle migrants also show the change of social structure in the modern society. While lifestyle mobilities have raised the increasing interests among the social science scholars, most of current studies focus on the consumption-oriented lifestyle migrant in western world. Limited researches have been carried out in the non-western country. This study would examine the behaviors and experiences of rising lifestyle tourism entrepreneurs in China who have shown a complicated mobility pattern. The study especially attempts to understand the relationship between their imagination and their experience of the destination. The field work was conducted in Dali and Lijiang. Data is collected through depth interview and participant observation. It is found out that entrepreneurial migrants' imagination of life in Dali/Lijiang include the charming physical environment and idyll lifestyle, which comes from mass media and their personal tourism experiences. To operate a small bar or guest house is often imaged as an easy, relax and enjoyable life. For most of the entrepreneurs, the actual experience is frequently much more difficult than expectation. They need to adapt and adjust to reduce the gap between imagination and experience. The failure to meet the gap will produce new mobility- either return or move to the next ideal destination.

### Keywords:

lifestyle migrant; entrepreneur; imagination; experience; Dali/Lijiang

## Livelihood Transition Study of Local Residents in the Tourist Resort Area: A Case of Jinshitan, Dalian

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### Abstract

As a new type of urbanization in China, tourism urbanization has been an important driven force for the livelihood transition of the local residents. However, research has not adequately analyzed changes caused by tourism on traditional livelihood. This study, therefore, uses the sustainable development of livelihoods analysis framework of DFID to analyze changes on traditional livelihood caused by tourism. Taking Jinshitan resort as the case study, combining with longitudinal sequence survey data from 1992 to 2012, we analyzed the transformation process of livelihood of local residents during the past 20 years. We found that dramatic livelihood changes have occurred in Jinshitan. On the whole, livelihood of the local residents has changed from farmer to citizen, which can be seen as follows: Firstly, the amount of local residents' livelihood capital increased with the background of the tourism development and moreover, its structure changed dramatically from "the pentagon" to "square" with the loss of natural capital. Secondly, livelihood strategies diversification due to multiple off-farm growing was more severe with decline of traditional farming livelihood activities; Finally, the overall standard of living of local residents present the improving trend. However, even though changes in livelihood may be an indication of the realization of urbanization in study villages, this type of livelihood transition reflect an unsustainable development of the resort because of: (1) extrusion of the local residents living space and the deprivation of the natural assets; (2) few tourism livelihood of local residents; (3) poverty of the local residents seen from the structure of the income which depends mainly on subsidies. Therefore, we proposed that: (1) protect the the original natural villages from being demolished as far as possible; (2) strengthen the tourism resort area residents itself as a mining and development of tourism resources; (3) build a multi-level employment post system for absorbing residents.

### Key words:

resort; local residents; livelihood transition; Jinshitan

## Research on Interactions in Kailash Ritual Space: Perspective of Study on Tourists

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### Abstract

2014 A.D is Tibetan year of horse, the legend of walking around mountain can accumulate merit 13 times than peacetime attracts plenty of tourists to come to Mt Kailash in Ngari Prefecture, Tibet, China. Walking around sacred mountain is a traditional ritual of Tibetan Buddhism, and Kailash Walking Path is the carrier of pilgrims and tourists' religious rituals, in other words, ritual space. This paper chooses the background of pilgrimage tourism, views Kailash ritual space as cultural context, aims to portrays the man-land interactions and explain the interpersonal interactions and the spatial influence on interactions by using qualitative research methods: collecting data from participant observation, interviews and Internet blogs. The paper demonstrates that: 1) In Kailash ritual space, tourists' man-land interactions and interpersonal interactions are inevitable, and present particularities; 2) Interpersonal interactions and man-land interactions cannot be separated in Kailash ritual space, there are interacted and interconnected relationship; 3) As a whole, tourists' interactions are influenced by Kailash ritual space, tourists' man-land interactions accelerate with ritual landscape, and interpersonal interactions fluctuant with changing spatial landform. This paper explores the uniqueness of tourists' man-land interactions and interpersonal interactions in ritual space, helps understand different context of interaction, divides tourists in ritual space into two parts by analysing tourists' interaction, responds the "pilgrim-tourist axis" theory proposed by Smith in 1992, discusses the relationship between man-land interactions and interpersonal interactions, responds to the model put forward by Peng (2011), and explores different conclusions.

### Key words:

Ritual space; Tourist; Man-land interaction; Interpersonal interaction; Kailash

## Social Integration Structure and Determinant of Tourism Migration in Ancient Village: Taking Hongcun as Example

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### Abstract

As a typical ancient village tourism area, Hongcun attracts a large number of workers, business owners, and even retirees settling here in the tourism development stage. They are defined tourism migration. This paper takes the tourism migration in Hongcun as the research object, and discusses the social intergration structure and level by the method of exploratory factor analysis. Trying to reveal the influence of tourism on the social and cultural changes of the host community from the perspective of the floating population. At the same time, the multiple regression equation is introduced to analyze the factors that affect the social integration. Research results show that: Firstly, the social integration of tourism migration in Hongcun contains 4 dimensions, which are cultural fusion, psychological fusion, identity fusion and economic integration. Secondly, the level of social integration is not high. And, psychological intergration is best of all, the factor score 3.57 points. Then cultural interation and identity interation do not reach the medium level. The internal discrete of cultural fusion dimension is strong. Economic integration owns the lowest intergration degree. Thirdly, the main factors that affect the social integration of tourism migration are divided into individual factors and local factors. Among them, the extent of local factors is greater than the individual factors.

### Key words:

Tourism migration; Social integration; Influencing factor; Hongcun

## Chinese Seasonal Retirement Community and Their Making of Home

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### Abstract

Compared to the international retirement migration surpassing national boundaries and transcending cultural diversity, domestic population movement spanning long distance across China by the retired is an interesting and important social phenomenon. The consumption-led retirement migration, diverges significantly to the previous production-led labor migration is leading the transformation of Chinese society. And the traditionally static Chinese home is challenged with increased socio-spatial mobility. A qualitative research is conducted to deal with the changing experience and meanings of home for the elderly people in China, with increasing lifestyle mobility nowadays. The heuristic framework on domains of meaning of home in old age by Oswald & Wahl (2005) is employed for structuring the analysis. The research focus on the physical, social and personal domains of home by retirement migrants, and closer investigations are conducted in the behavioral, cognitive and emotional aspects concerning personal domain. The research finds out that, retirement migration is motivated both by globalization and the coming of mobility society, and by changes in Chinese family relationship and parents' concern on health. Although physical home is maintained by means of materialization of homeland and continuation of daily routine in second homes, the social and personal home is susceptible to change. Migrants are lost in the orientation and disorientation of home in the constant changes. Laoxiang and Quanzi, which are rules in traditional social operation, once again take prominence to manage migrant's society. An acquaintance society is formed in destination and continue the home making process.

### Key words:

retirement migration; home making; meanings; acquaintance society

## The Relationship between the Human and Automobile in Self-Driving Tourism

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### Abstract

With the increasing dependence of the human on the automobile, the emotional relationship between them becomes more and more intense and complex. Not only daily commute, self-driving tourism has also become a new way for people to use automobile and a lifestyle of many people. Researchers having noticed the profound influence of the automobile on people's life, there are also some research on the tourists' driving behaviour, but little attention have been paid to the special relationship between the human and automobile in self-driving tourism. This article sheds light upon the relationship between them through network travel notes and in-depth interviews. Results show that the driving tourists see the automobile as a vehicle at the beginning, they concerned about its safety, performance, comfortable capability and access distance, etc. In addition, automobile has become a symbol of people's way of life; it represents different levels of the driver and their life attitude. An automobile also compose tour experience of self-driving tourist, people appreciate the landscape in the isolated space which the experience is highly dependent on. At last, the automobile has become emotional support to driving tourists, they express more attention and greater reliance on the automobile and their tour activities are often revolves around it. In self-driving tourism, the relationship between the human and the automobile is not just the human controlling over technology and tools, technology and tools are also controlling, shaping and affecting the human's body, behaviour and attitude conversely.

### Key words:

automobile; self-driving tourism; human-automobile relationship

## Unnecessary Old 'New' Friends? Finnish and Polish Second-Home Owners in Local People's Perceptions

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### Abstract

In recent years, second-home tourism has experienced a renaissance gaining a lot of popularity among the European societies. It has been manifested in the growing number of secondary residences, e.g. in Finland there are about 500.000 second homes and their number has doubled over past 33 years (Statistics Finland 2014); in Poland second-home ownership has gradually increased from 7.6% to 12.4% households in period 2000-2013 (Social Diagnosis 2014).

Moreover, latest Finnish and Polish studies have proved that the spatial patterns of the second homes development have had distinct changes in recent years (Rehunen 2011, Heffner & Czarnecki 2011) since second homes have not occurred exclusively in suburban and tourism-based communities but also in rural heartland and remote areas challenging negative tendencies, e.g. strong depopulation.

Given that several research questions raise: how this phenomenon can be perceived by local people? Do they consider it in positive way as an economic opportunity, a boost of vitality to local communities or do they see it mainly as a disadvantage, emerging environmental and social concerns? To answer these questions a comparative study between Finland and Poland was conducted addressed to 467 and 398 local residents respectively living in communities with high concentration of secondary residences. The structural equation model was applied to assess the significance of the second-home phenomenon for local community based on rural people's opinions.

### Key words:

second homes; local community; perceptions; rural areas

## Wellness Tourism and Local Landscapes: a Successful Match

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### Abstract

This paper illustrates a sustainable alternative to negative impacts of tourism development on small destinations, such as overwhelming environmental, economic, social and cultural/ aesthetic pressures on local destinations. Such an alternative (re)lies on centring, promoting and developing wellness tourism, in mid-range tourism destinations, on the basis of the local landscape, both incorporating natural and cultural attractions as well as various types of tourism infrastructure, and amenable to the principles of locality, sustainability, multifunctionality, identity and democracy. The objective of this study was to assess tourists' perceptions, values and understandings of the significance of landscape to wellness tourism, an alternative form of tourism very much on the rise, in recent times, as well as highly connected to landscape appreciation and consumption.

Towards this goal, 150 (foreign and domestic) tourists were surveyed with the aid of an intensive interview questionnaire, in three very different resorts exhibiting varying interrelationships to wellness tourism, on the island of Chios, a mid- to small-scale tourism destination in Greece. The results indicate and elucidate the central role of landscape in wellness tourism, in the context of tourists' quest for beauty, peace and calm, closeness to nature, but also cultural amenities as well as specific landscape services to health and well-being. The findings also point to the qualified, variable and contingent basis of successful landscape-related wellness tourism development, in intricate and mutually beneficial relationship with local societies, economies and landscapes.

### Key words:

wellness; landscape; mid- and small-scale tourism destinations; local communities; Greece



## Cross Cultural Adaptation of Third Culture Individuals' Cultural Identity

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### Abstract

"Third culture individuals" is complex and interesting in the field of sociology. They are the product of globalization, the promoter is globalization, is of great significance to adapt and spread of Chinese culture. This study of 12 sojourners who has third cultural features is about the cultural adaptation in the sense of belonging, cultural identity, intercultural communication ability. The results showed that TCI has a sense of belonging to different degrees, they in the childhood stage experience two or more cultural fusion created a multicultural identity, this experience did not disturb their cultural identity, but to make them possess the ability to adapt to the different culture quickly, and this ability is natural to come, and without any effort.

### Key words:

Third culture individuals ; Cultural adaptation ; Cultural identity ; Sense of belonging ; Intercultural communication ability

## Measure the Impact of Tourism on Cultural Security in Ethnic Regions: Taking Kashgar as an Example

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### Abstract

This study takes Kashgar as an example, using the method of principal component analysis and fuzzy mathematics comprehensive evaluation method, research the influence of tourism on the cultural security of ethnic areas. Results of the calculation show that the tourism industry has great influence on the cultural security. The influence degree of the culture subsystem is followed by: Spiritual culture security, material culture security and living environment culture security. The measure-valued of spiritual cultural security is higher than material culture and living environment culture, which conforms to the mechanism of cultural change. That indicates the ethnic culture core layer has been in the active state, but so far it has not been fully expressed in the form of material. According to the calculation results and combining the connotation of the culture safety, this study presents countermeasures in the aspects of against alien culture intrusive excessively and enhancing the vitality of the national culture, to ensure national culture "static" and "dynamic" comprehensive security.

### Key words:

Tourism industry; Cultural security measure; Kashgar

## Study on The Process of the Tourism Migrants Social Integration based on the Theory of Community Filed: Taking Hongcun as Example

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### Abstract

Though a growing number of transient people springing up in the tourist destination, but the research on this topic has not yet received enough attention. This research, which has based on the community theory and combined with the qualitative research -depth interviews- and the quantitative research, study on the tourism migrants of the world heritage sites-hongcun in order to reveal its social integration process and results with the local community. The study found that the social atmosphere between the travel community immigration in hongcun and the local people are harmonious and no obviously conflict, which can be divided into three stages, 'dual community', 'casual acquaintances' and 'community field'. The three stages are not a progressive layers, but exist side by side, and the "casual acquaintances" occupy the mainstream. The social environment which combined with the various of cultural degree, the lack of communication opportunities and the space obstacle, made the communicate between the locals and the immigrants mainly are ordinary exchanges in stead of forming the social integration. This is an obstacle to create community field and may lead to the immigrants lack of engagement in the community construction and cause community development unsustainable.

### Key words:

Community field; Tourism immigrants; Social integration; Hongcun

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Carbon Emission



Home

#### Oral

1. [A Critical Review on Several Issues of Regional Tourism-related Carbon Emissions or Its Carbon Footprint](#)  
Xue wang Dong (Zhejiang Gongshang University, China), Jie ZHANG (Nanjing University, China), Jinhe ZHANG (Nanjing University, China), Shengkui CHENG (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
2. [Do low-carbon tourist routes exist? - Empirical evidence from China](#)  
Jinkun SUN, Jinhe Zhang, Jingjing CAO (Nanjing University, China), Yu Zhang, Hongsong Peng (Nanjing University, China), Huan HU (Nanjing University, China)
3. [The Influencing Factors on Carbon Emission for Tourism Industry in Destination from the perspective of tourism area life-cycle model](#)  
Tang Chengcai (School of Tourism Management, Beijing International Studies University, China)
4. [The optimal allocation calculating model of sightseeing car in national park based on carbon emission](#)  
Jinhe Zhang (Geographic and Oceanographic Sciences, Nanjing University, China)

#### Poster

1. [Carbon Footprint Evaluation Research on the Tourism Transportation System at Tourist Attractions: a Case Study in Hengshan](#)  
Li Bohua (China, Hengyang Normal University)
2. [CO<sub>2</sub> Emissions Measurement and Dynamic Changes of Regional Tourism Industry in Jiangsu Province](#)  
Huan Hu; Jinhe Zhang; Jinkun Sun (China, Nanjing University)
3. [Constructing A New Preliminary Evaluation System Model for Green Tourism](#)  
Ching-Yu Lien; C. A. Longkey Hoowen (China, School of Tourism, Sanming University)
4. [Interpretation of Low-carbon Tourism Value and Reconstructing the Developing Model](#)  
Ma Yong; Yang Yang (China, Tourism Development Institute, Hubei University, China); Li Na (China, Research Institution of Human Geography, Xi'an International Studies University, China)

## A Critical Review on Several Issues of Regional Tourism-related Carbon Emissions or Its Carbon Footprint

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### Abstract

Global climate change is one of the most important and challenging problems facing the world today. The tourism sector is the world's biggest industry, and the measurement and control of tourism-related carbon emissions or its carbon footprint is of great significance if the global emission reduction targets are to be met. This paper discusses the deficiencies and weaknesses in existing research; and proposes the emphasis and direction that future research should take. The literature review shows that there has been considerable research on carbon emissions by the tourism sector, and its carbon footprint. However, few of these studies included uncertainty analyses, and their reliability and validity is hard to identify. Studies are difficult to compare, and the carbon intensity and ecological efficiency of the tourism sector or tourism consumption cannot be confirmed because there is no consensus about the intension and extension, system boundary, accounting caliber, and measurement methods. Finally, the emphasis and direction of the future research, which includes defining the intension and extension of carbon emissions or the carbon footprint that unifies the system boundary, and combines the strength of two methods, i.e., bottom-up based Process Analysis (PA) and top-down based Input-Output Analysis (IOA), to construct a detailed and comprehensive hybrid approach, are presented.

### Key words:

Tourism sector; Tourism Consumption; Carbon emission; Carbon footprint

## Do Low-Carbon Tourist Routes Exist? - Empirical Evidence from China

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### Abstract

Tourism products are the terminal and core parts of tourism. With the gradual favour of low-carbon products, green and ecological are becoming the important factors of choosing tourist routes. The difference between the carbon emissions from kinds of tourist routes mainly lies in the different vehicles in travel. Taking China as the example, this paper chooses 60 actual tourist routes (from a city to another) based on different travel distance, including five ranges ( $\leq 100\text{km}$ ,  $100\text{-}300\text{km}$ ,  $300\text{-}500\text{km}$ ,  $500\text{-}1000\text{km}$ ,  $\geq 1000\text{km}$ ), to calculate the carbon emissions from tourism transportation. The main vehicles contain airplane, train, coach and car. Every tourist route is finished by a main vehicle and other auxiliary. By this, we can uncover the characteristic of carbon emissions in different tourist routes. The results will provide decision support in publicity of low-carbon and green in tourism from government and buying tourism products from the public.

### Key words:

Tourist routes; low-carbon; tourism products; carbon emission; China

## The Influencing Factors on Carbon Emission for Tourism Industry in Destination from the perspective of tourism area life-cycle model

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### Abstract

The factor decomposition model on the changing carbon emission in energy consumption of tourism industry in destinations was established in this paper. The Wulingyuan Scenic and Historic Interest Area was chosen as research case, and the influencing factors on carbon emission for tourism industry in the Wulingyuan Scenic and Historic Interest Area were analyzed from the different stages of life-cycle. The research results indicated that: when the tourist destinations are in the stages of exploration and consolidation, the scale of tourists and tourism output are being larger and larger and they are combined to promote the rapid development of carbon emissions for tourism industry, while it has been restrained by the constant decrease of energy intensity. Making the policy of energy-saving and emission-reduction should focus on the improvement of energy efficiency and the optimization of inner structure in tourism industry for tourism destinations in the stages of consolidation. Electric power is one of the most important energy consumed in tourism industry in China, and the low-carbon development of tourism destinations in China can't rely on the mass use of electricity to achieve the target of cleaner production. Virtually, it is a space transfer of carbon emission from the electricity-consuming place to producing place, which cause a lot of problems, such as the regional ecological ethic problems and carbon compensation. We should be encouraged to use low-carbon energy (eg. natural gas, zero-energy) to substitute high-carbon ones (eg. petroleum, coal).

### Key words:

tourism destination; tourism area life-cycle model; LMDI method; low-carbon development; the Wulingyuan Scenic and Historic Interest Area.

## The Optimal Allocation Calculating Model of Sightseeing Car in National Park Based on Carbon Emission

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### Abstract

The internal traffic of national park is not only an important tool for tourists, but also the profit means of the enterprise and the main carbon source. In general, there are three major contradictions of tourist traffic allocation inside the national park, such as rigid supply and flexible demand, environmental protection and personal effectiveness, environmental protection and economic interests. How to solve these three conflicts is very critical. This paper put forward three principles, maximizing the tourist satisfaction, maximizing the enterprises' efficiency and minimizing the environment impact. Accordingly, this paper constructs the optimal allocation calculating model of sightseeing car and takes Jiuzhaigou and Huangshan national park as two cases studies.

### Key words:

carbon emission; optimal allocation model; tourism transportation; national park

## **Carbon footprint evaluation research on the tourism transportation system at tourist attractions: a case study in Hengshan**

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### **Abstract**

It is difficult to achieve sustainable development of the tourism industry because of increasing carbon emissions associated with tourist attractions. In this article, we focused on Hengshan as the case study and applied a life cycle evaluation theory to construct a carbon footprint calculation model of the tourism transportation system at a scenic spot in Hengshan. The following results were obtained: first, in terms of total volume, different types of transportation have different carbon footprints. The most energy-expensive method of reaching tourist attractions is tourist highways, which have a carbon footprint that is 2.6 times that of tourist cableways and 46.1 times that of tourist walkways. Second, in terms of the stages in which the carbon footprint is distributed, the majority of the carbon footprint of tourist highways (79%) and tourist cableways (96%) is in the operation and use stage of the life cycle. For tourist walkways, most of the energy consumption is at the construction and the later operation stages. Third, in terms of source constitution, the carbon footprint of tourist highways occupies the largest proportion (about 71%) during its useful life, followed by tourist cableways (27%) and tourist walkways (2%). The model described in this article will not only help to achieve the goals of low-carbon tourism development, but will also provide the theoretical support for saving energy and reducing emissions at tourist attractions.

### **Key Words:**

tourism transportation system; life cycle; carbon footprint; tourist attractions; Hengshan

## CO<sub>2</sub> Emissions Measurement and Dynamic Changes Oof Regional Tourism Industry in Jiangsu Province

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### Abstract

The CO<sub>2</sub> emissions is an important indicator of the environmental impact of regional tourism industry, and analysis of decoupling effects in tourism industry is an important basis for formulate the carbon emission reduction measures of different stages in the tourism industry. The study adopted a bottom-up approach to explore the influences of tourism transportation, accommodation and activities on the total CO<sub>2</sub> emissions of the tourism industry over the period 2001-2013 in Jiangsu Province. In addition, a decoupling index was applied to analyze the decoupling effects between tourism-related CO<sub>2</sub> emissions and the tourism economy from 2001 to 2013. The results showed that: the total CO<sub>2</sub> emissions in tourism industry was increasing, but the annual growth rate was lower than the growth rate of tourism economy. The total CO<sub>2</sub> emissions from the tourism industry rose from 188.574 7 x 10<sup>4</sup>t in 2001 to 478.088 7 x 10<sup>4</sup>t in 2013, with an increase of 153.53%, an average annual growth rate of 8.06%, lower than the average annual growth rate of tourism economy 9.74%. In addition, Tourism transportation was the main component of CO<sub>2</sub> emissions of regional tourism industry. From 2001 to 2013, the CO<sub>2</sub> emissions of the tourism traffic was 79.20%, the accommodation was 16.10%, the tourism activity was 4.70%. Thirdly, the development trend of tourism is green, the decoupling of CO<sub>2</sub> emissions from tourism economy growth is mainly weak decoupling, tourism economic development is sustainable.

### Key words:

tourism CO<sub>2</sub> emissions; decoupling index; Jiangsu Province

## Constructing A New Preliminary Evaluation System Model for Green Tourism

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### Abstract

The evaluation system of green tourism is derived from the conceptual framework of green tourism. The main purpose of this study is to define a clear conceptual connotation of green tourism evaluation system and sort out the assessment indicator systems of low-carbon tourism, eco-tourism as well as sustainable tourism respectively. This study integrated the literature research, comparative research and AHP analysis methods. China must vigorously promote green development and green consumption to protect the green environment under full consideration background. The development of green tourism in tourism industry involves economic, social, cultural, ecological and other multi-attribute characteristics. The result of this study proposes a new initial evaluation system model for green tourism. This evaluation system model includes five first-level evaluation indicators, which are natural environment indicators, socio-cultural indicators, economic indicators, business involvement and government spending indicators. Meanwhile, we also designed 12 second-level indicators and 40 third-level indicators. The three levels for evaluating the indicator system model of green tourism are more complete, structured and very clear logical relationships. This study would more importantly provide the values of related theoretical bases on literature reference for in-depth continuing study of this research field.

### Key words:

green tourism; evaluation indicators; evaluation system model; multi-attribute characteristics

## Interpretation of Low-carbon Tourism Value and Reconstructing the Developing Model

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### Abstract

As the new way to upgrade tourism industry, the practices of low-carbon tourism are challenged by many factors. Most of the existing low-carbon resorts are still in the transition to a low-carbon destination--"gray" stage, which is not conducive to the sustainable development of scenic spots. In the first place, the article analyzes the connotation of low-carbon tourism, and then extract the four core values that is functional value, symbolic value, experience value and social value, from the perspective of production and tourism consumption. After that, according to the highlighting extent of low-carbon tourism, the paper divides the model into the original ecological developing model and sub-ecological developing model, what's more, basing the comparison of the two developing models, the paper build low-carbon tourism development model called "driving force - state - response - potential" model on the basis of DSRP reconstruction framework, which promotes the low-carbon area by the "passive, controlled" original mode to the "active, attack type" sub-ecological upgrading model. As a result, we can realize the low-carbon tourism value overflowing to promote low-carbon build tourist destination.

### Key words:

low carbon tourism; the value of developing model; reconstruction

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism Planning and Destination Sustainability



Home

#### Oral

1. [Community-Based Tourism in Gashaka-Gumti National Park, Nigeria: Potential for Poverty Alleviation](#)  
Ifeoluwa Adewumi (Hiroshima University, Japan)
2. [Creating a Framework to Analyze the Sustainability of Mega-Cruise-Ship Tourism in Japan](#)  
Carolin Funck (Hiroshima University, Japan)
3. [Development of Major Tourist Destinations of Madhya Pradesh state of India: A Case Study of Khajuraho Tourist Spot](#)  
Devendra Singh Yadav (Jiwaji University, India), Dr. G S Chauhan (University Grants Commission, India), Dr. Shivraj Singh Tomar (Ambah P.G. College, Ambah, India)
4. [Evolution of Rural Tourism Landscape Character Network: the case of Jiangxiang Village](#)  
Hu Xianyang, Bao Jigang (Sun Yat sen University, China)
5. [Music-scene Harmony: According to the Perception of Musical Soundscape](#)  
Hui Zhang, Jie Zhang (Department of Land Resources and Tourism Science/ Nanjing University, China)
6. [Public Participation in Tourism Planning: Perspectives, Process and Outcomes in Southern China](#)  
Dan Lin (Jinan University, China), David Simmons (Professor of Lincoln Univeristy, New Zealand)
7. [State of Wine Tourism Development in South Africa: Managing and Planning for Sustainability](#)  
Sanette Ferreira Caitlin Hunter (Stellenbosch University, South Africa)
8. [Sustainable Development and Tourism: A Case Study from Lashi Hai \(China\)](#)  
Seraina Hurlemann (University of Lausanne, Switzerland)
9. [The Effect of Tourism Development on Local Community Identity](#)  
Hamdollah Sojasi Qeidari, Tahereh Sadeghloo (Assistant, Geography and Rural Planning, Ferdowsi University of Mashhad, Mashhad, Iran)
10. [Tourism Sustainability in Himalayas: A Study on Land Use Shift and Solid Waste Generation in Accommodation Sector of Leh](#)  
Shamim shah, muzafar wani (Department of Geography and Regional Development University of Kashmir Srinagar, India 190006, India), sajad dar
11. [Tourism-Induced Livelihood Changes at Mount Sanqingshan World Heritage Site, China](#)  
Ming Ming Su (Renmin University of China, China), Geoffrey Wall (University of Waterloo, Canada),

Kejian Xu (China University of Geosciences (Beijing), China)

12. [Understanding Tourism Flow Structure from GPS Trajectory and Social Network Model within a Destination: Case Study of Gulangyu](#)

Yuan Li, Jiacheng Xie (Xiamen University, China), De Wang (Tongji University, China)

## Poster

1. [A Quantitative Division for Each Stage of the TALC Model Based on the Logistic Model](#)

Zhang Cheng Ming (China, Sun Yat-sen University)

2. [A Regional Analysis of Tourism Promotion in India: Evidence from Large Scale Survey Data of Domestic Visitor](#)

Ravindra Chowdhary (India, Mumbai International Institute for Population Sciences,); Suraj Kumar (India, Jiwaji University); Rakesh Kumar (India, rakesh@iips.net)

3. [A Study of Tourists' Perception of the Tourism Image of Xi'an Based on Micro-blog Data](#)

Min Yang; Xinyi Li (China, Xi'an University of Finance and Economics)"

4. [A Study on the Optimization of Tourism Spatial Pattern in Qinba Mountain Area Based on Pole-Axis Theory](#)

Jian Jiao; Jian Ruan (China, College of Architecture, Xi'an University of Architecture & Technology, Xi'an Shaanxi)

5. [Analysis on Characteristics of Spatial Structure in Great Nanyue Tourism Circle](#)

Bohua Li; Danyun Luo (China, Hengyang Normal University); Hongli Liu (China, Beijing normal university)

6. [Building, Managing and Developing a new Destination after Natural Disaster: A Case Study of Beichuan Qiang Cheng Tourism Zone](#)

Wu Chuntao (China, Sichuan University)

7. [Characteristics of the Cultural Space of Guanzhong Ancient Emperor Graves](#)

Quan Dongji (China, College of Urban and Environmental Science, Northwest University); Zhu Haixia (China, Northwest University)

8. [Determinants of Island Tourism Development: The Example of Dachangshan Island](#)

Yuting Ge (Liaoning Normal University)

9. [Development of Tourist Destinations in and Around Bhopal, Madhya Pradesh, India](#)

AbdulRaof Khan (India, C.R. Institute of Management UTD Barkatullah University, Bhopal, India); DR. G. S. Chauhan (India, Deputy Secretary, University Grants Commission, Central Regional Office,

Bhopal -462016, India)"

10. [Harnessing the Tourism Potential and its Promotion in Madhya Pradesh State of India](#)  
Gambhir Singh Chauhan (India, University Grants Commission)"
11. [Prospects of Application of an Integrated Information System for the Tourism Development of the Baikal Region.](#)  
Maria Kuklina (Russian Fed, Irkutsk National Technical University)"
12. [Space Differences and Sustainable Development of Summer Tourism Climatic Resource in Qinghai-Tibet Plateau](#)  
Chunhua Li (China, Qinghai Normal University)"
13. [Spatial Differentiation and Influencing Factors of Rural Tourism Resources](#)  
Jingrong Sun (China, Nanjing Xiaozhuang University)"
14. [The Equilibrium Analysis Model of Ethnic Village Tourism Sustainable Development](#)  
Xia Bing (Northwest Normal University in China)"
15. [Tourist behavior analysis and tourism destination evaluation study](#)  
Han Cao (China, Shaanxi Normal University)"
16. [Tourists' Wayfinding and Spatial Behaviors in Mountain Sanqingshan Based on the Analysis of Space Syntax and Decision Tree](#)  
Peixue Liu (China, School of Geographic and Oceanographic Sciences, Nanjing University); Ronghua Wu (China, Guangzhou Urban Planning & Design Survey Research Institute); Jie Zhang (China, School of Geographic and Oceanographic Sciences, Nanjing University)

## Community-Based Tourism in Gashaka-Gumti National Park, Nigeria: Potential for Poverty Alleviation

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### Abstract

The designation of Gashaka-Gumti National Park (GGNP) resulted in the placement of various restrictions on the resources used by people living within and around the park, who are mainly farmers, hunters and pastoralists. Hence, various illegal activities arose within the park because the local people were deprived of their livelihood derived from the locally available natural resources. The people living within and around GGNP suffer from the effect of poverty, poor infrastructure and services. Community-based tourism (CBT) can serve as a tool to balance the negative effects from the national park designation by meeting the social, environmental and economic needs of the local communities through the offering of a tourism product. The aim of the research was to assess the potential of CBT as a tool for poverty alleviation. To achieve this, 250 questionnaires were administered in 9 communities while focused group discussions were conducted in five communities. The main complaints of the respondents were unemployment, insufficient land for farming and grazing, and lack of infrastructures. They showed willingness to participate in tourism projects if given the opportunity because it would not only create employment opportunities but also help in bringing about development. This suggests that the people are ready to accept the development of tourism projects, which is a good prospect for CBT. The management of GGNP therefore needs to facilitate the local people's involvement in tourism in order to reduce poverty while at the same time, solve most of the challenges the park faces.

### Key words:

Gashaka-Gumti National Park; Poverty alleviation; Community-based tourism; Unemployment

## Creating a Framework to Analyze the Sustainability of Mega-Cruise-Ship Tourism in Japan

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### Abstract

Within the global increase in cruise passengers, Asia, especially the growing Chinese market, has seen exponential growth. Many of the new mega-cruise-ships are destined for Asia, and ports in Japan compete to attract what they see as strong shoppers from abroad making up for the decline in Japan's own population. However, the sustainability of cruise tourism has been questioned for various reasons. Environmental issues like air pollution, garbage and sewage treatment, the highly concentrated industry structure where a few operators control the world market as well as social and cultural issues arising from large number of visitors arriving for short term visits have been documented. This paper aims to establish a geographical framework for the evaluation of mega-cruise-ship tourism by examining environmental, economic, social and cultural issues from the example of Japan. Research was conducted in four steps: analysis of literature and data on cruise tourism in general and in Japan, interviews with local government agencies involved in the acquisition of cruise tourism, questionnaires with international cruise ship passengers arriving in Hiroshima Port and interviews with local tourist attractions, shops and restaurant. Results revealed that the economic effect has been negligible and that the passenger management at the destination poses severe problems. Based on the results, a list of issues will be identified that need to be addressed to improve the sustainability of mega-cruise-ship tourism.

### Key words:

Cruise tourism, Japan, sustainability, mega-cruise-ship

## Development of Major Tourist Destinations of Madhya Pradesh sState of India: A Case Study of Khajuraho Tourist Spot

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### Abstract

The tourism industry has emerged as one of the key drivers of global economic growth. Tourism is termed as “sunrise” industry and it is multi-oriented employment generator. Madhya Pradesh state of India is known as heart of incredible India and is gradually attracting & alluring the tourists worldwide. The state has three world famous tourist destinations which are included in the list of UNESCO world heritage sites viz. (i) Khajuraho (Chhatarpur), (ii) Sanchi (Vidisha) and (iii) Bhimbetika (Raisen), Khajuraho is a very popular tourist destination among the overseas tourists. The other well-known tourist centers of the state are Orchha, Bandhavgarh, Gwalior, Kanha, Panna, Sanchi, Mandu, Panchmarhi, and Ujjain. The Madhya Pradesh holds 7<sup>th</sup> rank in domestic tourists arrival and 13<sup>th</sup> rank in foreign tourists' arrival at national level. The Govt. of Madhya Pradesh has launched various popular slogans and schemes to attract foreign travellers. The total no. of foreign tourist arrival was merely 89,169 in 2008 which has increased to 97,356 in 2012. While in 2014 the figures of foreign tourists has substantially gone down up to 71,898. The figures of foreign tourists reveal that the study region is on the top in order to attract maximum tourists making a visit to M.P. and it is the most sought after tourists' destination for foreign tourists. An attempt has been in the research paper to highlight the spatio – temporal analysis of tourists and strategies to attract maximum tourists to the heart of incredible India.

### Key words:

employment generator; economically viable; world heritage sites; year of tourism; sunrise.

## Evolution of Rural Tourism Landscape Character Network: The case of Jiangxiang Village

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### Abstract

The process and mechanism of rural tourism landscape character network evolution are overlooked in rural geography studies. Basing on field theory, this paper tries to reveal the evolution process through social network analysis and provides an interpretation of the mechanism by actor-net analysis. The results suggest that the network density becomes higher and the relationship between nodes gets closer in the three periods. The themes of the network are overall stable, but the landscape character of high degree centrality has fluctuated: Chang Desheng's celebrity effect and service environment are assumed increasingly important while the rural atmosphere being the opposite. The second part illustrates the logic behind the phenomenon. The actor network includes the central government, local government, village committee, political elites, the villagers, enterprise in the village and the local resources and environmental factors. Governmental guidance, professional ability of the political elites and actors' reaction to the changing social environment are crucial to the landscape character network evolution. Power and benefits are driving forces of role definition, distribution and conversion. This article also demonstrates that SNA and ANT have a good applicability in description of the process and mechanism of rural tourism landscape character network evolution. Additionally, this study discusses the connection between the landscape character and socio-spatial restructuring, the logic of space, power and interests as well as institutional logics behind the case.

### Key words:

landscape character network; evolution; tourism field; power relations; Jiangxiang Village

## Music-scene Harmony: According to The Dimensions and Characteristics of the Perception of Musical Soundscape

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### Abstract

The dominate researches in physical geography are relatively visual-oriented, neglecting the acoustic features. A Canadian environmentalist Schafer defined the concept of “soundscape” in 1960 for acoustic ecology. But up to now, most researches of the perception of soundscape are based on physical characteristics, and neglect the attributes of geographical. This research aims to find if the basic characteristics of the musical soundscape can be explored by the investigation of the perceptual dimensions, and uses the information processing theory of cognitive paradigm to test if the musical soundscape can call up people's imagination about the scene. By the open-ended questionnaires, undergraduate students were investigated in December in 2015. A total of 132 valid questionnaires were collected finally. After context encoding and weight processing, we find that several dimensions are concluded in the perceptual dimension of the musical soundscape, includes perceptual time, the musical carrier form, environmental features, individual psychology and so on. It has a certain concentration in environmental features and individual psychology, and these two aspects related to the scene which form the geographical feature of the musical soundscape. Schafer limited soundscape with three main elements: keynote sounds, sound signals and sound marks, and we find that as to musical soundscape, localization and time identifiability are the two key points to soundscape. This research has contributed to the empirical study of soundscape with a valid method, and can be used by designers in tourism scenic spots.

### Key words:

musical soundscape; perceptual dimensions; open-ended questionnaires; geographical feature

## Public Participation in Tourism planning: perspectives, process and outcomes in Southern China

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### Abstract

Public participation is considered a cornerstone of sustainable tourism planning. While well established and tested in western democracies, there is an emerging trend to develop such processes within the liberalising Chinese tourism economy. This paper applies the theoretical construct of community participation in tourism planning to the analysis of a purposeful attempt to engage various publics in the tourism planning process in Jiao Chang Wei, Shenzhen, China, using both qualitative and quantitative methods. It is found that: 1) new management structure has been created incorporating various interest groups involving local governments, local residents, outside investors, and social institutions. What sets at the core of this structure is a demoralising decision-making process and an interest shared mechanism; 2) at the operational level, high efficiency and effectiveness in public participation was evidenced in the case study in comparison with other Chinese tourism destinations; 3) interest groups report higher overall satisfaction of the participatory planning, with high quantity of conservative supporters and positive supporters for tourism development. The paper concludes with discussions on limitations and potentials of the present mode of public participation in tourism planning in China.

### Key words:

Public participation, tourism planning, community development, Shenzhen, China

## State of Wine Tourism Development in South Africa: Managing and Planning for Sustainability

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### Abstract

On a global scale the phenomenon of wine tourism is growing and is considered to be a driver of economic and social development in rural areas. Limited job opportunities and unemployment is a reality in most rural areas and especially in the rural areas of South Africa. In 2013 the wine industry in South Africa has generated more than 300 000 direct and indirect job opportunities. The main aim of this paper is to present the current state of wine tourism development in SA, the role that the sector plays in regional development, the social responsibility of two leading wine estate farms and how to manage and plan for sustainability. A mixed-methods research approach was used in this study comprising of one questionnaire-survey (farm-level survey) and two in-depth case studies. The results from the questionnaire survey enabled the classification of 16 wine routes according to their level of development and has discloses certain critical issues that needs to be addressed in the future planning of each of the 16 wine routes.

### Key words:

Wine tourism development; wine routes; tourism area lifecycle; responsible planning

## **Sustainable Development and Tourism: A Case Study from Lashi Hai (China)**

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### **Abstract**

Tourism often serves as strategy to promote sustainable development in China's remote rural areas that have not yet profited of the economic boom. But to what degree does this kind of development align with the principles of sustainability? How does it affect local communities? And what effect does it have on the environment? This research takes a holistic approach to tourism development by analysing a case study conducted in five villages in the Lashi Lake Wetland Area (Yunnan, China), that takes into account as many socio economic, political as well as ecological factors as possible. Consequently, the findings are able to generate profound insights on the changing processes stimulated by tourism development within the local community, economy and environment. It further demonstrates the conflicts between the idea of sustainability and the characteristics of Lashi Lake's development. Even though social inequalities and environmental degradation rose with the economic growth brought by tourism, living standards have increased as well, and existential problems faced by local households on everyday bases have diminished. Furthermore, there appears to be an increasing awareness of environmental and social issues among the local residents, which may play an important role in directing the regions future development.

### **Key words:**

Tourism; sustainable rural development; local empowerment; environmental conservation

## The Effect of Tourism Development on Local Community Identity

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### Abstract

Tourism development in rural area has been introduced as a one of the basic needs for rural economic diversification and tourist's recreation. Tourism industry cause to transmission of financial and monetary resource to rural area by tourism potential that create employment and entrepreneurial opportunities in these rural. In addition of financial resource, tourists enter external culture to rural environment. Thus, with tourism development and tourist's entrance to rural area, the context of rural identity changing will be provided in different aspects. Rural identity changing in developing countries is more than developed countries and often observed in economic, social and cultural dimensions. Therefore, in this study the main goal is identification of most important changes through of tourists presence in rural area especially in peripheral rural of Iran, by using of Quantitative Methodology. Findings show that these changes in cultural and social dimension are more than the other aspects. The result of these changes on rural architect, social – economical relationship and rural livelihood is more obvious.

### Key words:

Tourism development; rural identity; social- cultural changes; rural area.

## Tourism Sustainability in Himalayas: A study on Land Use Shift and Solid Waste Generation in Accommodation Sector of Leh

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### Abstract

In the present day world of rapid urbanization, mountains tourist destinations like Leh, are gaining grounds as preferred destinations for the people world over, because they offer unique opportunities and experiences in order to escape from the stress of urbanization. The Leh town has witnessed phenomenal growth in terms of tourist flow, accommodation sector and transportation in a very short span of time than other Himalayan tourist destinations. The present research was under taken with the objectives of analyzing the growth of tourism, dynamics of land use change and scenario of waste generation in Leh town. Remote sensing data was used to analyze the magnitude of land use change which has occurred over the period. For determining generation of solid waste from accommodation sector a detailed survey was conducted using direct waste estimation method. The main findings of the study reveals that there is shift in land use patterns especially agricultural land has changed to built-up area. The area under built-up was just 168 hectares in 2001 which went to 294 hectares in 2011. The results also show that category A and B hotels are generating 3.5 kg and 2.5kgs solid waste per room per day which is more than international standards. The main conclusion of the study is that that sustainable tourism management needs integration of geospatial technology for planning and development of tourist destinations.

### Key words:

Himalayan; Destination; GIS; GPS; Sustainable; environment; Generation; Accommodation

## Tourism-Induced Livelihood Changes Aat Mount Sanqingshan World Heritage Site, China

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### Abstract

Striking a balance among conservation, tourism and the needs of residents is among the key development goals of World Heritage Sites. Although tourism has the potential to improve livelihoods, it may disrupt livelihood systems, social processes and cultural traditions. Proper planning and management is required to ensure positive results on local livelihoods. This study assessed the livelihood changes at three rural villages at Mount Sanqingshan World Heritage Site, China to determine whether and to what extent tourism-related livelihood strategies are contributing to local livelihoods. A sustainable livelihood framework is adopted to guide the analysis. Semi-structure interviews were conducted at three villages with residents, site management agency, village mayors or committee members through three field investigations in 2014. It was found that the three villages exhibited different development patterns due to institutional, organizational and location factors. The new livelihood strategies involving tourism that were constructed and incorporated into the traditional livelihood systems resulted in different outcomes for residents of different villages. Village location, including the relationship to site tourism plan, affected the implications for rural livelihoods. High dependency on tourism with the loss of traditional livelihoods has diminishing effects on livelihood sustainability despite the short-term positive economic benefits. Thus the need to diversify livelihood opportunities from tourism is pertinent. Moreover, insufficient attention was given by both the site level government and village level management authorities to the socio-cultural aspect of livelihood sustainability. Practical implications are then suggested to enhance livelihood sustainability at such rural heritage tourism sites.

### Key words:

Tourism; community; sustainable livelihood; World Heritage

## Understanding Tourism Flow Structure from GPS Trajectory and Social Network

### Model within a Destination: Case Study of Gulangyu

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#### Abstract

The study of tourism flow structure is an important direction of tourism geography, however, few paying attentions within a destination. Under the background of smart tourism and human-oriented tourism management, the calls for understanding tourist's behavior within a destination and tourism flow structure is emerging. As a response to this trend, this paper explores a workable approach with the use of GPS trajectory and social network model. The proposed approach mainly includes two parts. The first part is processing individual tourist's GPS trajectory into *Behavior Chain*, which is used for recording the visiting sequences of scenic areas. The second part is integrating and converting individual tourist's behavior chain into *Choice Matrix*, which is used for recording the relationships of scenic areas. Based on the choice matrix, social network model is applied to calculate the *Point Centrality*, *Closeness Centrality* and *Betweenness Centrality*. In order to justify the proposed approach, the case of Xiamen Gulangyu Island is adopted as an example, and 341 GPS trajectories with questionnaires are obtained during 2015. The finding of case study shows: 1) core-periphery structure of the tourism flow is very clear on Gulangyu island, and the number of core and periphery districts is respectively 19 and 35; 2) land use of core areas are mainly containing commercial and hot scenic spots, showing the over-commercialization phenomena; 3) the tourism flow structures under the three parameters are related but slightly different. From the research, we could understand the tourism flow structure in more rational way and some potential development strategies could be suggested.

#### Key words:

Tourist's Behavior; GPS; Social Network Model; Gulangyu

## A Quantitative Division for Each Stage of the TALC Model Based on the Logistic Model: And Discussing the Tourism Life Cycle Types of the Ten National Parks in The United States

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### Abstract

This paper tries to use Logistic model to divide each stage of the TALC model quantitatively. Based on the analysis of the mathematical properties of Logistic model, this paper analyzes the applicability of Logistic model to the quantitative division of LATIC model, meanwhile, uses the data of ten national parks in the United States to discuss the development types of these ten national parks. Results show that:(1)the Logistic model can fit the first five stages of LATIC model fairly well: Exploration-Involvement stage, Development stage, Consolidation stage, and Stagnation stage; (2)using the mathematical properties of the logistic model, obtained divided the various stages of the three time nodes  $(t_1, \frac{K}{4.732})$ 、 $(\frac{a}{r}, \frac{K}{2})$ 、 $(t_2, \frac{K}{1.268})$ ; (3), the tourism life cycle types of national parks in the United States can be classified into three ones: Type I-Standard type, Type II - Cliff type, Type III - Leap type.

### Key words:

Logistic model; TALC model; national parks in US; tourism development types

## A Regional Analysis of Tourism Promotion in India: Evidence from Large Scale

### Survey Data of Domestic Visitor

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#### Abstract

In the year 2002, the Incredible India campaign was launched on the world stage by the Government of India, Ministry of Tourism and Culture to promote Indian tourism. India is a vast and diverse country, which attracts much attention as domestic as well as International tourist in major destination of India. This paper examines the household member or visitor aware about Incredible India campaign and state tourism promotional campaign at states and regional level. Using secondary sets of data on NSSO 65 round of domestic tourism in India and statistical software ARC GIS tool to identify the colour coded map of India and regional level. Finding suggest that there are 6.14 per cent person are aware about incredible India campaign at national level and there are few state performing well in context of knowledge. However, at the regional level using 88 region of National Sample Survey of India result found that there is some pocket of region were person are more aware about the campaign. This paper will be more helpful for the policy maker, tour operator and stakeholders at destination level as well as Indian tourism development.

#### Key words:

Incredible India; knowledge; regional & national level and development.

## A Study of Tourists' Perception of the Tourism Image of Xi'an Based on Micro-blog

### Data

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#### Abstract

With the rapid development of tourism and the fierce market competition, the images of the tourism destinations are playing an increasingly important role in attracting potential tourists and enhancing the competitiveness of the destinations. This paper intends to make an in-depth analysis of the domestic tourists' perception of the tourism image of Xi'an and the influencing factors on it by collecting the micro-blog data published by tourists in Xi'an, using content analysis and ROST, the word frequency analysis software. The research has found that the tourists' perception of the tourism image of Xi'an centers around the representative areas, the overall image perception, and the tourists' expression words. In general, the tourists have a good perception of the tourism image of Xi'an. But there are also some negative perceptions, the key influencing factors being the weather, the traffic, and the overcrowding in scenic spots etc. Using micro-blog data to systematically study tourists' perception of tourism image of Xi'an can help the administrative departments to decide on the tourism image of Xi'an clearly, and improve tourism images.

#### Keywords:

micro-blog; content analysis; Xi'an; image perception

## **A Study on the Optimization of Tourism Spatial Pattern in Qinba Mountain Area Based on Pole-Axis Theory**

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### **Abstract**

As the carrier of tourism, the rationality of tourism spatial structure will influence the development of tourism industry directly. Qinba mountain area, located in the geographical center of China, is a cross border tourism area of six provinces and cities, which forms a complete economic, social and cultural circle. As an important Chinese culture birthplace and biological gene pool, Qinba has an important strategic position in China's culture and tourism development. In order to make better use of tourism resources in Qinba mountain area and promote the sustainable development of tourism economy, based on the study of the types and space distribution of tourism resources and the present situation of regional tourism spatial structure features, this paper analyses and calculates the important tourism nodes and developing axis by applying the pole-axis system theory and build the network of tourism spatial structure consists of "points", "axis" and "plate" in Qinba mountain area which integrates into the regional tourism development pattern, to lay the foundation of the tourism development on the spatial level.

### **Key words:**

tourism spatial structure ,Qinba Mountain Area, pole-axis system theory

## Analysis on Characteristics of Spatial Structure in Great Nanyue Tourism Circle

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### Abstract

For taking full advantage of tourism resources in Great Nanyue Tourism Circle, this paper analyzed the resource type and spatial structure characteristics of Great Nanyue Tourism Circle by graphical method and spatial econometrics model. The samples were the 47 tourist attractions in the study area. The space distributions showed characteristics of uniformly distributed. The scenic spots tended to concentrate around 10 — 12. 5km of Hengshan. The level of space connection between scenic spots in Great Nanyue Tourism Circle was relatively weak, the same as the level of connectivity and accessibility of tourist traffic web. At last, some recommendations were given for optimization of the spatial structure of tourist attractions in Great Nanyue Tourism Circle.

### Key words:

tourist attraction; spatial structure; optimization; Great Nanyue Tourism Circle

## Building, Managing and Developing a New Destination after Natural Disaster: A Case Study of Beichuan Qiang Cheng Tourism Zone

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### Abstract

Natural disaster tourism is an activity to visit sites associated with dead or tragic events caused by natural disaster such as earthquake, typhoon, tsunami, debris flow, or volcanic. In China, the natural disaster tourism developed quickly in the “5•12” Wenchuan Earthquake affected areas after 2008. There two study purposes of this paper: to interpret the strategies of design and the practices in building tourism zone in the devastated areas; to find out some suitable methods to develop the zone sustainably, focused on the effects of exactly site on visitor experiences. Documents analysis, semi-structure interviews with elites from local tourism industries, and questionnaire survey with tourists are methods used. The questionnaire survey results indicate that, in 2014, the top three key motivations of visit were: to see the old town of Beichuan earthquake ruins, to feel the earthquake disaster closely, as well as to experience the Qiang culture. After the trip, the deepest experience was “felt the terrible nature of earthquakes and reverence of the nature” felt the solidarity spirit of disaster resistance” and “felt the value of the life”. However, only 9% of the visitors said that the most impressive experiences was relax, and only 16% of the visitors regarded that it was disaster prevention education. Regarding to the correction between each site and the deepest experience, the old town of Beichuan earthquake ruins was positively correlated with “experienced the terrible nature of earthquakes and reverence of the nature” or “experienced the value of the life”, but significantly negatively corrected with the “relax”. Meanwhile, the earthquake museum was positively correlated with a patriotism education item “the human life contains genuine feeling”; and Qiang shopping street was positively correlated with “had a relax”. Thus, in order to develop the Qiang Cheng tourism zone sustainably, the destination managers should develop more attractive tourism products such as visiting Qiang ethnic village, reducing preservation scale of the earthquake ruins, or re-writing the interpretation of the disaster sites to reduce the sad atmosphere of the zone. Furthermore, the managers should emphasis the role of tourism in natural disaster education, as it could increase visitors’ satisfaction and revisiting willingness.

### Key words:

natural disaster tourism; destination brand; Beichuan; interpretation; tourist experience

## Characteristics of the Cultural Space of Guanzhong Ancient Emperor Graves

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### Abstract

Guanzhong Ancient Emperor Graves are the subject of the Cultural Heritage in Guanzhong-tianshui Economic Zone. Also, it is a major component of Chinese civilization. Along with its historical evolution, the original cultural space and features has significantly changed. It is an urgent task to activate the value of cultural heritage and to better highlight the Chinese civilization. This paper, from multiple perspectives including archeology, history and human geography, analyzes the cultural connotation of space and character of Guanzhong Ancient Emperor Graves. There are six characteristics: 1. The natural and human environment is the fundamental base of the generation and evolution of the Guanzhong Ancient Emperor Graves; 2. Guanzhong Ancient Emperor Graves cultural space has a special place in the history of Chinese Mausoleum development; 3. It provides magnificent cultural landscape; 4. Guanzhong Ancient Emperor Graves cultural space has a strict system and rich cultural connotations. 5. The current situation of the cultural space is complex and contradictory; 6. The protection and utilization of the cultural space differs greatly.

### Key words:

Guanzhong Ancient Emperor Graves, Cultural Space, Cultural Heritage, Features



## Determinants of Island Tourism Development: The Example of Dachangshan Island

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### Abstract

Islands possess their own patterns of spatial and temporal evolution as tourist destinations. Taking Dachangshan Island as an example, two key stages were identified: a 'landscape-oriented' period from 2002 to 2009, and a 'background' stage from 2009-2012. Co-existing with both periods was changing spatial and land-use patterns of expansion and intensification. Using spatial mapping techniques, it was found that tourist resources were found to be the original driving force, tourist transportation and social and economic factors were endogenous determinants of change, and tourist enterprises and source markets subject to government policies the exogenous factors.

## Development of Tourist Destinations in and Around Bhopal, Madhya Pradesh, India

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### Abstract

It is seen that international tourism has come out as a cultural interaction to the industry during the last few decades and it's become a major sector for generating employment, income and foreign exchange for a country all over the world. This study has taken Bhopal the capital of Madhya Pradesh in India as a study area because it has numerous inherent characteristics of tourism like historical, heritage, cultural and natural. There are number of tourist point and destination in and around Bhopal which has lot of potential and of scope of tourism development due to its geographical advantage because it is centrally located and well-connected to the other parts of the country. The city has number of historical tourist points like Moti masjid, Jama masjid and Tajul masajid, Bhojpur temple, World heritage BhimBetka, Sanchi stupas, and various other religious, economic, social destinations in and around. The basic objective of the study is to investigate present status of the tourist destination and analyze the development of tourist sites in and around Bhopal by randomly selected respondent response of different group of society from the various parts of the city. The information has been collected on the tested questionnaire regarding the indicators of development of tourist destination. Various statistical tools have been applied for result and found that there is a positive response among respondents about the development of tourist destinations in and around Bhopal.

### Key words:

Destination; Development; Tourism; Scenario; Bhopal

## Harnessing the Tourism Potential and its Promotion in Madhya Pradesh State of India

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### Abstract

In the 21<sup>st</sup> Century, the global economic scenario is changing very rapidly and in the process of global transformation, tourism is considered to be one of the largest and fast growing industries. The occupation of tourism is providing very useful and fruitful avenues especially to those people who are engaged in tourism activities because through this smokeless industry, they are not only enhancing their standard of living but also generating income and employment opportunities. In the contemporary era of globalization and industrialization, the whole world has shrunk into a “global village”. In the last couple of years, the Madhya Pradesh has attracted considerable number of foreign & domestic tourists due to its climatic, scenic beauty and ecological resources. In the whole state, there are about 450 tourist destinations which are located at various important geographical locations and offer the rare opportunity to see them. Therefore, keeping in view, alluring and attracting maximum tourists in Madhya Pradesh, the State govt. has designated 2015-16 as “**Year of Tourism**”. According to the tourist statistics of Madhya Pradesh, the total number of domestic tourists arrivals has gone up from 22.08 million in 2008 to 63.6 million in 2014, while foreign tourists arrivals has also increased from 2,51,733 in 2008 to 3,16,195 in 2014. The current statistical figures of 2014 reveals that the percentage share of Madhya Pradesh at national level in domestic tourism is 4.93 per cent, while the foreign tourism share is merely 1.40 per cent. The state has 7<sup>th</sup> rank in domestic tourism and 13<sup>th</sup> rank in foreign tourist arrival according to the figures of 2014. The major centres of tourist attraction in the state are Khajuraho, Orchha, Bandhavgarh, Gwailor, Kanha, Panna, Sanchi, Mandu, Pench, Omkareshwar, Maheshwar, Panchmarhi and Ujjain. The research paper deals with to assess the tourism potential & its promotion in the state and to highlight the major hurdles for the promotion & development of tourism sector in the study region. The research paper also suggests important measures to promote the tourism in the state to harness its full potential.

### Key Words:

Tourism Potential; Smokeless industry; Global village, Year of Tourism; Madhya Pradesh.

## Prospects of Application of an Integrated Information System for the Tourism

### Development of the Baikal Region

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#### Abstract

Every year the number of tourists visiting the Lake Baikal increases by 10%. In 2015 it reached about 1.5 million, although only 10% were foreign tourists. Meanwhile, proximity to China has a lot of potential for attraction of Chinese tourists.

One of the main impediments for the development of international tourism is the lack of an integral image of the Baikal region since it is divided administratively by three subjects: Irkutskaya oblast, Republic of Buryatia, and Zabaykalskii Krai. There is no interactive map of Baikal region, although the one that would include the points of tourist destinations, accommodation, dining, shops, historical, religious and architectural attractions, etc. is needed. Also there is no multilingual information resources on the Baikal region.

Construction of the integral image of the Baikal region is the matter of federal policy that should provide a base for the different administrative units, private enterprises, and local communities to combine their informational resources under one united conception. Moreover, from the environmental point of view, the watershed of the Selenga river in Mongolia is also part of the Baikal watershed. Currently quite often international tourists visiting the Lake Baikal also visit Mongolia. So construction of the transboundary Baikal watershed regional image would benefit not only environmental, but also tourist purposes and therefore socio-economic development of the territory. The main informational resources of the region, the prospects and the main challenges of application of an integrated information system will be discussed in the presented paper.

## Space Differences and Sustainable Development of Summer Tourism Climatic Resource in Qinghai-Tibet Plateau

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### Abstract

The study of tourism climatic resource provides important reference to tourists, tour operators and managers. The simple rough plateau landscape and mysterious colorful religion culture in Qinghai-Tibet Plateau have attracted a large number of domestic and foreign tourists every year. The quantitative assessment of tourism climate resource can provide a scientific basis for developing the resources and for visitors to select the proper travel time. Based on the meteorological data of meteorological stations in Qinghai-Tibet Plateau, mainly including monthly average temperature, relative humidity and average wind speed in summer (June, July and August) during 1971-2011, tourism climate resource spatial differentiation were analyzed. The result shows that: climate resource distribution in Qinghai-Tibet Plateau has obvious regional characteristics, the more comfortable places lie in the Hehuang valley and Southern Tibetan valley, whereas the uncomfortable climate regions are in the northern, western and central areas of the Plateau. The ways to develop tourism climate resources are as follows: improve the tourism public weather services; expand the breadth and depth of the development of the tourism climate resources; protect the environment of Qinghai tourism climate environment.

### Key words:

Space Differences; Qinghai-Tibet Plateau; Summer Tourism Climatic Resource; Sustainable development

## Spatial Differentiation and Influencing Factors of Rural Tourism Resources

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### Abstract

It is an important meaning of regional rural tourism reasonable planning to study spatial characteristics, distribution and influencing factors of rural tourism resources. This paper researches the spatial differentiation characteristics and the influence factors of rural tourism resources in Jiangsu Province by the gini coefficient and related analysis. The results show that: (1) The rural tourism resources in Jiangsu Province in both interurban level and international level has obvious imbalance, and the distribution of evenness is very low; (2) From the point of spatial distribution density of regional rural tourism resources, rural tourism resources in Jiangsu Province can be divided into high density zones, medium density zones and low density, high density zones including Wuxi, Suzhou, Changzhou and Zhenjiang, medium density zones including Lianyungang, Nanjing and Yangzhou, low density community including Taizhou, Nantong, Yancheng, Xuzhou, Huaian and Suqian. From regional level, the spatial distribution density of the rural tourism resources in Jiangsu Province presents "southern above middle in Jiangsu Province, middle is higher than the north in Jiangsu Province" spatial pattern; (3) The spatial distribution of regional rural tourism resources affected by the regional economic development level and the impact of tourism economic development level.

### Key words:

rural tourism resources; spatial distribution; the influence factors; Jiangsu Province

## The Equilibrium Analysis Model of Ethnic Village Tourism Sustainable Development

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### Abstract

Ethnic village tourism is the core of China's national tourism attraction, is the basic unit of the whole industry chain of comprehensive tourism, is a new direction and a new growth point in the future development of ethnic tourism. The goals of sustainable development of ethnic village should include economic, cultural, ecological, human and social values, and also should include many other dimensions. Based on the analysis of the basic attributes of tourism function on the influencing factors to seek universal influence factors and general conditions through the analysis of the behaviours and the notion of stakeholders, this study finds out the influence variables of the tourism economic value, cultural value, ecological value and human value. It also analyzes the functional relationship and hierarchical relationship between the influence variables. With introducing Cobb Douglas production function, the study takes the core variables as the input of production factors of the sustainable development, after that, constructs the equilibrium model of sustainable development for ethnic village tourism.

### Key words:

ethnic village tourism; sustainable development; equilibrium analysis model; tourism value

## Tourist behavior analysis and tourism destination evaluation study

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### Abstract

The number of domestic tourists and the number of domestic tourism destinations have increased rapidly as tourism industry has encountered its explosive growth in recent years, which leads to travel business to be one of the most important incentives of economic. The research of spatial-temporal behaviors of tourists is helpful for tourism market managers in many ways, such as customizing sophisticated promotions, conducting effective traffic control. On the other hand, number of tourism destinations has increased a lot recently, which strengthen competition between different tourism destinations. In order to be more competitive and attract tourists from all over country or even all over the world, concerned organizations of destination firstly needs to identify weak points there exists, thus the requirement for effective evaluation model of tour destination has increased.

In tradition, researchers conduct tourism researches using tourists and destination data collected by manually approaches, such as questionnaire et al. Nowadays, with the development of Web 2.0 technology, more and more tourists choose to share their travel experiences with friends and strangers in Internet, which generates lots of UGC data (User Generated Contents) and provides researchers with a new reliable data source. This study analyzes domestic tourists spatial-temporal behaviors based on UGC data. Meanwhile, there are still some shortcomings in current destinations evaluation models, this paper proposes a new destination evaluation model that evaluate attractiveness of destinations.

### Key words:

tourism destination; tourists spatial-temporal behavior; destination evaluation model; clustering analysis

## Tourists' Wayfinding and Spatial Behaviors in Mountain Sanqingshan Based on the Analysis of Space Syntax and Decision Tree

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### Abstract

This paper analysis tourist's spatial behavior in the interior space at the micro level, taking the factors of complex objective environments, perceiver characteristics, cognition and abstract persons (team) into account in tourists' spatial behavior. Using questionnaires to get tourists' spatial behavioral data and perception data, etc. (received 558 valid questionnaires). Applied the method of space syntax, kernel density analysis to analyze the internal spatial structure of tourist trails and spatial layout of scenic spots in Sanqingshan. And analyze the relationships between spatial structure and tourists' spatial behavior. Choosing cluster analysis is used to sum the 120 kinds of tourist paths in six major types of spatial patterns, and Mann-Whitney U test and variance analysis are used to test the difference in variables, the tourists' spatial behavior has largely depended on the demographic and travel characteristics of individual. Motivation affects the tourists' spatial behavior through space choice preferences. Basing on decision tree approach to establish the tourist-based spatial choice rule models in which the tourists' spatial behavior index is as independent variable and the individual characteristics, tourism characteristics, motivation and perceived criterias for space choice indexes are as dependent variable. The perception scale of criteria for space choice can be divided into four categories: objective environmental factors, soft environmental factors, expected arrangement factors and their characteristics factors. Tourists cognition differences in whether or not objective environmental factors affect spatial behavior are very important to determining the subsequent spatial behavior.

### Key words:

Space syntax; Decision tree; Spatial behavior; Wayfinding behaviors

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism, Environmental Change and Sustainability



Home

#### Oral

1. [A Perspective on the Heritage of Dai People's Simple Ecological Cultural Tradition in Winter Resort Xishuangbanna](#)  
Ying Chen, Jinping Lin (School of Resource Environment and Earth Science of Yunnan University, China), Yumei Luo (School of Business Administration and Tourism Management of Yu)
2. [City Space, Tourism and Livestock Management in Gaborone, Botswana](#)  
Monkgogi Lenao (University of Botswana, Botswana), Jarkko Saarinen (Department of Geography, Finland)
3. [Climate Change and Its Impacts on Tourism and Livelihood in Manaslu Conservation Area, Nepal](#)  
Anup K.C. (Environment and Social Studies Department, Nepal Electricity Authority, Kharipati, Bhaktapur, Nepal, Nepal)
4. [Does the Space Shape Residents Attitudes towards Tourism Development? Evidence from Residents in Hong Kong](#)  
Lei Fang (Department of Geography, The University of Hong Kong, HongKong SAR, China), Hanqin Qiu (School of Hotel and Tourism Management, The Hong Kong Polytechnic University, HongKong SAR, China), Shenjun YAO (School of Geographic Sciences)
5. [Environmental Ethics and Its Effect on Sustainable Tourism Behavior: A Review](#)  
Feifei Xu (Southeast University, China)
6. [Flood Risk Assessment of Coastal Tourism Affected by Sea Level Rise and Storm Surge: A Case Study in Zhejiang Province, China](#)  
Yan Fang (Peking University, China), Jie Yin (East China Normal University, China)
7. [Fragile Mountain Ecosystem: Need for Sustainable Tourism](#)  
Ushvinder kaur (University of Delhi, India)
8. [Identification of Ecotourism Potential Villages in Ecological Sensitive Zone of Northern Part of Western Ghats in Maharashtra, India](#)  
Ravindra Jaybhaye (Department of Geography, Savitribai Phule Pune University, Pune, India), Tushar Shelar (Department of Geography, Savitribai Phule Pune University, Pune, India)
9. [Research on Formation Mechanism of Petty Bourgeoisie Operational Types in Ancient Town Tourist Destinations from the Perspectives of Taste and Distinction ---- A Case Study of Xitang Ancient Town](#)

Weng Lisheng, Weng Shixiu (Sun Yat sen University, China)

10. [Study on the Driving Mechanism of the Tourists' Pro-environment Behavior Based on the Cognition of the Soundscape](#)  
Qiu Mengyuan, Zhang Jie, Zhang Honglei, Yan Bingjin, Chen Junjie, Mao Ling (Nanjing University, China)
11. [Study on the Potentiality of Tourist Resources in Winter Resorts Driven by Elderly Consumers' Needs](#)  
Jinping Lin (School of Resource Environment and Earth Science of Yunnan University, China), Yumei Luo (School of Business Administration and Tourism Management of Yunnan University, China), Yanqin Guo (College English Teaching Department of Yunnan University)
12. [The Sound of a Destination: Soundscape Perception and Its Influence on Tourist Satisfaction](#)  
Aili Liu (Capital Normal University, China), Xuan Wang (University of West London, United Kingdom), Fucheng LIU, Zhiyong DENG, Changhong Yao (Capital Normal University, China)
13. [Tourism, Protected Areas and Conservation in Northern Botswana: Can Game Reserves Provide a Lasting Solution to Human Wildlife Conflicts?](#)  
Joseph Mbaiwa, Olekae Thakadu (University of Botswana, Botswana)
14. [Wetland as a Source of Sustainable Livelihood -A Case Study of Mansar Wetland, J & K- India](#)  
Md Asgher (University of Jammu, India), Gulshan Bhatt (School education, govt. of J&K, India)

## Poster

1. [A Scenario Simulation Based Study on Forming Mechanism and Dynamic Evaluation of Natural Hazard Related Risks to Tourists](#)  
Yong Shi (China, Zhengzhou University)
2. [Analysis of the Impact of Recreational Trail Usage for Prioritizing Management Decisions: a Regression Tree Approach](#)  
Aleksandra Tomczyk; Marek Ewertowski (Poland, Adam Mickiewicz University); Piran White (United Kingdom, University of York)
3. [Characteristics and Development Potential of Tourism Resources in Xinjiang](#)  
Aersilang Mamuti (China, College of Geographic Science and Tourism, Xinjiang Normal University, Urumqi, Xinjiang)
4. [Measure and Empirical Analysis of Eco-efficiency in Tourism Destinations Based on an SBM-DEA Model](#)  
Hongsong Peng; Jinhe Zhang; Guorong Tang (China, Nanjing University)

5. [Relationships among Hearing-Impaired College Students' Leisure Motivation , Participation and Satisfaction](#)  
Fujia Tang; Zhenfang Huang (China, Nanjing Normal University)
6. [Scientific Approach in Recreational Development in Protected Areas in Russia: Eastern Lake Baikal Case Studies](#)  
Anastasia Myadzelets; Natalia Luzhkova (Russian Fed, V.B. Sochava Institute of Geography SB RAS, FSE "Zapovednoe Podlemorye")
7. [Sustainable Thermal Tourism In Turkey: Afyonkarahisar Example](#)  
İbrahim Baş; Abdullah Tarıncı (Turkey, Selcuk University)

## A Perspective on the Heritage of Dai People's Simple Ecological Cultural Tradition in Winter Resort Xishuangbanna

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### Abstract

By choosing 9 Dai villages in winter resort Xishuangbanna as its research areas, taking the heritage of Dai people's ecological cultural tradition as a highlight and using questionnaires and interviews as its research methods, this paper attempts to analyze villagers' environmental knowledge, attitudes, comments and anticipatory behavior, and penetrate into the ecosystem of "harmony between man and nature" and "reverence for life" formed by Dai people's ecological views which are contained in their traditional culture. These ecological views include such things as their simple religion, mode of production and life, and language and culture. Dai people's unique ecological cultural tradition and the winter resort climate tourism resources in Xishuangbanna will form a coupling effect. It will cater for the dramatic increase in the tourist needs for winter resort caused by the current extreme weather, and promote the sustainable development of ecological tourism in Xishuangbanna.

### Key Words:

winter resort; Dai people in Xishuangbanna; the heritage of ecological cultural tradition; coupling effect

## City Space, Tourism and Livestock Management in Gaborone, Botswana

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### Abstract

Many cities around the world pride themselves on their ability to attract visitors from within their regions and beyond. Even those without adequate independent appeal as tourist destinations in their own right sometimes have roles as important gateways to more popular destinations within their countries and regions. Either way, these cities should always strive for higher levels of competitiveness, through among others, maintaining considerable standards of cleanliness, security and safety. Gaborone city, in Botswana, is not only the administrative capital of the country but also a critical gateway to such places as the Okavango Delta and Chobe National Park. In recent times this city has experienced an upsurge in numbers of domestic livestock (especially cattle) from neighbouring villages and localities. The presence of such large populations of cattle on the city spaces has prompted some reaction from different sections of society including the media, political leadership, residents and road users. This paper uses data from personal interviews, media commentaries and other sources to analyse the relationship between tourism and livestock management on the city spaces of Gaborone. The results show that owing to, inter alia, erratic livestock management practices, poor bye law enforcement and urban encroachment the increased population of livestock in Gaborone presents a challenge to the city's tourism competitiveness as it spoils the general ambience, tempers with landscape decors, as well as with the safety of travellers. The paper argues for review of current livestock management practices as well as bye-law enforcement practices.

### Key words:

Tourism development; city spaces; livestock management; competitiveness; Gaborone

## Climate Change and its Impacts on Tourism and Livelihood in Manaslu Conservation Area, Nepal

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### Abstract

The Hindukush Himalayan region including Nepal, a country reliant on tourism, is particularly sensitive to climate change. However, there are considerable gaps in research regarding tourism, livelihood and climate change in Nepal. The present research assesses the impact of climate change on tourism and livelihood in the Manaslu Conservation Area (MCA) of Nepal. Seventy-six households were interviewed followed by three focus group discussions and five key informant interviews. The empirical data collected at the site are complemented by secondary data on climate and tourism. Correlation, regression and graphical analysis was carried out for the presentation of data. Local people perceived that temperature and rainfall have been increasing in the study site as a result of climate change. Socioeconomic variables such as marital status, size of household, education and landholding status had positive effect on tourism participation while livestock-holding status and occupation of the household had negative effect on tourism participation. Number of visitors is increasing in MCA in recent years, and tourism participation is helping local people to earn more money and improve their living standard. In response to gradually warming temperature and decreasing snowfall, there seems an urgent need for tourism promotional activities in the study area. Also awareness and education related to tourism, gender empowerment of women, advertisement and publicity on tourism promotion, adequate subsidy and training on ecotourism and skill development trainings on handicraft are recommended.

### Key words:

Climate change; tourism; livelihood; MCA; Nepal

## Does the Space Shape Residents Attitudes towards Tourism Development? Evidence from Residents in Hong Kong

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### Abstract

In this study, we analyze attitudes toward tourism development in Hong Kong, using survey questions and a logistic regression method for measuring spatial and demographic factors affecting tourism development. Results show that neither residence distance from the tourism core nor economic dependency significantly influenced tourism growth and development in Hong Kong, while gender and age factors had significant relationship with local resident attitudes towards tourism development. Women and the youth are more likely to agree with the Individual Visit Scheme (IVS) for mainland China visitors. They stand for social vulnerable groups but are more inclusive than others. Hence, policy on inclusive development should be adopted in tourism industry of Hong Kong.

### Key words:

Spatial factors; Resident attitudes; GIS; Ordinal logistic regression model

## Environmental Ethics and Its Effect on Sustainable Tourism Behavior, A Review

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### Abstract

The human nature relationship is fundamental in resource management, while environmental ethics is critical to sustainable development (Schroeder 2007). Sustainable tourism has become a research focus in the past decades (Clarke 1997; Swarbrooke 1999; Liu 2003; Gossling, Hall & Weaver 2009). However, Buckley (2012 p534) argue that mainstream tourism is still “far from sustainable”.

Through extensive literature review, this conceptual work seeks to answer the following research questions:

1) What are the key components of environmental ethics and how to measure them? 2) What factors influence a person’s environmental ethics, and in a tourism context, what shapes tourists environmental ethics, as tourism activities usually happens beyond our daily lives. 3) Is there a casual relationship between environmental ethics and sustainable tourism behavior?

Preliminary results suggest environmental morality, environmental belief and environmental attachment are key components of environmental ethics, although sometimes, it is not easy to differentiate environmental morality and environmental belief. Among all the factors, value system is the most influential factor in developing tourists’ environmental ethics, while cultural is another critical factor. The Value Basis Theory (Stern & Dietz 1994) suggests a person’s belief about the environment significantly influences his attitude towards the use of the nature resources. A casual relationship can be found between environmental ethics and sustainable tourism behavior (Xu & Fox 2014), which suggest changing to a more ecocentric attitude would significantly improve sustainable tourism development.

### Key words:

Environmental ethics; environmental belief; environmental attachment; sustainable tourism behavior

## **Flood Risk Assessment of Coastal Tourism Affected by Sea Level Rise and Storm Surge: A Case Study in Zhejiang Province, China**

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### **Abstract**

Sea level rise (SLR) and storm surge have significant impacts on tourism properties and activities in the low-lying coastal region. Coastal tourism in Zhejiang province, China is physically and socio-economically susceptible to the flood risk posed by accelerated SLR and intensified storm surge. In this paper, within a scenario design of SLR and storm surge, a GIS-based dataset of major coastal tourism properties in coastal Zhejiang is created to assess their potential flood risk by using a simple inundation model and a risk matrix. It is estimated that only 2 resorts would be directly flooded by a SLR of 1 ~ 2 m but extensive inundation of coastal tourism communities may occur during low frequency surges, especially after adding predicted 1 m SLR. The risk assessment further show that a majority of the exposed sites is subject to moderate and low risk at current state but would be at higher (moderate and high) risk categories in the future. In the long term, a combination of adaption measures are presented for policy-makers and other stakeholders for sustainable flood risk management in coastal tourism destinations.

### **Key words:**

Climate change; Coastal tourism; Risk assessment; Adaptation; Zhejiang province

## Fragile Mountain Ecosystem: Need for Sustainable Tourism a Case study of

### Kedarnath

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#### Abstract

Mountains are an important source of water, energy and biological diversity, and of key resources as minerals, forest and agricultural products. As a major ecosystem representing the complex and interrelated ecology of our planet, mountain environments are essential to the survival of the global ecosystem. Mountain ecosystems are, however, rapidly changing. They are susceptible to accelerated soil erosion, landslides and rapid loss of habitat and genetic diversity. As a result, most global mountain areas are experiencing environmental degradation. Hence, proper management of development of mountain resources deserves immediate action.

Today, tourism is one of the largest and dynamically developing sectors of external economic activities. Its high growth and development rates, considerable volumes of foreign currency inflows, infrastructure development, and introduction of new management and educational experience actively affect various sectors of economy, which positively contribute to the social and economic development of the country as a whole. But it is known that this industry has its negative and disastrous impacts also, for example, attractive landscapes and scenic destinations are spoiled by tourist buildings. The fragile zone without any proper checks and balances causes disastrous impacts. Kedarnath became vulnerable to natural disasters in the area as a result of increasing anthropogenic activities and large scale increase in the number of pilgrims related to religious tourism.

Sustainable development requires participatory decision-making processes and enhancing the carrying capacity of the region. Sustainable tourism has three “pillars”: environmental, economic, and socio-cultural. Tourism has to be sustainable in all three areas to truly be considered “sustainable tourism.”

#### Key words:

fragile mountain ecosystem; sustainable tourism; carrying capacity

## Identification of Ecotourism Potential Villages in Ecological Sensitive Zone of Northern Part of Western Ghats in Maharashtra, India

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### Abstract

The Western Ghats is rich in biodiversity and cultural heritage but due to significant human interference like mining, industrialization, mass tourism etc. getting rapidly degraded environment and declared as biodiversity hotspot. The Indian government took the cognizance and the area identified as ecologically sensitive zone to impose restrictions on economic and development activities. It created unrest among the local people. Similarly, the area has number of famous natural and cultural tourism attractions. On this background of dilemma on environment or development, ecotourism could be the one of the best alternative for conservation of natural and cultural resources with well-being of local communities. The main objective of the paper is to find out ecotourism potential sites suitability by using Analytical Hierarchical Process in Arc GIS platform. The area covers 294 ecologically sensitive villages. The assessment is based on the major factors such as natural landscape, wildlife, topography, accessibility and cultural environment and nine sub criteria like visibility, land use/cover, reserved forest, species diversity, elevation, slope, proximity to cultural sites, historic sites and natural landscape and distance from roads by overlaying the hierarchy wise weighted these parameters. The result obtained in four level of suitability like high, medium, marginal and not suitable. The outcome of analysis revealed that out of the total, around 50 villages are highly suitable for ecotourism development. The ecotourism development in these villages may resolve dilemma of environment and development to truly achieve sustainable development.

### Key words:

Ecotourism; Western Ghats; Ecological sensitive zone

## Research on Formation Mechanism of Petty Bourgeoisie Operational Types in Ancient Town Tourist Destinations from the Perspectives of Taste and Distinction: Case Study of Xitang Ancient Town

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### Abstract

Commercialization of ancient town tourism is one of hot issues in tourism research. Past researches mostly focus on phenomenon and result of tourism commercialization, but only a few studies explore formation mechanism of commercial types in ancient town tourist destinations from the perspectives of evolution. Taking Xitang Ancient Town as the case, this paper conducts field survey and combines semi-structural interview method with observation method and applies taste and distinction theory of Bourdieu to interpret formation mechanism of petty bourgeoisie tourism operational types in Xitang Ancient Town, indicating that petty bourgeoisie tourism operational types initially originate from aesthetic taste of petty bourgeoisie tourists, and secondly, reception and imitation of consumption preference of petty bourgeoisie group by mass tourists promotes the rise and development of petty bourgeoisie tourism operational types. Finally, as it is difficult to “escape” from mass tourists spatially, petty bourgeoisie group pursues to show their difference in aesthetic taste and consumption taste from mass tourists when they are at the same space with mass tourists and try to get rid of mass tourists’ imitation, make efforts to search for new consumption taste for their re-distinction from mass tourists, all of which will upgrade petty bourgeoisie tourism operational types. The discovery has certain meaning for studying evolution rules of commercial types in tourist destinations.

### Key words:

aesthetic taste; distinction; petty bourgeoisie; petty bourgeoisie tourism operational types

## Study on the Driving Mechanism of the Tourists' Pro-environment Behavior Based on the Cognition of the Soundscape

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### Abstract

Soundscape is a combination of various sounds in the environment. It not only embodies the natural properties of the acoustic environment, but also reflects the historical and cultural connotation of the place. It is an important part of the tourist landscape system. However, research on how tourists perceive soundscape and the relationship between soundscape and tourists' pro-environment behaviour remain blank. In this paper, we based on the relationship between tourists' place attachment and pro-environment behaviour, introducing soundscape cognition as an exogenous variable, to analysis the driving mechanism of pro-environment behaviour. We totally collect 565 questionnaires in Gulangyu Islet, using SEM (structural equation model) for data analysis. The results illustrate that soundscape cognition is an important factor for the construction of place attachment and can indirectly influence tourists' pro-environment behaviour. The two major soundscape cognition indicators, soundscape perception and soundscape association, play a different role. In China, tourists show more high effort pro-environmental behaviours than low effort pro-environmental behaviours. This paper provides a new idea for to explore tourists' behaviour. We believe the results will have significant implications for the sustainable development of tourist destination and the protection of soundscape.

### Key words:

soundscape; cognition; place attachment; pro-environment behavior

## Study on the Potentiality of Tourist Resources in Winter Resorts Driven by Elderly

### Consumers' Needs

Lin Jinping<sup>1,2</sup>, Luo Yumei<sup>3</sup>, Guo Yanqin<sup>4</sup>, Chen Ying<sup>1</sup>, Huang Zhuqun<sup>1</sup>

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### Abstract

Consumers' new needs bring creative potentiality for the winter resorts destination. In recent years, extreme weather conditions such as extreme cold, fog and haze, snow disasters and ice rain have affected our country greatly. Extreme weather conditions lead to many types of diseases such as respiratory problems, angiocardiopathy and diseases of the digestive tract, resulting in the increasing rates of sickness and death. Meanwhile, such problems as the energy consumption, air pollution and PM2.5 dust brought out by the heating system in north China bring great harm to people's health. The sharp conflict occurs between the dramatic increase in tourists' needs for winter resort and the scarcity of resources of winter resort. By taking as examples the destination of winter resort tourism such as Xishuangbanna, and using the driving force of elderly consumers' needs as a sally port, this research is going to discuss how to combine the scarce climate resources of winter resort and the opportunities of sustainable ecological tourism development so as to exert the advantages of energy saving, low-carbon life of winter resort tourism and explore and analyze the potentiality of tourist resources in winter resort.

### Key words:

the elderly consumers' needs; scarce resources of winter resort tourism; low-carbon life; developing potentiality; sustainable ecological tourism

## The Sound of a Destination: Soundscape Perception and Its Influence on Tourist Satisfaction

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### Abstract

Soundscape, as an integral part of tourism destination, could affect tourist experience. However, understanding of the relationship between soundscape and tourists remains to be limited. This paper argues that tourist satisfaction could be perceived from the perspective of sensory experiences and aims to address the neglected area of tourism study by examining the relationship between soundscape satisfaction and tourist satisfaction. Factors including sound preference, soundscape expectation and soundscape perception as well as their influences on tourist satisfaction are also discussed in the paper. A typical case, Hongcun, an ancient village that became UNESCO world heritage site in 2000, located in the tranquil countryside setting of Anhui Province in China was chosen to conduct the empirical study through self-administrated questionnaire. The results derived from the structure equation model revealed that there is significant correlation between soundscape satisfaction and tourist satisfaction, which implies that the soundscape of destinations should be improved in order to enhance tourist satisfaction in practice. Findings also revealed that sound preference has no influence on soundscape satisfaction and tourist satisfaction, while soundscape expectation has influence on tourist satisfaction and soundscape perception has influences on soundscape satisfaction, which shows that soundscape satisfaction has no effect mediating role for cultivating positive tourist satisfaction. The findings of this study contribute to tourism management literature by addressing the importance of soundscape and how soundscape perception could influence tourist satisfaction. We argue that effective management of soundscape is as important as managing a destination's visual image.

### Key words:

soundscape; tourist satisfaction; sensory experience; Hongcun Village

## **Tourism, Protected Areas and Conservation in Northern Botswana: Can Game Reserves Provide a Lasting Solution to Human Wildlife Conflicts?**

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### **Abstract**

Human Wildlife Conflicts (HWCs) are a threat to natural resource sustainability, food security and livelihoods in northern Botswana. Using the concept of sustainability, this paper analysis whether the creation of tourism of game reserves around existing Protected Areas cannot provide a lasting solution to human wildlife conflicts in northern Botswana. Both secondary and primary data sources are used in this study. Preliminary results indicate that the creation of game reserves for tourism development around existing protected areas such as Moremi Game Reserve especially along the Buffalo Fence in the Okavango Delta, Chobe National Park in the Chobe District and Makgadikgadi Nxai Pans National Park has the potential to provide a lasting solution to human wildlife conflicts in the region. The creation of game reserve around existing PAs suggests a modification from the current land use planning to include small land units around PAs. These land units should be leased out to private tourism investors for tourism development especially for photographic tourism. The land units should have game fences electrified separating agro-pastoral land uses with wildlife-based tourism zones. While this has the potential to increase land for tourism development, it also has the potential to mitigate against HWC. Managing HWCs is critical to achieve sustainability in northern Botswana. Sustainability requires agreed land use zonation for agro-pastoralism on one the hand and wildlife and tourism on the other.

### **Key words:**

Human-wildlife conflicts; game reserves; protected areas; sustainability; predation; crop damage

## **Wetland as a Source of Sustainable Livelihood -A Case Study of Mansar Wetland, J & K- India**

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### **Abstract**

Since the evolution of mankind on this earth, water bodies act as a source of attraction for human settlement due to diverse facilities provided by it. The facilities like habitat, food, connectivity, strategic importance etc. provided by water bodies attracted human being in the past to settle near it. The wetlands in India play an important role in human life due to their scenic beauty and ecological importance. The Mansar wetland in Jammu and Kashmir has its own importance in terms of livelihood and sustainability for the inhabitants residing nearby. Despite being a source of pilgrimage as well as other type of tourism due to its religious and scenic beauty, this wetland also has its ecological importance due to its diverse flora and fauna. The influx of tourist for different purposes makes it a good source of income for many local inhabitants. The economic importance of wetland attracts many people from nearby to settle near the wetland. Looking at the multifarious benefits and importance of the wetland, the present study has been done to find out the dependence of local for their livelihood; efforts of various agencies to develop the tourism structure, and the present problems prevailing there. The present study is primarily based on primary sources of data and collected data was assessed to draw the conclusion based on identified objectives.

### **Key Words:**

Mansar; Pilgrimage; Wetland; Tourist; Ecological; settlement

## **A scenario simulation based study on forming mechanism and dynamic evaluation of natural hazard related risks to tourists**

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### **Abstract**

Ensuring the safety of tourists is critical to tourism development; and risk to tourists has been a serious inhabiting factor to the long-term sustainability of Chinese tourism. As such, tourist risk management has become an important field of research in recent years. Based on a systematic analysis of literature on risk management in the contexts of tourism and natural disasters both at home and abroad, this study will conduct an in-depth investigation into the unique characteristics and patterns of evolvement of risks to tourists in a background of increasing occurrence of natural disaster as a result of global warming and an era of mass tourism, comprehensive tourism and self-organized tourism. The Songshan Mountain is selected as the study area, acting as the simulation environment for the demonstration of formation mechanism and dynamic evaluation of the risk to tourists. Based on scenario analysis, this paper will focus on the tourists – a key stakeholder group in tourism development, the study will analyze the destructive mechanism of torrential floods on tourists, quantitatively evaluate the spatial–temporal characteristics of the torrential flood caused risks under different levels of hazard, exposure and vulnerability based on scenario simulation, various statistical analyses and field research. The study will involve a number of stages, focusing on risk identification, risk analysis, risk assessment and risk response, in order to construct a more comprehensive workflow and best practice model of risk management. A spatiotemporal approach will be used in the analysis of risks, aiming to demonstrate the evolution of flood risk over time and space for various receptors. A framework for assessing future tourist risk, including the evolving hazard characteristics, changing vulnerability and convoluted flood damages will be established. This will provide a strong scientific basis for the prevention, management and mitigation of risks to tourists in an increasingly uncertain future for various stakeholders.

### **Key words:**

tourist risk; scenario simulation; natural hazards

## **Analysis of the impact of recreational trail usage for prioritizing management decisions: a regression tree approach**

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### **Abstract**

The dual role of many Protected Natural Areas in providing benefits for both conservation and recreation poses challenges for management and requires decisions to be made about how to prioritise and direct management actions. Trails are commonly used to divert visitors from the most vulnerable areas of a site, but high visitor pressure can lead to increases in trail width and a concomitant increase in soil erosion. Here we use detailed field data on condition of recreational trails in Gorce National Park, Poland, as the basis for a regression tree analysis to determine the factors influencing trail deterioration, and link specific trail impacts with environmental, use related and managerial factors. We distinguished 12 types of trails, characterised by four levels of degradation: (1) trails with an acceptable level of degradation; (2) threatened trails; (3) damaged trails; and (4) heavily damaged trails. We also proposed five types of monitoring of recreational trail conditions: (1) rapid inventory of negative impacts; (2) monitoring visitor numbers and variation in type of use; (3) change-oriented monitoring focusing on sections of trail which were subjected to changes in type or level of use or subjected to extreme weather events; (4) monitoring of dynamics of trail conditions; and (5) full assessment of trail conditions, to be carried out every 10-15 years. The application of the proposed framework can enhance the ability of park managers to prioritise their trail management activities, minimising adverse impacts on the conservation value of the ecosystem.

### **Key words:**

protected areas; condition class assessments; recreational impact; trail degradation; Gorce National Park; Geographical Information Systems

## Characteristics and Development Potential of Tourism Resources in Xinjiang

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### Abstract

Cultural tourism resources mainly include two aspects, natural resources and human resources. Human resources are deposited culture of a long time and are a concentrated reflection of people's thinking, where culture is the carrier. The cultural tourism resources have relatively broader category, it is the cultural integration of natural resources into the beautiful landscape with strong ethnic style and the perfect fusion of the natural and cultural landscapes. Regional culture and natural beauty are the two basic elements of the regional tourism resources, and together they laid an objective foundation for tourism development. The ethnic culture is the most unique tourism resources, ethnic villages, architectural forms, lifestyle, clothing, diet, religion, music, dance, festivals and other cultural resources is a typical representative of the modern tourism products. Cultural tourism resources is the prerequisite and basis for cultural tourism, efficient use of resources and development of cultural tourism has become an important indicator to measure the level of development of cultural tourism industry. Xinjiang is located in the hinterland of the Eurasian continent, having served, since ancient times, as a national migration corridor, multi-ethnic enclaves, and east and west mingled for a variety of cultural, it is a concentrated and representatives of the world-famous "Silk Road", and its cultural characteristics differs from the mainland, Central Asia, and the Middle East. Over the years, various ethnic groups live together and develop together here, their culture influence each other, penetrate and interact with each other, has formed a cultural and multi-source generated, coexistent and development cultural system and local characteristics of ethnic cultural resource type. In short, Xinjiang is one of the areas in China that has the largest proportion of China's ethnic minority population, and the richest ethnic cultural tourism resources types. It has a series of characteristics like wide range of cultural resources, rich cultural heritage, high visibility and uniqueness. Among which, minority culture, cultural relics and red culture are the three pillars of the cultural tourism resources in Xinjiang. Therefore, re-analysis of the tourism resources in Xinjiang and the correct classification, evaluation and positioning, is an important and urgent major issue to study. It can better demonstrate the characteristics and development potential of tourism resources in Xinjiang as well as its unique charm.

**Key words:** Xinjiang; tourism resources; development potential

## Measure and empirical analysis of eco-efficiency in tourism destinations based on an SBM-DEA model

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### Abstract

Many tourism destinations are characterized by interactions between people and the environment. Typically, research on the eco-efficiency of tourism destinations is the basis for the formulation and implementation of inclusive, sustainable development policies and measures. Based on a time series Slack Based Measure-Data Envelopment Analysis (SBM-DEA) model including unexpected output, we built a model to measure the eco-efficiency of tourism destinations and an evaluation index system. We chose the Huangshan scenic area as an example, using input and output data from 1981 to 2014 to measure the eco-efficiency of the tourist destination composite system, and analyzed its evolution characteristics and phases. We used a Tobit regression model to empirically test the influence factors. The results showed the following: (1) Eco-efficiency (technical efficiency) has grown continually and has great development potential. In the decomposition, pure technical efficiency is the most influential and scale efficiency the second most. Scale efficiency is a decisive factor for technical efficiency. (2) The evolution of tourism ecological efficiency has four stages: initial-inefficient stage, rapid growth stage, mature-efficient stage and downside risks stage. The eco-efficiency characteristics and influencing factors in different stages are different. (3) The level of tourism development, industrial structure and technical level have a significantly positive impact on eco-efficiency, but investment levels have a significant negative impact. The environmental regulation that emphasizes the management of waste is not effective in promoting eco-efficiency.

### Key words:

tourism eco-efficiency; time series of SBM-DEA model; Tobit regression analysis; Huangshan scenic area

## Relationships among Hearing-Impaired College Students' Leisure Motivation, Participation and Satisfaction

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### Abstract

In order to explore the characteristics of hearing-impaired college students, this paper takes the hearing-impaired college students of Nanjing Normal University of Special Education as a typical example, adopts mathematical statistics and structural equation model methods on the basis of questionnaire survey and depth interview, and analyzes the relationships among the leisure motivation, participation and satisfaction of the hearing-impaired college students. The results showed: (1) the path "leisure motivation" → "social leisure activities participation" → "leisure satisfaction" is positively affected while affection isn't remarkably on the path "leisure motivation" → "personal leisure activities participation" → "leisure satisfaction". (2) this paper verifies leisure satisfaction feedback model, and explains leisure behavior is constantly changing under the amendment of satisfaction infecting motivation. It provides support to the further improvement of the leisure satisfaction of hearing-impaired students.

### Key words:

hearing-impaired college student; leisure motivation; leisure participation; leisure satisfaction

## Scientific approach in recreational development in protected areas in Russia:

### Eastern Lake Baikal case studies

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#### Abstract

The development conception of natural protected areas has been updated in past several years in Russia. Federal reserves used to be areas with limited access with exception to staff and certain researchers. Now the Russian government aims to introduce ecological or educational tourism in protected areas to the society. It will help learn more about the nature and raise environmental awareness. Recognized by the UNESCO, biosphere reserves had practiced ecotourism before the changes, therefore, the new concept was adopted in Barguzinsky State Biosphere Reserve. It is located in the northeastern part of Lake Baikal in Siberia and is the oldest PA in Russia. Barguzinsky Reserve and Zabaikalsky National Park have one management body – Federal State Establishment “Zapovednoe Podlemorye”, which is in charge of protection, educational and ecotourism. Tourism planning here faces several challenges such as remoteness and inaccessibility of the territory, poor tourist infrastructure and difficulties merging protection politics and economic development. Scientific approaches and applied investigations can bring a solution. Next steps have been made in Barguzinsky: Determining of “points of growth” with historical infrastructure and tourist attractions. Field work for review of the chosen points of growth, planning of possible routes around them and data collecting for the landscape description. Applying of geosystem approach for justification of tourist routes. It includes landscape mapping, assessment of potential sustainability and sensitiveness to anthropogenic loads, preparation of ecosystem monitoring plots at points of growth.

#### Key words:

natural protected areas development; tourism planning; educational tourism; ecosystem monitoring

## Sustainable Thermal Tourism in Turkey: Afyonkarahisar Example

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### Abstract

Turkey is a very rich country in terms of diversity of tourism activities. Turkey is currently the 6th most popular tourist destination in the World with 41,6 million tourist visits and 31,5 billion \$ tourism revenue. If Turkey is planned to evaluate more efficient its natural beauty and cultural richness, Turkey can reap a greater share of World Tourism pie. However, the protection and nurturing of tourism destinations during this process is required. It is seen that the irreversible damage and unprotected of natural and cultural structure in areas with rapid tourism activity. By this type of damages the importance of sustainability in tourism is better understood.

Thermal Tourism which is a type of Health Tourism. Turkey is one of the best rapidly growing country of the World in Health Tourism. Some of the areas to be treated to 60 percent cheaper in Turkey compared to most European countries. In 2014 the number of arrivals to Turkey for health tourism 400 thousand.

Afyonkarahisar is one of the leading thermal tourism centers in terms of high level of mineral water quality. It is seen a rapid increase in thermal plants since 2000 in Afyonkarahisar.

Therefore, protecting efficiently and using thermal sources is important. The most important principle of Ministry of Culture and Tourism is sustainability objectives in the 2023 strategy. In this strategy, it has been targeted construction plans and effectively distribution of geothermal water in thermal tourism centers.

### Key words:

Afyonkarahisar; Sustainability; Thermal Tourism; Turkey

## C12.15 Geography of Tourism, Leisure, and Global Change

### Nature-based Tourism in Asia



Home

#### Oral

1. [A Study on Methods of Designing and Managing Nature Disaster Heritage Sites](#)  
Chuntao Wu, Qian Dai (School of Tourism, Sichuan University, China)
2. [Forming Process of a Comprehensive Tourist Destination in the Higashi-Kishu District of Mie Prefecture, Japan](#)  
Takumi ISONO (Tokushima University, Japan)
3. [GPS+ Based Time and Spatial Characters of Recreation Behaviour in Forest Park](#)  
Chengzhao Wu (Tongji University, China), Wenqin Liu (Tongji University, China)
4. [Physical Carrying Capacity Assessment for Floating House Tourism in Ratchaprapa Dam, Khao Sok National Park Area](#)  
Chomchid Phromsin, Niorn Jitjong (Geography Department Kasetsart University, Thailand)
5. [Potential Ecotourism Areas Through Gis Application in Nainital District, Uttarakhand](#)  
Kalpana Bhakuni (University of Delhi, India)
6. [Potential for Special Tourism Development in Dzongu, Sikkim, India](#)  
Subrata Purkayastha (Department of Geography, North Eastern Hill University, Shillong 22, India)
7. [Revisit is Due to The Soundscape? The Role of Perception Image and Participation to Nature Soundscape](#)  
Jiang Jinde (Nanjing University, China)
8. [Special Features of Educational Tourism in Federal Protected Areas of Lake Baikal Region](#)  
Natalia Luzhkova, Leonid Korytnyy (V.B. Sochava Institute of Geography SB RAS, Russian Fed)
9. [Study on Geoscience Landscape System Regionalization of the Mid-Southern Section of Hengduan Mountains, Southwest China](#)  
Xing Chen (Chengdu University of Technology, China), Xianlin Shi (Chengdu University of Technology, China), Jianxiong Qin (Southwest University for Nationalities, China)
10. [Study on the Sustainable Rural Tourism Toward the Supply Side in Ajimu Town, Oita, Japan](#)  
Shuai Yajuan (Hiroshima University, China)

#### Poster

1. [Constructing a New Conceptual System of Green Tourism](#)

Ching Yu Lien; C. A. Longkey Hoowen (China, School of Tourism, Sanming University)

2. [Japanese and International Tourists' Perceptions and Attitudes Toward the Free-roaming Sika Deer \(\*Cervus nippon\*\) in Miyajima Island, Hiroshima, Japan](#)

Rie Usui; Carolin Funck (Japan, Graduate School of Integrated Arts and Sciences, Hiroshima University)

3. [National Park Management: An Analysis from the Perspective of the Relationship between Residents' Awareness of Environmental Consequences and Pro-environmental Behaviors](#)

Yuling Zhang (China, Geography of Guangzhou Institute)

4. [Nature-based Tourist's Environmental Attitude and Behavior: A Comparison Study of Visitors in Huangshan Scenic Area](#)

Xueting Hong; Hongmei Zhang (China, Anhui Normal University)"

5. [Research on Community Tourist Attraction in National Park: A Case Study on Kaihua Qianjiangyuan National Park Pilot Area](#)

Zhou Rui; Linsheng Zhong; Jiaming Liu (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

6. [The Change in the Relationship between the City Dwellers and the Farm Families in Terms of the City Farming](#)

Eri Kodama (Japan, Graduate student, University of Tsukuba)

## A Study on Methods of Designing and Managing Nature Disaster Heritage Sites

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### Abstract

In China, the natural disaster tourism developed quickly after the “5.12” Wenchuan Earthquake. This paper aims to explore the methods of designing and managing dark heritage sites at the nature disaster devastated areas, by taking Beichuan Qiang Cheng Tourism Zone and Wenchuan Special Tourist Area as study regions. Both of those two sites are located at the actual sites of death/suffering and adopted educational orientation. Semi-structure interviews with elites from local tourism industries and questionnaire survey with tourists are methods used by this paper. Particularly, the questionnaire survey focused on the effects of different interpretation or display methods on tourists’ visit experience and revisit willingness. The results show that Beichuan Qiang Cheng Tourism Zone is darker than Wenchuan Special Tourist Area, in term of interpretation, display and size of earthquake ruin. The deepest experiences of the tourists were “felt the terrible nature of earthquakes and reverence of the nature” “felt the solidarity spirit of disaster resistance” and “felt the value of the life”, but many tourists in Wenchuan have a feeling of relaxation. Thus, in order to attract more tourists, the destination managers in Qiang Cheng tourism zone need to reduce the sad atmosphere of the zone, and the destination managers in Wenchuan can re-build Yingxiu a new image as a town of leisure.

### Key words:

natural disaster tourism; destination management; Beichuan; Yingxiu in Wenchuan; “5.12” Wenchuan Earthquake

## Forming Process of a Comprehensive Tourist Destination in the Higashi-Kishu District of Mie Prefecture, Japan

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### Abstract

This study describes the forming process of a comprehensive tourist destination in the Higashi-Kishu district through an analysis of local residents' efforts. Based on the district's rich natural environment, local residents have historically engaged in the key industry of forestry and fishing. However, this primary industry has fallen into decline due to recent depopulation. Under the circumstances, local governments have begun to focus on tourism development utilising local resources, particularly Kumano Kodo Iseji. Higashi-Kishu was originally an unremarkable overland tourist destination located among the major seaside resorts, despite its partial involvement with the Kumano-Yoshino National Park and some nature-based tourism implemented by local residents. In the 1990s, local governments and residents of the district established a regional organisation to cooperatively promote tourism development with the Kumano Kodo Iseji. After the Kumano Kodo Pilgrimage Routes were registered on the UNESCO World Heritage List in 2004, they have been regarded as a symbol of tourism in the Higashi-Kishu district. As a result, the regional organisation offers various circuit-tour programs allowing tourists to visit not just the Kumano Kodo Iseji but the surrounding tourism resources. Furthermore, the organisation emphasizes human resources development to allow interpretation of the relationship between the Kumano Kodo Iseji and other natural and cultural tourism resources. Thus, the local people have practiced tourism development based on a bottom-up system, and the comprehensive tourist destination, which links with some existing natural and cultural resources, has been formed with a central focus on the Kumano Kodo Iseji in the Higashi-Kishu district.

### Key words:

comprehensive tourist destination; tourism resource; tourism development; regional cooperation; Japan

## **GPS+ Based Time and Spatial Characters of Recreation Behaviour in Forest Park: Taking Gongqing Forest Park in Shanghai City as an Example**

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### **Abstract**

Recreation behavior is a kind of interactive mechanism of human-nature in natural protected areas. Its research has been making in developed countries since 1960s, and management model of national park based the mechanism has been practiced in 1990s and widely applied by most countries in the world now. Research of dynamic interactive mechanism is a few in China, most research focus on tourism flow of destination, some research focus on ecological impact of recreation, but dynamic ecological impact research is a few, interactive mechanism research based information technology is just beginning in China. This paper study the characters of time and space of recreation behavior of different group recreationists based on dynamic GPS monitoring data of recreation behavior trails, and GIS spatial analysis with information lists of recreationists, taking Gongqin Forest Park of Shanghai as an example. Three hierarchy system of spatial distribution is a common character for different group recreationists, and discovering the law of centralization and scale grade diffusion of recreation behaviour. Distance decayed rule is also useful for spatial distribution of park recreationists, the highest density of recreationists is nearby main entrance of forest park, then gradually quantity decaying with distance adding. Facilities are the key attractions and supporters of park recreationists. There are obvious differences in recreation time, ages, activities, sites and places for different group recreationists of park.

### **Key words:**

Natural Protected Areas; Forest Park; Recreation Behaviour; Time and Spatial Character; GPS+ Technique

## Physical Carrying Capacity Assessment for Floating House Tourism in Ratchaprapa Dam, Khao Sok National Park Area

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### Abstract

Tourism is one of the most important sectors in the economy of Thailand. The balance of trade in tourism is the source of country's income and related with growing gross domestic products (GDP) of country. Khao Sok National Park, southern part of Thailand, is one of popular for natural and eco-tourism. The well-known and popular place in Khao Sok National Park for travel is floating house in Ratchaprapa dam. In 2010-2014, there were more than 200,000 arrivals visited the national park and also some visited to the dam. However, the largest visitors also give big impact to tourism carrying capacity. At that point, this research aim to assess the physical carrying capacity of floating house tourism located in Ratchaprapa Dam. The data was collected in low and high season in Khao Sok National Park. The result showed that there were 25.00% of floating houses had exceeding carrying capacity. The highest visitors came to floating house and make exceeding carrying capacity were 33 visitors per day. The over exploitation of the visitors can result in pollution and destruction of ecosystem. The 56.25% of floating house shad approaching carrying capacity and 18.75% of floating houses had below carrying capacity. The suitable visitors should below 19 people per a floating house area per day which will be appropriate for ecosystem in dam.

### Key words:

physical carrying capacity; floating house tourism; Ratchaprapa dam; Khao Sok national park; Thailand

## Potential Ecotourism Areas Through Gis Application in Nainital District,

### Uttarakhand

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#### Abstract

Ecotourism is a nature based travel experience which can be envisaged to help in conservation of natural and cultural resources alike. Ecotourism as an alternative tourism has been evoked by the planners and developers but on the ground reality its conceptualisation and implementation remain quite vague. However, ecotourism is not all about randomly carrying out activities like camping, biking, nature walks etc. It needs to be planned systematically by identifying the areas with high potential of ecotourism, prepare an inventory of nature and culture present there and evolve a strategy to realize their worth in a cautious manner. In a mountain system like the Himalayas where the natural scenery reigns supreme, instead of mass tourism, nature-based tourism is the most viable development option for stimulating eco-friendly development that contribute to local welfare. The present work undertakes to identify the potential eco-tourism areas in each administrative block of Nainital district in the Kumaon Himalayas through the GIS approach. The use of GIS is far more effective in terms of time, location and resources than any manual procedure or field survey. The identification of the potential ecotourism through GIS based approach work with the natural elements such as relief, altitude, aspect, water bodies, forest, etc. and cultural elements like the historical monuments, old temples, folk traditions, fairs and festivals etc. Apart from presence of these features, accessibility and population are regarded other important criteria to assess the potentiality in the region. In the present study the layering, classification, querying and buffering – all the important functions of GIS are meaningfully applied to identify the potential ecotourism areas in Nainital district.

#### Key words:

Ecotourism; Nature based; GIS application; Alternative tourism; the Himalayan region

## Potential for special tourism development in Dzongu, Sikkim, India

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### Abstract

Dzongu valley of North Sikkim can be regarded, as a *Shangri-La* in the Himalayan state of Sikkim in India, it is home to a small shrinking community- the *Lepchas*, who still retain ancient cultural practices intricately, related to their physical environment. In order to preserve the *Lepcha* culture, Dzongu has been declared a *Lepcha* reserve; but at present is facing ecological and cultural crises as this valley has high hydropower potential that is being tapped for development purpose. The local population resents this. It is in this context that the present paper seeks an alternative approach for ushering in the much-needed socio-economic development of *Lepchas* in Dzongu. The natural resource base with swift flowing streams, rich in vegetation and lofty snow clad mountains as its locale; along with the unique culture of the *Lepchas* can be showcased as tourism product in a sustainable manner. It is in this context that the present paper identifies and develops an inventory on types of tourism activities that may come up in the different tourism attraction spots located within Dzongu. An attempt has also been made to measure and rank the existing tourist spots as per the levels of attraction from the perception of the tourists visiting Dzongu in the tourist season of Oct 2013 to Jan 2014.

### Key words:

Lepcha culture; natural resource base; conservation; sustainable tourism

## Revisit is due to the soundscape? The role of perception image and participation to nature soundscape

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### Abstract

Nature soundscape is an important tourism attraction. Currently, many studies have focused on the temporal and spatial differentiation of soundscape from a geographical perspective, but little on the view of tourism. The purpose of this study is to investigate the influence of attitude, perceived image, and tourists' participation on tourists' loyalty to nature soundscape at Gulangyu Island, China. It also attempts to examine the mediating effect of participation to nature soundscape on the paths from emotion image and cognition image to tourists' loyalty to nature soundscape. Data were collected via an on-site survey and analyzed using a structural equation modeling approach. Results indicate that cognition attitude to nature sound positively influences the perceived image of nature soundscape and ultimately contributes to some participation activities to soundscape. Tourists' participation is positively associated with tourists' loyalty. Tourists' participation to nature soundscape fully mediates the relationship from emotion image and cognition image to tourists' loyalty. Based on these findings, both theoretical and practical implications of this investigation are discussed.

### Key words:

nature soundscape; perceived image; participation; revisit intention.

## Special Features of Educational Tourism in Federal Protected Areas of Lake Baikal

### Region

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### Abstract

Russian system of protected areas (PAs) celebrates its centennial anniversary in 2017. Over the years priorities have changed from fur species preservation to total conservation and educational tourism (a branch of ecotourism) development. Lake Baikal region has been a pioneer in most of crucial protection innovations: Barguzinsky Nature Reserve was established here in 1916, the first educational tourism program included two Baikal Federal PAs in 2011, and the inaugural merge of PA administrations happened on the eastern shore in 2012. Despite of long-term experience in PA management in the region, educational tourism faces socio-economical and environmental challenges. The goal of research was to demonstrate features for educational tourism in seven Federal PAs around Lake Baikal. Objectives included analysis of tourism strategies in PAs, assessment of environmental approaches in development, tourist data estimation. Main tourism features included different level of area access, additional funding for infrastructure development, and lack of connection between PAs in order to provide joint services. Two national parks and two wildlife sanctuaries had high tourist demand however capacity level could cause environmental damage. Three nature reserves managed remote areas, additionally they could have only 5 percent of territory developed for educational tourism. In order to present Lake Baikal as an educational tourism destination common strategy should be considered by management bodies. Environmentally friendly approaches should be applied for infrastructure creation and further visitor management. After a 100 years of nature conservation PAs in Lake Baikal region have potential to incorporate educational tourism in their function.

### Key words:

educational tourism; Lake Baikal; protected area

## Study on Geoscience Landscape System Regionalization of the Mid-Southern Section of Hengduan Mountains, Southwest China

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### Abstract

Landscape system regionalization is an important scientific basis for landscape protection and tourism development. Combining with perspectives of geology and geography, this paper comes up with grading standards of geoscience landscape system, and makes empirical study of mid-southern section of Hengduan Mountains. The mid-southern section of Hengduan Mountains, which crosses Sichuan, Yunnan and Tibet, is a core region of Hengduan Mountains. It contains the most typical geomorphic features of Hengduan Mountains and the landscape diversity in this region is very obvious. It is an important resource enrichment region for tourism development in western China. According to grading standards of geoscience landscape system and forming background analysis of regional stratigraphic system, fault marks of tectonic and characteristics of geomorphological zoning, this paper divides geoscience landscape system of Mid-Southern Section of Hengduan Mountains into 2 Grade I geoscience landscape system tracts, 8 Grade II geoscience landscape systems, 21 Grade III geoscience landscape areas and 165 representative Grade IV geoscience landscape attractions. And then the geoscience landscape types of the Mid-Southern Section of Hengduan Mountains are presented. Combining with the landscape regionalization, this paper finally systematically analyzes the geo-spatial characteristics of geosciences landscape system in the Mid-Southern Section of Hengduan Mountains. This paper provides an important research sample and method reference for geoscience landscape system regionalization, and owns important theoretical direction significance on tourism planning and development in the Mid-Southern Section of Hengduan Mountains.

**Key words:** landscape system; landscape regionalization; geoscience landscape; alpine and gorge regions; Hengduan Mountains

## Study on the Sustainable Rural Tourism Toward the Supply Side in Ajimu Town, Oita, Japan

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### Abstract

Tourism development in rural areas in Japan started based on changes in urban residents' values, rural economy and the rural environment in the 1980s. The Japanese definition for rural tourism emphasizes exchange between visitors and local people as an important element. Accommodation like farm inns plays an important role as an economic activity, but also as a place for exchange. Research on the role of farm inns in Japan so far has focused on comparison with examples from Europe, the image tourists from urban areas hold on rural tourism, managerial aspects of farm inns and the challenges presented to farmers (Yamazaki 1996, Takada 2000, Zeng 2010). However, there is little research about the aspects of farm inn owners' life histories, their motivation and their connection with local communities. From research conducted by the author in several locations in Japan, a shortage of farm-inn managers as well as the problem of aging owners and visitors were identified as major challenges. As a consequence, rural destinations face difficulties in responding to the growing demand by international tourists. This paper takes rural tourism in Ajimu town in Oita, which started rural tourism very early, as an example to analyse the role farm inn owners play in the development of rural tourism. Through questionnaires and interview surveys, we distinguished three indicators that will influence the further development of rural tourism. These are (1) rural tourism awareness, (2) satisfaction of management (supply side) or work (personnel) and (3) interest in international tourism.

### Key words:

Sustainable tourism; rural tourism-Japan; accommodation; life history

## Constructing a New Conceptual System of Green Tourism

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### Abstract

A clear definition to the conceptual system of green tourism is the cornerstone of in-depth study and practice activities for green tourism. In this study, the basic concept of green tourism is similar to sustainable tourism, eco-tourism and low-carbon tourism. This study indicates the connotation of green tourism is a wide range of attributes, fit the new concepts of the green development, focus on green tourism products and effective service supply as well as promote the consumptions of green tourism vigorously. In this study, we adopt the literature analysis method to discriminate the similar connotations of green tourism in order to determine the infrastructure conceptual system of green tourism through discourse analysis. The result of this study proposes that a new conceptual system of green tourism contains the following elements: (1) To promote green travel, reduce carbon emissions, and promote energy recycling and sustainable use; (2) To pay attention the tourism actors, environment and society as well as between each harmonious and symbiotic relationship; (3) Looking forward to the development of green tourism in the tourism industry can be contributed to local communities, investors, operators, local governments and other stakeholders parties; (4) To cultivate the green consumption concept of tourists and protect the better green surroundings.

### Key words:

green tourism; conceptual system; green consumption; green development

## Japanese and International Tourists' Perceptions and Attitudes Toward the Free-Roaming Sika Deer (*Cervus Nippon*) in Miyajima Island, Hiroshima, Japan

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### Abstract

Sustaining wildlife resources is essential for tourism that takes place in nature. Yet, how to achieve sustainability is a common challenge that many tourism operators face. One way to plan and assess effective management policy is to measure visitors' perceptions (Marin et al., 2009). Miyajima Island in Hiroshima, Japan attracts approximately four million tourists annually (Hatsukaichi City, 2016). Because the island itself was once regarded as the site where the Gods resided, free-roaming sika deer (*Cervus nippon*) inhabiting the island have long been protected from being harmed and have become part of the tourism resources. However, an emerging human-deer conflicts and growing concerns for vegetation damage by the increased number of deer in recent years resulted in a ban of deer feeding since 2007 (Hatsukaichi City, 2014). Still, some tourists were observed feeding the deer. During the observational study that we conducted previously, we saw the deer given items that they naturally do not feed on (e.g., maps) and tourists showed dissimilarities in their reactions toward the deer. This is assumed to be partially due to multi-nationalization of tourist groups in recent years and further examination can help in understanding these differences. Thus, the objective of this study is to investigate Japanese and international tourists' perceptions and attitudes toward the deer on the island. Using a direct questionnaire survey, we explore the following aspects: 1) knowledge about the deer (e.g., feeding ecology), 2) perceptions about the deer, and 3) opinions about the current management policy.

### Key words:

attitude; Japan; perception; questionnaire; sika deer; tourist; wildlife; wildlife management

## **National Park Management: An Analysis from the Perspective of the Relationship between Residents' Awareness of Environmental Consequences and Pro-Environmental Behaviors**

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### **Abstract**

Progress in exploration of the relationship between hand-foot-mouth disease (HFMD) and environmental variables has revealed impacts of the climate on the transmission of HFMD. However, research on how the relationship changes over space and time remains blank. In this paper, we combine geographically and temporally weighted regression (GTWR) with visualization of isosurfaces to analyse the spatiotemporal complexity of HFMD and environmental variables with an aim to understand their relationship and its spatiotemporal change. With recent data for Shandong Province, China, we explore the spatiotemporal heterogeneity of the relationship quantitatively with the assistance of visualization. The results illustrate that in the study area, the two major climate indicators, temperature and rainfall have a significant influence during the months of... than other months and spatially affect areas such as more heavily than other areas. Change trend is described as in fig... We believe the proposed approach will have significant implications for similar health and environmental research.

This research focuses on management of national park in the perspective of the relationship between residents' diverse awareness of environmental consequences and pro-environmental behaviors in the Jiuzhaigou National Park, China. Descriptive statistics from a sample of 342 residents indicated that residents had high level of awareness of positive consequences of environmental protection, followed by awareness of disaster consequences, finally awareness of negative environmental consequences of tourism. Results of the regression analysis showed that the prominent role of awareness of positive consequences of environmental protection and awareness of disaster consequences on residents' pro-environmental behaviors, while awareness of negative environmental consequences of tourism hadn't impacts on pro-environmental behaviors. So management of national park especially in environment aspect should focus on locals' interests, wellbeings and disasters education which could activate residents' pro-environmental behaviors. In addition, publicizing harmful environmental impacts caused by the tourism and educating residents with environment knowledge (such as the relationship among tourist sites' environment, tourism and locals' interests) are urgent.

### **Key words:**

national park management; awareness of environmental consequences; pro-environmental behaviors

## Nature-Based Tourist'S Environmental Attitude and Behavior: A Comparison Study of Visitors in Huangshan Scenic Area

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### Abstract

The serious problems such as global climate change, decline in biodiversity, haze and sandstorm have prompted great concern for environmental issues. Nature-based tourism is believed to influence environmental attitude, environmental knowledge and environmental behavior of tourists, which has become an important field of researchers who focus on environmental issues. Previous studies have examined the changes, influencing factors and relationships in tourist's environment attitudes, knowledge and behavior, yet, few studies have focused on nature-based tourism destination in China. In China, the high-quality nature-based tourism destinations attract so many tourists that it has had the characteristics of mass tourism, such as over-exploitation, crowded, lack of nature interpretation of tourists, etc. Under this circumstances, nature-based tourists' environmental attitudes and behavior need more specific and deliberated study. Huangshan Scenic Area is one of the earliest natural-based tourist destinations in China, and was named the World Natural and Cultural Heritage in 1990. But few study has explored the tourists' environmental attitude and behavior in Huangshan, and fewer study compare the differences in environmental attitude and behavior of different groups. Huangshan provides visitors with cableway and walking trails as tourist trails. Relatively speaking, the walking trails is more environmental friendly, low-carbon and sustainable. The purpose of this study is to explore the differences in environment attitude and behavior between the two groups which select different modes of transportation. This study will collect data by questionnaire survey, and will statistically control the social desirability bias which probably exist in self-reported environmental attitude and behavior.

### Key words:

nature-based tourism; environmental attitude; environmental behavior; Huangshan Scenic Area; socially desirable effect

## Research on community tourist attraction in national park: a case study on Kaihua Qianjiangyuan National Park Pilot Area

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### Abstract

Community tourist attraction of national park which driving tourists refers to all tourism resource and service facilities and other factors in community spatial scale. Evaluation on community tourist attraction should be on a basic of comparing attractions' scale and quality with tourist perception. A push-pull model was constructed to test tourist attraction of 74 communities in Kaihua Qianjiangyuan National Park Pilot Area. The results shown that the pull and push factors were highly coincided in community spatial scale. Besides, evaluation on tourist perception was superior to that on tourist attractions. Moreover, 59.46% communities were in an imbalance situation. In them, 36.49% communities in which the pull factor was greater than push ones indicated that level of tourist attractions was superior to the evaluation of the perception of tourism. The defect of this article lied in insufficient amounts of tourist questionnaire and five segments score system throughout the whole evaluation process, which may affect the overall evaluation result.

### Key words:

national park; community tourism; attraction; evaluation; Kaihua Qianjiangyuan National Park Pilot Area

## The Change in the Relationship between the City Dwellers and the Farm Families in terms of the City Farming

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### Abstract

The appreciation of city farming has been increased among city dwellers. At the same time, it is expected that the urban farmland is conserved and the city farming is maintained, improving their functions. However, it has not been clear as to how the city dwellers and the farmers should relate each other in terms of the city farming. The object of this study is to clarify the change in the relationship between the city dwellers and the farm families in terms of the city farming. The city farming is generally a family business where the farm families performs the function of supplying the agricultural products. The recent problems in the aging agricultural population and the short of successors have make it necessary to effectively utilize the agricultural land or find a new work force in order to solve them. Private farmlands have been developed under the governmental support, so that the city dwellers participate in the agriculture under the guidance of the farmers. The labor-consuming pesticide-free cultivation needs a lot of work force. Thus, the participation of flexible city dwellers as agricultural work force makes it possible to grow high-quality vegetables without pesticide. There is a mutual complement between the farmers needing the cooperation with the city dwellers as supplemental work force and the city dwellers wanting to participate in the agricultural activity for refreshment. The farmers in the city farming have changed to provide opportunities of participating the agricultural activities to the city dwellers along supplying fresh agricultural products.

### Key words:

city farming; city dwellers; urban farmland; vegetables without pesticide; agricultural work force; agricultural activities; supplemental work force

## C12.15 Geography of Tourism, Leisure, and Global Change

### Resilience Approaches to Managing Change in Tourism Places



Home

#### Oral

1. [Eco-Tourism in Ecologically-Fragile Zones of India – A Social Marketing Approach](#)  
Soma Sengupta, Anjan Sen (University of Delhi, India)
2. [Empowerment and Benefit-sharing: The Dilemma of Rural Tourism Development in Post-disaster Reconstruction under China's Beautiful Village Strategy](#)  
Tingxi LIU (Institute for disaster reconstruction and management, Sichuan University Hong Kong Polytechnic University, Chengdu, 610207, P. R. China, China), Li CHENG (Tourism School, Sichuan university, Chengdu, 610041, P. R. China, China)
3. [Island Planning for Tourism Resilience: Hainan, China](#)  
Jinjin Wan (School of Management, Nanjing University of Posts and Telecommunications, China), Qi Chen (Department of Geography, University of Hawai'i at Manoa, United States)
4. [Resilience Approach to Managing Mountain Hazards Risks during Emergency Avoidance Process in Tourism Places of Western China](#)  
Rong Chen, Peng Cui (Institute of Mountain Hazards and Environment, CAS, China)
5. [The Consequences of Tourism Strategies as a Tool for Rural Revitalisation in Kasumi, Japan](#)  
Lesley Crowe Delaney (Curtin University, Australia)
6. [The Research Technique of Individual Accommodation Facilities and Abundance Estimate of «Disorganized» Tourists](#)  
Tatiana Volkova, Vera Minenkova, Anatoly Filobok, Juliya Karpova (Kuban State University, Russian Fed)
7. [Vulnerability and Resilience of a Tourism-Based Social-Ecological System in Qinling Mountains, China](#)  
Xinjun Yang (College of Urban and Environmental Sciences, Northwest University, China), Jing Sun (Center for Systems Integration and Sustainability, Michigan State University, East Lansing, 48823, USA, United States)

#### Poster

1. [An Actor-network Analysis of Reproduction of Nature landscape in Community-based Tourism](#)  
Chien yu Tsao; Chin cheng Ni (China, Taiwan, Hsin chu University of Education)

## Eco-Tourism in Ecologically-Fragile Zones of India – A Social Marketing Approach

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### Abstract

Inhospitable and uninhabited terrain marks India's land frontier, which are also ecologically fragile. One way to preserve these zones is to make them strictly "no-entry" zones, but such exclusion is not a solution. Hence, eco-tourism, if practiced strictly according to norms could be solution to promoting a healthy and mutually beneficial relation between man and nature. The purpose of the present study is to explore how social marketing approach based on Environment-Technology-Society (ETS) Model can be used to make the "Eco-tourism" a success in India.

Case studies of different eco-tourist resorts in India revealed a serious flaw in marketing and management of such resorts. Lack of professionalism, high tariffs, less facilities, and difficult accessibility are the issues that negatively affects the occupancy rate. An analysis of data collected from 250 respondents from Delhi and NCR revealed that people are not concerned about environment. A behavioural change of the target audience can be ensured through social marketing.

This strategy includes designing and operating such resorts as a strictly green resort, ensuring no harm to the environment and enhancing sustainable development; presenting the green aspect of the resort as the unique selling proposition; setting affordable tariffs to reduce psychological fears of costs; providing pick and drop facilities, and providing eco-friendly alternatives to modern amenities; administering an integrated promotion mix; building linkages with travel agents and corporate houses; employment of local people; generating the raw materials indigenously; and a partnership between the stakeholders, while setting up and running such a resort.

### Key words:

Eco-tourism; Psychological Cost/Fears; Social Marketing; Green Marketing; Environment-Technology-Society (ETS) model

## Empowerment and Benefit-sharing: The Dilemma of Rural Tourism Development in Post-disaster Reconstruction under China's Beautiful Village Strategy

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### Abstract

Tourism is an effective path for post-disaster reconstruction and development in rural areas. In particular, the coupling relation between national rural development strategy and reconstruction plan has a significant impact on rural tourism. Empowerment and benefit-sharing are the key factors to achieve tourism sustainable development. This research, taking the disaster area of Lushan earthquake in China as the field site which implemented with China's Beautiful Village Strategy (CBVS) in 2013, adopting in-depth interview, participant observation and questionnaire survey with local residents, sought to assess the situation of rural empowerment and benefit-sharing. This empirical study probes relationships among rural empowerment, benefit-sharing and perceived satisfaction during the course of post-disaster reconstruction from the perspective of the villagers; Moreover, the role, status and influences of rural tourism in CBVS are major issues within the framework as well. The results indicate that rural tourism has become a representative form of China's beautiful village strategy in the process of post-disaster reconstruction. Massive infrastructure and landscape restoration embody state's will-power, while the villagers remain a passive role (powerlessness) or sharing unfair perceived interests in post-disaster reconstruction and tourism planning. The deficiency of empowerment and benefit-sharing inevitably leads to the dilemma of rural livelihoods and culture. Thus based on the special circumstances of the disaster area, this study aims to update a reasonable mechanism of empowerment and benefit-sharing. Meanwhile, the findings and implications from empowerment and benefit-sharing economically, psychologically, socially, and politically would further promote post-disaster reconstruction and rural tourism sustainable development.

### Key words:

empowerment and benefit-sharing; dilemma of rural tourism development; post-disaster reconstruction; China's Beautiful Village Strategy

## Island Planning for Tourism Resilience: Hainan, China

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### Abstract

The aims of this study are to increase island resilience of tourism system and reduce vulnerability to establish a basis of tourism sustainability, and to maximize economic, environmental, and socio-cultural benefits in tropical island destination. The study presents a case study in international tourism island in China, Hainan to illustrate island planning in comprehensive benefits for tourism resilience. Along with a creative framework corresponding to panarchy model, the study analyzes variabilities and responses in Hainan Tourism, and explores resilience insights in human and ecosystems respectively to increase tourism resilience and attempts to open up new adaptive measures for island tourism industry when experiencing a broad array of changes.

### Key words:

Tourism resilience; island planning; community resilience; stakeholders; insights; Hainan

## **Resilience Approach to Managing Mountain Hazards Risks during Emergency Avoidance Process in Tourism Places of Western China**

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### **Abstract**

Emergency avoidance is one of the most important mountain disaster mitigation measures at mountainous region, which directly influence the severity of casualties. Tourism place is highly populated with tourists whose consciousness and behaviors against mountain hazards are unpredictable, which has made it very difficult to organize and manage the risk when mountain hazards occur. This study focuses on this issue and concentrates on mountain disaster risk management during the emergency avoidance process in tourism places. Based on analysis of recent mountain disaster events and semi-structured interviews with 70 local people in country resort areas of western China, we identified the whole process of emergency avoidance and the potential risks, and found that the owners of farmhouse and the monitoring personnel play great roles in emergency avoidance process. The evacuation model led by monitoring personnel was summarized and feasible measures to reduce loss of mountain disasters were proposed and applied in empirical research of Longmenshan town, Pengzhou County. This study will look for resilience approach to managing mountain hazards risks during emergency avoidance process in tourism places of western China and provide scientific support of hazard prevention and mitigation at mountainous region.

### **Key words:**

mountain hazards; emergency avoidance; resilience approach; tourism place

## **The Consequences of Tourism Strategies as a Tool for Rural Revitalisation in Kasumi, Japan.**

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### **Abstract**

In order for the remote fishing and tourism town of Kasumi (now Kami-cho) in Hyogo Prefecture to reinvigorate its economy, multiple level government and municipal business strategies were instigated as part of Tajima district's revitalisation within the Japanese Northern Kinki tourism region. A micro-strategy to enhance the flailing tourism industry fostered the Kasumi snow-crab, gourmet tourism that had been in place since the 1980s as part of the national government strategy of 'one village one product' aimed to improve regional tourism by linking a specific product or attraction to a locality. Additionally, home-town themed regional tourism strategies were also initiated to attract urban tourists. The Kasumi Renaissance Plan(R-Plan), a large resort development focussed on successfully attracting various sources of government and local funding. Local business participants were expected to contribute 1% from their 'development of new events and products' budget for a 'home town living with the sea'. Community expectations were enthusiastic for the success of this project to further revitalise the local economy and rundown tourism attractions. Meanwhile, in the period of 2001-2002 an 'ongoing' construction project, the Kasumi bypass section of the Kyoto-Tottori route and the (R-plan) created a complex and confused situation for the community, compromising local tourism. By 2005, there was no clear distinction between various development projects, sequencing of works and several projects were in mid and final stages of funding. This paper demonstrates a proud fisheries community's reaction to tourism development and how change has been managed in a nature based community.

### **Key words:**

Japan; Tourism; Fisheries; Sustainability; Gourmet Tourism; Coastal Development; Women

## Research Technique of Private Accommodation Establishments and Abundance Estimate of Non-Organized Tourists

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### Abstract

The development of one of the main recreation regions of the Russian Federation has the following trends: growth of service volumes of tourism complex organizations, growth of volume of health resorts and health improvement services as well as growth of hotel services volumes. The obvious fact is that collective establishments play a special part among all types of lodging facilities. The actual number of individual tourists staying in private accommodation establishments in the Krasnodar region is much higher than official data. Almost all the interviewers pointed out that the private accommodation establishments often "hide" tourists, introducing them as relatives in order such data not to reach the Tax Inspection Office. The sphere of hotel services needs an improvement of the material and technical facilities and further government help for the tourism development as well as the aligning of the seasonal disbalance of the health-resorts and touristic organizations occupation.

### Key words:

tourism complex organizations; private accommodation establishments; tourism and recreation sphere;  
Russian Federation; individual tourists

## Vulnerability and Resilience of a Tourism-based Social-ecological System in Qinling Mountains, China

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### Abstract

Based on the social-ecological system (SES) and resilience theory, we build a tourism-based local SES for Qinling Mountains, China. Our work includes: (1) to quantify the vulnerability of tourism-based SES; to analyze the spatial difference of vulnerability across three dimensions, including exposure, sensitivity, and adaptability; to summarize the influencing mechanism; and advance the countermeasures of adaptive management. (2) to construct an adaptive framework for tourism impact analysis based on the adaptability of SES; to discuss the behavioral models and mechanism that influences the local farmers' adaptation under the development of rural tourism. (3) Taking the rural area as a local tourism-based SES, we integrate environmental, socioeconomic, and tourism development factors to study human-environmental interactions of rural tourism. We identify the key variables of stable state and the degradation coefficients in the local tourism-based SES. (4) At the local and community scales, we analyze the deep influence of road paving on the local SES in Qinling Mountain Area. We explore the relationship between the road paving and the local community resilience. (5) To identify the driving force of the local SES, we conduct a field survey and interview different stakeholders, then measure the acceptability of different groups toward different scenarios based on a social-ecological matrix analysis.

### Key words:

Socio-ecological system; resilience; rural tourism; Qinling Mountains

## **An actor-network Analysis of Reproduction of Nature Landscape in Community-based Tourism**

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### **Abstract**

With the growing occurrence of extreme weather events, the resilience of tourism landscape are core issues for the sustainable development for community-based tourism. Resilience theory refers to the capacity of social ecosystems to recover and reorganize when faced with disaster. Thus, local stakeholders play important roles during the process of reproduction of tourism landscape. Owing to ignoring the characteristic of nonhuman, it enhances this study to focus on the role of physical and ecological environment, especially in marginal regions. Referring to the actor-network theory, the physical environment could be regarded as a subjective stakeholder along with the other factors in the tourism region. This study applied actor-network theory to identify the critical role of human and nonhuman actors at community level. The Shanmei community is located on the boundary of the world-renowned Alishan National Scenic Area in the Alishan Township of Chiayi County in Taiwan, following Typhoon Morakot in 2009, as a case study. We analysis the dynamic process of destruction and reproduction of the tourism landscape. Observed how the actors through the translation process, to recruit human and non-human actors and formed a heterogeneous network alliance. The findings indicate that nature-based tourism model are sensitive the effects of climate change. Nonhuman actants have high influence on tourism development. Therefore, local communities and private industry sector, as well as public sector, must actively cooperate with them, and adapt the constantly change of the natural environment.

### **Key words:**

resilience; touristic landscape; community-based tourism; actor-network theory

## C12.15 Geography of Tourism, Leisure, and Global Change

### “Tourism Geographies” in Asia: Contrasting issues, approaches and traditions



Home

#### Oral

1. [Analyzing the Evolution of Tourism Geographies Research Topics in Asia Through Dynamic Co-Word Networks](#)  
Zhang Jiarong (Nanjing University, China)
2. [Carrying Capacity and Satisfaction of Kinmen National Park](#)  
Jing Shoung Hou (Formosa University, Taiwan, China)
3. [Pan Asia-Pacific Perspectives of Tourism Geographies and Traditional Culture: Sustainable and Beneficial or Profane and Incongruous?](#)  
Joseph Cheer (Monash University, Australia)
4. [Situating Tourism Geography in China: A Comparatively Critical Reflection](#)  
Guosheng HAN (Department of Tourism Management, Shandong University at Weihai, China)

#### Poster

1. [A Grounded Theory Oriented Approach to Motivation of Pua Travelers](#)  
Junjie Chen (China, Nanjing university)
2. [Charting the Development of Geography of Tourism and Recreation in Taiwan: 1946-2014](#)  
Guosheng Han (China, Shandong University (Weihai), Weihai, P. R. China, [hanguosheng@sdu.edu.cn](mailto:hanguosheng@sdu.edu.cn)); Pin NG (Armenia, Northern Arizona University, Flagstaff, AZ, USA); Chih-Kuei Yeh (China, Taiwan, Dong Hwa University)
3. [Research of Tourism Scenic Spots Economic Linkage and Spatial Organization-- Taking Hangzhou metropolitan circle 5A, 4A Scenic Spots as an Example](#)  
Shengli Ju; Zhuomin Tao (China, Nanjing Normal University)

## Analyzing the Evolution of Tourism Geographies Research Topics in Asia Through Dynamic Co-Word Networks

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### Abstract

It is of great importance to understand the evolution of research topics in a certain research field like tourism geographies. This study focuses on exploring how the topics of tourism geographies in Asia change over time. It analyses the research literatures of tourism geographies research literatures retrieved from Science Citation Index Expanded and Social Sciences Citation Index databases, visualizes the topics and its change using alluvial diagrams and coloring networks through the co-word networks. The study discovers that the main topics nowadays are the temporal and spatial relationship of tourism, the planning methods to achieve sustainable development of tourism, the topics concerning climate change and the tourism development and each country in Asia has its unique approach to deal with these topics.

### Key words:

scientometric analysis; tourism geographies; Asia

## Carrying Capacity and Satisfaction of Kinmen National Park

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### Abstract

Kinmen National Park has become a popular tourism destination for domestic and international tourists, due to its rich natural resources, historical war monuments, and traditional architectures. The purpose of this project is to estimate the tourism carrying capacity of exhibition areas and to establish suitable tourist service strategies in Kinmen National Park. This project selected 21 in-door exhibition areas to estimate their recreational carrying capacity, and to evaluate tourist satisfaction, service quality, tourists' willingness to re-visit and recommend through questionnaires. In total, 1644 valid questionnaires were collected. Each exhibition hall is given an evaluation on its tourism capacity and information, spatial and recreation management strategy. The results showed the tourists' satisfaction after visiting Kinmen National Park are significantly higher than their expectation before visiting. Tourists also show high recognition for service quality and professional commentary, and high willingness to re-visit and to recommend. Based on the number of tourist and tourist behavior, different tourist service management models are proposed.

### Key words:

crowding; carrying capacity; satisfaction; service quality.

## **Pan Asia-Pacific Perspectives of Tourism Geographies and Traditional Culture: Sustainable and Beneficial or Profane and Incongruous?**

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### **Abstract**

Traditional Culture in this paper is defined as the unique cultural heritage of people and place. For the most part, this comprises cultural landscapes that have existed in situ and passed down via previous generations. The traditional culture spectrum is personified variously and can include particular ways of living, livelihoods, ritualistic and performative actions, culinary practices, art, music, languages, modes of agriculture, building and construction methods, gendered observances, historic legacies, animisms and spirituality amongst others. For peoples steeped in the practice of traditional culture, tourism expansion provides a ready outlet for livelihoods and economic diversification and resilience building, especially where few alternatives exist and where tourism is actively embraced at community, provincial and national levels. The exigencies of alleviating hardship and poverty makes the monetisation and commodification of traditional culture through tourism imperative and necessary, thus raising a multitude of concerns including issues of curatorial and cultural management, intellectual property ownership, dividend distribution, cultural bastardisation, authenticity (and inauthenticity), culture and heritage policy development, grassroots empowerment and legacy development. This paper draws from recent fieldwork in the Pacific Islands (Vanuatu, Fiji, Solomon Islands and Hawaii) principally and in Southeast Asia (Myanmar and Indonesia). In all locations, the tourism-traditional culture nexus is prominent, stimulating international tourist visitation and local-level economic development. A pan Asia-Pacific comparative perspective is provided that interrogates the tourism-traditional culture nexus and predicated around the development of a conceptual framework for research and policy development.

### **Key words:**

Resilience; Traditional Culture; cultural heritage; livelihoods; Pacific Islands; Asia

## Situating Tourism Geography in China: A Comparatively Critical Reflection

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### Abstract

Although some researches on tourism geography in China have been published in some prestigious international geographical and tourism journals, more are on what tourism geographers in China have done and few on explaining why. We try to understand tourism geography research in China linking research issues to research practices of scientific community, traditional Chinese philosophical style, disciplinary identity and imagination and current academic evaluation systems and meanwhile situating tourism geography against mainstream geographical thoughts, and eventually extending Michael Hall's work (Framing tourism geographies, 2013). This research might contribute to an understanding of complexity and diversity of tourism geography internationally.

### Key words:

tourism geography; research practices; disciplinarity; geographical thoughts; academic evaluation systems

## A Grounded Theory Oriented Approach to Motivation of Pua Travelers

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### Abstract

PUA(pick-up artist) is a kind of culture community where the member inside are pursuing the factors and strategies about how to pick up others and PUA is also a short term call of the member within the group. They like to use their invented method to chat-up with others when taking trips to the destination. Tourism motivation study has shared some of the push and pull factors of traveler. This paper takes a qualitative study with a grounded theory method to explore distinguished motivation from the previous study. This factors including both inner side and destination-related side. The finding indicates social interacting itself may be the tourism attractions. This hidden desire would be implemented during the trip.

### Key words:

tourism motivation; grounded theory; push and pull factors; PUA; pick up group

## Charting the Development of Tourism Geography in Taiwan: 1946-2014

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### Abstract

We analyze tourism geography research conducted in Taiwan to gather a better picture of its development and evolution in the greater Chinese-speaking region and in the larger Asia-Pacific region. The history of geography education and research in Taiwan can be traced back seven decades. We use articles published in geography journals and tourism and recreation journals as our analysis sample. We classify the seven decades into five different periods—Gestation (1946–1959), Inception (1960–1974), Formative (1975–1989), Expansion (1990–2004), and Diversification (2005–2014)—and chart the development and evolution of Taiwan’s tourism geography according to its major research paradigms. Our analyses are organized based on the evolution of Taiwan’s geography thought and research paradigms, institutional development in the various geography subfields (tourism in particular), socio-economic changes, and the development of the tourism and recreation industry. We place the literature in the global context against the backdrop of the international geography research paradigm with regard to approaches and traditions. This research might contribute to an understanding of complexity and diversity of tourism geography internationally.

### Keywords:

tourism geography; geography thoughts; research paradigms; Taiwan; Greater China

## Research of Tourism Scenic Spots Economic Linkage and Spatial Organization-- Taking Hangzhou Metropolitan Circle 5A, 4A Scenic Spots as an Example

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### Abstract

Tourism economic linkage and destination spatial characteristics are important research contents of tourism geography. This article puts forward concepts and models of scenic spot economic linkage intensity, introverted degree, extroverted degree and degree centrality. The scenic spots economic linkage spatial characteristics of Hangzhou metropolitan circle is measured on basis of Arcgis network, Matlab matrix calculation, Ucinet center analysis function. The space characteristics of the scenic spot economic linkage of Hangzhou metropolitan circle shows center periphery structure and obvious center of grading system. Interregional scenic economic linkage axis is the center of radiation. The district economic linkage shows obvious regional imbalance. On this basis, the paper puts forward a series of spatial organization strategies such as the integration, multi-level central radiation, nearest neighbor effect of function Scenic Area.

### Key words:

scenic spots; economic linkage; spatial organization; Hangzhou metropolitan circle

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Economic Geography



Home

#### Oral

1. [A Study on the Spatial-temporal Evolution and Dynamic Mechanism of Hotel Groups' International Expansion](#)  
Xiang Zhang (Central China Normal University, China)
2. [Current Trends in the Development of Tourism in the Southern Regions of the Russian Federation.](#)  
Vera Minenkova, Anatoly Filobok, Tatiana Volkova (Kuban State University, Russian Fed)
3. [Facilitating Cross-Administrative Scenic Spots' Cooperation Based on IWF Analysis—A Case Study of Grand Xiannvshan Tourism Area in Chongqing](#)  
Yao Liu, Xiaoxia Yang (School of Geographical Sciences, Southwest University, Chongqing, China)
4. [Informal Economy of an Ephemeral Sacred Space: A Case Study of Magh Mela 2016 in Allahabad](#)  
Satyam Mishra, Anjan Sen (Department of Geography, Delhi School of Economics, University of Delhi, Delhi – 110007, India)
5. [Local Embeddedness and Failure of Transnational Retail Corporations: The Case of Gaziantep, Turkey](#)  
Nuri Yavan (Ankara University, Turkey), Ragıp Kalelioğlu (Gaziantep University, Turkey)
6. [Mapping the Relationship between World Heritage Sites and Regional Tourism Economics](#)  
Honglei Zhang, Zehua Liu, Jiarong Zhang, Junjie Chen (Nanjing University, China)
7. [Regional Analysis of Domestic Tourist Flow in India: Evidence form Large-Scale Data](#)  
Rakesh Kumar, Prof. R.B. Bhagat (International Institute for Population Sciences, Mumbai, India)
8. [Student Activities in Local Tourism Organizations in Japan](#)  
Munehiko Asamizu (Yamaguchi University, Japan)
9. [The study of Tourism Demand in Small Island Developing States](#)  
Kantaro Takahashi (Tokyo Metropolitan University, Japan)
10. [Tourism - Planning, regional management and developement](#)  
Henrik Toft Jensen, Viggo Plum, Julie Skjelborg Frederiksen (Roskilde University, Denmark)
11. [Uneven development, tourism and production of space in Brazil](#)  
Rita Cruz (University of São Paulo, Brazil)

#### Poster

1. [Enviromental Accounting in Hotel Bussiness](#)

Haci Arif Tuncez (Turkey, Selcuk University)

2. [Informal Economy of Pilgrims in an Ephemeral Sacred-Space – Reading the Lifestyle of Kalpawasis during Magh-Mela in Allahabad](#)

Anjan Sen; Soma Sengupta; Satyam Mishra (India, University of Delhi)

3. [Research on the Change of the Spatial Distribution of Tourism Supply-demand Market in Northeast City Under the Impact of Harbin-Dalian high-speed railway](#)

Jianke Guo; Shaobo Wang (China, Liaoning Normal University Research Center of Ocean Economy and Sustainable Development)

4. [The Research of Exhibition Economy and the World Famous Tourism City](#)

Lili Kang; Chengyun Wang (China, Shanghai Normal University)

## **A Study on the Spatial-temporal Evolution and Dynamic Mechanism of Hotel Groups' International Expansion**

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### **Abstract**

The paper has teased the spatial-temporal evolution history of hotel groups' international expansion. With the ArcGIS clustering analysis, it has described the spatial expansion scale and direction evolution of typical case hotels' international expansion such as Cendant Corp. and Marriott International Inc. Then, it has measured and interpreted the situation and dynamic mechanism of the spatial concentration and diffusion of case hotels' international expansion by fragmentation index, unfirming index and agglomeration index. The study shows that: (1) The spatial scale of hotel groups' international expansion is expanding. (2) Hotel groups' international expansion shift from contagious diffusion to the mixture of contagious diffusion and hierarchical diffusion. (3) Hotel groups' international expansion display a characteristic which is homogeneous development from multicenter. (4) Hotel groups' international expansion display a characteristic which is spreading from the core region to the hinterland. (5) Hotel market attraction, market competition and transportation development is the important motivation of spatial concentration and diffusion of hotel groups' international expansion, among them, the market factors such as international tourism flows and business flows play a decisive role. The paper has important practical guiding significance for chinese native hotel groups to learn international expansion spatial law and experience from overseas hotel groups and implement transnational operation strategy.

### **Key words:**

Hotel groups; international expansion; spatial-temporal evolution; concentration and diffusion; dynamic mechanism

## Current Trends in the Development of Tourism in the Southern Regions of the Russian Federation

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### Abstract

Russia has high tourist and recreational potential. The southern regions of the country are the most attractive for tourists in terms of diversity of natural and cultural-historical recreation resources. Current processes of development of the tourist market in the southern regions are influenced by many factors of regional, national and global scale. Trends in the development of tourism define changes in the territorial organization of industry, redistribution of tourist flows, their quantitative and qualitative composition, direction of investment policy in tourism, management of natural. The changes require a careful study of the nature and the consequences for the sustainable development of tourist areas and their effective impact on the socio-economic development of regions.

Current trends are:

- New tourism areas and the development of existing tourist and recreation systems.
- The integration processes in the management of tourism.
- The increased role and participation of the state in the process of tourism development.
- Involvement of the local tourist market in the processes of globalization.
- Activation of event tourism to ensure the occupancy of Olympic infrastructure.
- Transformation of hotel services market as a result of the XXII Olympic and XI Paralympic Winter Games.
- Transformation of the tourist market under the influence of the new geo-economic and geo-political conditions in Russia and in the world.
- Safety and security control.

### Key words:

tourism; current trends; South of Russia

## Facilitating Cross-Administrative Scenic Spots' Cooperation Based on IWF Analysis: A Case Study of Grand Xiannvshan Tourism Area in Chongqing

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### Abstract

The competition of regional tourism in China has been transformed into regional cooperation. Cooperation of scenic spots, an important part of regional tourism development, has been a hot topic. Grand Xiannvshan tourism area, an integration of several scenic spots at Fuling, Wulong and Fengdu, has been put forward by the government of Chongqing in 2010, but it turns out to be a disappointed performance. Importance-Willingness-Feasibility (IWF) analysis tool originated from IPA (Importance-Performance Analysis) has been used in this paper. Governments' perception of cooperation content from perspectives of importance, willingness and feasibility in the three counties has been investigated. Then, index and quadrant analyses have been conducted. The results shows: though the brand recognition of "Grand Xiannvshan" is high, it is a long way to realize; the cooperation of tourism planning, tourism transportation and tourist routes are low-hanging fruits now; the hindrance of marketing cooperation is mainly from subjective willingness while the obstacle of tourist bus system is from objective conditions. In addition, tourism website shows low importance for the cooperation; the setup of administrative committee, establishment of tourism enterprises and formation of profit distribution mechanism are next to impossible in the current. Therefore, the development of Grand Xiannvshan tourism area depends on the collaboration of local governments at present. The cooperation of tourism traffic can be considered as a breakthrough to strengthen communication and grow trust among local governments. Then, make the market mechanism function, expand the cooperation more widely and deeply. Meanwhile, each scenic spot needs to seek common points but reserve difference, in other words, showing complementary advantages in the light of the actual circumstances.

### Key words:

cooperation of scenic spots; cross-administrative regions; IWF analysis; Grand Xiannvshan tourism area

## Informal Economy of an Ephemeral Sacred Space: A Case Study of Magh Mela 2016 in Allahabad

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### Abstract

Allahabad an important city at state of Uttar Pradesh in India, also culturally known as Prayag, is eulogized in *Puranic* mythic as the “*tirtharaj*”, the king among all sacred places, situated picturesquely at the confluence of the rivers Ganga, Yamuna and invisible Saraswati. Every year pilgrims and devotees to Hinduism and its various sects come by the hundreds of thousands to the religious bath-fair at river banks of Ganges and Yamuna that is Magh Mela, it is known as Kumbh Mela after each 12 years.

Making of this temporary mega city inhabited by pilgrims and tourists requires proper planning and execution that is done by state Government of Uttar Pradesh, by the investment of huge capital and human-technical support. With the congregation of millions of visitors there, evolves a religious economy that consists from priests offering Moksha (solvation) to pilgrims to sellers of daily life goods, for a certain period time. This paper attempts to discuss the various kind of economic activities being run in Magh Mela and interrelation with livelihood of people involved.

This research paper is based on primary data collected through focus group discussion and individual interviews through questionnaires. It also uses secondary data and literature available on this particular topic. Inductive methodology has been used in this research paper to accomplish the objectives of the study.

### Key words:

temporary city; Magh Mela; pilgrimage tourism; mass gathering; Sacred Economy; Prayagwals (Priests of Prayag)

## Local Embeddedness and Failure of Transnational Retail Corporations: The Case of Gaziantep, Turkey

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### Abstract

Economic globalization has enabled global corporations to be able to move freely on a global, regional as well as local scale. In this respect, transnational retail corporations opened stores and dominated modern retail sector by expanding dramatically on a global scale and investing in almost any regions and local areas around the world. However, some large transnational retail corporations could not succeed in the competition for different reasons on local levels despite their supremacy in many areas. Therefore, the motivation behind this research is to reveal the reasons why two global retail companies, Carrefour and Real, were forced to close down their stores after the development of their local investment in the city of Gaziantep and their failure on the local level. In this context, the purpose of this paper is to analyze how the embedded, complex and structural relations between local agents and foreign retailers can be understood in terms of the failure of investments in Gaziantep, Turkey. To do so, in-depth interview with both these two foreign invested corporations and those of local retail firms, which benefited from the competition in local markets, have been conducted and the data gathered has been analyzed qualitatively. We found that these foreign corporations selected the wrong location to compete with other firms in the local market and ignored the socio-cultural backgrounds of local consumers as well as local consumption habits. The paper revealed that local embeddedness has vital importance for large global retail corporations in order to survive in local level.

### Key words:

Retail sector, Transnational corporations, Failure, Super-hyper markets, Local embeddedness, Economic geography, Gaziantep, Turkey



## Mapping the Relationship between World Heritage Sites and Regional Tourism Economics

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### Abstract

World Heritage Sites, aimed to identify, recognize, and protect the sites with outstanding universal value, are increasingly used as a brand for tourism marketing. However, the real effect of World Heritage Sites on tourist arrivals and regional tourism economics is rarely been well investigated. Using difference-in-differences model and a set of GIS spatial statistical techniques, this paper investigates the spatial distribution of and relationships between World Heritage Sites and regional tourism economic growth in China with a county level. The difference-in-differences model indicates World Heritage Sites positively influence regional tourism economic growth at the county level. Furthermore, this positive influence presents regional variance and city level variance. Moreover, this paper describes and visualizes the spatial distribution of regional tourism economics and suggests the spatial relationships between spatial tourism clusters and World Heritage Sites. Based on the results, this paper shows that World Heritage Sites, as the most valuable brand of regional tourism marketing for either domestic and international market, can be an important market-based and geographical arrangement tool to accelerate regional tourism economic growth and balance the uneven development of regional tourism economic growth.

### Key words:

World Heritage Sites; regional tourism economics; difference-in-differences model; spatial distribution

## Regional Analysis of Domestic Tourist Flow in India: Evidence form Large-Scale Data

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### Abstract

Regional tourism within developing countries is a growing phenomenon. This paper explores the spatial regional distribution of domestic tourist flows in India using exploratory spatial data analysis. This method is a set of GIS spatial statistical techniques that are useful in describing and visualizing the spatial distribution, detecting patterns of hot-spots, clustering of tourist destination and suggesting spatial regimes. Using national sample survey data on domestic tourism in India 2008-09. Which provide overall information about domestic tourism in both origin and destination as well as expenditure incurred for different purpose. A better distribution of tourism activities at regional level correlated with challenges of sustainable tourism and its sustainability will ensure attractiveness and quality of new tourist destinations. Result suggest that there are some pocket of region where the high cluster of tourist outflow for the different purpose like holidaying, leisure, recreation and social (Including visiting friends and relative, attending marriages, pilgrimage & religious activities, business education & training and health and medical. The Cluster & Outlier Analysis (Moran's I statistics) for domestic tourist outflows in the region reveal strong positive and significant spatial autocorrelation for different purpose and Hot Spot Analysis (Getis-Ord  $G_i^*$ ) were also indicate statistically significant Hot spot of tourist outflow from different region of India.

### Key words:

regional development; Tourist flow and clustering and hot spots

## Student Activities in Local Tourism Organizations in Japan

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### Abstract

Japan recorded the highest number of inbound tourists in its history in 2015. Despite the rapidly increasing tourist numbers, some tourist destinations are still struggling working out how to attract tourists. Some municipalities believe they need something with international flavor to attract international visitors. There often remains a gap between what is offered by Japanese people and what is wanted by international visitors. Local people know local products quite well. However, to understand the needs of tourists, opinions from outside the community are essential.

The author of this paper is working at a Japanese University in a remote area. The author often sends students to tourist destinations to learn about local tourism. In many cases, students work as volunteers, and they contribute to human resources in aging and depopulating areas. The students and the local communities have a win-win relationship.

These off-campus activities are popular among both domestic and international students. Many international students are interested in attending something more local. The local way of life in Japan is seen to be very attractive by some international students, and some of these international students have made proposals for local authorities to invite international tourists in the future. For Japanese students, volunteer interpreter work is also popular.

### Key words:

inbound tourism; international students; Japan

## The Study of Tourism Demand in Small Island Developing States

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### Abstract

This paper analyzed tourism demand in Small Island Developing States with two indicators; one is the number of tourists, the other is tourist expenditure per capita which shows demand indicators. One is the number of tourists; the other is tourist expenditures per capita. The number of tourist is often used as demand indicator, for instance, study of tourism flow with gravity equations. But the author questioned that the number of tourist is affected by the destination's social and economy size and might be possible that small destination is underestimated as indicators. Because of the reason above, this study uses the tourist expenditures per capita to analysis the island tourism demand as well as the number of tourist.

First, this paper put the both indicators into the ranking to compare the differences of these. As a result, the number of tourist is affected by social and economic size. Meanwhile, the tourist expenditures per capita shows resort islands tend to be high price.

Second, regression analysis is undertaken to see the factor of two indicators. We find the size of tourist would be increased by income and tourism infrastructures despite length of stay shows significant and negative. Meanwhile, tourist expenditures per capita would be increased by population density length of stay and ratio of tourist from suzerain states despite tourist expenditures per capita would be decreased by market size. Moreover, SIDS had experienced colony era, and relationship of suzerain state is still important factor to see the island tourism.

### Key words:

Small Island Developing States; Tourism Demand; Tourism Expenditure per capita; Number of Tourist

## Tourism – Planning, Regional Management and Development

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### Abstract

Research in tourism is an interdisciplinary research field where several research disciplines have to collaborate to be able to understand the behavior and preferences of tourists and the tourist sector and how tourism contribute to the regional development. The activity in the tourist sector is at least in northern Europe very much depending on the season – a special employment structure.

Some of the tourist orientated activities are reasons for tourists to go to a place par example a famous manor house, restaurants with Michelin stars or good beaches. Other tourist orientated activities are reasons to stay at a place, for example good restaurants or interesting and clean urban environment. It is important to realize, what could be the reasons to go to the destination, and what could be the reasons to stay, this understanding could be a point of departure for marketing.

In this paper there is a discussion of management types in tourism, we are using the results of 40 interviews of tourist businesses - 20 in Denmark and 20 in Germany – to understand the priorities and offers from the tourist sector. We are also using nearly 1.300 interviews with passengers at the ferryboat between Roedby in Denmark and Fehmarn in Germany to understand the travel pattern and priorities of the tourists.

This article also inscribes itself in the research of a European cross-border region. The cross border region consisting of a part of northern Germany and the southeastern Denmark is in focus in the following discussion.

### Key words:

Collaboration; Management; Marketing; Regional development; Tourist; Destination; Economy; Holistic

## Uneven Development, Tourism and Production of Space in Brazil

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### Abstract

Tourism in Brazil produced particular geographies related to equipment and services such as tour operation, hotel infrastructure, second homes, maritime cruises and therefore to tourist flows which reveal a process of privatization of the territory settled on its corporative use. The spatialities produced by tourism activity is considered in this analysis as a cause and also as a consequence of an uneven development in the terms discussed contemporaneously by Neil Smith (2008). In this regard, we look for discussing, apart of supposed cultural determinations and through a political economy of territory, the logics that engender these spatialities taken over by tourism in Brazil and we met in the historical and dialectical materialist method the basis for the interpretation of this complex phenomenon in its relation to space. The notion of uneven development as the “systematic geographical expression of the contradictions inherent in the very constitution and structure of capital” (Smith, 2008: 4) is a conceptual pillar on which we sit our analysis. As a result of this analysis, we highlight the significant spatial concentration of tourist facilities and flows in Brazil as a historical product of processes of concentration and centralization of capital in its relationship to different Social and Territorial Divisions of Labour distributed over time and materialized in space.

### Key words:

Uneven development; tourism; production of space; Brazil.

## Environmental Accounting in Hotel Business

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### Abstract

Rapid decreasing of renewable land and water resources threaten economics of developing countries. Especially, high birth rate cause to high environmental subversion in natural sources dependent states. When natural sources are non-sustainable, economic activities are late as a result of capital poor and labor scarcity. From this point of view, the world's industrial companies take precautions to not-pollute the environment and also the full use of resources. These precautions raise escalation of costs.

Businesses use accounting system and financial statements with the output of this system as to inform the interest groups related to activities protecting natural environment. Difficulties of environmental activities about accounting issues revealed to understanding of environmental accounting in the traditional accounting system.

Environmental accounting is an important management tool to improve the environmental and economic performance of enterprises. It provides enterprises with useful information in taking rational environmental decisions, determining environmental strategies, managing environmental costs and reporting environmental performance. This study gives a road map for entering these precautions in the accounts.

### Key words:

Hotel Establishments; Environmental Costs; Accounting For Environmental Costs

## Informal Economy of Pilgrims in an Ephemeral Sacred-Space – Reading the Lifestyle of Kalpawasis during Magh-Mela in Allahabad

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### Abstract

Allahabad is the site for Hindu religious fairs-cum-bathing festivals, the annual ‘Magh-Mela’, sexennial ‘Ardha Kumbh-Mela’ and duodecennial ‘Purna Kumbh-Mela’. Dubbed as the largest gathering of human being on earth, the mela of 2013 saw an attendance of over 100 million Hindu pilgrims from around the world.

The sacredness of the melas are defined by specific temporal and spatial dimensions. The fairs are organized in the Hindu lunar month ‘Magh’ (January and February), but precise moments and time periods on specific days or dates are the holiest for bathing, usually poornimas (full moon) or amavasyas (no moon), when the shahi snans (royal baths) are held. The melas are held at Triveni Sangam, which is the confluence of rivers Ganga, Yamuna and mythical Saraswati. The holiest site for bathing are located east of Allahabad fort, on the bank of Rivers Ganga and Yamuna.

Those pilgrims who stay for the entire period of the mela, i.e. ‘kalpawas’, have to follow a strict lifestyle of austerity. Getting up early before sunrise and complete daily chores; performing pujas, aartis and yoga; practising upwas, dan and dakshina; cooking and consuming simple saatvik food; participating in havans, bhajans and kirtans; and retiring early after sunset. During the extended stay, pilgrims are attached to different akharas, and live a life of dharma, to seek moksha. Those who are able to successfully complete the kalpawas, are honoured with the title of ‘kalpawasis’. They take a vow to live a pious life, and to return every year for the melas.

### Key words:

Magh-Mela; Kalpawas; Kalpawasi

## Research on the Change of the Spatial Distribution of Tourism Supply-Demand Market in Northeast City Under the Impact of Harbin-Dalian High-Speed Railway

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### Abstract

Based on the GIS technology, the paper takes the 4A level and above attractions as the research object, from two perspectives of supply and demand. Separate the market potential model into two models: supply and demand market potential models. The study found that: ① High-speed Rail made northeast cities all spots accessibility level average compression in about 2.5 hours, the number of suitable for a tour and the two tour spots increased rapidly, it filled the blank of one day market and expanded the range of two days market, and last it formed in High-speed Rail as the center spread around, from the inside to the outside are a new development model for a day, two days, seven days for the tourism characteristics. ② The alteration of the potential of tourism market supply and demand presented the phenomenon that off high iron decay. Stimulating market supply and demand to gather in the high-speed railway line, led to the formation of high iron Tourism Economic Zone, at the same time, the northeast tourism spatial distribution characteristic is more obvious. ③ High speed rail make the short tour (day trips, two day tour) of the supply and demand market potential become better than seven days tour. ④ According to the core periphery theory, we divide the tourism market in the northeast into four kinds. Tourism market core area, tourism market peripheral zone, tourism market transition zone, tourism market edge area. This paper thinks: it is necessary to rely on high-speed rail and other fast transportation mode and tourism hub city, to improve the commuter network, and promote the optimization and docking of the regional tourism supply and demand space network.

### Key words:

Attraction accessibility; supply and demand potential model; high speed rail tourism economic belt; Space distribution; northeast region

## The Research of Exhibition Economy and the World Famous Tourism City

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### Abstract

Exhibition industry is played an increasing important role on the economy development of the city in the world. On the basis of analysis about the data and the index system of the world famous city, we easily find that shanghai had become one of the leading cities on exhibition tourism in china. However, shanghai is backward compared to Paris and Tokyo which are the world famous tourism city. Therefore, we research about the correlation between world famous tourism city and international conference and exhibition. The essay takes shanghai as an example. We research the influence of exhibition economy on the development of tourist city and gives some advice on how to develop the world famous tourist city and international conference and exhibition by taking the advantage of exhibition economy.

### Key words:

international conference and exhibition; world famous tourism city; shanghai; relationship; research

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Environment

#### Oral



Home

1. [Encounters with Jaws: Exploring Shark Cage diving in Gansbaai, South Africa - the Great White Shark Capital of the World](#)  
Tracey McKay (Unisa, South Africa)
2. [Estimating Social Carrying Capacity in Protected Mediterranean Mountain Areas. Methodological Orientation](#)  
maría luisa gómez moreno, Ana Luque Gil, Peláez Fernández Ángeles (University of Malaga, Spain)
3. [Study of Tourism Eco-Compensation Mechanism in Three-Gorge Reservoir Area of China](#)  
Yiqi Zhou (Zhongnan University of Economics & Laws, China)
4. [The Conservation of Residential Environment and Sustainable Development of Tourism for Chantang gaqiang chongda \(Tibet University, China\)](#)
5. [The Delivery of Messages of Environmental Awareness and Custodianship for Canoe Trails in Australia](#)  
Ruth Lawrence (LaTrobe University, Australia)
6. [Tourism and Conservation in Tortuguero National Park \(Costa Rica\) and Ras Al. Hadd Turtle Nature Reserve \(Oman\)](#)  
Anna Dudek (University of Warsaw, Faculty of Geography and Regional Studies, Poland)
7. [Tourism Development, in Search of Livelihood Sustainability: A Comparative Study of Gadhwal and Kumaun Region of Uttarakhand](#)  
Atithi Pant, R.B Singh (Department of Geography, Delhi School of Economics, University of Delhi, India), V.S Negi (Department of Geography, Saheed Bhagat Singh College (Eve.))
8. [Tourist Crowding Perception, Perceived Attractiveness and Satisfaction: A Second-Order Structural Model](#)  
Li Li, Jie Zhang, Sifeng Nian (Nanjing University, China)

#### Poster

1. [A New Concept in Turkish Tourism: Floating Islands](#)  
İhsan Bulut (Turkey, Prof. Dr. / Akdeniz University)
2. [Ecosystem Services Assessment for Tourism Planning in the Protected Area](#)  
Navchaa Tugjamba; Amarbayasgalan Gantumur (Mongolia, University of the Humanities)

3. [Effects of Tourist Activity on Soil in Huangshan Scenic Spot](#)  
Wang Chang (China, Nanjing University)
4. [Response of the sandy beach ecosystem to recreational activities at Liandao Beach, China](#)  
Xiaowei Wu; Xinqing Zou (China, Nanjing university)
5. [Role of Sustainable Tourism to Foster a Vibrant Industry in the Conservation of the Environment- The Case of Bhutan](#)  
Uttam Kumar (India, Mmh College Ghaziabd Ccs University Uttar Prudish)
6. [The Contribution of the Serra do Mar State Park in Promoting Knowledge of its Territory: an Analysis of Visitation](#)  
Davis Sansolo (Brazil, São Paulo State University, Bioscience Institute); Sidnei Raimundo (Brazil, São Paulo University, School of Art and Human Sience); Eliane Simões (Brazil, Campinas University State)
7. [The Relevance of Soundscapes and Acoustic Tourism: Examples from Hong Kong](#)  
Lawal Marafa (HongKong SAR, China, The Chinese University of Hong Kong)
8. [The Response of Desert Ecological Environment to Tourism Activities](#)  
Longtang Li (China, Ningxia University,); Chenhao Xue (China, Northwest University For Nationalities); guanle zhang (China, Ningxia University,)

## Encounters with Jaws: Exploring shark cage diving in Gansbaai, South Africa - the Great White Shark capital of the world

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### Abstract

This study explored the commercialisation of shark cage diving in Gansbaai, a small fishing village two hours from Cape Town, South Africa. Gansbaai is located in the heart of Great White Shark migratory routes. The presence of these apex predators has enabled the establishment of 15 hard adventure tourism enterprises. The shark cage diving industry is a valuable one, attracting many wealthy international tourists. Most operators focus only on interactions with Great White Sharks, some have evolved into more complex operations or have carved specialised niches in order to counteract the negative effects of competing on price. One, for example, focusses on servicing the backpacker market, another has a supplementary souvenir shop and a third services the high end, ultra luxury segment of the market, catering for Hollywood super stars and billionaires. In the main, sales are driven by referrals from tour operators, guides, accommodation providers and other hospitality businesses; in conjunction with social media such as websites, Facebook, Twitter and YouTube. The industry faces a number of challenges. The cost of doing business is high, specifically purchasing diesel and chumming products. Some battled to secure operating permits. Theft and high insurance costs were another headache for the enterprises. Operations are highly weather dependent, as the treacherous Cape seas must be dealt with cautiously. Overall, the industry is a key segment of the local economy, although with most tourists being day-trippers, the positive impact the industry on the Gansbaai economy is less than it could be.

### Key words:

Sharks; adventure; South Africa; tourism; commercialisation

## Estimating Social Carrying Capacity in Protected Mediterranean Mountain Areas.

### Methodological Orientation

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#### Abstract

The concept of social carrying capacity, though opens to debate and critique, is a valuable tool that enhances the management of recreational use in protected natural areas in order to planning visitor affluence to avoid crowded situations. In this paper, conducted in Sierra de las Nieves natural park (Spain), we first categorised the hikers making use of the park and then, from the profiles obtained, analysed their perception of crowding on the trails. This assessment was subsequently used to assess levels of user satisfaction and thus to determine the psychosocial carrying capacity of the park. The results obtained can be extrapolated to most of the Spanish natural parks in Mediterranean mountain areas, due to their comparable levels of visitor numbers and to the prevalence of recreational hiking use. The results suggest that management efforts should be directed toward relocating trails outside the core areas, such that user preferences may be satisfied while less impact is made on the areas of highest environmental value.

#### Key words :

Hiking; visitor classification; natural area planning and management; social carrying capacity

## Study of Tourism Eco-Compensation Mechanism in Three-Gorge Reservoir Area of China

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### Abstract

Due to ecological disruption and even ecological disaster phenomenon some ecological sensitive areas, calling for the construction of ecological civilization is growing. As an ecological compensation mechanism in the field of the tourism, tourism ecological compensation system has become frontier problem of the current ecotourism and sustainable tourism economic development. Taking three-gorge reservoir area as example, this paper reviews the development history of ecological compensation as well as tourism ecological compensation, summarizes and analyzes tourism ecological compensation system from four aspects, including basis, host-guest, standard accounting and security mechanism. Meanwhile, this paper intends to provide relevant reference for the further development of three-gorge reservoir area, increase the efficiency of three-gorge reservoir area's ecological compensation mechanism and form mutual balance relationship between local tourism economy and ecological environment.

### Key words:

tourism ecological compensation; three-gorge reservoir area; compensation system

## The Conservation of Residential Environment and Sustainable Development of Tourism for Chantang

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### Abstract

From the analysis of the Chantang case, this article also discusses the subject of how the Tibetan traditional culture and the sustainable tourism development can be mutually benefited to each other in general. Finally, this article gives some recommendations about how in the most feasible ways the Chantang's tourism to be boosted, environmentally sustained and the local peoples' livelihood be enhanced.

### Key words:

Chantang; Sherpa; Residential Environment; The protection; Tourism; Sustainable development



## The delivery of messages of environmental awareness and custodianship for canoe trails in Australia

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### Abstract

The recent increase in private ownership of paddle-craft in Australia has resulted in a corresponding increase in participants seeking self-guided paddling experiences. Canoe trails have the capacity to provide participants with the necessary knowledge to safely engage in paddling activities as well as engender messages of river custodianship. An imbalance frequently exists between the information provided to enable safe passage along canoe trails and environmental interpretation of the natural and protected areas through which the canoe trail passes. In this quantitative text analysis survey of Australian canoe trails, it was found that some form of safety information was almost always communicated in published trail materials. However, only about half the trails provided either natural area interpretation or custodial messages of the riparian corridor through which the trail passed, indicating an underdeveloped market for environmental custodial advocacy.

## Tourism and Conservation in the Tortuguero National Park (Costa Rica) and Ras Al-Hadd Turtle Nature Reserve (Oman)

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### Abstract

The paper presents the comparative study of two protected areas - in Costa Rica and Oman - which protect the habitats of several species of sea turtles, especially green turtle. Green turtles *Chelonia mydas* are classified as endangered species and are found around the world in warm ocean waters. Both protected areas are important nesting sites where sea turtle females lay eggs on beaches. In both countries, protected areas are also a major tourist attraction, popular among local and foreign tourists. Development of tourism in these areas could pose a threat to the population of sea turtles. The article presents the organizational models of tourism in both reserves. The comparative analysis includes: transport accessibility, tourism infrastructure, annual number of visitors, number of visitor groups, schedule of tours in the reserves, tourist information and educational programme. The paper highlights the principal challenges facing protected areas, including the threat posed by development of tourism activities and other factors impacting conservation efforts.

### Key words:

conservation; tourism; Costa Rica; Oman; Tortuguero; Ras al. Hadd; sea turtle; protected area

## Tourism Development, In Search of Livelihood Sustainability: A Comparative study of Gadhwal and Kumaun region of Uttarakhand

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### Abstract

The state of Uttarakhand is a storehouse of biodiversity and Natural resources. It has been a hot spot of tourism due to its magnificently diverse landscapes, numerous pilgrimages with religious tourist potential and rich cultural heritage. This has also generated a good source of income and employment to youths and rural masses. Since its inception, as a newly borne hilly state its resources have been immensely utilized rather over utilized in the names of revenue generation, employment, development, growth and many such related terms. It is very important that natural resources should be utilized in a viable and sustainable manner with co-existence with the development of socio-economic environment. Therefore, the purpose of this research is to adopt integrated approach and establishment of new plans for the sustainable development of tourism in Uttarakhand.

The study attempts to identify and describe different tourism zones in Gadhwal and Kumaun region of Uttarakhand with their unique resources. It will further emphasise the differences in the prevailing resources of both of the regions and utilize these differences by proposing a number of new and diverse products in locations of different natural and cultural importance.

Therefore, the purpose of this research is to make a comparative study with integrated approach and establishment of new plans for the sustainable development and livelihood security in Uttarakhand. And finally to synthesis all the findings and give feasible suggestions and recommendations for further development of tourism in this region.

### Keywords:

Uttarakhand; Tourism Development; Livelihood Sustainability.

## **Tourist crowding perception, perceived attractiveness and satisfaction: A second-order structural model**

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### **Abstract**

Drawing on the theories from stimulus overload and social interference, this study proposed a multidimensional way to measure tourist crowding perception with neutral crowding, personal crowding and social crowding. A second-order SEM is tested to analysis the relationships among crowding perception, perceived attractiveness and satisfaction. The result of a confirmatory factor analysis confirmed that crowding perception has negative effects on perceived attractiveness. However, the effect of crowding perception on tourist satisfaction is not significant. The findings of this study refined the multidimensional connotation of tourist crowding perception and provide another dimension to evaluation the quality of tourist experience apart from the universal construt satisfaction. The importance of managing tourist crowding perception is discussed to improve tourist experience.

### **Key words:**

tourist crowding perception; tourist experience; satisfaction; perceived attractiveness; experience quality

## A New Concept in Turkish Tourism: Floating Islands

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### Abstract

Floating Islands become one of the important touristic values of Turkey. Especially the natural assets located in developing regions have an important role to play in economic life of those regions. The floating islands are one of these assets and have become an important research subjects lately. With many floating islands, Turkey is considered as a heaven of floating islands. Almost all geographical regions in Turkey has many floating islands located throughout landscape of the country. Turkey's Floating Islands is very important. This islands have not come to the attention of the researchers so far. By examining the islands we hope to bring the subject to the attention of nature conservation parishioners. We hope to contribute to the tourism literature by examining the potential of the area in terms of eco-tourism. Because these floating islands were discovered recently and because their use by human population has not been regulated, we are concerned with the sustainability issued as related to these places. In order to provide a sustainable use of the floating islands a committee should be established to register these areas throughout Turkey and develop management plans for sustainable use of them. Because of a high tourism potential tourism development plans should be prepared for each of the floating islands and a criteria should be set up to determine the nationally and internationally important areas. When the floating islands planned as a new tourism potential for national and international touristic routes they can bring a new concept to tourism variety in Turkey.

### Key words:

Floating Islands; Solhan-Bingöl; Osmancik-Corum; Honaz-Denizli; Ladik-Samsun; Kackar-Camlıhemsin-Rize; Lake Zökün; Tortum-Erzurum

## Ecosystem services assessment for tourism planning in the protected area

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### Abstract

Assessing ecosystem services of the protected area and controlling and managing tourism impacts on the area is a core aspect of the park tourism. Defining the tourism carrying capacity is related to ecosystem service assessment. Based on the literature review and previous research studies, a general model of ecosystem service assessment was developed for tourism planning in the protected area of Mongolia. A model was used to assess ecosystem services and tourism carrying capacity of the Orkhon Valley National park (OVNP). Ecosystem assessment based ecosystem management issues in the main part of tourism planning and sustainable tourism.

To define ecosystem services of the OVNP, required information and data were generated from the park management plan. Assessing ecosystem services of the protected areas are very important to develop the sustainable tourism and improve the conservation management through tourism development. In terms of sustainable development, tourism needs to make a positive contribution to the natural and cultural environment, generate benefits for the host communities, not put at risk the future livelihood of local people, and strive to anticipate and prevent economic, environment, social and cultural degradation. However, it might be hard to assess ecosystem services in the certain protected areas because the lack of information and methodology; any initiatives and considerations would be essential to improve the natural protection through tourism development.

### Key words:

Ecosystem services, tourism carrying capacity, park tourism planning, the protected area

## Effects of Tourist Activity on Soil in Huangshan Scenic Spot

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### Abstract

Taking state-level Huangshan natural scenic spot as the research object, and using the sampling investigation method, the author measured and analyzed such indicators as outboard soil hardness, soil organic matter, litter layer thickness, and soil humus layer thickness of four footpaths in the Huangshan Mountain, and explored the effects of tourist activity on the quality of outboard soil environment of the footpaths, in order to provide some exploratory suggestions for the development, management and planning of roadside environment of the Huangshan Mountain.

### Key words:

tourist activity; Huangshan scenic spot; footpath; soil

## Response of the sandy beach ecosystem to recreational activities at Liandao Beach, China

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### Abstract

Sandy beaches are prime recreational assets underpinning many coastal economies and developments. However, the intense stressors to the ecology of sandy beaches that recreational activities bring are generally underestimated or ignored, and the related researches are rare. In this study, we quantified and evaluated the effects of human recreational activities on a sandy beach ecosystem using the macrobenthos as the bioindicator. Integrated geographical, ecological multi-discipline research method to recreational and tourism research, a contrast design approach that included spatial and temporal dimensions was used to assess the differences in the macrobenthic density and species richness between a beach section that is heavily recreationally impacted and another, less-impacted section. The data analysis showed sharp decrease in and loss of macrobenthic assemblages, which undeniably reflected the degradation of the ecological environment of Liandao Beach. On a spatial scale, the total macrobenthic richness and mean density on the heavily recreationally impacted beach section were substantially lower than the same values for the less-impacted section (total richness declined 70%, and mean density declined 91.07%); on a temporal scale, there were also significant differences between two periods, the period before the peak season and that during the peak season, total macrobenthic richness during the peak season was lower than that before the peak season (declined 75% from 12 to 5 species). These spatial and temporal variations in the macrobenthic community structure were directly related to the variation in the intensity of human recreational use. Furthermore, based on the contrast analysis, the beach ecosystem can not recover by itself under the continuous recreational influence. Conservation measures for recreational beaches are very challenging. However, practicable conservation measures might be implemented that could avoid or slow ecological degradation in recreational beaches. A number of management and conservation suggestions were put forward.

### Key words:

beach ecosystem;sandy beach;recreational impacts;Bioindicator;beach management; coastal tourism

## Role of Sustainable Tourism to Foster a Vibrant Industry in the Conservation of the Environment- The Case of Bhutan

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### Abstract

The share of tourism industry in the total GDP of the world is around 10 percent. And surprisingly this is larger than the contribution of automobile or IT sector. Hence, almost all-Asian countries have seen the growing potentials of tourism sector for quite a long time. Now a day, though, it is expected that all kind of developmental approach should take place within the framework of sustainable development. Hence, Sustainable tourism or alternative Eco-tourism has become part of sustainable development within the sector of tourism. The mass tourism will consistently predominate in the world tourism, but pursuing ecotourism or alternative tourism like nature tourism programs are essential in overhauling the tourism sector and tapping of its potentials. Bhutan is among the few rather unique countries in the world, which believe in the preservation of environment – both physical and cultural at any cost. The Bhutanese doctrine of “high value low volume” is an important example to it. The current tourism policy of Bhutan clearly depicts the Bhutan’s tourism vision that gives more stress over the conservation of the environment and promotion of cultural heritage. This also reflects on the country’s desire to develop a responsible and sustainable tourism industry. The present paper endeavours to evaluate the current tourism policy of Bhutan, which tries to combine tourism advancement and transformation in the nation supported by the exceptional Bhutanese development model.

### Key word:

Sustainable Development; Sustainable Tourism; Environment; Bhutan; Eco Tourism

## The Contribution of the Serra do Mar State Park in Promoting Knowledge of Its

### Territory: An Analysis of Visitation

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#### Abstract

The Serra do Mar State Park, located in São Paulo state on coastal zone is the largest protected area of Atlantic Rainforest in Brazil. It is located between the biggest metropolitan of Brazil and the coastal zone. One objective of the state park is to promote the environmental education and leisure. We consider that the environmental and territorial context is an essential content to delivery to the students, tourists and visitors. This research aims to evaluate the public-use program of the Park, specifically in Picinguaba that is one of the 10 administrative nucleus. This is a qualitative research, based on 7 interpretation keys about the park and its territory context. Structured Interviews were administered throughout the year 2015 for 48 visitors and students. The majority of respondents had no previous knowledge of the territorial and environmental context of the park. When they have finish the activities inside the park, they had not improved knowledge about the park and its context. The result reveals that the park offers leisure and entertainment in the natural space, but a few benefits for the visitor to interpret the landscape in such a way to broaden their knowledge about the conservation of nature contextualized in the territory in which the park operate.

#### Key words:

Protected areas; territory; parks; environmental education; leisure.

## The Relevance of Soundscapes and Acoustic Tourism: Examples from Hong Kong

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### Abstract

Although many people travel for visual experience, there are increasing trends for people travelling and visiting places to satisfy their tastes, and sonic interests. The soundscapes of places is increasingly becoming an issue of concern and when carefully studied and understood, can also represent a potential for promoting a location or can constitute an attraction by itself. Scholars like Trevor Cox have identified sonic wonders of the world and others like Carmen Braden have postulated that acoustic tourism can enrich a visitor's experience. The advantage of acoustic tourism is that it can be studied both in urban and rural areas.

In the urban area, the soundscapes of the tourist's attractions were similarly studied. Respondents were asked to categorize the sounds that they hear, their perception and the value of the acoustic environment that they are in. For this purpose, three country parks and two street markets were selected based on popularity and accessibility. Soundscape measurements and interviews were conducted on-site. Results were analyzed and interpreted in terms of representativeness, expressiveness and sentiment of the place as it relates to visitation. Findings from questionnaire surveys and interviews could help to further identify those soundscape attributes that are valued by people for the future of acoustic tourism.

### Key words:

Acoustics; Country Parks; Hong Kong; Markets; Soundscapes; Tourists

## The Response of Desert Ecological Environment to Tourism Activities

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### Abstract

This paper studies the impact of tourists activities to swim trails, vegetation and soil crust of typical desert scenic area in Ningxia. Main results are as follows: Using a method of fait accompli calculates, the result shows that influence scope of tourism trampling to swim trails is 4m in the two scenic spot, but the north of Shapotou is less affected because of the palisade; The ticket office (sample with 1) of wet land park in Yellow sand ancient crossing is the most affected, and the average value of ILCI is as high as 74%; Because of the palisade on both sides of the plank road, the average value of ILCI in north of Shapotou (sample with 4) is less than 43%. The other three samples present the change of the "high - low - high" from swim trails edge to the remote sample region. Using the simulation method, results indicate: With the increase of tourist activity, the coverage of vegetation decline, the height of plant reduce, the quantity and kinds decrease, soil crust fragmentation increase. Because of different angle of sand dune, the impact of tourist activity to vegetation and soil is different. Vegetation and biological crust of sample C which is the biggest angle suffer from the devastation. The diversity of desert biological resources, the reputation of sand dune landscape, and the desert tourism environmental bearing capacity are affected by tourism activity greatly.

### Key words:

tourist activities; interference; response; Desert ecological environment; Ningxia

## C12.15 Geography of Tourism, Leisure, and Global Change

### ICT and Modern Technology in Tourism



Home

#### Oral

1. [Impact of Information Technology in the Tourism Industry of Madhya Pradesh state of India](#)  
AbdulRaof Khan (C.R. Institute of Management UTD Barkatullah University, Bhopal, India)
2. [Sharing Economy and Tourism in Spanish Mountain Areas. The Role of ICT in New Tourism Developments](#)  
Dolores Sanchez Aguilera, Jaume Font Garolera (University of Barcelona, Spain)
3. [Tourism Mobility Research in the Age of the Smartphone](#)  
Noam Shoal (The Hebrew University of Jerusalem, Israel), Amit Birenboim (University of Utrecht, Netherlands)
4. [Toward a Location Theory Within Areal-Tradition: Mega-Spatial Structure of Potentiality of Tourist Flow \(Mobility\) with Background of the Mega-Areal Differentiation in China](#)  
Jie Zhang, Zi Lu Zhang, Hong Lei Zhang, Li Li (School of geography, Nanjing University, China)

#### Poster

1. [On Spatial Structure and Behavior Mechanism of Urban Recreational Flow](#)  
Yuelin Liang (China, China University of Geosciences); Shaowen Cheng (China, Huazhong Normal University)
2. [Spatial Differentiation of Portal Websites in China's 5A Rated Tourism Attraction](#)  
Hu Yuna (China, Ludong University); Mei Lin; Chen Yan (China, Northeast Normal University)

## Impact of Information Technology in the Tourism Industry of Madhya Pradesh state of India

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### Abstract

There is positive relationship between tourism and economic development, and information technology has played a vital role in promoting tourism. Recently, a number of studies provide the evidences that there is expedite and symbiotic relationship between Information Technology and tourism industry which not only changed the operational activities of tourism sector but also improved its efficiency which led to increase its contribution in the exchequer of the country in all over the world. Madhya Pradesh is the study area where tourism department provides several services through IT and claims that they are offering better services to its stakeholders than their other counterparts. This study explain the policies of the government at both center and state level and also investigate the perception of masses about the information technology on the basis of the selected stratified samples from the selected study area. The study basically concerned with metro city Bhopal and two other small towns Raisen and Vidisha of Madhya Pradesh state in India. To estimate the impact of IT on tourism industry the present study has been selected, variables like consumer services, domestic and foreign tourist arrival, foreign exchange receipt, information availability on tourism website in terms of, booking, tourist cost, transportation and accommodation etc. The information has been mainly collected from primary sources from selected 150 stratified samples of tourists from three districts Bhopal, Raisen and Vidisha. The study has taken domestic, foreign tourists arrival and foreign exchange receipt as dependent variable and the variables of information technology as independent variable in multivariate regression approach and found that there is positive and significant impact of IT in the tourism industry of Madhya Pradesh in India

### Key words:

Tourism; Information Technology; Web Site; Madhya Pradesh

## Sharing Economy and Tourism in Spanish Mountain Areas. The Role of ICT in New Tourism Developments

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### Abstract

During the two last decades, ICT have revealed as a dynamic engine for economic and social change. The exponential growth of social networks (Facebook, LinkedIn, Twitter) and linked to, the emergence of various exchange platforms and marketing of tourism products and services online, can contribute to transform the former touristic markets.

Sharing economy, especially the platforms offering tourist accommodation had a global success mainly in urban areas, with a wide offer of both tourist apartments and private homes. Studies examining the spread of these platforms (Airbnb, Couchsurfing, etc.) are preferably focused in urban areas. However, the territorial expansion of these new accommodation offers has reached rural areas and is growing in mountain areas. Despite the evidence of success of some products and some specific destinations, Spanish mountain destinations globally lose weight during the last fifteen years, in a scenario of strong competition from destinations in different environments (coastal, urban) and emergence of new products, addressed to satisfy the demand of "tourism experiences." The result is that the mountain loses strength and visibility as a touristic space and mountain touristic destinations need, in many cases, an urgent renewal.

The aim of this communication is to analyse the territorial diffusion of these new forms of accommodation related to sharing economy in two Spanish mountain areas (Val d'Aran and Sierra de Guadarrama) and its contribution to the renewal of these destinations. Knowledge of these new tourist offers can provide valuable information about future patterns of tourism in rural and mountain areas.

### Key words:

mountain tourism; ICT; sharing economy

## Tourism Mobility Research in the Age of the Smartphone

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### Abstract

At the end of 2014, over 93 percent of the world's population owned cellular phones, with penetration rates that exceeded 100 percent in most developed countries. Mobile phones have become an integral part of our lives and have had a significant impact on society—including on individuals' daily movement and mobility patterns. Cellular phones have also been utilized for research and have been employed to collect time-space data about the mobility of relatively large populations. In this presentation, we provide a review of the potential of advanced mobile phones—known as smartphones—in the investigation of the geographies of mobility. We discuss how these devices can be employed in research, tracking individuals in time and space and functioning as location-aware survey tools in real time, among other things. We also engage in a debate over the advantages, disadvantages, and limitations of smartphones in this context, and highlight new research trends that are beginning to appear following the introduction of smartphones.

### Key words:

GPS; mobile sensing; sensors; tourism; smartphone; tracking

## Toward A Location Theory Within Areal-Tradition: Mega-Spatial Structure of Potentiality of Tourist Flow (Mobility) With Background of the Mega-Areal Differentiation in China

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### Abstract

Location theory is thought to be the typical one for the spatial tradition of the Robinson (1964)'s four geographical traditions, which is different from the study focusing on areal differentiation with areal tradition. Since location theory concern the spatial structure and spatial organization with functional mechanism. Yet in China with case of the potentiality of tourist mobility or tourist flow, it is easy to find the mega-areal differentiation pattern in national scale with background of HU Huan-Yong's Line, i.e., the N-S oriented line across the mainland of China that describes a mega-pattern of the discrepancy between East and West China in population. We developed a simplified geometric model of Hu's Line on the rectangular plane coordinate system:

$$E (\text{Longitude}) = 0.8697 * N (\text{Latitude}) - 60.639$$

With database of population and GDP of 2363 cities and counties in mainland of China, using space potential model, we successfully revealed characteristic location pattern of "Hu Line Location Effect" in three ways:

1st, the total tourist mobility potentials on different side of Hu Line of China as a whole;

2nd, the different spatial structure of tourist mobility potentials of the original geographical units on both side of Hu Line of China to a specific destination,

3rd, the different spatial structure of tourist mobility potentials among destinations with different location to Hu Line.

With so called Hu line location effects, the significance of a location analysis model with areal tradition was elucidated.

### Key words:

Tourist mobility; Location theory; areal tradition; spatial structure; Hu's Line

## On Spatial Structure and Behavior Mechanism of Urban Recreational Flow

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### Abstract

Urban residents in China have increased demand for high-quality leisure life. However, research on micro-scale urban recreational flow remains fringe. In this paper, the authors combine leisure resident's behaviour space with their image space, a new classification criterion of urban recreational flow, together with the image index, behaviour index and the recreation index are proposed to summarize the recreational pattern, the spatial congregating and diffusing model of urban residents. Based on the questionnaire and on the spot investigation, the authors analyze leisure resident's behaviour and image characteristics in Wuhan City. Using Geographic Information System (GIS), the authors analyze the behaviour mechanism of recreational flow, and its subjective and objective influential factors. In this paper, the results illustrate that there is a significant interaction between the image spatial structure and behaviour structure of urban residents. So applying the urban image theory to the research on recreational behaviour is helpful to the design of more humanized urban recreational space. And GIS spatial statistical analysis techniques could play a big role in simulating the actual spatial structure of urban recreational flow.

### Key words:

urban recreational flow; image index; behaviour index; recreation index; congregating and diffusing model; Wuhan city

## Spatial Differentiation of Portal Websites in China's 5A Rated Tourism Attraction

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### Abstract

Website is the portal and platform of information show for tourism attractions. This paper assesses the portal websites' quality of China's 112 5A rated tourism attractions and analysis the spatial distribution. It is shown that the distribution of websites' quality in China is spatially differentiated and presented a situation of relative concentration and centrality. Jiangsu and Zhejiang province have the most high quality websites, which represent the center of China's online business. With Sichuan, Chongqing, Anhui and Hubei together, these 6 provinces constitute a collective belt of highest quality websites which around Changjiang River. Another collective belt of higher quality websites is in the east of our country, which is consisted of Shandong, Jiangxi, Fujian, Guangxi and Hunan.

Besides, the results of each evaluation show that the spatially distribution of websites' quality are different. On the effect functionality, the gap between east and west of China isn't so big; on the content completeness, attributing to the close cooperation and collection between tourism attractions and other tourism enterprises, the gap is big; the user experience evaluation shows a state of relatively dispersion because of good performances from websites in the middle and west regions, that means the technical problem of interact experience on website is no longer the restriction to the construction of website; the result of technique support evaluation is more or less same with the overall evaluation result.

### Key Words:

5A rated tourism attraction; portal websites; spatial differentiation

## C12.15 Geography of Tourism, Leisure, and Global Change

### Tourism and Mobility

#### Oral



Home

1. [A Tale of two cities: The Nature of Business Tourism in Cameroon](#)  
Tembi Maloney Tichaawa (University of Johannesburg, South Africa), Christian Miles Rogerson (University of Johannesburg, South Africa)
2. [Empowering Mobility: Russian Travellers` Forums Against Immigration and Customs Barriers](#)  
Sergey Golunov (Center for Asia Pacific Future Studies, Kyushu University, Japan)
3. [Forms of Language Tourism Facilitated Through Multi-Layered Human Mobility: The Japanese Case in Vancouver](#)  
Daisuke Kojima (Nagasaki International University, Japan)
4. [Kaliningrad as A Tourism Enclave/Exclave. Influence of Cross-Border Cooperation](#)  
Alexander Sebentsov, Vladimir Kolosov, Maria Zotova (Institute of Geography, Russian Academy of Sciences, Russian Fed)
5. [Reflections on Tourism and Freedom](#)  
Jim Butcher (Canterbury Christ Church University, United Kingdom)
6. [Slowing Down for Sustainability: Backpacker Mobilities and the Influence of Pace](#)  
Ben Iaquinto (University of Melbourne)
7. [Tourism, Mobility and Participation Rates in the European Union](#)  
Tim Coles (University of Exeter Business School)
8. [Trend and Pattern of International Tourist Arrival in India: A Geospatial Approach](#)  
Rakesh Kumar, R.B Bhagat (International Institute for Population Sciences, Mumbai, India)

#### Poster

1. [Domestic Air Cabotage within the European Union Countries – Perspectives for Tourism in Peripheral Regions](#)  
Edyta Pijet-Migon (Poland, Wroclaw School of Banking)
2. [Impact of Nonresident on Impulse Buying: An Empirical Research on Tourists](#)  
Zhifei Li (China, Hubei University); Shengliang Deng (Canada, Brock University)

## A Tale of two cities: The Nature of Business Tourism in Cameroon

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### Abstract

Existing scholarship on business tourism as a whole suggest that most of such studies have been conducted mainly in the developed context with specific focus on the “formal sector” business tourist. In the context of Africa, although business tourism has been acknowledged as an important contributor to economic growth on the continent, its significance for many tourism economies continues to be overlooked in academic discourse. The overall aim of the study is to critically examine the nature of business tourism in Cameroon with specific focus on the hotel economy in Yaoundé (the capital city) and Douala (the economic capital). Interviews with hotel managers representing various tiers of hotel classification reveal similar trends in terms of hotel development in both cities. Majority of the hotels were fairly new in terms of existence, unbranded, locally owned, and not officially graded by the relevant authority. Managers indicated that most of their clients (largely domestic) were on work/business as opposed to leisure. Interestingly, the study found the emergence of “meubles” (self-catering accommodation) to be a very significant “new player” in the hotel economy in Cameroon. Furthermore, a major disconnect exists in terms of government policy objectives for hotel development and the intentions of local developers. The study concludes that business tourism largely drives the economy in both cities, and its pathways in Cameroon should be further examined by means of research that provide an understanding of the different forms of business tourism, and unpack associated impacts holistically.

### Key words:

Tourism; business; hotel economy; Cameroon

## Empowering Mobility: Russian Travellers` Forums Against Immigration and Customs Barriers

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### Abstract

Development of online interaction technologies (Web 2.0) potentially makes more capable even those categories of people whose representatives do not communicate to each other routinely and normally are not able to act jointly for defending their interests. In cases when establishing online networks involves sharing practices and knowledge while 'most of the members are unknown to one another' online communities can be referred as 'networks of practice' (Brown and Duguid 2000). This kind of networks can give some hope to some categories of border crossers, including tourists.

The proposed paper focuses on the role of online travel communities for empowering tourists taking as a case study discussions concerning those border issues that Russian tourists face while travelling to the most popular destination countries. The author concludes that online travel communities can successfully supply tourists with a range of efficient practices on how behave in typical formal situations (e.g. during visa application and border control) and how to circumvent restrictions by employing logistical solutions or tricks. At the same time, online travel communities currently hardly can mobilize tourists for some joint actions to advocate their common interests.

### Key words:

Border Studies; online travel communities; network of practice

## Forms of Language Tourism Facilitated Through Multi-Layered Human Mobility: The Japanese Case in Vancouver

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### Abstract

This study explores the forms of multi-layered human mobility that are facilitated through language tourism. In particular this paper will examine the case of Japanese tourists in Vancouver, Canada.

The first example of human mobility that enables language tourism is that of the entrepreneurs from language travel agents in Vancouver who target Japanese people as potential customers. Two thirds of these agencies are Japanese businesses that were established when the founder entered the market from another sector, such as the travel industry, an education-related business, or another language travel agency.

The second example of human mobility that enables language tourism concerns the employees of the language travel agents. These can be former international students who are employed as counselors but some also work as recruiters.

The third example of human mobility concerns the language tourists themselves. After the third or fourth month of their stay, they subsequently exchange information, part-time jobs, and accommodation with each other in various ways such as through the classified section of Japanese-language local papers, the bulletin board at language travel agents, or on the Internet. This means that mobility for consumption changes to mobility for production.

The Japanese case in Vancouver suggests that the presence of constant flows of language tourists in a destination creates the coexistence of a variety of forms of tourist stages, and that the exchange and communication made by this multi-layered human mobility enables such a form of tourism.

### Key words:

Language tourism; human mobility; Japanese; Vancouver

## **Kaliningrad as a tourism enclave/exclave. Influence of cross-border cooperation**

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### **Abstract**

The objective of the paper is to analyze the influence of cross-border cooperation (CBC) in Russia-Poland borderland on the development of tourism in Kaliningrad region (KR). Tourism as an industry of the KR's economy has a big potential for its development. Many researchers concern on internal conditions (many objects of the Heritage of the Culture and Nature, maritime location etc.) and limitations (lack of the medium-priced hotel, scarcity of English-speaking staff in service sector etc.) for the development of the tourism. A part of the scientists distinguishes CBC as a relevant factor of development for tourism industry. At the same time, neighbors of KR are usually perceived as business rivals, which offer a good services and low prices. When local-border traffic regime in the Russia-Poland borderlands was established, more and more Kaliningraders became visiting Poland not only as a consumers, but and as a tourists too. Many Kaliningrad tourists visit the neighbor Polish voivodeships for outdoor recreation on holidays and vacations, combining it with buying consumer goods. As for Polish citizens in KR, they cross the border only to buy limited list of the goods (petrol, alcohol). To change the asymmetry of touristic flows it is crucially important to revalue the role of CBC for KR. CBC is a chance to attract the tourists from the neighboring countries and promote cross-border touristic products that would be common for both countries. At the same time, some local experts are prone to perceive such cooperation as challenge for regional identity.

### **Key words:**

Cross-border cooperation; Kaliningrad region; development of tourism

## Reflections on Tourism and Freedom

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### Abstract

Tourism has long been associated with freedom, both material freedom borne of economic and technological advance, and spatial freedoms to travel for leisure. Such freedoms were both celebrated and criticised in the nineteenth century: celebrated as progress, in a spirit of optimism with economic development; criticised as extending travel to those deemed incapable of benefiting from it.

One of Jack Kerouac's travelling characters in *Dharma Bums* says: 'I saw that my life was a vast glowing empty page, and I could do anything I wanted'. For post war tourists, likewise, the world was becoming, according to journalist Jennie Bristow, an 'a truly open space' of expanding possibilities.

Yet this freedom for an expanding minority of the world's population has been subject to a critique that views it as a potential threat to cultural and environmental diversity. 'Freedom to' is to be balanced against 'freedom from', and freedom is to be exercised 'responsibly'.

Most recently the expanding possibilities for leisure travel have been questioned by the growth of a terrorism that targets not politics but freedom itself. In the face of this, some have sought to champion freedom. Others have cautioned that western freedom to travel perpetuates neocolonial and neoliberal assumptions, and have called for a more circumspect take on individual freedom.

The paper will provide an outline of how the freedom to travel has been viewed over the last 250 years, and offer some reflections on how leisure mobility has been celebrated and problematised over this period.

### Key words:

tourism; freedom; mobilities

## Slowing Down for Sustainability: Backpacker Mobilities and the Influence of Pace

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### Abstract

In this presentation I explore the relations between backpackers, mobility and sustainability practices. Practice-based approaches applied in the study of sustainability have generally avoided an engagement with mobile people, while scholars using practice theory in sustainability-related research have often overlooked the actions of people on holiday. As backpackers are highly mobile but also reside in place for prolonged periods, they can help us to understand what influence fluctuating mobilities have on practices of sustainability. The central claim of this presentation is that pace, as a form of mobility, is responsible for enabling and obstructing sustainability practices. Pace is understood as speed plus rhythm and it is this combination that is particularly well expressed in the intermittent mobilities of backpackers. Pace provided a way to explain and contextualise the relationship between sustainability practices and mobility, as a slow pace of backpacker travel was associated with the performance of more sustainability practices. Therefore, incorporating sustainability into the tourism experience requires more than education programs or changing tourist attitudes. There must be attention paid to the ways tourist mobilities are implicated in the performance of sustainability.

### Key words:

Tourism mobilities; sustainability; social practices; practice theory; backpacking; pace

## Tourism, Mobility and Participation Rates in the European Union

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### Abstract

Over the past four decades the rise of travel and tourism has been inexorable, and moving forward further growth is both forecast and desired by policy makers and practitioners around the world. To this end, there have been numerous calls, especially by state and supra-national actors, to reform passport and visa regimes. By focusing the gaze on ever greater mobility, attention is diverted from the fact that many consumers are relatively immobile and others do not travel at all. Recent research in the United States demonstrates that many Americans do not use their full paid leave entitlements while similar work in the United Kingdom points to work cultures as well as school holiday regulations as major impediments. This paper presents an analysis of recent tourism participation rates in member states of the European Union (EU). While contemporary conditions seemingly encourage mobility, of late there has been little systematic attention on the nature and extent of participation and, more importantly, non-participation rates in advanced economies. Utilising secondary data compiled, *inter alia*, by Eurostat and the United Nations World Tourism Organization, notable variations across the EU are identified. Analysis of this nature almost inevitably raises issues of the possible extent and consequences of realising potential and deferred demand. However, a closer examination of the data also raises a series of much wider-ranging future research questions relating to who does not travel and why.

### Key words:

Tourism; mobility; immobility; participation; European Union

## Trend and Pattern of International Tourist Arrival in India: A Geospatial Approach

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### Abstract

Tourism is a vital economic activity. It is a major foreign exchange earner. In 2012- 13, the Indian tourism industry, earned a record of more than USD 17 billion in foreign exchange. According to world travel and tourism council, India will be a tourism hotspot form 2009-2018, having the highest 10- year growth potential. As per the travel and tourism competitiveness report 2009 by the World Economic Forum, India is ranked 11th in the Asia Pacific region. Using a new, global database on international tourism destinations. The database differs from other databases and includes international tourists' arrival of non-resident visitors at national borders, by country of residence; and it contains, for the most important aspects of destinations in context of India. However, using secondary sets of UNWTO unit level data of India tourism. This paper examine analyse the trend and pattern of International tourist arrival in India. While using ARC GIS tool showing the flows of international tourist arrival from different region and country of the world. Which identify the growth of international tourism arrival from the period 2005-2013. Furthermore, also understand the changing pattern of international tourist flows using the method Population Adjusted Travel Index (PTGI). Results suggested that arrival for holidays, leisure and recreation purpose are more compare to business and other purpose. Future more this paper will helpful for policy maker's stakeholder and administrative purpose for development of tourism projects.

### Key words:

International tourism; Growth; Development; GIS approach

## Domestic Air Cabotage Within the European Union Countries – Perspectives for Tourism in Peripheral Regions

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### Abstract

The contemporary development of passenger air transport in the European Union countries occurs under conditions of complete liberalization of aviation market, with respect to all nine air freedoms. Implementation of these freedoms, finalized in 1997, resulted in the appearance of transport phenomena not present before, with resultant consequences for tourism. Among them are full cabotage connections, including domestic connections within a given country, previously allowed only to be offered by carriers registered in this country. Most cabotage connections have been established in southern European countries, i.e. in Italy, France, Spain, Portugal and Greece. Less common they are in Great Britain, Germany, Poland and Romania. Cabotage network is dominated by connections between far-apart airports on the mainland and to island airports, as well as to/from airports not served by other fast means of transport, especially high-speed rail. Regional and satellite airports in the vicinity of large agglomerations are typical destinations, as are areas attractive, or potentially attractive for tourism. Cabotage service fills gaps in domestic networks and is rarely offered between main airports, where competition between carriers is strong. Implementation of cabotage helps to increase transport accessibility of peripheral regions and hence, of those among them which may play a role in the European tourism market such as Greek, Italian and Spanish islands or various parts of the mainland Spanish coast. Cabotage connections supplement or even compete with charter flights, since they allow greater flexibility due to higher frequency of flights and respond to increasing readiness to individual trip planning.

### Key words:

air transport; tourism; full cabotage; domestic flights; low cost carriers

## Impact of Nonresident on Impulse Buying: An Empirical research on Tourists

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### Abstract

Impulse buying has a large proportion in retail and nowadays more and more consumers have impulse buying at nonresident. But a large amount of research about impulse buying centers in the resident buying, empirical research about nonresident buying not found. Obviously these are two different environments, will customer purchase behavior change? Can the already existing theory models explain these changes? Because of these, this paper puts forward the following research question. What's the impact of nonresident characteristic on impulse buying? This paper adds nonresident variable to the Dholakia's impulse buying model, constructs four measurement dimensions including culture diversity, time pressure, repurchase cost, and purchase pressure via interview and content analysis, and then finds structural equation modeling of the relationship between nonresident variable and impulse buying behavior and tests the model hypotheses. The results show that perceived culture diversity, repurchase cost and purchase pressure have significantly positive correlation with impulse buying intention and behavior, among which the effect of purchase pressure is largest and then culture diversity, which of repurchase cost is comparative least. From the discoveries, we can achieve the following management implements. For remote consumers, based on the perception of increased purchase pressure, it's more important for digging the demand of their families and friends than for mining its own demand; based on the increasing awareness of culture diversity, it's probably more important for introducing the cultural background of merchandise than introducing commodity itself; based on the increasing perception of repurchase cost, selling some commodities originally may be better than selling them everywhere. Finally, the paper points out the research limitations and future research.

### Key words:

Nonresident; Impulse buying; Tourist

## C12.15 Geography of Tourism, Leisure, and Global Change

### Is Tourism a Help or Hindrance to Global Awareness and Understanding?



Home

#### Oral

1. [Is Tourism a Help or Hindrance to Global Awareness and Understanding? Tourism, Cosmopolitanism and Global Citizenship](#)  
Jim Butcher (Canterbury Christ Church University, United Kingdom)
2. [Mass Cruise Tourism Creates Culture Shock Situations](#)  
Manuela Gutberlet (Rwth Aachen University, Germany)
3. [Tourism and Global Understanding?](#)  
Alan Lew (Northern Arizona University, United States)
4. [Tourism in Times of Crisis: Perils, Prizes and Prospects, the case of Greece](#)  
Theano S. Terkenli (University of the Aegean, Greece)

## Is Tourism a Help or Hindrance to Global Awareness and Understanding? Tourism, Cosmopolitanism and Global Citizenship

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### Abstract

Citizenship has traditionally referred to the formal political and legal relationship of the individual to the state. This has changed drastically in recent decades. Contemporary discussions of cosmopolitanism and global citizenship have effectively reworked citizenship profoundly. According to such formulations, it operates on a global level via global NGOs, ethical trade and an awareness of one's impact upon the world generally.

Because of these changes tourism has become implicated in citizenship. Tourism is held to have the potential to link the individual to global politics, and prompt reflection upon one's place and role in the world. Ethical tourism is a part of the wider category ethical consumption, the latter central to contemporary politics, especially the 'public face of development' (Smith and Yanocopulos, various). It can facilitate social action, with volunteer tourism perhaps the clearest example of this. Some even see tourism as part of an emergent ethical politics (e.g. Stephen Wearing, Freya Higgins-Desboilles).

The exploratory paper look at the rise of tourism's association with global citizenship and understanding, and considers what this tells us about contemporary political and social consciousness.

### Key words:

global citizenship; global understanding; ethical tourism; citizenship

## Mass Cruise Tourism Creates Culture Shock Situations

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### Abstract

Tourism can be both an asset and a hindrance, depending on the scale of tourism, the cultural differences between hosts and guests and the tourists travel motivation.

In the Sultanate of Oman mass tourism has been an agent of change. The country only opened up for tourism in the mid 1980s. A different value system and communication style between European tourists and the Arab / Asian local community contributed to various 'culture shock situations' and an increase in stereotypes and 'stigma' in two tourist destinations. Cultural brokers and other local stakeholders play an important role in mediating between tourists and hosts. As for the cruise tourists, their dress behaviour can be seen as a reflection of the post tourist, who is seeking for his/her own self, an 'existential authenticity' while travelling and being away from home.

The main goal of my research was to analyse the cruise tourists' dress behaviour, while applying the concept of 'mindfulness' and its impacts on the local community and on other tourists (individual and group tourists). Two questionnaire surveys were conducted with German-speaking cruise tourists in 2012 (N=830) and in 2013 (N=235) in two destinations. In addition, a large number of in-depth interviews with various stakeholders were conducted as well as participant observation.

### Key words:

Cruise tourists behavior; cross-cultural communication; culture shock; Sultanate of Oman



## Tourism and Global Understanding?

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### Abstract

Tourism is one of the major social and economic success stories of humankind. Despite persistent regional and global disturbances, international and domestic tourism continues to grow year after year. Tourism has been a major agent of the economic and cultural globalization trends that have been shrinking our planet at the same rate that tourism has expanded in its scope. In theory, we should know and understand the world today more than at any time in the history of humankind. In reality, however, global ignorance remains a significant challenge. Because 2016 is the International Year of Global Understanding, it is vital that tourism scholars address the important questions of: How has tourism shaped our understanding of global others? What are tourism's successes in fostering global awareness? Why has tourism not achieved the full potential toward these goals? What are the prospects for a better tourism for the future of our shared planet?

### Key words:

Globalization; global understanding; mass tourism; alternative tourism; geographic knowledge

## Tourism in Times of Crisis: Perils, Prizes and Prospects, the Case of Greece

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### Abstract

Contexts and circumstances of various sorts of crises present both opportunities and setbacks to the tourism industry, often highly unexpected and volatile, other times beyond control and economic profit. In all cases, however, they represent and open up new eras and areas of global awareness and understanding. This paper critically assesses two such realms of perils and possibilities, for the case of Greece. Resting on data from statistical sources and stakeholders' in-depth interviews, it proceeds to a swot analysis of such prospects and perils, as regards a) the credit-economic crisis of the past 7-8 years and its socio-political, cultural and environmental consequences in the country and b) the refugee crisis that has hit Greece, along its eastern borders, during the past year. Towards this goal, on-site research has been undertaken a) in the city of Athens, with a reference to national tourism trends and b) on the island of Lesvos, one of the country's main hot spots and ports of refugee entry.

As regards the former area of investigation, the grave socio-economic impacts of crisis in Greece have been accompanied by surprising and unprecedented possibilities in the tourism industry, whereas in the latter area of investigation, the refugee crisis has opened up fascinating but volatile and risk-laden new realities for local tourism development. In both of these examples, central both to the drivers giving impetus to tourism growth and to its impacts have been new kinds of relationships of (mis)understandings, developing between the two sides—locals and tourists.

### Key words:

crises; threats; profits; prospects; Greece

## C12.16 Geopark

### Geoheritage

#### Oral



Home

1. [A Case Study of Digital System Assisting the Sustainable Development of World Heritage: Digital Mount Tai](#)  
Kun Zhou (China University of Geosciences, China)
2. [Are Landforms Differently Attractive?](#)  
Aleš Smrekar (Zrc Sazu, Slovenia)
3. [Changing Land Use and Environmental Degradation in Varkala as a First Proposed Geopark in South Asia](#)  
Subhash Anand (University of Delhi, India)
4. [Development of Landscape Resources in Busan National Geopark by Using Spatial Analysis](#)  
Ji Won Suh (Ewha Womans University, South Korea), Hyo Hyun Sung (Ewha Womans University, South Korea)
5. [ESD \(Education for Sustainable Development\) and Geoparks](#)  
Daichi Kohmoto (Nara University of Education)
6. [Interpretation of Geoheritage Using a Communication Channel Model](#)  
Anze Chen, Fang Ren (Institute of Geomechanics, Chinese Academy of Geological Sciences, Beijing, P. R. China, China)
7. [Progress and Achievements of Geoheritage Survey in China](#)  
Ying Dong (China Institute of Geo Environment Monitoring, China)
8. [Research on Establishing Approach of National Park Category System: A Case Study on Nature Reserve in China](#)  
Zhou Rui, Linsheng Zhong, Jiaming Liu (Institute of Geographic Sciences and Natural Resources Research, China)
9. [Study of Geo-Historical Perspectives: Gandeshwari Rivulet Zone: Bankura, West Bengal, India](#)  
Malavika Sinha (Jogamaya Devi College, India)
10. [Utilization Perspectives of Degraded Landscapes in the Area of the Novohrad–NÓGrÁD Geopark](#)  
Gergely Horváth (Eötvös Loránd University, Hungary)
11. [Valuing Landscapes: A Structured Approach to Defining Geomorphic Values for Geo-Conservation](#)  
Ian Rutherford, James Grove (The University of Melbourne, Australia), Kathryn Storey (Government

of Tasmania, Australia)

12. [Yawata Ironworks as Transnational Geoheritage: Looking Behind the Scenes of a Late 19th Century Japanese/German Investment Project](#)

Dietrich Soyez (Inst. of Geography, University of Cologne, Germany)

## Poster

1. [A Quantitative Inference Approach for World Geopark Capability of Lut Desert by Geo-heritages Features](#)

Adel Sepehr (Iran, Dept of Desert and Arid Zone Management, Ferdowsi University of Mashhad, Mashhad, Iran)

2. [Application of high-resolution Satellite Remote Sensing in Geoheritage Survey and Monitoring of the Yellow River delta](#)

Xueping Liu; Liping Zhou; Xiaochen Dong (China, Peking University)

3. [Deterioration Hazard of Granite Geomorphologic Landscape: a Case Study of Sanqingshan National Park \(SE China\)](#)

Xingshan Wang; Jie Zhang (China, Nanjing University)

4. [Geotourism Management in China Learned from the Grand Canyon Experience in the US](#)

Jinjin Wan (China, School of Management, Nanjing University of Posts and Telecommunications); Run Sha (China, School of Geography Science, Nanjing Normal University)

5. [The Geo-tourism Development of Geopark in Japan-A Case Study of Naeba Mountain Geopark](#)

Kun XIAO (Hokkaido University); Tanjinul Hoque MOLLAH (Hokkaido University); Takaaki NIHEI (Japan, Hokkaido University)

6. [The value assessment of main geological heritage resources in Fangshan World Geopark of China](#)

Kun Zhou (China, China University of Geosciences)

## **A Case Study of Digital System Assisting the Sustainable Development of World Heritage: Digital Mount Tai**

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### **Abstract**

To realize the sustainable development of world heritage has being a research hotspot of heritage. Digitization and information technology provide effective modes and methods when they were exerted in the relevant research field at the beginning of the 21st century. “digital mount tai” is the key project of mount tai to build domestic first-class digital scenic spot and the demonstration project that digital system is employed to assist heritage protection and heritage management. This paper discusses construction mode of the project and expounds the content of “a portal, two centers, two bases, three platforms and multiple application systems” .In the view of sustainable development, the effects that digital system is used in the heritage site include: 1) providing dynamic monitoring; 2) affording visual scheduling command; 3) building integrated management platform of heritage site; 4) displaying virtual tourism information; 5) enhancing the work level of planning, construction and land resources.

### **Key words:**

digital system; sustainable development; world heritage; mount tai

## Are Landforms Differently Attractive?

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### Abstract

This presentation determines which landforms attract people the most and whether one can speak of collective patterns in the aesthetic evaluation. Even though many studies of this type have been conducted in cultural landscapes, where there have been instances of land development, some have also been carried out in landscapes that were only slightly reshaped, such as in semi-natural and close-to-natural landscapes. The research based on photographs was carried out in two areas in Slovenia: in Dolina Triglavskih jezer (the Triglav Lakes Alpine valley) within the protected Triglav National Park where there are almost no anthropogenic “disturbances” due to extremely limited human activity, and in the unprotected Istria on the Mediterranean coast, where the coastal area is highly affected by tourism and urban sprawl, while in the interior, extensive rural landscape prevails. This survey evaluated the landforms in the protected area of Triglav National Park using various cases and proved that people are the most attracted to water features and vegetation-covered landscape. In Istria as well, people are the most attracted to water features and, perhaps surprisingly, also to entirely anthropogenic landscape elements, such as a motorway viaduct. It can be concluded that collective patterns exist in connection with the perception of the beauty of the natural environment. In professional circles, the aesthetic importance of landforms is often an unjustly and intentionally ignored criterion in defining the importance of landforms. This has especially been the case over the past decades due to the increasing objectification of science, research, and perception.

### Key words:

geography; aesthetics; landscape; online survey; photography; Triglav National Park; Istria; Slovenia

## Changing Land Use and Environmental Degradation in Varkala As a First Proposed Geopark in South Asia

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### Abstract

South Asia is having huge rich geographical diversity which can provide many geoparks but so far no geopark has been developed in this region. Government of India is in process to declare Varkala beach as a first national geopark of country. Varkala beach is well-known tourist destination located in Thiruvananthapuram district of Kerala, which is a fast developing tourism destination, attracting many tourists of national and international origin. Varkala has a great potential for backwaters, beaches, medical, and pilgrim tourists. This paper aims to study land use change, its environmental implications and development of geopark in Varkala. The change in population, growth of non-agricultural activities and socio economic development trigger landuse/ landcover change and has led to alteration of the cliff landscape, degradation of the natural environment and destruction of coastal ecosystem. The data for the spatial and temporal change was taken from Landsat Satellite Imagery of February 2000 and 2014. Field survey was also conducted among the visitors, hotels and local community to assess the status of the infrastructure, environmental problems and their opinion in the study area. The maximum land use is under perennial crops with settlements and built up area. Because of increased tourism activities, the land use pattern is changing very fast and leading into environmental pollution, land degradation, overcrowding etc. The augmented construction on the cliff is responsible for gradual slumping of the cliff. Development of geopark based on sustainable land use becomes relevant in this scenario for proper management of natural cliff.

### Key words:

Geoheritage; geotourism; landuse; degradation; geopark; development; varkala

## Development of Landscape Resources in Busan National Geopark by Using Spatial Analysis

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### Abstract

For sustainable development of Geopark, it is important to diversify landscape resources in Geopark. Landscape resources of Geopark, which are view points, are categorized based on geology, geomorphology, ecology, history and culture. Busan National Geopark consists of 12 Geosites and 121 landscape resources. They place too much emphasis on geology and geomorphology, which account for 75% of landscape resources. Therefore, this study aims to diversify landscape resources in Busan National Geopark. To improve this situation, firstly it was analysed by 5 categories and visualize the distribution of the landscape resources in Busan National Geopark. Second, we collect and analyse survey data through overlaying the landscape resources in aspect of geoheritage, geomorphology, ecology, designated cultural properties, geo-tagging (Google Panoramio) data. Third, hotspots were detected and field survey is taken to validate hotspots. In conclusion, this study allows for diversifying the landscape resources in Busan National Geopark through the hotspot analysis and validation processes. Ultimately this study contributes to extend to develop Geo-tourism and Geo-education.

### Key words:

Busan National Geopark; landscape resource diversity; spatial analysis

## ESD (Education for Sustainable Development) and Geoparks

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### Abstract

Geoparks have a marked affinity for ESD (Education for Sustainable Development) since education and sustainable development are highlighted in the concepts of geoparks, and both have strong associations with UNESCO. However, research on what are the relationships between ESD and geoparks remains blank. In this paper, the author examines possibilities of our society led by multiplying ESD and geoparks. Firstly, the description contents of the Global Action Programme (GAP) on ESD are considered about cases of geoparks. GAP is intended to make a substantial contribution to the post-2015 agenda, and the follow up to the United Nations Decade of Education for Sustainable Development (2005-2014). Secondly, the members of the ASPnet (UNESCO Associated Schools Project Network) in geoparks of Japan are calculated. Thirdly, learning contents for geoparks are examined from the viewpoints of Earth Sciences and community development. From the former, nature of familiar territory as the first stage, and understanding of the mechanism of Earth activity as the second stage have been found. From the latter, relationships between our life and nature as the first stage, and development of social skills for reaching an understanding with other stakeholders as the second stage have been found. Additionally, international understanding and cooperation through geopark would be the third stage. The results illustrate that geoparks could be places for inspiring learners to act for realizing sustainable society if we transform organizational operations of relevant actors and maximize learning contents given by Earth Sciences and community development.

### Key words:

ESD; geopark; sustainable society, Earth Sciences; community development; UNESCO

## Interpretation of Geoheritage Using a Communication Channel Model

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### Abstract

This study presents an interpretation system model of geoheritage to facilitate the understanding of geoscience knowledge by the common lay person. Interpretation system construction is crucial to geoparks and is a shared value. The improvement of the effectiveness of geoheritage interpretation is still under exploration. Therefore, the interpretation systems of two global geoparks in China are outlined and compared with the interpretation system in Zion National Park in the United States. From lessons and experiences, this paper suggests utilizing geotourism as a complete contextual communication system, in which a geopark (source) delivers information about its unique cultural and natural values to target tourists (receivers) through tourism activities (channels). The communication effect of geotourism is monitored by feedback from tourists through the post-travel surveys or activities. We expect that this model will provide a better interpretation of geoheritage with a new perspective.

### Key words:

Geotourism; Geopark; Geoheritage; interpretation system; communication channels

## Progress and Achievements of Geoheritage Survey in China

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### Abstract

Geoheritages are precious wealth of human beings which are formed by the inner and outer-momentum geological function. Conservation and scientific utilization of geoheritage has become the consensus of mankind. Since 2008, China Geological Survey Bureau of the Ministry of Land and Resources has deployed systematically a national important geological heritage investigation and established the system of technical methods. As of the end of 2015, the geological survey work has been completed 56% of the land area. By the end of 2017, the first round of the national geological survey work will be completed. The timely application and transformation of the main achievements of the survey, played a very important role and brought benefit in geological scientific research, management of geological heritages protection and local economic development.

### Key words:

Geoheritage; technical methods; main achievements

## Research on Establishing Approach of National Park Category System: a Case Study on Nature Reserve in China

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### Abstract

It is inevitable that the administrative managements are disordered and the function-positioning are improper since the categories of protected areas in China are abundant with overlapped protected objective. Therefore, the measure of straightening out protected area category system is significant to coordinate relationship between protection and development. National park is a branch under the protected area system that undertakes dual tasks in natural ecological resources protection and utilization. Based on literature review, this article teases the connotation and functions of national park worldwide and states that national park under IUCN protected area category system is more complete and accurate generalization for global single national parks. Hence the basic criteria of designating any protected area to be national park are concluded according to definition of national park under IUCN protected area category system. The basic criteria should consist of area suitability, nature resource representative, the human influence degree and function comprehensiveness. Following the establishing steps, this article uses nature reserves in China as cases to filter candidates of national parks in China. Firstly, global “national park” should be no less than 1,000hm<sup>2</sup>, so nature reserves in China which do not match this bottom line of area suitability criteria are excluded from candidate list. Secondly, nature reserves at national level in China have been designated to be National Representative for its unique nature resources and ecosystem. So, national nature reserves are selected to enter into national park candidate list. Then, human influence degree in every national nature reserve is evaluated by virtue of human footprint index dataset which indicates a degree of human activities influence to every 100hm<sup>2</sup> terrestrial area. Therefore, a total of 55 nature reserves in China at national levels with areas are not less than 1,000hm<sup>2</sup> are finally determined to be candidate national park items. In the end, an approach of “nested” other 5 categories of protected areas are proposed in order to meet the final criteria of function comprehensiveness.

### Key words:

protected area; national park category system; nature reserve; IUCN protected area category system; human footprint index

## Study of Geo-Historical Perspectives: Gandeshwari Rivulet Zone: Bankura, West Bengal, India

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### Abstract

The river is an open system. As an open system river gets input from climatic system (precipitation) and geomorphic system (path). The surface runoff is the connector of its upper to the lower catchment area and also it connects the recent geo-formation with the azoic or proterozoic era. The two basic principles of Hotton; the 'present is the Key of past' and 'climate leaves imprints of land form' are reveal that the analysis of present earth's geological and climatic situations provide an idea about its evolutionary history. The geomorphic imprints are related to climatic and land form evolution and all are scatter over the earth's surfaces. The historical perspective of human's evolution is also related the climatic evolution. The rivulet zone of Gandeshwari lies in edge of Gondwana shear zone with Proterozoic formation. But here the most of the land form is not older than Pleistocene. This zone was the habitat zone of Proto Australoid people and the living anthropological remnants of the proto Australoid people are still observed. The geomorphic imprints with archaeological sites of early hominoids of Gandeshwari rivulet zone is a document site from Acheulean culture, in West Bengal

### Key Words:

Proterozoic Formation; Proto Australoid People; Acheulean Culture; Palaeolithic tools

## Utilization Perspectives of Degraded Landscapes in the Area of the Novohrad–NÓGrÁD Geopark

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### Abstract

The Novohrad-Nógrád geopark which was established in 2011 as result of a Hungarian-Slovakian cross-border cooperation contains several abandoned mining or industrial regions with strongly degraded landscapes. Although the geoheritage, especially the geological values of the mining regions is often great, offering possibilities e.g. for establishing study trails or other thematic routes, however, these landscape-constituent elements result in considerable landscape conflicts. Important task to solve these landscape conflicts and to turn them into potential, in addition, to involve these degraded landscapes into the aims of the geopark project and into the geotourism. The transformation of these degraded landscapes needs landscape reclamation of which implementation could be joined to use of renewable energies, as well; there are already international good examples to be followed. Local renewable energy production of these degraded regions greatly contributes to the development of the infrastructure of the Geopark. For carrying out these ideas, also categories of the mining landscape elements were worked out, taking into consideration among others the localization, the linkage to the settlements, the condition, the scenery, the distance from paved and main roads, the usability etc. As result of the investigations, recommendations will be drawn up for the local authorities of the settlements lying in the Geopark, of which implementation could promote both the regional development of the region and the increasing attractiveness of the Geopark.

### Key words:

geopark; landscape degradation; mining; renewable energies

## Valuing Landscapes: A Structured Approach to Defining Geomorphic Values for Geo-Conservation

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### Abstract

Geographers love awe-inspiring landscapes. The growing field of geo-conservation aims to recognise and protect these landscapes. Numerous areas (including World Heritage Areas) have been preserved for their majestic character. But such subjective criteria are a poor basis for a systematic inventory of geomorphic values in a large region. For geomorphic systems we need to be able to value both forms and processes. In completing a review of geo-conservation sites in the large World Heritage Area of Tasmania, Australia, we have made three improvements in identifying (and mapping) geomorphological values. (1) We have developed spatial descriptive units for categorising geomorphic systems (2) We have defined a more effective set of value-classes namely: emotional values, consequential values, and information values. (3) For the class of 'information-values' we define five improved sub-values:

1. Quality of information
  - a. Is it the first studied example of this geomorphic unit?
  - b. Is it well studied?
  - c. Does the unit contain embodied information?
2. Condition
  - a. Is the feature minimally impacted by humans?
  - b. Is it the least impacted example?
3. Rarity
  - a. Is the value endangered?
  - b. Is the site deviant relative to the population?
  - c. Is the unit at a geographical outlier?
4. Reference
  - a. Is it a representative reference?
  - b. Is it an outstanding example?
5. Assemblage. Is the unit part of an assemblage of units or values that together have additional values?



These values provide tools to geo-prospect for new sites and can also be used as basis for management decisions.

## Key words

Geo-conservation, geosites, Tasmania, geomorphology, values, classification, World Heritage

## Yawata Ironworks as Transnational Geoheritage: Looking behind the Scenes of a late 19th Century Japanese/German Investment Project

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### Abstract

Yawata Iron and Steel Works was the first modern, coke-based integrated iron and steel plant in Japan. Construction of the plant by the renowned German iron, steel and machinery manufacturer Gutehoffnungshütte (GHH) as the primary contractor began in 1897 and was completed in 1901.

Arguably, Yawata represents both the first step toward, and the main symbol of, the country's late 19th/early 20th century industrialization during the so-called Meiji Industrial Revolution. It was recently awarded UNESCO World Cultural Heritage status together with 22 other sites dating from this period. Yawata can be regarded as a true fusion of Japanese-German competence, as exemplified by the pervasive tangible and intangible legacies both in Japan and Germany. These find expression not only in particular sites and buildings in both countries, but also in archival resources, in Germany mainly at Rhineland-Westphalia Economic Archives/RWWA, Cologne, housing the GHH documents. Thus, the Yawata project can serve as a model for demonstrating both the importance of and potential for a new, decidedly transnational perspective on heritage endeavours.

The main objective of the presentation will be a specific look behind the scenes, based on the archive in Cologne, in order to take stock of specific planning problems, blunders and intercultural collisions, i.e. elements of an almost adventurous investment project normally not addressed or even deliberately concealed in heritage valorizations. The main idea behind this is to, hopefully, enrich future interpretation strategies by adding decidedly real life flavours to run-of-the-mill narratives about inventive engineers, diligent workers, creative architects or visionary entrepreneurs, thus adhering to Tilden's well-known dictum that the chief aim of interpretation is not instruction but provocation.

### Key words:

Transnational Geoheritage; Yawata Iron and Steel Works

## A Quantitative Inference Approach for World Geopark Capability of Lut Desert by Geo-heritages Features

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### Abstract

In this paper has been studied the capability of Lut desert as a world Geopark based on geo-heritages sites. Lut Desert with area of 100,000 km<sup>2</sup> approximately is hottest point in the world and 25th world largest desert. To investigate Geopark capability of Lut desert, we applied a quantitative approach based on geoheritage features inference score. In the first was identified the main geomorphology landforms in the Lut desert considering Hydro-Aeolian landforms regarding Mega Yardangs and Kalut, Aeolian features involving desert pavement stones (Hamada), Nebkha, and sand sea (Erg) with highest sand dunes in the world. In other hand was determined the main geomorphic forms in the Playa of lut with huge salty-clay pan areas. To assess capability of these geoheritages for introducing Lut desert as a world geopark, an approach was developed based on utility theory and matrix decision framework. A representative value function was inferred to explain the relative importance of the geoheritages features. The results of this research indicated that Lut desert can be considered as a world geopark to comparison desert evolution and landform chronology in relation to geomorphology events, anthropology and civilization development in similar areas in the world.

### Key words:

Inference approach; Geo-heritages; Geopark; Lut desert; Geoarchaeology

## Application of High-Resolution Satellite Remote Sensing in Geoheritage Survey and Monitoring of the Yellow River Delta

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### Abstract

High-resolution remote sensing image can provide clear details of Earth surface. A combination of remote sensing data and Quaternary information allow us to identify and interpret geoheritage of fluvial landform in Yellow River delta and to monitor the changes in the conservation of the the protected geoheritage. We show that high-resolution satellite remote sensing image has distinct features of river geomorphology in shape, colour and texture, especially for ancient channels and marine sediments, which help to define the types of geoheritage. Using the remote sensing image, we have obtained the information of the surrounding area of the geoheritage environmental conditions including landuse, vegetation coverage and human activities, evaluation of degree of the geoheritage availability. By applying method of dynamic contrast of remote sensing, we can monitor the river migration and collect more detailed features of the geoheritage.

### Key words:

Geoheritage; Fluvial Geomorphology; High-resolution satellite remote sensing; Yellow River delta

## Deterioration Hazard of Granite Geomorphologic Landscape: A Case Study of Sanqingshan National Park (SE China)

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### Abstract

The granite geomorphologic landscape is all over the world, which is important physical heritage and tourism attraction, especially in China: many famous religious or tourism mountains are granite geomorphologic landscape. Although being hard material, the granite is still suffering weathering and facing deterioration hazard of all kinds of environmental agencies. Therefore, it is very important to find the main weathering agencies for the sake of the landscape and geo-heritage conservation work.

Previous research of granite weathering mostly focused on the correlation between weathering and physical parameters such as porosity, P-wave velocity, uniaxial compressive strength and so on, which are significant to those building stone. However, as view of tourist, the granite landscape should deserve more attention on the surface deterioration. The authors chose the Sanqingshan National Park as experimental object, measured the surface hardness through Schmidt Hammer, and obtained the chemical weathering degree such as Chemical Index of Alteration (CIA), Weathering Index of Parker (WIP), Weathering Index of Colman (WIC) through XRF experiment. Based on field work and such experiments, we obtained:

- 1.The weathering process of Sanqingshan granite landscape is mainly chemical weathering.
2. The surface hardness of Sanqingshan granite has a certain correlation with the chemical weathering degree: the granite whose CIA are all below 60 or so, have a extremely low surface hardness (below the minimum of the Schmidt hammer); the CIA of granites which are capable for Schmidt measurement are all above 60, but further correlation analysis showed that there is a weak correlation between the CIA and the surface hardness. Such results indicate that, at the primary stage of chemical weathering, the surface hardness of granite is mainly determined by the texture and structure, comparing the chemical components; at the terminal stage of the chemical weathering, the surface hardness of granite decrease sharply, and the granite landscape have high risk of deterioration.
- 3.The main driving agency of Sanqingshan granite weathering is precipitation, other environmental



condition such as sunshine, vegetation have little effect on the weathering process, the granite surfaces with well hydrodynamic conditions have the high risk of deterioration; moreover, the tourist action have a obvious interference to the granite surfaces.

**Key words:**

granite landscape; chemical weathering; surface hardness; deterioration hazard; Sanqingshan National Park

## Geotourism Management in China Learned from the Grand Canyon Experience in the US

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### Abstract

The development of geotourism is presenting a global trend. Under the theoretical background to the geotourism, this paper explores the geotourism structure of the Grand Canyon National Park in the US based on sustainable tourism, and points out the characteristics of geotourism management. The successful experience strategies are learned from the Grand Canyon through field trip method: 1) Plan out tourism product with art experience, and develop vivid interpretation and geoscience education; 2) Improve and optimize tourism infrastructure centering on the visitors; 3) Focus on community tourism resilience planning, and obtain sustainable balance between resource protection and visitor demand; 4) Raise and secure funds of geological heritage management in many ways, and thus promote sustainable development level of geotourism in China.

### Key words:

Geotourism; geological heritage management; GeoPark; Grand Canyon

## The Geo-Tourism Development of Geopark in Japan-A Case Study of Naeba Mountain Geopark

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### Abstract

Geopark is the place to preserve the value of earth science of natural heritage. The construction of geopark is to preserve the heritage of the earth and education, utilize tourism resources and speed up the regional sustainable development. In Japan, there are 1839 geoparks including 8 Global geoparks. In the geopark activities, the development of the geological tourism is very important. This study takes the Naeba Mountain Geopark in Japan as an example to know about the present situation of the Geo-tourism in order to clarify the purpose of the study of Naeba Mountain Geopark. Using interview of local administrations and tourists as well as data analysis, the authors described the current situations of the Geo-tourism and making future plan along with conclusion that the geo-tourism has great contribution to the local economy however, there have been problems such as the support of government is not enough.

### Key words:

Geopark; geo-tourism; tour; geography; Japan

## The Value Assessment of Main Geological Heritage Resources in Fangshan World Geopark of China

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### Abstract

Based on analytic hierarchy process and linear weight method, this paper constructs the value assessment indicator system to classify and evaluate the main geological heritage resources of Fangshan World Geopark of China. The results indicate that there are abundant and high scientific value geological heritage resources in Fangshan World Geopark of China, with two world-class ones, four nation-class ones and eight province-class ones; the abundance of geological heritage resources in Shidu Geo-Region and Baishi Peak Geo-Region is higher than others; the types of geological heritage resources in Zhoukoudian Geo-Region and Shihua Cave Geo-Region are more characteristic and distinctive; the world geopark is rich in geological tourism resources and relying on the advantages of resources, a China's top base for scientific popularization and research and a international famous scenic spot for geoscience popularization could be built at Fangshan World Geopark of China.

### Key words:

geological heritage; value assessment; world geopark

## C12.17 Global Change and Human Mobility

### Moving World, Moving Actors: Global Changes and Personal Challenges

#### Oral



1. [Black Moves: Moments in the History of African American Masculine Mobilities](#)  
Tim Cresswell (Northeastern University, United States)
2. [Borders, Mobility and Migration Choices. The role of Thresholds](#)  
Martin van der Velde (Nijmegen Centre for Border Research, Department of Geography, Planning and Environment, Nijmegen School of Management, Radboud University Nijmegen, Netherlands)
3. [Climate Change and Causes of Migration in Coastal Bangladesh – Empirical Insights](#)  
Boris Braun (University of Cologne, Germany)
4. [Drought and Migration--Case of Gendered Response in Baoshan of Yunnan](#)  
Yahui Zou (Yunnan Academy of Social Sciences, China), Banerjee Soumyadeep (ICIMOD, Nepal)
5. [Migration Experience and Cultural Impacts: A Study in the Island of Majuli](#)  
Avijit Sahay (University of Allahabad, India)
6. [Mobility in an Aging Society: An Investigation of Elderly Travel Behavior and Satisfaction in The Old City of Beijing](#)  
Yue Wang, Pengjun Zhao (Peking University, China)
7. [Motivational Profiles of Young People to Go to Live/Work Abroad](#)  
Antonio Jose Rojas Tejada, Pablo Sayans Jiménez, Andrea Blanc Molina, Laura Piedra Muñoz, Pablo Pumares Fernández (University of Almeria, Spain)
8. [Population Mobility on Small Tourist Islands. The case of the Canary Islands](#)  
José León García Rodríguez (Universidad de La Laguna (Canary Is, Spain)
9. [Quantitative and Qualitative Features of Post-Communist Romanian Emigration. Case Study: Moldovan Region](#)  
Dimitriu Radu Ionut, Tudora Daniel (Univ. Al. I. Cuza, Iasi, Romania), Dimitriu Andreea (Univ. Al. I. Cuza, Iasi, Romania)
10. [Reforming Agricultural Guestworker Visas: U.S. vs. E.U.](#)  
Miguel Glatzer (La Salle University, United States)
11. [Rural-Urban Migraton and Household Livelihood in The Agona West Municipality, Ghana](#)  
Prof. Tanle Augustine (Population & Health, University of Cape Coast, Ghana), Dr. Ogunleye Adetona Comfort, Miss Arthor Gifty (Geography and Regional Planning, University of Cape Coast, Ghana)



12. [The Challenge of Diversity: Refugee Allocation and Integration in Post-Socialist Rural Settings](#)  
Birgit Glorius (TU Chemnitz, Germany)
13. [The Gandharbas Living on the Margins; Travelling in and from Nepal](#)  
Izumi Morimoto (Meiji Gakuin University, Japan)
14. [Translocal Life and Integration of Highly-Skilled Migrants in Germany](#)  
Carmella Pfaffenbach (Rwth Aachen University, Germany)
15. [Where, When, How Often and Using What Routes? Everydayness and Time-Space Mobility of Ukrainian Labour Migrants in Prague \(Czechia\)](#)  
Dusan Drbohlav (Charles University, Czech Republic)

## Poster

1. [Gender, Migration, Remittances and Development in Uganda](#)  
Mushomi John (Uganda, Makerere University, Department of Population Studies)
2. [Return to Volcano. Resilience of Human Mobility Facing Natural Hazards. Ilha Do Fogo \(Cape Verde\)](#)  
Claudio Moreno-Medina (Spain, Department of Geography, University of Las Palmas de Gran Canaria)

## **Black Moves: Moments in the History of African American Masculine Mobilities**

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### **Abstract**

This paper explores the mutual constitution of blackness and mobility in the context of the United States. Using insights gained from the inter-disciplinary field of mobility studies it argues that mobilities have played a key role in the definition of blackness (particularly black masculinity) at the same time as blackness has been mapped on to particular forms of mobility. The paper is constructed through a series of suggestive vignettes moving backwards through time that illustrate continuities in the way forms of movement, narratives of mobility and mobile practices have intersected with representations of African American male bodies. Examples include endzone celebrations in American Football, stop and frisk procedures in New York City, the medical pathologization of runaway slaves, and the Middle Passage of the slave trade.

### **Key words:**

Mobilities; race; blackness; African Americans; the United States; embodied mobilities; the Middle Passage

## **Borders, Mobility and Migration Choices. The role of Thresholds**

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### **Abstract**

The crossing of national state borders is one of the most-discussed issues of contemporary times and it poses many challenges for many. Choosing to move - or not - across international borders is a complex decision, involving both cognitive and emotional processes. This paper tests puts three crucial thresholds that need to be crossed before mobility occurs to the fore. These concern the individual's mindset about migrating, the choice of destination and perception of crossing borders to that location and the specific routes and spatial trajectories available to get there.

The threshold approach, with its focus on processes affecting whether, when and where to move, aims to understand the decision-making process in all its dimensions, in the hope that this will lead to a better understanding of the ways migrants conceive, perceive and undertake their transnational journeys. This paper examines the three constitutive parts discerned in the cross-border mobility decision-making process: people, borders and trajectories and their interrelationships. It hopes to demonstrate that the relation between the three is not fixed but flexible and that decision-making contains aspects of belonging, instability, security and volatility affecting their mobility or immobility.

### **Key words:**

Borders; Migration; Mobility; Threshold Approach; Decision Making

## Climate Change and Causes of Migration in Coastal Bangladesh – Empirical Insights

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### Abstract

The idea that global climate change is contributing to migration in vulnerable regions such as coastal Bangladesh has generated considerable academic debate but only limited systematic evidence. In general, the existing evidence shows that climate change is generating rising sea-levels, more intense and destructive storms, greater rainfall extremes (both droughts and flooding) and higher temperatures. All of these are creating greater vulnerability for at risk populations. But is this creating greater migration? This paper presents empirical evidence based on data from national statistics and household surveys in rural areas of coastal Bangladesh. It is based on extensive field work in Bangladesh including a questionnaire survey of almost 1,200 households in selected coastal communities. This work has been conducted by an international team within the framework of the Belmont Forum funded Band-Aid research programme. Our findings suggest that migration is a complex process which is not adequately described by deterministic models and simplistic concepts such as climate or environmental migration. Rather, results point toward a new and broader understanding of climate- and disaster-induced mobility that recognises the significant barriers to migration for vulnerable households as well as their substantial adaptive capacity.

### Key words:

Migration; climate change; environmental change; riverbank erosion; flooding; Bangladesh

## **Drought and Migration: Case of Gendered Response in Baoshan of Yunnan**

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### **Abstract**

Yunnan Province in Southwest China suffered from a record-breaking, persistent meteorological drought with an estimated return period of greater than 80 years from autumn 2009 through 2012. Rural population was confronted with decreased water availability for farming. Therefore, out-migration from agriculture to other industries became one of the most important recommended solution for combating drought promoted by governments at various level. This paper, adopting a gender sensitive perspective, found that men and women have different perceptions and response about this policy and are affected by this policy in different ways. The study focuses on 3 different locations in Baoshan Prefecture to explore the gender differentiated perception of drought and out-migration in Yunnan, and discusses the gender-differentiated impacts of out-migration and men and women's responses to out-migration. The paper suggests that government-supported should response to women's response directly to meet their priority needs, and encourage women's active contribution and participation in local village public domain/affairs.

### **Key words:**

droought; migration; gendered response

## Migration Experience and Cultural Impacts: A Study in the Island of Majuli

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### Abstract

Majuli, a riverine island in Assam is culturally dominated by neo-Vaishnavism. While in the rest of Assam, neo-Vaishnavism got diluted with new philosophical currents, Majuli preserved it in its pristine form. However, in 1950, Assam was struck with a powerful earthquake and River Brahmaputra started eroding land in Majuli, leading to almost one-third to two-third area of the island being lost to the river. During this time, population of the island has more than doubled, causing a large number of people to move out of the island, either as agriculturalists to nearby districts, or else to work in the industrial centres across the country. However, the youth does not always immigrate, and in many cases, return to the island. A long term trend is discernible in which families moving out to short distances to settle as agriculturalists migrate permanently, whereas youth going to far off urban areas return after an year or two. Thus, while the short distance migrants reinforce the neo-Vaishnavite culture in the rest of Assam; the long distance migrants return to Majuli with elements of foreign culture. Majuli as an island has always been in isolation, but the changing balance between land and people has resulted in contact with the outer world which is influencing the island as well as rest of Assam. The present paper studies the cultural changes being introduced in Majuli by returning islanders as well as the elements of culture being reinforced in places where Majulians have migrated.

### Key words:

Erosion; Migration; Cultural Change; Island; Majuli

## **Mobility in an aging society: An investigation of elderly travel behavior and satisfaction in the old city of Beijing**

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### **Abstract**

The rapid increase in the older population in China has been concerned since 1990s and can pose a significant challenge to transportation. Chinese older population aged 65 and over has increased from 98.79 million to 138.15 million, with the percent of total population from 7.95% to 10.1% during the period between 2004 and 2014. Mobility is a critical element of one's quality of life especially for the older citizens. It is imperative to investigate the mobility characteristics and satisfaction of older adults and explore influencing factors.

Although some studies have examined elderly travel behaviour, the influencing factors have not fully explored and less studies investigated their subjective satisfactions. This study would meet the gap by investigating the trips, distances, time, mode choices of day travel characteristics for older adults, compared with young adults. We also assess the elderly stated satisfactions with mobility. The main factors influencing the elderly mobility are discussed, such as the built environment, transportation, economics and self-preference. The results would enhance our understanding of the characteristics of mobility of China's elderly, and contribute to the policies designed to improve mobility in an ageing society.

### **Key words:**

mobility; aging society; travel behaviour; elderly

## Motivational Profiles of Young People to Go to Live/Work Abroad

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### Abstract

Youth mobility is a raising issue in Europe. The European Union (EU) is encouraging mobility to improve labor market adjustment and to contribute to an European identity. Despite the free mobility for EU citizens it doesn't reach the expectations. Thus, it is important to understand the motivations that encourage people to move. This study focuses on the motives of young people to move to live or to work abroad. A comprehensive representation of youth mobility requires understanding not only who migrates but also who is sedentary. The aim of this work is to analyze the differential motivational profiles of young people in the case they decide to migrate. The sample for this study is composed of a sample of university students and young unemployed people. They were interrogated about nine motives to move or not to move abroad responding to a questionnaire. This questionnaire was framed in the H2020 European project YMobility. In order to identify the motivational profiles, a cluster analysis was performed with the scores of each motive. After determining the optimum solution of clusters, the differences in some socio-demographic and other related variables were analyzed by motivational profiles.

### Key words:

Youth mobility, migration motives, motivational profiles

## Population Mobility on Small Tourist Islands. The Case of the Canary Islands

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### Abstract

The Canary Islands have 2.1 million inhabitants and cover a total area of 7,493 km<sup>2</sup>. The seven islands are of varying size, with unequal resource endowment. With 12 million visitors in 2015, the main source of income is tourism, accounting for 31.4% of regional GDP. The islands' airports handled 35.8 million passengers in 2015, of which 5.5 million corresponded to interisland travel; the seaports handled 5.6 million. These figures demonstrate the high mobility of the island population.

But the heterogeneous population dynamics relate to the different island demographics and economies, and to the importance of tourism and services on each island. Tenerife and Gran Canaria, with 85% of the population and the greatest economic and services potential in the region, are the islands with the greatest population mobility and immigration. The islands of La Palma, La Gomera and El Hierro, with very little tourism development, have lower population mobility and their population is decreasing. The arid islands of Lanzarote and Fuerteventura were sparsely populated in the past. Now, however, they have the highest relative population mobility and the highest population growth rates in the archipelago due to the introduction of seawater desalination, which enabled tourism to expand. Consequently, the development of tourism is the main factor behind the complex patterns of population mobility in the Canary Islands.

### Key words:

resource scarcity; tourism economy; population mobility

## Quantitative and Qualitative Features of Post-Communist Romanian Emigration.

### Case Study: Moldovan Region

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#### Abstract

After the collapse of the communist regime, the Romanian society has experienced numerous social, political and economic changes. One of them refers to regaining the right of free movement, which has triggered significant migratory flows mainly oriented towards Western Europe.

However, the quantitative and qualitative knowledge of this phenomenon (which is very typical of present-day Romania) is poor, the three post-communist population censuses providing but very general and (anyway) inaccurate data.

In order to remove this informational lack we focused our attention on Moldavia (a historical province lying in North-East Romania) within which, by means of the directed survey method, we collected a sample of 24,987 people who have gone abroad the country in order to work after 1989. In our study we examined the destinations of immigrants from Moldova, as well as various aspects of population dynamics of these movements. Structural aspects of the population involved haven't been neglected: the structure by age and sex, structure depending on marital status, and professional and confessional structure. Moreover, where this was possible they were studied including changes that have suffered these structures over the period.

#### Key words:

International migrations; migration dynamics; demographic structures of immigrants



## Reforming Agricultural Guest-Worker Visas: The U.S. and E.U. Compared

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### Abstract

Every year, tens of thousands of workers enter the United States and the European Union on temporary visas to perform low-wage work on farms. However, guest-worker visas for agricultural labor in the rich democracies are often associated with worker abuse and exploitation. In the words of a member of the US Congress, some of these programs, such as the H-2A and H-2B visa categories in the United States, have produced conditions “close to slavery”. Violations of minimum wage laws, wage theft, overcharging of housing, violations of housing standards, unsafe working conditions, lack of access to medical care, and excessive fees paid to labor recruiters and middlemen are frequent occurrences. Similar problems bedevil temporary immigrant farm labor in Europe. This paper examines the failure of these guest-worker programs to ensure decent working conditions, analyzes proposals put forward to remedy these issues, and evaluates the politics and trajectories of reform in the United States and the European Union. Using interviews with advocates for immigrant farm labor, it examines the variety of proposals presented as potential solutions. The legislative history of recent reform attempts in the US Congress and the European Parliament, as well as executive action by the European Commission and U.S. Presidential Administrations, is used to process-trace the dynamics and differential success of reform of low-wage temporary work visas for agricultural work on both sides of the Atlantic.

### Key words:

Guest-worker visas, Low-wage work, Agriculture, Temporary work visas, Circular Migration

## **Rural-Urban Migration and Household Livelihood in the Agona West Municipality,**

### **Ghana**

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#### **Abstract**

Rural-urban migration a multidimensional phenomenon, is becoming part of the daily reality in Ghana and many other developing countries. For instance the impact of migration on households whose member(s) migrated is not relatively very clear especially how this impact differs for households with different socio-economic status. A study was then undertaken to examine the impact of rural-urban migration on rural migrant's households' social-economic status (livelihood) in Agona West Municipality, Ghana. 150 respondents were randomly selected and interviewed to obtain information on the motives of migration and the impact of remittances on household livelihoods. Eight male and female heads of households were purposively selected from each village for the focus group discussion. Frequencies, percentages, diagrams and tables were used to explain the data obtained. The study identified two types of households; the poor and very poor households, and the better-off households. Also it was observed that the poorest migrant households mostly females, were often forced to migrate because of their poor living conditions and low educational attainment, the better-off migrant households with higher educational attainment often migrate deliberately in order to accumulate more wealth. The better-off are therefore positively impacted; better access to health-care, more education opportunities, and agriculture than the poor migrant households. It is therefore recommended that government policy on poverty and employment especially for rural areas need to be revisited for better employment opportunities in the rural for the youth and adults and thereby curb the drift to urban areas.

#### **Key words:**

Migrant Households; Poor Households; Better-off households; remittances; Socio-Economic Status; household livelihoods

## The Challenge of Diversity: Refugee Allocation and Integration in Post-Socialist Rural Settings

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### Abstract

Migration has severely changed the population structure and social fabric of many regions in Europe. Especially in recent years, many urban but also peripheral, rural regions in Europe experienced increasing population diversity due to the inflow of European free movers, third country migrants and refugees. Contrary to urban agglomerations, rural communities often have few experiences with diversity. In Germany, the huge inflows of refugees since 2013 and their redistribution among federal states and counties confronted many rural municipalities with questions of integration and diversity for the first time. Dealing with those questions we can observe a new East-West divide, with the post-socialist part of Germany appearing as especially hostile, xenophobic and even dangerous for foreigners. My paper explores the perceptions and practices of refugee reception in a post-socialist rural part of Germany. I will show that the recent refugee allocation is not only perceived as an external shock, but also as a form of betrayal of the local population that partly still suffers from devaluation due to the political and economic transformation since 1990. Using selected case studies, the problem of social acceptance and possibilities to overcome xenophobia are discussed. In the outlook, the paper will generalize its findings and unfold the interfaces between immigration, integration, social resistance and social innovation in a regionalized perspective. The paper draws on statistical material and case studies which the author carried out in East Germany.

### Key words:

Diversity; integration; post-socialist transformation; refugees; rural regions

## The Gandharbas living on the margins; Travelling in and from Nepal

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### Abstract

Transnational migration, particularly from global south, has become one of the essential issues at the time of globalization. Nepal is no exception to this movement. Since the 1990s, the number of Nepalese going abroad has been increasing. The Gandharbas, recognized as the musical caste, and at the same time as the untouchable caste, in Nepalese Hindu society, and marginalized in and excluded from the society, had travelled around in Nepal to sing songs, and gotten some foods and money in return. Recently, some Gandharbas started to go abroad to work same as other Nepalese. In this study, the two Gandharbas, who have migrated to Ireland as workers, are focused on and analysed how they have survived through these situations as untouchables in Nepal and then as migrant workers in Ireland. Even though they are marginalized in Ireland, they could purchase their own houses in Kathmandu for their families. After getting Irish green cards, they don't work if they can't find good jobs, because they can get jobseekers' insurances there. And more they sometimes provide food and accommodation to other Nepalese who have economic and social problems in Ireland. Under such circumstances that they had never imagined in Nepal, they transformed their identities from as the untouchable caste in Nepal, to successful Nepalese migrant in Ireland. The changes of life worlds seem occurred in local scale, but we have to consider these changes as some aspects of the same phenomenon, ongoing reality on the global changes.

### Key words:

Nepal; the Gandharbas; travel; migrant; marginalization; exclusion; identity

## Translocal Life and Integration of Highly-Skilled Migrants in Germany

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### Abstract

This paper addresses the living situations of highly-skilled migrants in Germany, taking managers and persons working in the arts in western German cities as examples. With reference to integration concepts as well as approaches to transnational migration and translocality, the results of qualitative guideline-based interviews conducted with these groups are presented. The focus is on the highly-skilled migrants' professional work conditions, their translocal mobility practices, as well as their shaping of everyday practices and networks in their German places of residence. The depicted networks and translocal practices of highly-skilled migrants reveal existing integration options and aspirations. Both, options and aspirations, are limited by the temporality of their stays, their heavy workloads, their often limited knowledge of the German language, their focus on international networks and only little interest for social contacts on the part of the host society.

### Key words:

highly-skilled migrants, translocality, transnational migration, integration, Germany

## Where, When, How Often and Using What Routes? Everydayness and Time-Space Mobility of Ukrainian Labour Migrants in Prague (Czechia)

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### Abstract

The contribution deals with an in-depth survey of everyday life of Ukrainian labour migrants in Prague, a capital of Czechia. The analysis is based on data which was gained via a diary method (the survey was carried out for half a year - in 2011 and 2012 when altogether 19 migrants were willing and able to take part in the diary survey mapping in detail their daily behavior). The research task was to ascertain what are daily “time-space models” of migrants’ behaviour through the city. Of course, time-space patterns are accompanied with description and explanation of migrants’ economic, social and cultural backgrounds and activities which trigger why and how the given migrants are on the move. Two concepts were used: time-space geography (tied mainly to Hägerstrand’s Lund school) and sociology of everydayness (see e.g. Bennett, Watson 2002). This study – analyzing in detail migrants’ time/spatial patterns inside the city, is, in fact, really unique. On one side, there have so far been studies on “time-space” patterns in cities and, on the other side, migrants’ living style in cities, but there are non combining these two topics together.

### Key words:

Ukrainian labour migrants; Prague; Czechia; “time-space” behaviour; dairy method



## Gender, Migration, Remittances and Development in Uganda

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### Abstract

Understanding the intricacies of gender, migration remittances and development can result in programs and policies that enhance the benefits and decrease the economic and social costs for female migrants, who make up half of the global migrant population. In this chapter the importance gender as important predictors of remittances use for development by households is underscored. While International migration tend to favor males in Uganda, in this chapter it is noted that households with female senders had increased odds of using remittances for development purposes at household level.

### Key words:

Gender; Migration; Migration; Development

## Return to Volcano. Resilience of Human Mobility Facing Natural Hazards. Ilha Do Fogo (Cape Verde)

Claudio Moreno-Medina<sup>1</sup>, Agustín Naranjo-Cigala<sup>1</sup>, Ezequiel Guerra de la Torre<sup>1</sup>, Alexandre Nevsky Rodrigues<sup>2</sup>, Herculano A. Dinis<sup>2</sup>, João P. Andrade<sup>2</sup>, Adriana Ruiz Santana<sup>2</sup>

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### Abstract

One year after the volcanic eruption of 2014-2015 in Fogo Island (Cape Verde), the spatial mobility of inhabitants affected by this natural event requires an analysis and a deeper understanding. In this poster it is presented the most characteristic data of the social and cultural behavior of migrants in the context of migration studies, a fruitful interdisciplinary research field. The sample studied represents a new interpretation of mobility linked to natural hazards such as volcanic eruptions. Within this framework of analysis, human behavior and attachment to the place of origin are analyzed as a challenge to the limits of the volcanic risk areas and the intrinsic spatial relationship between nature and population mobility, a mobility that exceeds the natural disasters. The balance of migration, according to the processes of volcanic eruption, provides a good example of the importance of social and cultural behavior of the inhabitants of volcanic islands.

Statistical information of the return of the inhabitants to Cha das Caldeiras the analysis of the damage caused by the eruptive event, changes in the location of settlements and economic activities, aerial photographs, satellite images, photo gallery and maps comparing the before and after Caldeira and, in particular, the information obtained through individual interviews to affected people, are a powerful witness to the social, cultural and economic resilience of human mobility in the context of natural hazards.

### Key words:

spatial mobility; resilience; natural hazards; volcanic risk; Fogo Island



# 33rd International Geographical Congress

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## C12.17 Global Change and Human Mobility

Information, communication, new media, and human mobility



### Oral

1. [Exploring the efficiency of location-based social media in modeling activity patterns—a case study of Beijing, China](#)  
xujiao wang (Texas State University, China), yihong yuan (Texas State University, China)
2. [Media Representation: A Study of Crime News Reporting in Delhi](#)  
Vivek Tripathi (Department of Geography, Delhi School of Economics, University of Delhi, India)
3. [Mobility and translocal livelihoods in Bangladesh](#)  
Mohammad Mahmudul Islam (Sylhet Agricultural University, Bangladesh), Farin Sadeque (Pranthik, Sylhet, Bangladesh)
4. [The National Identity of the Korean Chinese in South Korea: A Geographical Analysis of Their Social Network](#)  
Yinhe Li (Institute of Korean Peninsula Studies in Yanbian University, China), Yongmin Lee (Ewha womans university, South Korea), Shangyi Zhou (Beijing Normal University, China)

### Poster

1. [Mapping the Spatial Evolution of Urban Innovation Structure at the Zip-code Region Scale: A two-city Comparison of Beijing and Shanghai](#)  
Duan Dezhong; Du Debin; Liu Chengliang (China, East China Normal University)

## Exploring the Efficiency of Location-based Social Media in Modeling Activity Patterns—a Case Study of Beijing, China

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### Abstract

In this big data era, location-based social media (LBSM) are increasing being used to replace traditional survey methods in modeling activity patterns. In order to evaluate the efficiency of LBSM data quality and temporal resolution, we are focusing on 3 indicators in this research. First, individual's activity patterns will approach the steady point based on analyzing a large LBSM sample size, through the steady indicator we will find out the balance point between the data efficiency and the sample size. Second, using a sample of Weibo (a popular social media in China) users' data of 7 months mainly focused on the geotagged data of individuals in Beijing area, we calculate the radius of gyration indicator for each user, interpreted as the characteristic distance travelled by the user when observed up to the time. Then analyze user's activity trajectories regularity ellipse which records one's attending frequency at the locations, and each user's activity trajectory regularity ellipse is different due to their activity patterns diversity. Third, because of the random nature of human mobility, we calculate the entropy of their regularity to get a degree of predictable value for the regular pattern of an individual. We expect this inherent similarity in individual activity patterns could explain and impact some phenomenon driven by human mobility in the field of temporal resolution, data quantity and other complements.

### Key words:

data quality; human mobility; individual activity patterns; spatial-temporal location-based social media

## Media Representation: A Study of Crime News Reporting in Delhi

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### Abstract

Information about crime and violence is primarily derived through the media. This paper examines the structure and pattern of crime news and tries to determine the extent at which reported news by media differs from actual crime reporting conducted by government agencies. Four months crime news reports published by Time of India Newspaper, from June, 2013 to September, 2013, have been examined through content analysis method. After analysis it has been found that media crime reports are presenting skewed crime data and they over-hype certain types of crime, particularly, crime against women. There has been huge difference found between the data generated through crime reporting in Times of India newspaper and the National Crime Record Bureau, a governmental data portal. Adoption of selective news negatively influences the perception of people. It results in increased fear among people. Media must adhere to objectivity and present the reality among people instead of prevailing false fear of crime. The practice of moulding crime news according to the incident and person involved is highly dangerous for the welfare of the people. This paper provides a clear picture of actual crime in Delhi and the selective approach of News Media that falsely damages the image of city as crime capital of India. This study positively fills the gap to the limited research on News Media in context of India.

### Key words:

Media Effect; Media Representation; Public Perception; Crime and Violence; Crime and Media; Mass Media; News Reporting; Crime reporting.

## Mobility and Translocal Livelihoods in Bangladesh

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### Abstract

Human mobility has garnered increasing attention in both policy and academic debates, particularly in the context of climate change. Based on secondary literature and qualitative fieldwork, this research investigates the migration trajectories in Bangladesh through translocality lens. The findings indicated that though ongoing environmental change act as driver for mass migration but it can only explain parts of peoples' motivation to migrate. A complex array of economic, societal and cultural issue is interplaying in making the migration trajectories. In many instance, the decision to migrate is shaped by and shaping rural–urban networks across space that organize the behavior of households. Consequently, migrant demonstrated active orientations towards their place of origin that builds translocal households by coordinating their livelihoods activities over geographical distances. Finally, the study concluded that the exchange process of different resources within divided migrant households is crucial for building resilience against crises they constantly face.

### Key words:

Translocality; Mobility; Bangladesh

## The National Identity of the Korean Chinese in South Korea: A Geographical Analysis of Their Social Network

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### Abstract

Many studies show that national identity changes when people enter another country. It is because they are involved in new social situations. This is a foregone conclusion. What people want to know is what impact national identity and what are the mechanisms that contribute to changing identities. One's national identity is influenced by many factors. To understand this complex issue, scholars need to investigate the mechanism behind those changes and deconstructing it. The Korean Chinese in South Korea are interviewed in this study. A general analytical framework was designed for this case study. It considers geographical characteristics of social networks as independent variables and the home country identity as the dependent variable. The major objective is to investigate changes in a Chinese identity to a Korean Chinese identity in South Korea. We conclude that the Korean Chinese in South Korea are gradually tightening their economic relationships and ties with China. The networks of their family and kinship has still include both China and South Korea, as they have since the early of 1990's when the first tide of Chinese entered South Korea. The international influence of China improved when more Korean Chinese began to also enter other countries in the past decades. All of these developments enhance the Chinese identity of the Korean Chinese in South Korea. A geographical perspective aids in analysing the changing national identity. The identity of the immigration country and emigration country is to be compared in the future.

### Key words:

Korean Chinese in South Korea; identity of emigration country; social network; geographical characteristics

## Mapping the Spatial Evolution of Urban Innovation Structure at the Zip-Code

### Region Scale: A Two-City Comparison of Beijing and Shanghai

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#### Abstract

Based on Zip code geodatabase, the evaluation system of urban innovation was established in the perspective of innovation output, and the spatial evolutionary mode, which is concerning the structure of innovation space of Shanghai and Beijing from 1991 to 2014, was discussed. During the 25 years, the growth of spatial structure of innovation of Shanghai and Beijing demonstrated a lot of common features: with the increase of urban space units participated in innovation year by year, although the overall gap of regional innovation output has narrowed, the trend of spatial agglomeration has strengthened. The growth of spatial structure of innovation of Shanghai and Beijing demonstrated the differences among common features during the 25 years as well: in the trend of the suburbanization of innovation resources, the spatial structure of innovation of Shanghai indicated the driver has evolved from the single-core driver to the multi-core resonance evolution. Radiation effect using traffic arteries as spatial diffusion corridors was prominent. The spatial structure of innovation of Beijing was single-core oriented structure all the way.

#### Keywords :

Innovation output; Zip code; Spatial-temporal evolution

## C12.17 Global Change and Human Mobility

### Development Safeguards, Forced Displacement and Resettlement - Inside China and Going Out



Home

#### Oral

1. [Acculturation and School Life Satisfaction of Elementary Students of North Korean Refugees in Daegu and Gyeongbuk Region, South Korea](#)  
Soon Ho Park (Daegu National University of Education, South Korea)
2. [Addressing Social Issues in Chinese Overseas Investment: A Conceptual Framework Integrating Social Impact and Risk Assessment](#)  
Luke Long, Kai Shang (MWH China, China)
3. [An Assessment of the Effectiveness of the Bui Dam Project Resettlement Scheme](#)  
Richard Koranteng (Ghana Dams Dialogue Volta Basin Development Foundation, Ghana)
4. [Exploring Socio-cultural Effects of Forced Resettlement in the Bui Dam Project Area of Ghana](#)  
David Tei Mensah Adjartey (La Trobe University, Australia)
5. [Hands-off in Practice? Chinese Engagement in African Dam-induced Displacement and Resettlement](#)  
Xiao Han (University of Melbourne, Australia)
6. [Managing Social Risks for Chinese Outbound Development Projects Adapting to Local Socioeconomic Context](#)  
Jianliang Xiao (Hohai University, China), Piers Touzel (ERM, HongKong SAR, China)
7. [Resettling the Displaced Via Government Migration Schemes: Considering Indonesia's Transmigration Program](#)  
Jane Singer (Kyoto University, Japan), Dorotea Agnes Rampisela (Research Institute for Humanity and Nature, Japan)
8. [Sustainable Infrastructure Projects? New Developments in Managing Social Risk in Investment Lending](#)  
Bettina Gransow (Free University of Berlin, Germany), Susanna Price (Australian National University, Australia)
9. [The Asian Infrastructure Investment Bank: Understanding its social and environmental framework](#)  
Brooke Wilmsen (La Trobe University, Australia), Susanna Price (Australian National University, Australia)
10. [The Benefit-Sharing Policy and Practice in China: Past, Present and Future](#)



Yuefang Duan (China Three Gorges University, China)

11. [“Win-win approach”: Innovation in reservoir resettlement patterns in China](#)

Shaojun Chen (National Research Center for Resettlement, Hohai University, China), Yuhang Chen (National Research Center for Resettlement, Hohai University, China)

## Acculturation and School Life Satisfaction of Elementary Students of North Korean Refugees in Daegu and Gyeongbuk Region, South Korea

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### Abstract

The number of North Korean refugees entering South Korea have been increased from 148 in 1999 to 2,941 in 2009. There are 24,671 North Korean refugees in South Korea in 2014. About 8.9% of 24,671 North Korean refugees in South Korea are in elementary, middle and high school. About 51.7% are elementary students. This study attempted to analyze the relationship between school life satisfaction and acculturation of elementary students of North Korean refugees in Daegu and Gyeongbuk region. The proportion of assimilation was slightly higher than that of integration. However, 42 percent of students belonging to separation and marginalization passively accepted south Korean culture, so that they would have a difficult time in adjusting to new culture. Students getting older and being used to school life strongly inclined to accept south Korean culture; while, students born in north Korea tended to resist acceptance of south Korean culture. Most students were satisfied with school life. The satisfaction level was high in the relationship with teachers and school environment; while, the satisfaction level in learning activity was relatively low. In the relationship between school satisfaction and types of acculturation, students actively accepting new culture were relatively high satisfied with their school life. accepting new culture were relatively highly satisfied with their school life. A standardized short-term education oriented program for north Korean adolescents refugees living in south Korea should be shifted into the long-term support policy reflected in class and attribute in terms of acculturation.

### Key words:

north Korean elementary students refugees living in south Korea, acculturation, school life satisfaction

## Addressing Social Issues in Chinese Overseas Investment: A Conceptual Framework Integrating Social Impact and Risk Assessment

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### Abstract

Since the adoption of China's "Going Global" Strategy, Chinese overseas investment by Chinese enterprises is becoming increasingly influential globally. Such investment has brought considerable positive outcomes to China and the recipient countries in Asia, Africa and Latin America. However, the benefits are oftentimes undermined by inadequate social safeguards and poor social performance. There is a need to better manage social conflicts and assure sustainable development in the recipient country's community, but how best to fulfill this need remains to be answered. Our international and China experiences have shown us that social assessment is the cornerstone of implementing social safeguards and carrying out the assessment at the preparation stage of a project is the best time to address social issues. This paper consolidates the lesson-learned from internationally practiced Social Impact Assessment (SIA) and China initiated Social Stability Risk Assessment (SSRA), to profile an innovative approach to address the social issues and challenges in Chinese overseas investment. Five sections are included. Section one summarizes the issues and challenges faced by Chinese overseas investment. Section two discusses the concepts and common features of a SIA and SSRA. Section three examines the limitations within SIA and SSRA individually and explores the imperative needs to combine both together in practice. Section four develops an integrated social impact and risk assessment (SIRA) framework to identify, evaluate and address social issues, impacts and risks related to Chinese overseas development projects. The last section proposes policy recommendations for Chinese enterprises and financing institutes to better manage overseas investments.

### Key words:

Chinese overseas investment; social safeguards; integrated assessment; social assessment

## **An Assessment of the Effectiveness of the Bui Dam Project Resettlement Scheme**

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### **Abstract**

The Bui Hydro Electric Project was financed and constructed by the Chinese in Ghana. Findings indicated that the affected people have been sufficiently consulted at all levels of their resettlement. In particular the Ghana Dams Dialogue which served as a liaison entity between the Government and the communities came up for praise for its usefulness. Many tangible policies were put in place to mitigate the socio-cultural negative effects on the people. There were however issues with loss of identity and disrespect for some traditional authorities. The Bui Power Authority also rigorously followed national and international laws and protocols in the design and implementation of the resettlement scheme. There had been a great appreciation of the compensation regarding infrastructural development but much more would have to be done to satisfy livelihood empowerment requirements. Candid efforts be made to restore the lost identities of those who felt so and more dialogue be encouraged among communities living together. To keep faith with the people, all unfulfilled compensations promised be redeemed immediately by the appropriate Government agency. Capacity building for the resettled people should be seriously looked into by appropriate institutions. Irrigation schemes should be made available for the people to cultivate.

### **Key words:**

Participation; Multi-Stakeholder Platform; Cultural Harmony and Integration; Livelihood Empowerment

## Exploring Socio-cultural Effects of Forced Resettlement in the Bui Dam Project Area of Ghana

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### Abstract

The Bui dam in Ghana is a state-directed project that was funded by the Chinese Government, through the Export-Import Bank of China, and built by China's Sinohydro Corporation. The aim of the dam was to generate hydroelectric power to enhance economic development, however, it also caused the displacement of 1216 people who required resettlement. While there are studies exploring the livelihood implications of this process, the socio-cultural impacts are not well understood. This presentation will explore the spiritual landscapes, built environment, ancient settlements, and memorable spaces that the resettled villages lost under the floodwaters of the Bui dam. The data will be drawn from a community-based visual recording of everyday behavior and the cultural resources of the affected villages, which I undertook for my master's thesis between 2009 and 2011. The presentation will also share initiatives by both Ghanaian project authorities and village leaders to exhume and relocate the ancestral remains and shrines of deities to the resettlement communities in 2012. These are the few attempts made by various project stakeholders to address the cultural losses that the resettled persons would have suffered because of the Bui dam forced resettlement project. The paper highlights the importance of increasing local voices in resettlement projects.

### Key words

Bui Dam, Socio-cultural Impact, Forced Resettlement

## Hands-off in Practice? Chinese Engagement in African Dam-induced Displacement and Resettlement

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### Abstract

China has raised its dam construction industry via the built-up of numbers of world-class large dams in the past semi-century. As a result, it has also gained comprehensive experience to address dam-induced displacement and resettlement issues. In the nation's going-out wave over the last decade, Chinese dam construction enterprises accompanied with Chinese financial institutions have entered Africa among the so called Chinese influx to "export" large dams. Although the "China in Africa" topic has been debated widely, little has been explored on the ground about Chinese actors' engagement in African development-forced displacement and resettlement, either directly or indirectly. This paper thus attempts to understand the roles of Chinese actors in the displacement and resettlement induced by African large hydropower development. Specific attention will be paid to: how do Chinese actors involved in African dam-induced displacement and resettlement? how could China's domestic resettlement experience be delivered? The recent completed Bui hydroelectric project in Ghana, contracted with Chinese builder and financier, will be employed to illustrate with first hand data.

### Key words:

Development-forced Displacement and Resettlement; China's dam construction industry; financial institutions; Ghana

## Managing Social Risks for Chinese Outbound Development Projects, Adapting to Local Socioeconomic Context

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### Abstract

China's domestic practice on development-forced displacement and resettlement are increasingly aligned with international expectations. In China, where government plays a leading role in land acquisition and resettlement, project developers are responsible mostly for the costs associated with land acquisition and resettlement. The "Social Safeguard" components of the land acquisition and resettlement process (such as livelihood restoration) are the responsibility of the government agencies implementing the resettlement. While China has resettled more people than any other country to accommodate industrial and infrastructure projects, the institutional knowledge relating to land acquisition and resettlement rests largely with the government rather than the project proponents. Against this backdrop, Chinese developers investing in emerging markets are challenged by the need to be much more "hands-on" in planning for and implementing resettlement programmes, where host government agencies lack the institutional knowledge that Chinese companies have come to rely on back home. Such challenges are compounded by operating in a very different socio-economic and regulatory context. This paper explores the social performance of Chinese outbound projects and proposes measures to mitigate these risks through tripartite engagement with affected communities, government agencies and project partners.

### Key words:

Social Safeguard; Outbound Project; Resettlement; Social Risks; Adapting

## Resettling the Displaced Via Government Migration Schemes: Considering Indonesia's Transmigration Program

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### Abstract

Many dam-displaced populations in Indonesia have been resettled through inclusion in the transmigration program, a government-sponsored internal migration scheme that has moved more than 7 million indigent farmers from Java, Bali and Madura to the outlying islands over the past 50 years. The researchers examine transmigration as a displacement policy instrument with case studies of the Wonogiri dam in central Java and the BiliBili dam in Sulawesi. In the case of the Wonogiri dam, the original participants in resettlement in the 1970s tended to be poorly compensated or landless farmers, as more financially abled residents chose to remain in central Java. However, ongoing interviews and surveys of Wonogiri farmers resettled in West Sumatra and Jambi provinces suggest that a shift from reliance on food crops to tree crops such as rubber and oil palm have enabled them to record higher average income than households remaining in Java. For Bili-Bili displacees as well, when presented with options under a "cash for land" system, poor and landless farmers tended to choose transmigration to remote areas. After initial adversity the resettlers, who had received large land allotments, realized increased earnings from cash crops when compared with pre-displacement conditions. The authors suggest that distant resettlement can be one means of relieving the problem of poor land availability for displaced populations in densely populated areas, but it raises such issues as coerced participation, cultural or ethnic incompatibility with host populations and adverse environmental impacts.

### Key words:

Dam-forced displacement; resettlement; livelihood strategies; internal migration; resource-based development

## Sustainable Infrastructure Projects? New Developments in Managing Social Risk in Investment Lending

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### Abstract

Recent announcements of new international financing initiatives, especially China's new multilateral development bank (MDB) the Asian Infrastructure Investment Bank (AIIB), have sparked widespread interest in the governance and safeguard standards that might apply to projects which are financed by emerging economies. Drawing upon analysis of the recently released AIIB Environmental and Social Framework (ESF) and the previous consultation process, this paper explores the AIIB's planning assumptions, social safeguards and intended modes of operating, including its stated objective of 'knowledge management.' (AIIB website). This paper addresses the question: what kind of knowledge may be considered relevant in social safeguard application to new AIIB-financed project investments? In what ways could knowledge be utilised to inform planning decisions that will inevitably distinguish AIIB as a new MDB in Asia, and inextricably mark its character? The paper addresses these questions by drawing, selectively, upon recent developments in China in social impact assessment and upon China's recent record of overseas investments.

### Key words:

Social risk analysis and management, sustainable infrastructure projects, AIIB

## The Asian Infrastructure Investment Bank: Understanding its Social and Environmental Framework

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### Abstract

In 1999, China formally launched its “going out” policy and for the last decade its efforts to invest abroad have intensified. China is now the world’s third largest outbound investor, backing large infrastructure constructions across Asia, Africa, Latin America, Europe and the Middle East. Many of its investments, such as large dams, mines, transportation corridors and port constructions displace large numbers of people. As such, China’s social responsibilities feature high on the agendas of activists, NGOs, CBOs, academics and practitioners in the sector. This is a shift from the many decades where such scrutiny was concentrated on the activities of the major international development banks. However, in 2015, China established a new international development bank, the Asian Infrastructure Investment Bank (AIIB). This new player in the global development architecture includes 57 member states from around the world. China holds the largest voting share at over 25 per cent and therefore maintains power of veto. Not only will China’s investment in large infrastructure projects be further intensified through the AIIB, but such investments will also be more visible as will their social and environmental impacts. In its bilateral dealings, China’s position is to default to the borrower’s domestic policies on land acquisition and resettlement, however, under the auspice of AIIB it is committed to an environmental and social framework. Late last year a draft was circulated for comment. How that framework compares to the latest operational procedures of other leading development banks in the region, the World Bank and Asian Development Bank, will be explored in this paper.

### Key words:

development safeguards; land acquisition

## The Benefit-Sharing Policy and Practice in China: Past, Present and Future

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### Abstract

In an attempt to deal with the complicated involuntary resettlement issue caused by the construction of water resources development projects properly China has established the benefit-sharing policy to allow the displaced populations to share the benefits of water resources development since the middle of 1980s. This policy has been evolved as one very important pillar of Chinese resettlement policies with the transformation and development of Chinese economy over 30 years. Evidence has shown that this policy has played an indispensable role in restoring and improving the resettlers' livelihoods. But there is still room for this policy to be further improved in terms of the policy application coverage, the payment standard for supporting the resettlers and the types of benefit-sharing. This paper intends to analyze the evolution process of the benefit-sharing policy and conduct a preliminary evaluation of the effect of the current benefit-sharing policy based on the fieldwork finished in Shangrao City, Jiangxi Province as well as make some recommendations for the further policy improvement.

### Key words:

Water resources development; Involuntary resettlement; Benefit-sharing policy; Sustainable resettlement

## “Win-win approach”: Innovation in reservoir resettlement patterns in China

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### Abstract

Since the foundation of new China, China’s reservoir resettlement and compensation policies have evolved for over 60 years. From 1949 to 1978, reservoir resettlement was conducted under administrative orders by means of political mobilization under the planned economy system. Since 1979, with China’s reform and opening up, the Chinese government began to pay attention to reservoir resettlement and compensation, and proposed a development-oriented resettlement policy, a change from the past concept of paying more attention to construction and little attention to resettlement. In 1991, the Regulations on Compensation and Resettlement for the Construction of Large and Medium Water Resources and Hydropower Projects were promulgated formally, indicating that China’s reservoir resettlement and compensation work became legalized and normalized gradually. In the 21st century, China’s reservoir resettlement and compensation policies and practices have been innovating to protect the rights and interests of migrants, and realize the sustainable development of water resources and hydropower projects.

This paper explores “win-win approaches” to reservoir resettlement and compensation based on real examples, and analyzes elements, features, conditions and effects of various approaches to provide a useful reference for other water resources and hydropower projects. A “win-win approach” to reservoir resettlement and compensation is a pattern in which the migrants, developer, local government and other stakeholders share the benefits of the project jointly. Such approaches mainly include: 1) Equity participation: For a hydropower project with stable income, migrants may become shareholders with construction land approved according to law to share benefits; 2) Urbanization: The local government brings migrants into the urban employment system, offers free training, and establishes a social security system in conjunction with China’s new-type urbanization strategy; and 3) Resettlement on reserved land: When collectively owned land of migrants is acquired, a certain percentage (10-15%) of the land is reserved as construction land to be developed and utilized by the migrants or collective in a unified manner to receive long-term income.

### Key words:

Win-win approach; reservoir resettlement; reference

## C12.17 Global Change and Human Mobility

### Youth Mobility. An Emerging Phenomenon at the Global Scale



#### Oral

1. [Academic Achievement of Immigrant Children. Individual-Level Sources of Success: the Self, Parents, and Friends](#)  
Paula Tufis (Department of Sociology and Social Work, University of Bucharest, Romania), Monica Serban (Research Institute for the Quality of Life, Romanian Academy of Sciences, Romania), Mădălina Manea (Department of Sociology and Social Work, University)
2. [EU Countries Youth Mobility: Policies to Facilitate Their Repatriation. The Case of Italy](#)  
Armando Montanari (Sapienza Rome University, Italy)
3. [Harmonizing Youth Migration Stocks And Flows Data In The Eu: A New Approach](#)  
Guido Sechi, Zaiga Krisjane, Maris Berzins (Department of Human Geography, University of Latvia )
4. [International youth migration: challenges for Latvia](#)  
Zaiga Krisjane, Elina Apsite Berina (Department of Human Geography, Faculty of Geography and Earth Sciences, University of Latvia, Latvia), Girts Burgma
5. [Italian Youth Mobility in the Last Two Decades: An Overview in Eight Selected Countries](#)  
Gerardo Gallo (ISTAT, Italy), Barbara Staniscia (Sapienza University of Rome, Italy)
6. [Motivations and Barriers of International Youth Mobility in Europe: A Comparative Study](#)  
Allan Williams, Gang Li, Hania Janta (University of Surrey, United Kingdom)
7. [The Current Migration of High-skilled Young Adults in Spain: between the Economic Crisis and the Globalization of Labor Market](#)  
Juan Parreno Castellano, Josefina Domínguez Mujica, Ramón Díaz Hernández (University of Las Palmas de Gran Canaria, Spain)
8. [What Makes International Students Stay in The Study Host Country after Graduation? A Statistical Analysis of Longitudinal Register Data of International Students In Switzerland](#)  
Annie Lombard (University of Neuchâtel, Geographical Institute, Switzerland)
9. [Youth on the Move: An Overview of Recent Trends in Latvia](#)  
Maris Berzins, Zaiga Krisjane (University of Latvia, Latvia)

#### Poster

1. [Crisis, Migration and Return: New Mobility of Young Spaniards and its Consequences](#)



# 33rd International Geographical Congress

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Pablo Pumares Fernandez; Marisol Navas Luque; Beatriz González-Martín (Spain, University of Almeria)

## Academic Achievement of Immigrant Children. Individual-Level Sources of Success: the Self, Parents, and Friends

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### Abstract

Previous studies have shown that immigrant children's academic achievement differs both across origin and destination countries, and that there are important predictors of achievement at multiple levels of the analysis: individual, school, community, and country levels. In our analysis, we focus on discussing individual level effects but we also assume that there are important macro-level effects that have to be taken into consideration. We account for these latter effects by using a cross-classified hierarchical model by origin and destination countries. We use the PISA 2012 data on mathematics achievements of 15-year-old students to explore how various factors influence achievement and how much variance in achievement there is at the individual level, between immigrant students in different destination countries, and between students from different origin countries. We draw on ideas from research on the academic achievements of children, in general: that the way parents interact with schools is an important factor that can enhance or hinder children's academic success (the role of parental cultural capital), that the child's peers may be an important resource in motivating children to do well in school (the role of the child's social capital) and that both cognitive and non-cognitive traits of children may influence their success in school (the role of the child herself). We explore whether these factors, which have been shown in previous studies to be important vehicles of academic achievement for students in general, among other proven predictors (such as parental socio-economic status), operate in the same way for immigrant children.

### Key words:

Academic achievements of immigrant children; cross-classified hierarchical model; socio-economic status; cultural capital; social capital

## EU countries youth Mobility: Policies to Facilitate their Repatriation. The case of Italy

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### Abstract

Youth mobility within EU countries is now a significant phenomenon. This is possible for the right to free mobility within the EU which is guaranteed to all citizens. The boost to the mobility of young people is caused mainly by cultural globalization and economic phenomena, and forms of information that easily cross national boundaries. Certainly young people move also for prospects of better economic conditions or even better chance to assert their career aspirations. The press and the political authorities have considered the phenomenon especially from a quantitative point of view. It is so widespread a kind of convergence baseless alarmism that leads to the impoverishment of the EU southern countries. It seems that young leave a number larger of those who then decide to return. The Italian Government in the last six years, in the wake of political forces and of the press, has implemented policies to encourage the return of young expatriates. Return policies put in place have made particularly reference to tax breaks for those who after being abroad for a few years have decided to return home. The contribution will highlight the actual size, characteristics and behaviour of youth mobility departing from Italy on the basis of the preliminary results of the YMOBILITY European project that is being carried out as part of the EU Horizon 2020 program.

### Key words

Youth mobility; European Union; Italy; repatriation policy; policy effectiveness

## Harmonizing Youth Migration Stocks and Flows Data in the Eu: A New Approach

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### Abstract

Comparative analysis of migration trends in EU countries is hampered by substantial differences in terms of criteria and definitions, depending on the cultural, political, legal, geopolitical and historical context of each country, which make it difficult to ensure the consistency of patterns and figures.

The proposed study is aimed at defining a new approach for the integration and comparison of national data, by taking into account regional, gender, and education differences, and temporal evolution of migration patterns and definitions, on the basis of secondary national data about young migrants' stocks and flows, related to 9 EU countries. A mixed quantitative-qualitative methodology will be adopted, consisting of descriptive and inferential statistical analysis and metadata review respectively. Typologies of youth mobility and their main characteristics will be identified and described for the selected countries, as well as patterns of migration flows between and among such countries.

### Key words:

Secondary data analysis; mixed methodology; EU internal migration; youth migration

## International youth migration: challenges for Latvia

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### Abstract

Migration in recent years are characterised with diversity of migration forms, groups involved, contexts of sending and receiving countries. Group of young migrants takes part in these current processes.

The paper examines trends of international youth migration and its effects on home countries. Since the EU enlargement in 2004 the share and numbers of youth among out migrants are steadily increased particularly during the peak of recession period of 2009-2012.

In order to research this group successfully we have used innovative research tool - web-based survey in locally popular social networking website *draugiem.lv*. Survey was posted to all registered Latvian users who geographically according to their *IP* address were located in the UK, Ireland, Germany, Sweden and Norway. The data used in this study consists of responses of two survey waves in 2012 – 2565 and in 2014- 2702 respondents. The results display following findings:

- Change of destination – more search for new opportunities and new destinations to fulfil the expectations;
- Change of motivations -from unemployment to better prospects in labour market and need to pay housing mortgage payments;
- Change of pull factors – from higher income and new experiences to better work conditions and career growth.

Emigration of youth, in turn, causes long term consequences of depopulation in Latvia. These circumstances are challenging for many shrinking regions in finding ways for further development, attracting young return migrants and utilise their human capital.

### Key words:

International migration; youth migration; Latvia

## Italian youth mobility in the last two decades: an overview in eight selected countries

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### Abstract

International mobility of young persons from European Mediterranean countries has become an important theme in the scientific debate. The issue has a big echo in national media and press, as well, since youth outflows – not adequately compensated by return flows or new inflows – can undermine the economic and social sustainability of development paths in the countries of origin. The 2007-2008 financial and economic crisis has deeply contributed in intensifying those outflows and in reducing the return flows.

This paper will focus on the international mobility of young Italians in the last two decades. After having tackled the problem of existing data sources and their comparability, spatial analysis will be concentrated on 8 EU destination countries presenting different socio-economic characteristics: UK, Germany and Sweden (characterized by high mobility, high income, and high attractive capacity); Latvia, Romania and Slovakia (characterized by high out-mobility, medium-low income, and low attractive capacity); Ireland and Spain (characterized by high mobility, medium-high income, and an attractive capacity temporally and spatially discontinuous). Spatial analysis will consider the most representative places of origin in Italy, at the scale of labour market areas.

Our study will provide a taxonomy of international outflows of young Italians that will consider destination countries, places of origin, gender, civil status and stage of youth. Those results could be used by scientists and policy makers dealing with the challenge of maximizing the advantages of mobility for individuals and minimizing their costs in terms of social and economic sustainability.

### Key words

International mobility; youth mobility; international migration; youth migration; Italy

## Motivations and Barriers of International Youth Mobility in Europe: A Comparative Study

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### Abstract

The scale and nature of youth mobility have changed dramatically in recent decades. Youth mobility provides a strategy for negotiating a number of critical life course transitions. By enhancing lifelong skills and competences, youth mobility shapes the transitions from education to work, and from unemployment to employment. It is a means of enhancing individual employability, employment and careers, which have become increasingly important as a consequence of the latest global economic crisis.

While the returns to human capital are undoubtedly a major driver of youth migration, motivations are diverse, and also include lifestyle aspirations, stimulus-seeking, personality characteristics, previous mobility history and social networking. Less often considered are the barriers to migration – in terms of economic costs, cultural and linguistic obstacles and immigration control regimes – all of which determine who does and does not migrate, and who does and does not intend to migrate. Although there has been considerable research on youth mobility, there is a lack of the comparative research which is required to understand the motivations and barriers of youth mobility in different national and institutional contexts.

Focusing on young people aged 16-35 in nine European countries, this research aims to provide a comprehensive examination of a broad range of motivations and barriers of youth mobility, and identify and compare the key determinants of who does, versus who does not, migrate as a life course-enhancing strategy. The empirical analysis is based on a large online panel survey. Regression analysis will be employed to provide statistical evidence. (This research is part of the “YMOBILITY” project funded by the European Commission.)

### Key words:

Youth mobility; life course transitions; motivation; barrier

## The Current Migration of High-skilled Young Adults in Spain: between the Economic Crisis and the Globalization of Labor Market

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### Abstract

The economic crisis started in 2008 has implied a sharp change in the international migrations in Spain. The situation has gone from the arrival of labor migrants of different origins to the return of a part of foreign people and the emigration of Spaniards. The recent Spanish emigration abroad is characterized by the departure of high-skilled young workers due to the Spanish labor market does not offer the proper employment opportunities for this group.

The aim of this paper is to show the current situation of these migratory flows. In particular, we focus on the analysis of the quantity of migrants, the origins and host countries, the level of qualification, the occupation, the situation in the host countries and the future expectations. In consequence, we have used several official statistic sources, some surveys conducted between young emigrants and qualified information coming from the emigrants and Spanish organizations located abroad.

The study of these migratory flows allows us to glimpse to certain extent this process is the result of the gap between the progress in education and the characteristics of labor market in Spain, the economic crisis, the politics of austerity implemented by the government or the globalization of labor market. We think that all these factors converge to explain the current situation in Spain.

### Key words:

emigration; high-skilled young adults; economic crisis; globalization; Spain

## What makes international students stay in the study host country after graduation?

### A statistical analysis of longitudinal register data of international students in

### Switzerland

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#### Abstract

International students are very mobile individuals and potential highly skilled workers for the host countries labour market. Upon graduation, international graduates have various options for their future professional career, further formation/education, research or an entry into the labour market – and consequently, leaving the host country or staying there. On these options and the final decision, various factors may have an impact. Some factors have been identified in a literature review so far (such as study and labour market conditions, social ties in host country and abroad, leisure opportunities and living conditions, and others). Options may also be restricted due to limited resources, immigration and labour market policies. The aim of the study is to analyse whether these and additional factors have an impact on the stay rate of international students in Switzerland. Therefore, individual pathways of international students are analysed with a longitudinal approach. The national statistical data originates from the Swiss student register that is linked with the population register. This combination covers a broad range of variables (such as progress in studies, change of permit, marriage, child birth, entry into labour market and socio-demographic characteristics). The graduation cohorts from 2012 to 2015 are analysed retrospectively from the time of entry in Switzerland until the latest available data from 2015.

#### Key words:

International student mobility; statistical analysis; return rate; labour market integration

## Youth on the move: an overview of recent trends in Latvia

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### Abstract

Youth migration is a relatively new but increasingly noticeable phenomenon in migration studies. The most significant life course events of the individuals usually move through numerous changes in the place of residence. Thus, youth migration as an age-related phenomenon shapes a series of key life course transitions – from education to work, from unemployment to employment, from youth to adulthood and family formation. There has been considerable number of previous studies on many of these aspects of youth mobility. However, existing research has been fragmented by focusing on particular groups (e.g. students, highly skilled workers) of youth migration. Moreover, relevant studies in Latvia are almost inexistent, despite the fact that many urban and rural areas are facing a significant drop in fertility rates and an overall ageing of the population. The proposed study analyses recent trends in youth (15 to 35 years of age) migration. The research question that we address in this study is whether there are distinctive compositional variations in migration behaviour, depending different flows. The focus of the study is both on internal and international youth migration taking place in the 12 month before the 2011 census. We are using individual level data from the recently released 2011 census round. Using multivariate methods, we analyse different flows of youth migration based on their compositional characteristics.

### Key words:

Youth mobility; internal migration; migration behaviour; life course transition; Latvia

## **Crisis, migration and Return: New Mobility of Young Spaniards and its Consequences**

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### **Abstract**

The deep economic crisis and its uneven impact on the different European countries have produced a dramatic shift in the map of migration flows. Young well-educated people from Southern European countries and Ireland, recent immigration countries and former emigration countries in the past, have been impelled to move to other European countries in order to find a job or to fulfill their career expectations. The short-term consequence is a certain relief of the pressure in origin labor markets, but also a profound feeling of deception in young people, especially in those with university degrees that may deter their return intentions. This process tends to increase the concentration of human capital in fewer areas. The consequences for countries of origin may vary depending on the duration of the process, whether these people return or not, the concrete region they return to, and if their experience is acknowledged and used in origin, so that it can have spread effects. We will approach these issues through the testimony of 30 young Spaniards returnees to the regions of Madrid and Andalucía. These interviews were framed in the H2020 European project YMobility. They were interrogated about the motivations and obstacles to return to Spain, the competences acquired, if their experience abroad was useful for their career in Spain and in which way this knowledge is having an impact in the current labor environment (work culture, international networks...). Affective factors, life style, confidence in the country and transferability of human capital will also be considered.

### **Key words:**

Youth mobility; return; human capital; brain drain; brain gain

## C12.18 Hazard and Risk

### Hazard and Risk

#### (Flooding)

#### Oral



Home

1. [Charting the Waterlogging Risk Rating Map of Beijing--Take Low-Lying Areas on Traffic Roads of Chang'an Avenue, Second and Third Ring Road for example](#)  
Zhenfa Li, Luming Qiao, Dongyu Zhang, Jing ai Wang (School of Geography, Beijing Normal University, China)
2. [Cyclone Warning Systems in Coastal Districts of Andhra Pradesh: A Case Study of Nellore District, India](#)  
Nagabhushanam Nagula (S.V.University, Tirupati, India)
3. [Exploring the Effects of Increasing Urbanization on Flooding: The Case Study of Xiang River basin, southeast China](#)  
Linlin Cheng, Juan Du, Yumeng Yang (Beijing Normal University, China)
4. [Flood Disaster Risk Analysis in Shanghai](#)  
Jiahong Wen, Shiqiang Du, Hui Xu (Department of Geography, Shanghai Normal University, China ),  
Jianping Yan
5. [Flood Hazard Resilience and Vulnerability of Bulgarian Mountain Regions](#)  
Mariyana Nikolova(NIGGG BAS,Bulgaria)
6. [Flood RISK Assessment in the SIDS: the First Steps Towards a Generic GIS-based Tool](#)  
Hanne GLAS, Philippe DE MAEYER, Greet Deruyter (Ghent University, Belgium)
7. [Hazard Zoning of Flash Flood in Wushan County under the Climate Change](#)  
Lin Xiaosong (Chongqing JiaoTong University, China)
8. [Hazard-formative Environment Compartments of Typhoon Disaster Chains Based on GIS Spatial Analysis - A Case Study of Guangdong Province, China](#)  
Zhang AnYu, Chai Mei, Yu Han, Wang JingAi(School of Geography, Beijing Normal University, China)
9. [Improvement to the Flooding Risk Assessment of Storm Surges by Residual Interpolation in The Coastal Areas of Guangdong, China](#)  
Xianwei Wang, Xina Wang (Sun Yat sen University, China)
10. [Research on Flood Risk in Medium and Small Basin during Urbanization —A case Study on the East](#)

[and West Streams Watershed in Xiamen](#)

Jie Xiang, Youpeng Xu, Jie Yang, Liu Yang, Yu Xu (Nanjing University, China)

11. [Risk Assessment of Flood Hazard in the Nepal Himalaya: Case Studies of Seti River, Pokhara and Tamakoshi River, Dolakha](#)

Bhabana Thapa (Hokkaido University, Japan)

12. [The Applicability of Remote Sensing Precipitation Data for flood events detection in Xiang River Basin, China](#)

Yumeng YANG, Juan DU (Academy of Disaster Reduction and Emergency Management, Ministry of Civil Affairs & Ministry of Education, Beijing Normal University, China)

13. [The May 5, 2012 Seti River, Nepal, Outburst Flood Disaster—Physical and Socioeconomic Causes](#)

Jeffrey Kargel, Gregory Leonard (University of Arizona, United States), Dhananjay Regmi (Himalayan Research Centre, Nepal)

14. [Tropical Cyclone Hazard Mapping Using Geospatial Techniques: Application to a Coastal Upazila in Bangladesh](#)

Muhammad Al Amin hoque, Stuart Phinn (Remote Sensing Research Centre, School of Geography, Planning and Environmental Management, The University of Queensland, Australia)

15. [Use of Remote Sensing for Verification of a Two-Dimensional Hydrodynamic Model for Flooded Areas](#)

Alexey Sazonov, Svetlana Agafonova, Natalia Frolova (Lomonosov Moscow State University, Faculty of Geography, Russian Fed)

## (landform and landslide)

### Oral

1. [Analysis of Progressive Failure Mechanism of the Dissolution accumulation horizon landslide under rainfall condition](#)

Jiao Wang (Institute of Mountain Hazards and Environment, China), Xiuyuan Yang (The Center for Excellence in Tibetan Plateau Earth Sciences, China), Peng Cui (Institute of Mountain Hazards and Environment, China)

2. [Application of Debris Flow Hazards Emergency Assessment Method](#)

Yan Yan, Peng Cui (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)

3. [Assessment of Landslides Susceptibility and Landuse/Landcover Analysis in Jos South Lga, Plateau](#)

[State, Northcentral Nigeria: A Gis Approach](#)

Olawale Oluwafemi, Shitta Nyofu, Mahmud Umar (Centre for Geodesy and Geodynamics, National Space Research and Development Agency, NIGERIA, Nigeria)

4. [Catastrophic Landslides Shape New Mountain Environment \(the Caucasus, Georgia\)](#)

Raisa Gracheva, Iliia Shorkunov (Institute of Geography of RAS, Russian Fed)

5. [Debris Flow Modeling for Susceptibility Mapping at Regional Scale in Himalayan region, INDIA.](#)

Anand Malik (SSN College (University of Delhi), India)

6. [Erzurum Ski Jumping Complex Landslide, 7 July 2014 \(Eastern Anatolia\)](#)

T.Ahmet ERTEK, Emre ELBAŞI, Ihsan BULUT (Akdeniz University, Turkey)

7. [Frequency Difference of Debris Flows Controlled By Fault in Alpine Region, Moxi basin, Southwestern China](#)

Yongbo Tie (Chengdu Center of China Geological Survey)

8. [Landslides and Vulnerability in East District of Sikkim](#)

Amrita Singh, Rakesh Kumar Ranjan (Sikkim University, India)

9. [Lithology and Geologic Structure Associated with Recent Landslides in Nepal](#)

Alina Karki (Nepal Society for Ecological Restoration, Nepal), Jeffrey Kargel (University of Arizona, United States), Dhananjay Regmi (Himalayan Research Centre, Nepal)

10. [Monitoring Hydrological Processes in Loess and Its Effect on Slope Instability Using Electrical Resistivity Tomography - A Case Study in the Heifangtai Terrace, Northwest of China](#)

Xingmin Meng, Runqiang Zeng, Fanyu Zhang, Siyuan Wang, Yi Zhang, Guan Chen (Lanzhou University, China), Zhijie Cui

11. [Natural Hazards in Mountainous Regions in Relation to Abundant Sediment Supply and Resultant Depositional Landforms](#)

Takashi Oguchi (The University of Tokyo, Japan), Daichi Kohmoto (Nara University of Education, Japan)

12. [North Tehran Faults and Seismic Hazard Assessment in Tehran city](#)

Parivash Karami (Kharazmi University, Iran)

13. [Properties of Snowpack Profile and Driving Factors of Snow Avalanche in the Tianshan Mountains](#)

Jiansheng Hao, Lei Bai (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China ), Osamu Abe

14. [Quantitative Morphology of Bedrock Fault Surfaces and Identification of Paleo-earthquakes](#)

Honglin He (, Zhanyu Wei (Key Lab. of Active Tectonics and Volcano, Institute of Geology, China Earthquake Administration, China), Alexander Densmore

15. [Regional Scale Landslide Risk Assessment in Data Scarce Area- a Case Study on West Kameng District, Arunachal Pradesh, India](#)

Kapil Ghosh, Sunando Bandyopadhyay (Department of Geography, University of Calcutta, India)

16. [The Assessment of Road Network Fragility Under the Duress of Slope Disaster in the Upper Reaches of Min River](#)

Shujun Tian, Xiaoyi Fan, Xinpo Sun (School of Civil Engineering and Architecture, Southwest University of Science and Technology, China)

17. [The Research of GLOFs \(Glacial Lake Outburst Floods\) in Cordillera Blanca, Peru](#)

Vít Vilímek, Adam Emmer (Department of Physical Geography, Faculty of Science, Charles University in Prague, Czech Republic), Jan Klimeš

18. [The Response of Debris Flow to Mountain Vertical Differentiation in Upper Min River](#)

Mingtao Ding, Xiating Lv, Cheng Miao (Southwest University of Science and Technology, China), Sergey A. Sokratov

## (vulnerability and assessment)

### Oral

1. [A Geographical Study of The Evacuation from Welfare Facilities for the Aged in the Case of a Tsunami Disaster](#)

Matsuo Toshitaka (Hokkaido University, Japan), Yuichi Hashimoto (Hokkaido University, Japan)

2. [Assessments and Suggestions for the Urban Construction and Industrial Development Based on the Cause Analysis on Water Related Hazards](#)

Lili NI, Shengwen HUANG (China Architecture Design Group, China)

3. [CO<sub>2</sub> Emissions from The Summer 2010 Forest Fires in Russia](#)

Meng GUO (Northeast Normal University, China)

4. [Community Resilience against Natural Hazards: Case Studies from the Pacific Islands](#)

Eberhard H. Weber (The University of the South Pacific, Fiji)

5. [Construction of Elderly Vulnerability Assessment Index System in Urban Community](#)

Ran Xu (Beijing Normal University, China)

6. [Do Spatial Heat Vulnerability Assessment Studies Influence Policy?](#)

Tanja Wolf (King's College London, United Kingdom), Wen Ching Chuang (Arizona State University, United States), Glenn McGregor (Durham University, United Kingdom)

7. [Drought Adaptation Capacity Assessment of Agricultural system---take Xingtai District in North China as an example](#)

Yanrui Shang, Qinghua Hu (School of Resources and Environmental Science, Hebei Normal University, China), Jingwen Ma (School of Resources and Environmental Science, Hebei Normal

8. [Global Agricultural Drought Vulnerability and Its Spatial Characteristics](#)

Jianjun WU, Guangpo GENG (Beijing Normal University, China)

9. [Land Use and Land Cover Change Detection and Its impact on Hydrological Hazards and Sustainable Development: a Case Study of Alaknanda River Basin, Uttarakhand, India](#)

Abhay Shankar Prasad, B.W. PANDEY (Department of Geography, Delhi School of Economics, University of Delhi, India, India), V. S. NEGI

10. [Managing Disaster Involving Community: A Case Study of Chamoli District, Uttarakhand, India.](#)

Suman Das (Shaheed Bhagat Singh (Eve.) College, University of Delhi, India), Ashis Kumar Saha (Department of geography, Delhi School of Economics, University of Delhi, Delhi., India)

11. [Measuring Social Vulnerability to Natural Hazards in Beijing: from the Perspective of Spatial Heterogeneity](#)

Jianyi Huang (BUU, China)

12. [Regional Feature Analysis of Natural Disaster Chains in Northeast China](#)

Ran Wang, Shujuan Cui, Jingai Wang (School of Geography, Beijing Normal University, Beijing 100875, China, China)

13. [Research on Vulnerability of Natural Disasters of tshe Elderly —A case Study in Beijing](#)

Liang Cai (Academy of Disaster Reduction and Emergency Management, Ministry of Civil Affairs & Ministry of Education, Beijing 100875, China; Key Laboratory Of regional Geography, Beijing Normal University, Beijing 100875, China, China), Shujuan Cui

14. [Risk and Resilience in Urban Area Under the Land Use Change](#)

Shigeko Haruyama (Mie University, Japan)

15. [Social Disparities in the Distribution of Air Pollution Risks: Comparing Perceptions and Exposure in Houston, Texas](#)

Jayajit Chakraborty, Timothy Collins, Sara Grineski, Alejandra Maldonado (University of Texas at El Paso, United States)

16. [The Geographic and Demographic Determinants of Mortality in the Great East Japan Disaster](#)  
Takashi Abe (Tohoku University, Japan)
17. [The Population in China's Earthquake-Prone Areas has Increased Significantly Along With Rapid Urbanization](#)  
Qingxu Huang, Chunyang He, Yinyin Dou (Beijing Normal University, China)
18. [The Use of Remote Sensing Data for Vegetative Drought Monitoring of Mountain Ecosystem \(Armenia\)](#)  
Vahagn Muradyan (The Center for Ecological Noosphere Studies National Academy of Sciences of RA, Armenia)
19. [Understanding Community Resilience to Tropical Cyclones in the Mahanadi Delta, India](#)  
Margherita Fanchiotti (University of Southampton and UNESCO)

## Poster

1. [10Be Exposure age Reveals a 12 ka Seismic Triggered Rock Avalanche in the Tibet-Bhutan Himalaya](#)  
Peng Xu; Liu Gengnian; Chen Yixin (China, College of Urban and Environmental Sciences, Peking University)
2. [A Study of the "11.2" Landslide-Debris Flow Characteristics of Chuxiong, Yunnan Province](#)  
Jiangcheng Huang; Guoqiang Ou; Jinfeng Liu (China, Key Laboratory of Mountain Hazards and Earth Surface Process, Institute of Mountain Hazards and Environment, CAS)
3. [Agricultural Accidents in a Segment of Lower Ganga Plain](#)  
Braj Raj Kumar Sinha (India, Department of Geography, Institute of Science, Banaras Hindu University)
4. [Analysis of Climatic Hazards of Iran](#)  
Manuchehr Farajzadeh (Iran, Tarbiat Modares University); Mehran Safa (Iran, Islamic Azad University, science and research branch)
5. [Analysis of Flood Risk Using Spatial Technology in the Southern Coastal Zone of Sri Lanka](#)  
Ashvin Wickramasooriya (Sri Lanka, Department of Geography, University of Peradeniya, Peradeniya, Sri Lanka)
6. [Analysis of Relations between Natural Disaster Resilience and Regional Socioeconomic Characteristics](#)  
Soyeon Pak; eunyeong jeon; Byun Byungseol (South Korea, Inha University)
7. [Analysis of the Peak Flow Dynamics Based on Information Technologies and Algorithms of the Automatic Hydrograph Separation](#)

Maria Kireeva (Russian Fed, Lomonosov moscow State University); Ekaterina Rets (Russian Fed, Water Problem Institute RAS); Natalia Ezerova (Russian Fed, Lomonosov moscow State University)

8. [Analysis of Vulnerability of Dam Failure Using GIS Technology](#)

Salamatu Abdullahi (Nigeria, Centre for Geodesy and Geodynamics, National Space research and Development Agency); Kayode Adepoju (Nigeria, Obafemi Awolowo University, Ile-Ife); Olawale Oluwafemi (Nigeria, Centre for Geodesy and Geodynamics, National Space research and Development Agency)

9. [Analysis on Susceptibility of Flood Disaster's Disaster-pregnant Environment in Honghu Basin](#)

Lei Wu; Youpeng Xu (China, Nanjing University); Yang Qian (China, Heifei University)

10. [Analyzing Changes to a River Network and its Storage Capacity Under Rapid Urbanization during the Past 50 Years in the Yangtze River Delta, China](#)

Yang Liu; Youpeng Xu; Yu Xu (China, Nanjing University)

11. [Assessment and Mapping of Sinkhole Susceptibility in Gypsum Karst Terrains \(study area: Yek-mahe sub basin, southwest of Iran\)](#)

Saffari Amir (Iran, Associate Professor, Department of Geographical Sci, Kharazmi University); Zakieh Mohammadi (Iran, Ph.D. Student in Geomorphology, Kharazmi University)

12. [Application of UAV Remote Sensing in Urban Atmospheric Environment Disaster](#)

Liu HuiLin (China, Anhui Normal University)

13. [Assessment of Tourist Risk Perception of Mountainous Rainstorm Hazard —Take Huayang Ancient Town Resort in Qinling Mountains of China as an Example](#)

Xiaofeng Wang; Sha Wang; Xianchao Huang (China, Shaanxi Normal University)

14. [China's Population Exposure Change Analysis under Rainstorm Disaster](#)

Weixia Yin; Yao Jiang; Yaoyao Wu (China, School of Geography of Beijing Normal University)

15. [Coal Mining and Rural Livelihood in Korba Coalfield, India: An Empirical Analysis Based on Livelihood Approach](#)

Pushpendra Singh; Dr. Falguni Pattanaik (India, Indian Institute of Technology Roorkee, India)

16. [Contamination and Health Risks of Arsenic and Heavy Metals at Different Land Use Types in Tianjin Qilihai Ancient Lagoon Wetland, China](#)

Lixiong Xiang (China, School of Geography & Environmental, Jiangxi Normal University)

17. [Coseismic Landslips and Associated Newmark Displacements in the Bhote Koshi Watershed of Central Nepal by the 25 April 2015 Gorkha Earthquake](#)

Megh Raj Dhital; Moti Lal Rijal (Nepal, Central Department of Geology, Tribhuvan University, Kirtipur, Kathmandu, Nepal); Samjwal Ratna Bajracharya (Nepal, International Centre for Integrated Mountain Development, Dhapakhel, Lalitpur, Nepal)

18. [Crop Drought Risk Assessment Based on Vulnerability Surfaces—A Case Study of Global Maize](#)  
Hao Guo; Xingming Zhang; Fang Lian (China, Beijing Normal University)
19. [Debris Flow Series in Kerala Western Ghats, India](#)  
Sreekumar Sankara Pillai; Arish Aslam (India, Christ College)
20. [Detecting Fire Disturbance and Monitoring Post-fire Vegetation Recovery in Greater Khingan Mountain](#)  
Xiaoyi Guo; Hongyan Zhang; Jianjun Zhao (China, School of Geographical Sciences, Northeast Normal University)
21. [Distribution of Debris Flows Along the Sichuan-Tibet Highway From Kangding to Qamdo](#)  
Yang Jia (China, Institute of Mountain Hazards and Environment)
22. [Ecological Sensitivity Analysis in Key Ecological Function Areas: Taking Wanan, Jiangxi province as a Case](#)  
Yu LI; Dingguo MA (China, Jiangxi Normal University)
23. [Extreme Precipitation on the Territory Mountain Crimea](#)  
Olena Todorova; Valeriya Ovcharuk (Ukraine, Odessa State Environmental University)
24. [Flood Inundation Mapping in Greater Dhaka District Using Satellite Data and Geomorphological Land Classification Map](#)  
Marju Ben Sayed (Japan, Mie University)
25. [Flood Risk from Extreme Water Level Driven By Sea-level-rise under the RCP Scenarios](#)  
Aiqing Feng; Shaohong Wu (China, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences)
26. [Floods Occurred by a Collapse of an Earthquake-Induced Dam, Gongar, Dolakha, Nepal in April 2015](#)  
Teiji Watanabe (Japan, Hokkaido University); Lalu Paudel (Nepal, Tribhuvan University); Yusuke Kobayashi (Japan, Hokkaido University)
27. [Fractal Dimension for Earthquake in Sichuan and Chongqing Based on GIS](#)  
Xu Gang (China, School of Geographical Sciences, Southwest University)
28. [Geohazard Map of Collapse Sinkholes in the Sahel of Doukkala-Abda \(Morocco\)](#)  
Elhassane Boumaggard; Elbchari Fatima (Morocco, Cadi Ayyad university)



29. [Goharrod River Flood Zone Determination within Rasht using GIS and HEC-RAS Hydraulic Model](#)  
Parviz Rezaei (Iran, Islamic Azad University-Rasht, Branch)
30. [Grassland Fire Spatiotemporal Pattern Evolution During 2000-2014 In China- Mongolia Border Regions](#)  
Narisu Narisu (China, Inner Mongolia Normal University)
31. [Hazard distribution Assessment of Debris Flow Alluvial Fan Based on Remote Sensing in Xiaojiao Valley](#)  
Li Yanji; Hu Kaiheng (China, IMHE)"
32. [Heat Waves in Romania. Regional Reatures and Changes](#)  
Adina-Eliza Croitoru (Romania, Babes-Bolyai University, Faculty of Geography)
33. [Impact of Rockfalls and Screens on Human Activity](#)  
Sergey Govorushko (Russian Fed, Pacific Geographical Institute)
34. [Inhabitants' Awareness of Prevention and Preparation towards Hazards in the Settlements along the Tamakoshi River, Dolakha, Nepal](#)  
Yusuke Kobayashi (Japan, Hokkaido University); Bhabana Thapa (Nepal, Hokkaido University); Teiji Watanabe (Japan, Hokkaido University)
35. [Kosi Flood Disaster and its Impact on Women: A Case Study of Kheriya Village, India](#)  
Sumita Kumari (India, Banaras Hindu University)
36. [Landslide Susceptibility Assessment By the Statistical Index Method and the Analytic Hierarchy Process technique](#)  
Guifang Zhang; Zhuo Zheng; Yixi Cai (China, Sun Yat-sen University)
37. [Monitoring of Hydro Geological Conditions around Nuclear Power Station in Permafrost Areas in Russia](#)  
Yaroslav Egorov; Olga Khlebosolova (Russian Fed, The Russian State Geological Prospecting University)
38. [Moraine-dammed Lake Distribution and Outburst Flood Disaster Risk in the Chinese Himalaya](#)  
Wang shijin (China, Cold and Arid Region Environment and Engineering Research Institute, CAS)
39. [Multi-Level Analysis of Vulnerability to Flooding in Lagos Metropolis, Nigeria](#)  
Olutoyin Fashae (Nigeria, Department of Geography, University of Ibadan); Adeyemi Olusola (Nigeria, Department of Geography, Osun State University, Osogbo, Nigeria)
40. [Potential GLOF Hazards and Initiatives Taken to Minimize Its Impacts on Downstream Communities](#)

[and Infrastructures in Nepal Himalaya](#)

Dhananjay Regmi (Nepal, Himalayan Research Center); Jeffery S Kargel; Gregory Leonard (United States, University of Arizona)

41. [Quantitative assessment on regional risk of debris-flows, case study: Southwest China](#)  
Guangxu LIU, Erfu DAI, Xinchuang XU, Wenxiang WU, Aicun XIANG(Gannan Normal University, Ganzhou, China)
42. [Rainfall Aggressiveness in Relation to Morphological and Hydrological Processes in the Margin of the Eastern Himalaya](#)  
Pawel Prokop (Poland, Institute of Geography and Spatial Organization, Polish Academy of Sciences, Department of Geoenvironmental Research, Jana 22, 31-018 Krakow); Adam Walanus (Poland, AGH University of Science and Technology, Department of Geoinformatics and Applied Computer Science, Krakow)
43. [Reconstruction Processes of the Radioactive Contamination Area in Fukushima, JAPAN](#)  
Masayuki Seto (Fukushima University); Akira Takagi (Kumamoto Gakuen University)
44. [Relationships Between the Loess Slide Size, Slope Relative Height and Slope Gradient within Different Slip Surfaces](#)  
Haijun Qiu (China, Northwest University)
45. [Research on the Driving Force of Soil Salinization and Ecological Risk Assessment in the Yellow River Delta](#)  
Jianrong Cao (China, Liaocheng University)
46. [Research on Time and Space Symmetry in Earthquake Disaster](#)  
Junping Yan; Pengtao Wang (China, College of Tourism and Environment, Shaanxi Normal University)
47. [Resilience to Green Famine: Dimensions, Magnitude and Ethno-culture Disparity in the Green Famine Belt](#)  
Guyu Ferede; Muluneh Wolde-tsadik (Ethiopia, Addis Ababa University)
48. [Rock Fall Hazard and Risk Assessment Along Araniko Highway, Central Nepal Himalaya](#)  
Amar Deep Regmi (Nepal, Institute of Mountain Hazard and Environment, Chinese Academy of Sciences); Cui Peng (China, Institute of Mountain Hazard and Environment, Chinese Academy of Sciences); Megh Raj Dhital (Nepal, Central Department of Geology, Tribhuvan University, Nepal)
49. [Spatial and Temporal Pattern Discovery for Fire in China Using Statistical Probability Distribution](#)  
Bin Li (China, RADI)

50. [Spatial Characteristics Analysis and Potential Risk Evaluation of Heavy Metals in Jiaojia and Jincheng Mining Areas of Shandong Province, China](#)  
Fei WANG; Quanyuan WU; Jianshu LV (Shandong Normal University, College of Geography and Environment)
51. [Spatial Characteristics of Physical Environment for Human Settlements in Jinsha River Watershed \(Yunnan Section\), China](#)  
Jisheng Xia (China, Yunan University)
52. [Spatiotemporal Analysis of Typhoon Disaster Chains in Southeast China](#)  
Mingyue Zhao; Jian Peng; Jitao Wang (China, Laboratory for Earth Surface Processes, Ministry of Education, College of Urban and Environmental Sciences, Peking University)
53. [Study on Early-warning of Typical Regional Coastal Zone Carrying Capacity in the Beibu gulf, Guangxi, Southern China](#)  
Xinxian Huang (China, Guangxi Teachers Education University)
54. [Study on Monitoring for Soil Sodium Chloride Content Based on Hyperspectral Reflectance](#)  
Cao Wentao (China, Shandong Normal University)
55. [The Distribution of Educational Infrastructure on The Vulnerable and Areas of of Potential Disaster in Metropolitan Bandung Area](#)  
Nandi Nandi; Enok Maryani; Jupri Jupri (Indonesia, Universitas Pendidikan Indonesia)
56. [The Impact of Climate Changes on the Coastline of the State of Kuwait](#)  
Ahmed Hassan (Egypt, Ain-Shams University)
57. [The Livelihood Vulnerability of Rural Households in Earthquake-stricken areas—a Case Study of Ning'er, Yunnan province](#)  
Benyong Wei; Guiwu Su (China, Institute of Geology, China Earthquake Administration)
58. [The Research on Flood Disaster Risk Zoning in Chaonan District of Shantou](#)  
Wang Hang; Qin Fun (China, Henan University)
59. [Variability of Geotechnical Parameters of Slope Covers and Its Influence on Landslide's Vulnerability – Case Study from Polish Flysch Carpathians](#)  
Anna Bucala (Institute of Geography and Spatial Organization PAS); Tymoteusz Zydroń; Andrzej Gruchot (Department of Hydraulic Engineering and Geotechnics, University of Agriculture in Cracow)

## Charting the Waterlogging Risk Rating Map of Beijing: Take Low-Lying Areas on Traffic Roads of Chang'an Avenue, Second and Third Ring Road for Example

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### Abstract

The rainstorm waterlogging is one of the most typical natural disasters that endangers city safety, and it has caused great concern of all parties. This study takes low-lying areas on traffic road of Chang'an Avenue, Second and Third Ring Road as the research object, combines hazards risks, stability of fostering environment, fragility of exposures, uses Analytic Hierarchy Process (AHP) to calculate waterlogging risk rate and generates the waterlogging risk rating map under different scenarios. With data of precipitation in long time series, ground elevation, traffic flow and other aspects, our main findings are as follows: ① Under the same precipitation return period, the risk level of the low-lying areas gradually increases with the antecedent soil moisture condition changing from ACM1 to ACM3. Under the same antecedent soil moisture condition, the risk level of the low-lying areas increases with the precipitation return period increasing. ② Jianguomen Bridge to Zuoanmen Bridge in east of Second Ring Road and northeast of Third Ring Road are the high risk areas of the research. Rapid assessment of city waterlogging risk can provide scientific instruction for waterlogging disaster warning and risk prevention.

### Key words:

traffic roads; disaster system; waterlogging risk level; precipitation return period; antecedent soil moisture

## **Cyclone Warning Systems in Coastal Districts of Andhra Pradesh: A Case Study of Nellore District, India**

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### **Abstract**

Among all the coastal districts of Andhra Pradesh, the Southernmost is the Nellore district. It is very prominent with a lengthy coastline of 165 kilometres lying adjacent to Bay of Bengal. The district was exposed to repeated and more number of cyclonic storms of severe intensity accompanied by storm surges, caused unmeasurable devastation of people, livestock, settlements, crops, soils, properties etc. This loss can be prevented by the application of timely available efficient Cyclone Warning Systems (CWS), creating proper awareness among the people about disasters and their likely impact and adopting appropriate advance measures for disaster reduction. Since, a sound early warning system is a prerequisite for effective disaster management, the state of art of forecasting and warning by Indian Meteorological Department (IMD) in mitigating the intensity of disasters in various parts of the country is briefly discussed and the cyclone warning process in coastal Andhra Pradesh, the mode of dissemination of warnings and cyclone warning centres established in the district and their functionaries are discussed in detail in the present paper.

### **Key words:**

Cyclone Warning; Disasters; Indian Meteorological Department; Prof. N.Nagabhusanam

## Exploring the Effects of Increasing Urbanization on Flooding: The Case Study of Xiang River Basin, Southeast China

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### Abstract

Land use changes in space and time tremendously affect the hydrological, ecological and environmental processes in rapid urbanization basin. The increase in impervious areas reduces basin lag time and may lead to higher flood peaks. The present study examined the effects of land use changes associated with urbanization on basin flood peaks and flood volumes of the 55 sub-basins of Xiang River in Hunan Province, China, by using the HEC-HMS hydrological model. The model was calibrated and validated using observed daily streamflow data and flood events records. Land use changes before and after rapid urbanization in the basin for the year 1980 and 2010 were analyzed. The analysis revealed that the lower basin experienced a rapid urbanized process and there was an obvious increase in the built-up area of Changsha-Zhuzhou-Xiangtan economic zone from 1980 to 2010. The simulation results of HEC-HMS model for 1980 and 2010 land use scenarios indicated that flood peaks and flood volume have increased within the lower Xiang River basin, especially in the Changsha-Zhuzhou-Xiangtan economic zone. And the frequency of small floods increased in post-urbanization than that in pre-urbanization period in Xiang River basin. The phenomenon implied the positive relationship between ongoing urban expansion and increased flood risk. The results of the study can provide useful information for rational land use planning and urban flood risk management.

### Key words:

Urbanization; HEC-HMS; flood peaks; flood volume; Xiang River basin

## Flood Disaster Risk Analysis in Shanghai

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### Abstract

Located on the Yangtze River Delta alluvial plain, Shanghai is low-lying and surrounded by waters, and Huangpu River and Suzhou Creek pass through the city. Such a geographical environment makes Shanghai prone to floods (waterlogging, coastal floods, riverine floods). The future climate change and rapid urbanization will makes Shanghai become one of the cities with rapid increasing flood risk. The urban areas was 3 km<sup>2</sup> in 1840, 86 km<sup>2</sup> in 1949, and reached up to 2968 km<sup>2</sup> in 2009. Over 260 rivers, with a length about 470 km disappeared in center district of Shanghai during the past 140 years. The total river drainage capacity reduced by 80%. The population increased from 5 million in 1950 to 25 million in 2015, with a density of 3900 people per square kilometer. Rapid urbanization results in: (1) More people, properties and infrastructures exposed to floods; (2) dramatic increase in impervious surfaces and reduction of river drainage capacity.; (3) more intensive "Rain Island Effect", and thus more urban torrential rainstorms. The maximum 1-hour precipitation has increased significantly since 1980. Shanghai has been subject to land subsidence since the 1920's. The maximum subsidence over the last century is up to 3 m. The annual maximum high tide has an increasing trend, and sea level rise and land subsidence increases the risk of urban floods. More work for identification, analysis and evaluation of flood risk in Shanghai, especially for the black swan events are urgently needed.

### Key words:

flood disaster; risk analysis; urbanization; climate change, Shanghai

## Flood Hazard Resilience and Vulnerability of Bulgarian Mountain Regions

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### Abstract

Climate change and related changes in intensity and frequency of climate extremes pose serious challenges to prevention and management of natural hazards in mountain territories. Flood hazard management needs specific approaches in mountain regions, which should be in accordance with both their vulnerability to climate change impact and their resilience in respect of existing land management practices. An integrated regional approach for assessment of mountain's vulnerability to flood hazard and resilience of mountain communities to it is proposed. Discussed are issues related to EU policy for flood risk management, geographical specificities of mountain regions, observed and projected extremes according to the regional climate change projections for different time horizons and potential flood risk. Indicators based Flood Vulnerability Index is calculated for Bulgarian mountain territory. In conclusion are outlined priority areas in which to pursue regional policy for flood risk management under conditions of climate change in mountain regions of the country.

### Key words:

mountain regions; climate change; natural hazards, vulnerability; resilience

## Flood Risk Assessment in the SIDS: The First Steps Towards a Generic GIS-Based Tool

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### Abstract

Natural hazards cause devastating economic losses worldwide. The SIDS (Small Island Developing States) are characterised by a high vulnerability and a low resilience to these hazards, due to their geographic, political and economic fragile situation. Flooding is one of the most common hazards in these regions, triggered by heavy rainfall, hurricanes and tropical storms. The limited resources and funds available must be allocated as efficiently as possible. Therefore, an oriented approach on minimizing the consequences of flooding is necessary. A flood risk assessment calculates the expected damage cost from inundations and indicates the high risk areas. This research aims to develop such a flood risk tool, applicable for all SIDS. A first assessment was carried out in Annotto Bay, Jamaica, where a flood damage map was created showing the building, road and crop damages from an inundation in 2001. Since data availability is a major issue in developing countries, determining a basic set of indispensable input data, necessary to achieve an accurate result, is a main focus in this research. Furthermore, the use of satellite imagery as an added value in order to achieve a higher accuracy is investigated. The methods that were used in the Annotto Bay case study will be tested in other countries in the SIDS, in order to derive a generic, user-friendly flood risk tool that is applicable for all low-lying, densely populated, coastal areas.

### Key words:

Flooding; natural hazards; SIDS; risk assessment; vulnerability; damage calculations

## Hazard Zoning of Flash Flood in Wushan County under the Climate Change

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### Abstract

Flash flood is a serious threat to people's life and property security. In recent years, a series of flash flood disaster led to a series number of casualties and property losses, which seriously hampered the sustainable development of the socio-economic in mountain areas. China is a mountainous country, and mountainous area counts for 2/3 of the total land area. Complicated geological and topographical conditions, climates with severe storms, dense population and human activities have led to frequent mountain floods and thus caused huge casualty and property losses. With Wushan County in Chongqing as a research scope, in accordance with the characteristics of the formation of flash flood disasters in mountain areas, this paper establishes a flash flood hazard zoning index system based on the micro landforms, topography and slope position, surface runoff accumulation and vegetation coverage, and under the ArcGIS platform support, get the index data of study area by the appropriate methods, calculates the flash flood hazard comprehensive index of every grid cell by using the flash flood hazard zoning model, after that get the results of synthetic regionalization in Wushan County. The results of flash flood disasters research can provide a decision-making basis to Wushan County for preventing and mitigating the flash flood disasters, meanwhile also can provide reference to urban planning in Wushan County.

### Key words:

flash flood; hazard zoning; Wushan County

## Hazard-formative Environment Compartments of Typhoon Disaster Chains Based on GIS Spatial Analysis - A Case Study of Guangdong Province, China

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### Abstract

Hazard-formative environment compartments are the basis for integrated disaster risk study. In this paper, we compartmentalized three basic units, namely coastal areas, inland plains and inland mountainous areas, by analysing coastline, DEM, and slope data of Guangdong Province with GIS technology. These three basic units respectively correspond to three typhoon disaster chains, which are typhoon – storm surge – flood, typhoon – rainstorm – flood and typhoon – rainstorm – landslide/debris flow. On the basis of the three units, drainage density data was used to precisely compartmentalize the areas where storm surge, flood and landslide/debris flow disasters more likely take place. The compartment results indicated that area of the hazard-formative environment of three typhoon disaster chains are 13,561 km<sup>2</sup>, 99924 km<sup>2</sup> and 111751 km<sup>2</sup> respectively. To test the result, we collected 72 damage cases of typhoon in Guangdong Province during the years from 2010 to 2015 on news records and spatialized as verification points to make cross-validation. The validation result indicated that the overall accuracy reached 83.3% and the kappa coefficient is 0.705. We believe this result will provide significant reference for the further research on vulnerability and risk studies of typhoon disaster chain.

### Key words:

typhoon – storm surge – flood disaster chain; typhoon – rainstorm – flood disaster chain; typhoon – rainstorm – landslide/debris flow disaster chain; hazard-formative environments compartments; Guangdong Province

## Improvement to the flooding risk assessment of storm surges by residual interpolation in the coastal areas of Guangdong, China

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### Abstract

The coastal areas of Guangdong Province, China are susceptible to tropical cyclones and storm surges. The projected global warming, coastal subsidence and sea level rise together will bring about great flooding risk to these areas. Previous studies on flooding risk assessment directly interpolate the extremely total storm tide height at limited standard tide gauge stations into elevation grids covering the large study areas and normally have great uncertainties due to the spatial heterogeneity of storm tidal heights. This study develops a residual interpolation to estimate the extreme storm tide height based on the long-term observations of extreme storm tidal heights at the standard tide gauge stations and the astronomical tidal features of numerous additional tide stations in the Guangdong Province, China. The extreme storm tide height consists of the diurnal and semidiurnal astronomical tide and the storm surge. Over ten standard tide gauge stations with long-term observations of tidal heights are applied to compute the extreme storm tidal heights, the astronomic tidal heights and the storm surge heights at seven return periods (T) from 2, 10, 20, 50, 100, 200 and 500 years. The residuals between T years and 2 years computed from the long-term observations at standard tide gauge stations are interpolated into numerous additional tide stations and form the extremely total storm tide heights, which are further interpolated into elevation grids for inundation modeling. A static inundation model is used for flooding analysis. The residual interpolations can better capture the spatial variability of the storm tide than the traditionally total tide height interpolation. Accordingly, the flooding risk uncertainty is greatly reduced by the residual interpolation based on the astronomical tidal features of numerous additional gauges, thus offering better supports for coastal development planning and flooding hazards risk management.

### Key words:

Flooding risk; Storm tides; Storm surges; Residual interpolation; Guangdong Province

## Research on Flood Risk in Medium and Small Basin during Urbanization: A case study on the East and West Streams Watershed in Xiamen

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### Abstract

With the rapid development of economy and the accelerating urbanization process in recent years, the disaster caused by frequent floods has become one of the major natural disasters in southeast coastal urbanization cities, which has threatened the safety of life and property. Therefore, it's urgent to implement the flood risk research in small basin under the background of urbanization. In this paper the East and West Streams Watershed in Xiamen were taken as study area. Based on the spatial analysis of GIS and the two-dimensional hydrodynamic model named MIKE21, this paper combined the rainstorm flood frequency analysis with plain flood submerging simulation, to proceed the flood risk analysis, to simulate the submerged conditions of the study area under strong flood, to evaluate the flood risk degrees in this area, and finally to create dynamic flood hazard mapping of the East and West Streams Watershed in Xiamen. The research supports to the flood control and disaster mitigation in study watershed. Meanwhile, it provides helpful references to the flood hazard analysis for the small watershed of southeast coastal areas.

### Key Words:

Flood Risk Analysis; Two-dimensional Hydrodynamic Model; Submerging Simulation; Flood Hazard Mapping; The East and West Streams Watershed in Xiamen

## **Risk Assessment of Flood Hazard in the Nepal Himalaya: Case Studies of Seti River, Pokhara and Tamakoshi River, Dolakha**

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### **Abstract**

The Seti River suddenly flooded rural areas in the Pokhara on 5 May, 2012. The flood killed 32 people and left 40 missing. Meanwhile, Nepal's 2015 earthquakes killed over 9,000 people and injured more than 23,000. The aftershocks might cause a glacial lake outburst flood from the Tsho Rolpa (one of the most dangerous glacial lakes in Nepal). The main objectives of this study are to map flood hazard risk; and to analyze community profiles and to assess communities' vulnerability in Seti River, Pokhara and Tamakoshi River, Dolakha to mitigate future flood hazards to be caused by the similar events recently occurred. The first study area is the Seti River basin with the altitudinal range from 812 m to 1,511 m, which covers from Jamire Bari to Ramghat Kaski districts. The second study area is the Tamakoshi River basin with the altitudinal range from 2,216 m to 4,595 m, covering from Tsho Rolpa (glacial lake) to Kunaure ghat. This study first conducted a flood inundation mapping, and then conducted social surveys. The flood inundation map was prepared by the existing topographic maps, by the detailed topographical survey at 1 m contour level, and by calculation using software HEC-RAS and ArcGIS. This study adopted a number of different approaches of social survey such as interviews, focus group discussion, questionnaire survey, and field observations. We interviewed 163 households in the Seti River basin and 300 households in the Tamakoshi River basin.

### **Key words:**

Flood hazard; inundation mapping; risk assessment; questionnaire survey

## The Applicability of Remote Sensing Precipitation Data for flood events detection in Xiang River Basin, China

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### Abstract

Flood, as one of the most globally hazardous natural disaster, causes huge loss and casualties every year. A well understanding of the extreme stream flow is significant to identify the potential floods thus achieves the goals of disaster monitoring and risk management. The remote sensing precipitation data with high spatial-temporal resolution have been proved to be potential alternatives to the gauged data, which are sparse or even unavailable in some places. There are 756 national meteorological stations in China, the precipitation data of which are available to the research. But only 14 out of the stations are located in the Xiang River Basin, with an area of about 90,000 km<sup>2</sup>. Obviously the scarce precipitation gauge data can hardly satisfy the need of the flood discharge simulation of the basin.

The preliminary work of this study is to evaluate the usefulness of satellite-based data to flood monitoring by forcing the HEC-HMS hydrological model with the TRMM 3B42 V7 precipitation data, and to find whether the simulated discharge can denote the rare special flood events in Xiang River basin, a sub-basin of Yangtze River basin. Results indicate that the TRMM precipitation data can be successfully used in detecting the rare flood events in spite of some biases of the time and magnitude of the flood peak comparing with the historical records. Further study will focus on estimating the success rates of TRMM precipitation data to flood events detection considering the whole time series (1999-2012) and different spatial distributions, in order to verify the applicability of the TRMM precipitation data as the hydrological input forcing data in simulating the hydro-process in scarce gauged area.

### Key words:

precipitation; TRMM; flood events detection; HEC-HMS model

## The May 5, 2012 Seti River, Nepal, Outburst Flood Disaster—Physical and Socioeconomic Causes

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### Abstract

On May 5, 2012, a hyperconcentrated slurry flood slammed into tourists, gravel workers, and small villages along the Seti River, north of Pokhara, taking 72 lives. Clues to the mysterious disaster are lack of rainfall, youtube videos of the disaster, and video capture of an immense dust cloud high within the Sabche Cirque nestled among Annapurna peaks. Two weeks later the first author made an overflight and found an ice-rock landslide sourced near Annapurna III. The landslide's initial impact generated a small earthquake. Satellite data revealed the disaster pathway and pre-event conditioning. In the weeks or months before the disaster a rockfall had taken place in the Seti Gorge and blocked the Seti River. Furthermore, satellite thermal imagery indicated that the lower snowfields and glaciers were likely undergoing spring melting. Collapse of cornice ice most likely initiated the mass movement. The ice avalanche mobilized rock debris and wet lower snowfields and icefields, and maybe ingested small supraglacial ponds and meltwater stored somewhere, apparently including a rockfall dammed lake within the Seti Gorge. 6300 m of descent of the rock-ice-water mass generated further heat, which melted much entrained ice/snow mass. A sediment-laden avalanche wind plastered mud across the Sabche Cirque; the impoundment in the gorge pastured mud onto the gorge walls. The event was a classic sturzstrom according to German/Swiss literature. A climate change attribution is tenuous, but plausible considering the role of spring thaw. Increasing human exposure is a bigger factor in the deadly toll.

### Key words:

Nepal; Seti River; Outburst flood; disaster; glacier; Himalaya; climate; hazard

## Tropical Cyclone Hazard Mapping Using Geospatial Techniques: Application to a Coastal Upazila in Bangladesh

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### Abstract

Tropical cyclones are one of the most dangerous and devastating natural disasters, regularly affecting coastal areas around the world. The intensity and extent of damage due to tropical cyclones are very high. An appropriate mapping approach is essential for producing detail hazard assessments to plan for and reduce the impacts of cyclones on people, property and environment. This study developed and tested a hazard mapping approach for tropical cyclone impacts in Sarankhola Upazila, a 151 km<sup>2</sup> local government area, located in coastal Bangladesh. The study integrated remote sensing, field data and multi-criteria evaluation at local scales. Four criteria associated with cyclone hazard impacts were assessed: storm surge height, cyclone wind speed, cyclone frequency and precipitation intensity. Thematic raster map layers quantifying the level of hazard were prepared using Analytical Hierarchy Process (AHP) approach. A weighted overlay technique was used for overlaying standardized maps for each of the four input hazard criteria with their weights to produce the final hazard map. Our results indicated that 15% of the study area was located in the very high hazard zone, mostly close to the coastal river, with 25 % area as high hazard zone and around 18 % area was at moderate hazard zone. The area was classified as low and very low hazard zone accounts the 16% and 26% respectively. This approach provided very promising result and it was verified by field survey. Our findings indicate this approach has potential to assess the cyclone hazard in the affected countries for the purposes of disaster planning and management.

### Key words:

Tropical Cyclone; Hazard; Remote sensing; Spatial analysis; Analytical hierarchical process

## Use of Remote Sensing for Verification of a Two-Dimensional Hydrodynamic Model for Flooded Areas

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### Abstract

There are more than 700 cities and towns, thousands of villages and settlements, and more than seven million hectares of agricultural land of the Russian territory are exposed to a risk of flooding. Results of flood modeling for three cities located in different parts of Russia: Veliky Ustyug at Northern Dvina river (Europe); Yakutsk at the Lena river (Siberia) and Blagoveschensk at the Amur river (Far East) are presented. The two-dimensional hydrodynamic model of flow in channels and on floodplain STREAM\_2D on the basis of the numerical solution of two-dimensional Saint-Venant equations was used for the simulations. One of the major challenges in mathematical modeling is the verification of the model. This is usually made using data on water levels from hydrological stations: the smaller the difference of the actual level and the simulated one, the better the quality of the model used. Alternative sources of verification, e.g. remote sensing, should be used where data is unavailable. Flooded areas obtained from hydrological modeling and satellite images interpretation have been compared. Satellite images made by optical and radar sensors: SPOT-5/HRG, Resurs-F, Radarsat-2 were used. Flooded areas were calculated using unsupervised classification for satellite images. Verification of the model through a comparison of simulated inundated areas with outlines of flooded zones from satellite images for known hydrologic situations demonstrate close correspondence (relative errors of 7-10% in terms of the area for peaks of the analysed floods). This study was supported by the Russian Science Foundation, project no. 14-17-00155.

### Key words:

flood; two-dimensional hydrodynamic model; remote sensing; dangerous hydrological processes

## Analysis of Progressive Failure Mechanism of the Dissolution accumulation horizon landslide under rainfall condition

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### Abstract

Under rainfall or earthquake conditions, karst accumulation bodies on the slopes were easily triggered and transform into landslides which may lead to major disasters. Huluqiao landslide, occurred in Longtoushan mountain before Ludian 8·03 earthquake, went through obvious deformation process, did not cause any casualties of residents or passing vehicles due to the success of early warning. Based on field investigation and lab analysis, this landslide was identified as a progressive failure type according to the characteristic of its slope deformation vs. failure time curve. Steep slope, loose structure and low intensity of the accumulation horizon provided favorable environment for landslide formation. Long duration rainfall with high intensity caused the rock and soil particles to flow and rupture inside the sliding area at micro scale. At the same time, the flow and micro rupture play imperative roles in the macro deformation and failure of slope. The rainfall infiltrated into landslide along the surface of the accumulation mass, formed conflux transfixion at the interface between the soil and rock where backwater was formed. The backwater reduced the soil strength and introduced dynamic uplift force in the landslide. Meanwhile, with the rainfall filled in the cracks and the weak structural planes, the dynamic expanding force was induced and the tension crack was enlarged. As a results, the deformation of the accumulation mass was intensified. Revealing the mechanism of such landslide provided support to the slope stability assessment at regions with similar geological condition and laid the guideline for early warning of such landslides.

### Keywords:

Karst accumulation landslide; Sliding mechanism; Rainfall; Dissolution

## Application of Debris Flow Hazards Emergency Assessment Method

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### Abstract

Emergency assessment is extremely useful in urban hazard reduction and post-hazard reconstruction at hazard prone region. It is also imperative to the development of sustainable society at mountainous countries. In this paper, we have developed a debris flow emergency hazard assessment method and its application. This method was based on the analysis of the unmanned aerial vehicle aerial photography data. From the aerial photographs, the information on sediment thickness and diameter of the large particles in debris flow deposition zone were extracted and analysed. This information allowed us to retrieve flow path, and dynamic parameters of debris flow including velocity, impact force, and momentum of debris flow. The availability of these debris flow parameter can be used to derive a quantitative analysis of destructive degree due to debris flow in its deposition area, as well as to carry out the rapid assessment of hazard. This proposed method could carry out dynamic inversion for specific location over the whole area, and make a quantitative analysis of the damage within the debris flow deposition zone after the hazards. The application of this method will be very instrumental for the post hazards relief and reconstruction operation. As a case study, the method is applied to the quantitative analysis of a specific debris flow event in Wenchuan earthquake area.

### Key words:

debris flow; hazards emergency assessment; dynamic inversion; degree of damage

## Landslides Susceptibility in A Traditional Nigerian City: A Remote Sensing Approach

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### Abstract

As a result of dearth of relevant information about Landslide Susceptibility in Nigeria, the monitoring and assessment appears intractable. Hence, the study developed a Remote Sensing approach to map landslides susceptibility, landuse and landcover analysis in Jos South LGA, Plateau State, Nigeria. Field Observation, SPOT 5 2009 and 2012, ASTER DEM 2009, Geological Map 2006, Topographical Map 1966 was used to map Landslide Susceptibility and Landuse /Landcover Analysis in the study area. Geospatial Analytical Operations employed using ArcGIS 10.3 and Erdas Imagine 2013 include Spatial Modeling, Vectorization, Pre-lineament Extraction Image Processing among others. Result showed that 72.38 % of the study area is underlain by granitic rocks. The landuse/cover types delineated for the study area include flood plain (29.27 %), farmland (23.96 %), sparsely vegetated land (15.43 %), built up area (13.65 %), vegetated outcrop (8.48 per cent), light vegetation (5.37 %), thick vegetation (2.39 %), water body (0.58 %), plantation (0.50 %) and mining pond (0.37 %). Landslide Susceptibility Analysis also revealed that 87 % of the study area is relatively at low to very low risk of landslide event. While only 13 % of the study area is at high to very high risk of landslide event. The study revealed that the susceptibility of landslide event is very low in the study area. However, possible landslide event in the hot spots could be pronounced and could destabilize the natural and man-made environmental systems of the study area.

### Key words:

Landslide Susceptibility, Geo-information, Jos South, Nigeria;

## Catastrophic landslides shape new mountain environment (the Caucasus, Georgia)

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### Abstract

Being a part of global process of the earth surface denudation, transportation and irrecoverable mass wasting by catastrophic landslides is of vital importance for mountain environment and population causing change of watercourses, a dramatic reduction of biodiversity and population outflow. Subsequent environmental evolution in damaged regions is not always predictable. That is especially important when landslide excavates and brings to the surface rock material that is not typical for the area.

Landslide hazard is extremely high in Georgia. Local population often adapts stabilized great slumps for agricultural needs because they contain a great volume of dispersed mineral matter. The latter is highly important in the mountain region with limited land and strongly eroded soils. 25 years ago, in the densely populated forested region of Adjara (Minor Caucasus) catastrophic landslides excavated alkaline material changing properties of geochemical landscape. Over the past years calcicole plants became dominant replacing endemic species, and *species* homogeneity resulted in homogenous environment; local waters which before were of low mineral content, in new environment are much more mineralized.

Adaptation of “alkaline landslide” for human needs requires special remediation measures. Composition of landslide body has to be tested for revealing the probability of including it in land use. (Researches were supported by Russian Scientific Foundation, Project 14-27-00133)

### Key words:

Landslides; alkaline rocks; environment homogenization

## Debris Flow Modeling for Susceptibility Mapping at Regional Scale in Himalayan Region, INDIA

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### Abstract

The first assessment of debris flows susceptibility at regional scale was performed in Kullu Manali region of North Himalaya in India where 500 landslides were reported in two days (Times of India, March 11, 2011). The complexity of phenomena and variability of local controlling factors limit the use of process based models for first assessment. The GIS based approaches associating an automatic detection of the source areas and assessment of the debris flow spreading may provide a substantial basis for a preliminary susceptibility assessment at regional level. The discrimination of source areas is based on an index approach, which includes three topographic parameters (slope, contributing areas, and curvature) and hydrological settings. The debris flow run out was estimated using a process and GIS based model Flow\_R (IGAR, University of Lausanne), which is based on combined probabilistic and energetic algorithms for the assessment of the spreading of the flow and maximum run out distances; where the first results for different test areas have shown that run out distances can be modeled reliably and can be useful to determine which areas need to be prioritized for detailed studies.

### Key words:

Debris flow;Flow\_R;Landslide

## Erzurum Ski Jumping Complex Landslide, 7 July 2014 (Eastern Anatolia)

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### Abstract

Landslides, generally in slope, the rock, soil or debris down the slope, under the influence of gravity is moving in the direction of the slope. Each year, many people lose their lives due to landslides and excess material damage is seen. Among the causes of landslides, such as excessive rains, earthquakes, volcanic activity and anthropogenic influences or a combination of these effects can be shown. According to USGS, due to landslides, \$ 2 billion in property damage occurs each year only in the United States.

Our study area which is located in Erzurum Plain is on Kiremitlik hill in the Eastern Anatolia. The ski jumping ramps and runways were built on Kiremitlik hill with \$ 67 million budget in 2011 for the 25th Winter Universiade. Two landslides were occurred on slope of jumping ramps and runways in firstly 7 July 2014 and triggered again 15 July 2015. In the first landslide, ski jumping complex and facilities where the towers are, are completely unusable. The natural and antropogenic cause of this landslide has been tried to present by this study. It was utilized in previous studies, reports and satellite images in this study. There's an ongoing lawsuit case relating to the region and therefore are factors that restrict the field of research to be closed to visitors.

Kiremitlik Hill which is an anticline structure, is limited to the north and south with the faults. In addition, this anticline is fragmented with active faults. Pliocene geological formation which was named Gelinkaya Formation (tuffs and basalt blocks) being overlain by Quaternary alluvium constitutes Kiremitlik Hill. Erzurum Ski Jumping Towers and Runways Landslide occurred in slipping into suitable geological structure and erroneous engineering applications result. Prior to the construction of the area by examining satellite images have also been proved to be an old landslide area. Where the loose material and buildings built on the northeast slope in motion taking no precautions have triggered this landslide. Loads should be removed and left in its natural state on this slope. Otherwise, it is inevitable for new landslides to happen again and again.

### Key words:

Landslide; antropogenic slope slipe; ski jumping ramps; winter sports; Erzurum; Turkey.

## Frequency Difference of Debris Flows Controlled By Fault in Alpine Region, Moxi Basin, Southwestern China

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### Abstract

Debris flow is one types of remarkable geomorphological hazard in mountain area. The primary objective of this study was to understand the relationship between active fault and debris flow frequency (high-frequency debris flow (HDF) and low-frequency debris flow (LDF)) in Moxi basin. The study area Moxi basin is a typical high mountain environment dominated by tectonic uplifting and glacier movement processes, where debris flow frequency show a distinct difference and many debris flow fans occupy the valley bottom. Based on the field surveying, literatures studying and the interview to residents for historical events of HDFs and LDFs in study area. This paper using geographic information systems (GIS) techniques, outlining their relation with fault, and analyzing possible effects in their frequency difference. Results show that the spatial distribution, topographic characteristics of debris flow gully, return period and numbers of debris flow is mainly controlled by the Xianshuihe fault because of the tectonic uplift. The frequency difference between HDFs and LDFs is mainly controlled by the glacier distribution, because of the glacier deposits act as the loose source for the initiation of debris flows.

### Key words:

Debris flow; frequency difference; alpine environment; Moxi basin

## Landslides and Vulnerability in East District of Sikkim

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### Abstract

Sikkim is among the India's most vulnerable regions both to natural and human-made disasters. Landslides in Sikkim have been constant sources of destruction of property and loss of lives. Number of landslides in Sikkim has increased in recent years. The lithological variation as well as structural deformation in form of various large and small scale structural features mainly thrust, faults, small and large scale folds are geological controlling factor of the landslides in Sikkim. In addition, high rainfall, steep topographical slope, and high weathering rate are other major contributory factors. Loss of vegetative cover, and slope modification for construction of various erections like roads & tunnels etc. is among the anthropogenic factors.

It has been found that East district of Sikkim is more vulnerable as compared to other districts in the state. Population density in this district is highest and so the amount of property damage and other loses will also be higher. It has also been found that vulnerability varies in terms of rural and urban settlement. It has been noticed that urban area is more vulnerable also because of its developmental activities and huge and haphazard infrastructural development in the study area, owing people more prone to the disasters which takes the form of hazard for the settlements and creates havoc for them and can give it a worse shape in near future.

### Key words:

Landslide; Hazardous; Susceptible; GIS & Remote Sensing

## Lithology and Geologic Structure Associated with Recent Landslides in Nepal

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### Abstract

The M7.8 Gorkha earthquake on April 25, 2015, and subsequent aftershocks—up to M7.3—produced thousands of landslides. Kargel et al. (2016) mapped their distribution and found that there were several important geologic controls in addition to seismicity—on their occurrence. The first-order geologic units of Nepal seem to have a strong bearing on where landslides occur. However, until now no detailed lithologic study of the recent earthquake- and meteorologically induced landslides and their adjoining rocks has been undertaken. Here we focus on the lithology of the landslides and make note of significant rock structures, such as faults, which might have played a role in localizing the quake-caused landslides. In addition to earthquake induced landslides, we examine also some landslides affected by anomalous extreme rainfall, and others by road and aqueduct construction for a small hydroelectric power plant. In general, we found that (1) weak lithologies, especially of highly weathered low-grade metamorphic rocks such as phyllite, and (2) closely adjoining rocks of distinctive lithologic contrast both favored landslide activity. An expected increase in regional precipitation and especially an increase in extreme rainfall and snowmelt events in eastern Nepal might increase the frequency and magnitude of weather-related landslides. Glacier thinning and retreat and consequent debuttressing of moraines and hanging glaciers may aggravate collapse of those. Overall, however, the natural Earth system and demographic/land use change mandates that whatever happens with climate change, destructive landslides of many types will always be commonplace in the Himalaya. Geologic susceptibility factors must be better understood.

### Key words:

Landslide ; lithology; earthquake; Nepal; precipitation; construction; climate; Himalaya

## Monitoring hydrological processes in loess and its effect on slope instability using electrical resistivity tomography - a case study in the Heifangtai Terrace, Northwest of China

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### Abstract

Loess has long been considered as a homogeneous and porous material in engineering geological perspective. It is commonly believed that water penetrates through loess pores into ground and causes mass movements. A few researchers have doubted about this, however, the hydrological processes in loess and the effect on slope failures have not been fully investigated. This study selects the loess terrace, Heifangtai of the fourth terrace of the Yellow River, at the northwestern China. 2D and 3D time-series electrical resistivity tomography (ERT) approach was employed to monitor the movement of ground water before and after irrigation & rainfall and the evolution of a sinkhole in the toe of the landslide deposits. In addition, laboratory tests were carried out and integrated the other researchers' results on the undisturbed loess samples to examine the variations of their physical properties. It has been observed that (1) The depth of infiltration into the thick unsaturated loess is less than 5 m from the implication of the 2D ERT results in TL profile. (2) The electrical resistivity decreased with the water infiltration through the sinkholes, which can increase soil water content in loess, induce soil liquefaction and eventually result in land sliding. (3) The landslide deposits block the drainage pipes of the groundwater, which makes water concentration in the toe of the landslide. As a result, the groundwater and the rainfall trigger the failure of sinkholes or cracks, which may induce new slope failure in the old landslide sites, and this process is sustained.

### Key words:

hydrological process; loess landslide; sinkhole; electrical resistivity tomography (ERT); Heifangtai Terrace

## Natural Hazards in Mountainous Regions in Relation to Abundant Sediment Supply and Resultant Depositional Landforms

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### Abstract

Countries and regions like Japan, Taiwan, China, and northern India in and around the Ganges Plain are characterized by large population sizes, steep mountainous terrain, and frequent storms. Large sediment supply from the steep mountains due to landslides and gully erosion often results in sediment deposition in piedmont areas to form alluvial fans and in coastal areas to form alluvial plains. The amount of sediment supply varies according to various factors such as topography, geology, rainfall, and human interference. In addition, long-term geomorphic responses to the Pleistocene-Holocene climatic change affect contemporary sediment supply. Types of depositional landforms such as dissected and non-dissected reflect past changes in sediment supply. These types also indicate the possibility of sediment disasters, which are useful for appropriate land-use planning. However, attention to landform types is often insufficient during land development including the construction of residential areas. This situation may result in serious sediment disasters such as the debris-flow hazard on coalescing alluvial fans in Hiroshima, August 2014, which killed 76 people. The impacts of abundant sediment yields on natural hazards are sometimes complex. For example, large sediment supply from a river mouth may lead to the formation of offshore sand bars along the nearby coast. Then the area between the bars and land may be filled with fine sediments to form flat coastal plains. Although such plains are useful for various human activities, they are prone to inundation and liquefaction due to earthquakes. Knowledge about landforms and sediment yields is highly important to prevent natural disasters.

### Key words:

sediment disaster; mountain; alluvial fan; coastal plain; landform type; residential area

## North Tehran Faults and Seismic Hazard Assessment in Tehran City

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### Abstract

Modern cities in different parts of world for various reasons, including the type site selection, poor physical development, non-compliance with the required standards and are constantly exposed to risks of natural disasters. One of the hazards that many cities to threaten the world , including our country, earthquakes Iran is one of the most earthquake-prone countries in the world in relation to this natural phenomenon damages the cities have seen. Tehran metropolis of the first countries not only as an exception, is not due to structural density, dense population, lack of standards, poor physical development and is faced with a serious threat in the study area (north of Tehran ) is a large tectonic forms among which we can mention the major and minor faults. Considering the importance the study area and residential areas and resident population in the area, identify faults and their effects on environmental hazards is of great importance. Activity of each of the faults in the area could have a dramatic earthquake and caused damages and casualties. In this study, we tried to identify these forms and how their performance on risks, providing solutions to help during the earthquake, the amount of damages to be reduced.

### Key words:

geomorphology- tectonic faults Tehran- environmental hazards

## Properties of Snowpack Profile And Driving Factors of Snow Avalanche in the Tianshan Mountains

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### Abstract

The national road 218 connects the southern and northern parts of Xinjiang. Snow avalanche often happened in the section across the Tianshan mountains in spring. This paper tried to analyze the physical properties of snowpack profile before the snow avalanche and identify the triggering factors for snow avalanche. The results showed that the most occurring frequency of snow avalanche happened within about 7 sites/km where is characterized by the slope of the hillside with 30°-43° trenches. Avalanche mainly occurs from January as dry avalanches, to late February and early March as wet avalanches, due to the different properties of the snowpack. The main factors triggering snow avalanche are extreme snowfall event and significant rise of temperatures in a given time period. Based on the observed data before the one week of the massive avalanche on 26 February 2016, the change of physical properties of snow profile before one week of the massive avalanche happened can be observed: 1) Daily mean air temperature increased at a rate of 0.7°C/d; 2) The temperature within the snowpack rapidly increases, and the temperature of 0°C quickly moved up from the bottom to the top of the snow and reached to 30cm up to the ground; 3) The average density of snowpack increased at a rate of 7.4kg/m<sup>3</sup>·d; 4) The depth hoar hardness decreases and thickness rapidly increases to 83.1% of the total snowpack depth with a increasing rate of 4.2%/d. These findings help assisting the management and forecasting of avalanches to mitigate the damage from avalanche disasters.

### Key words:

Snow avalanche; Characteristic; Triggering factor; Air temperature; Snowpack

## Quantitative Morphology of Bedrock Fault Surfaces and Identification of Paleo-earthquakes

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### Abstract

The quantitative analysis of morphologic characteristics of bedrock fault surfaces is a useful approach to study faulting history and identify paleo-earthquakes. It is an effective complement to trenching techniques, especially to identify paleo-earthquakes in a bedrock area where trenching technique cannot be applied. We calculate the 2D fractal dimension of three bedrock fault surfaces on the Huoshan piedmont fault in the Shanxi Graben, China using the isotropic empirical variogram. The fractal dimension varies systematically with height above the base of the fault surface exposures, indicating a clear segmentation of the fault surface morphology. We interpret this segmentation as being due to different exposure duration of several parallel fault surface bands, caused by periodical earthquakes, and discontinuous weathering. We take the average of fractal dimensions of each band as a characteristic value to describe its surface morphology, which can be used to estimate the exposure duration of the fault surface band and then the occurrence time of the earthquake that exposed the band. Combined with previous trenching results, we fit an empirical relationship between the exposure duration and the morphological characteristic value on the fault:  $D=0.314 \times \log_{10}(17707 \times T)$ . The average width of those fault surface bands can also be regarded as an approximate vertical coseismic displacement of characteristic earthquake similar to the Hongdong M8 earthquake of 1303. Based on the segmentation of quantitative morphology of the three fault surfaces on the Huoshan piedmont fault, we identify three earthquake events. The coseismic vertical displacement of the characteristic earthquake on the Huoshan piedmont fault is estimated to be 3-4 m, the average width of these fault surface bands. Gaps with a width of 0.1-0.3 m between two adjacent bands, in which the fractal value increases gradually with fault surface height, are inferred to be caused by weathering between two earthquakes or interseismic slip on the fault.

### Key words:

Morphology of bedrock fault surface;Paleo-earthquake;Isotropic empirical variogram;Huoshan piedmont fault

## Regional Scale Landslide Risk Assessment in Data Scarce Area- a Case Study on West Kameng District, Arunachal Pradesh, India

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### Abstract

The present research is intended to present an integrated approach involving uses of geospatial technologies for landslide risk assessment in data scarce region of Eastern Himalaya. Successful Landslide management plan and policy depends on in-depth knowledge about the hazard and associated risk. Thus, Landslide hazard and risk assessment is carried out as an integral part of landslide hazard management in West Kameng District, Arunachal Pradesh. The landslide hazard map is prepared by using weight-rating based method. To analyze landslide manifestation in the present study area different causative factor are analysed. The present research revealed that geological structure and road have more influence than other considered factors on the occurrences of landslide in the present study area. The hazard zonation map shows that the very high and high hazard zone covers about 18% in comparison to low and very low hazard zone which covers about 50.07 % of the total district. The final landslide risk scouring map of the District is generated by integrating hazard scouring and resource damage potential scouring (fuzzy membership values) maps. The values of landslide risk matrixes are varying within the range of 0.04 to 1.00. The risk scouring map has been reclassified into very high, high, moderate, low and very low risk zones. The final risk assessment map shows that only 15.43% (845.54 km<sup>2</sup>) of the district is under very high to high risk zone. The major part (3126.47 km i.e. 57.06%) of the district is under very low and low risk zone.

### Key words:

Landslide; Hazard; Risk; Fuzzy set theory

## The Assessment of Road Network Fragility Under the Duress of Slope Disaster in the Upper Reaches Of Min River

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### Abstract

The upper reaches of Min River is an area with topographic uplift and economic trough, which is not only with superposition of unfavorable conditions and difficult factors but also prone to geological disasters of collapse, landslide and debris flow. The mountain settlement is the basic social economic unit and the basic social organization unit in the upper reaches of Min River. Road is the main channel and arterial of mountain settlement, and also the short board and bottleneck of economic and social development because of the threat of slope disaster in the upper reaches of Min River. Firstly, the level of road network accessibility was studied by analyzing the index such as road density, connectivity of road network, inner accessibility of townships and connection to trunk road. Then, taking the side slope of road as the evaluation unit, the possibility of slope disaster is evaluated based on analyzing the combination of environmental factors such as the degree of slope, lithology, slope structure and aspect of slope. Moreover, the possibility of the highway slope disaster is analysed based on the spatial relationship between the slope and the road. Finally, the road network fragility under the duress of slope disaster was studied through the analysis of the impact of road network accessibility when a certain section of road was destroyed by slope disaster. The results will provide some theoretical basis and practical guidance for economic sustainable development of settlement, disaster prevention and mitigation, road layout and road network optimization in the upper reaches of Min River or other similar areas with road slope disaster.

### Key words:

road network fragility; road network accessibility; slope disaster, settlement; Min River

## The Research of GLOFs (Glacial Lake Outburst Floods) in Cordillera Blanca, Peru

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### Abstract

High mountain areas are considered as regions of exceptional risk for human population and activities. These areas are also very sensitive during global climate changes. Our research of Glacial Lake Outburst Floods (GLOFs) consists from several steps hold in last 10 years and is mainly dedicated to the Cordillera Blanca in Peru. Apart of different case studies dealing with hazardous GLOF events we tried to solve also some more general topics to contribute to the research of GLOFs in general: inventory of lakes in Cordillera Blanca, new methodology for hazard evaluation and establishing of GLOFs database. We also tried to sum all different factors which influence the GLOFs hazard evaluation. Due to the fact that slope movements are the main triggering factor for GLOFs in Cordillera Blanca we tried to go more detailed into this phenomena as well. Because of several regional differences we decided to establish the worldwide GLOFs Database to get more detailed dataset for future comparison. The research of GLOFs is an example of topic which needs a complex approach across geosciences.

### Key words:

GLOFs; high mountains; natural hazards; database; Cordillera Blanca; Peru

## The Response of Debris Flow to Mountain Vertical Differentiation in Upper Min River

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### Abstract

The generation, formation, and development of debris flows are closely related to the vertical climate, vegetation, and soil condition of a given mountainous area. Taking the Upper Reaches of Min River as the study region, this paper selects a total of 12 indices from the 2 aspects of heat and moisture: mean annual temperature, dry seasonal temperature, wet seasonal temperature, mean temperature of the hottest month, mean temperature of the coldest month,  $\geq 0^{\circ}\text{C}$  accumulated temperature,  $\geq 10^{\circ}\text{C}$  accumulated temperature, solar radiation, annual precipitation, dry seasonal precipitation, wet seasonal precipitation, and dryness. The analysis and discussion of the mountain vertical zonation shows that the elevation has a conspicuous negative correlation with the following 7 indices: mean annual temperature, dry seasonal temperature, wet seasonal temperature, mean temperature of the hottest month, mean temperature of the coldest month,  $\geq 0^{\circ}\text{C}$  accumulated temperature, and  $\geq 10^{\circ}\text{C}$  accumulated temperature; and a positive correlation with solar radiation, annual precipitation, dry seasonal precipitation, and wet seasonal precipitation. Vertically, the study region has been divided into 7 zones: the subtropical ~ evergreen broadleaved forest ~ yellow soil zone, the warm temperate ~ deciduous broadleaved forest ~ cinnamon soil zone, the temperate ~ mixed coniferous and broadleaved forest ~ brown soil zone, the cold temperate ~ spruce forest ~ cryo-brown soil zone, the subpolar ~ alpine meadow ~ mat cryo-sod soil zone, the polar ~ scree vegetation ~ alpine frozen desert soil zone, and the tundra ~ permanent snow zone. The debris flow gullies have been found to concentrate on 4 of the zones from the subtropical ~ evergreen broadleaved forest ~ yellow soil zone to the cold temperate ~ spruce forest ~ cryo-brown soil zone. The deposition and circulation areas are mainly distributed along arid valleys of the subtropical and temperate zones, while the formation and confluence areas within one or two base zones. The study results of this paper will expand the cognition of debris flow development laws, provide boundary reference for debris flows and mountain vertical differentiation, and enrich the scientific basis of prevention and reduction of debris flow hazards.

**Key words:** Debris flow; Mountain vertical differentiation; Response; The Upper Reaches of Min River

## **A Geographical Study of the Evacuation from Welfare Facilities for the Aged in the Case of a Tsunami Disaster**

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### **Abstract**

This study aimed to clarify the problem of the tsunami evacuation for the elderly welfare facilities in the heavy snow region. The study area is Kushiro City, which is located in the eastern part of Hokkaido. In this study, the following procedure was used. First, by using GIS and the tsunami inundation simulation data, this study clarified where welfare facilities were located in the hazard zone. Next, by the interview and questionnaire survey to the directors of welfare facilities, it investigated the factors which delay tsunami evacuation. In addition, it examined the problems with the point of view in the snow season. The result is as follows. The 18 facilities was located in the tsunami hazard zone in Kushiro City. In tsunami evacuation, there were mainly four subjects. First, it was difficult for elderly people to evacuate on foot. Second, equipment of the refuge place was not well-equipped. Third, the cooperation with the area and administration was insufficient. Finally, there are too few personnel at night. Furthermore, the condition aggravation of the elderly people in refuge place was a problem in winter. Since a road surface froze, it turned out that a walk and movement with a wheelchair become difficult.

### **Key words:**

Welfare facilities for the aged; Tsunami evacuation; snow area; Aged people; Kushiro

## Assessments and Suggestions for the Urban Construction and Industrial Development Based on the Cause Analysis on Water Related Hazards (Taking China as an Example)

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### Abstract

Water issues have been emerged along with the fast urbanization and industrialization since 1979. Presently, China is undergoing a new round. The issue how to conduct an integral and overall assessment for water related hazards has become hot.

Like the on-going sponge city construction in China, various places adopt intervention on water body to tackle the problem. Also, new risks may be triggered while overcoming difficulties on water, due to the complex influence to water arising from construction. The water disasters such as the July 21 water logging in Beijing arising from extraordinary rainstorm ever took place frequently. Therefore, a comprehensive cognition for the issue is needed by introducing new perspectives.

The text, based on the analysis for the water body intervention, obtains relevant experiences of time dimension, assessment indicators and spatial scale through analysis for the different results of two duration of short and long term, as well as from the two spatial scales of urban area and drainage basin.

The cases concerning drainage basin mainly include the human intervention for the Yellow River basin etc. The cases from urban local areas mainly include the Fushou gutter in Ganzhou of Jiangxi etc. The influences involved with drainage basin are mainly made by industrial development. As for such influences regarding urban, they mainly come from engineering construction. It is hoped to learn experience from nature, guide urbanization decisions, reduce risks and achieve applicable feedbacks from the practice like the sponge city construction of Ganzhou.

### Key words:

water related hazards; safety; resource; sponge city; planning; urban construction; cause analysis; practice

## CO<sub>2</sub> Emissions from the Summer 2010 Forest Fires in Russia

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### Abstract

We used forest fires in Russia in the summer of 2010 as a case study, and we used GOSAT (Greenhouse gases Observing SATellite) data to evaluate CO<sub>2</sub> emissions for the study case. Based on MODIS (Moderate Resolution Imaging Spectroradiometer) AOD (Aerosol Optical Depth) daily mean values and daily maximum value trends, we determined that the forest fires occurred from July 20 to August 20. We calculated the CO<sub>2</sub> concentration changes during the period of the forest fires and found that the forest fire smoke rose to a height of approximately 850 hPa (1.56 km). Using GOSAT L4B data, we determined that there were 412.54 Tg of CO<sub>2</sub> emissions from the 2010 Russian forest fires. We also calculated the CO<sub>2</sub> emissions using the Biomass Burning Model (BBM) for the same study site. With regard to the missing BBM parameters, we used the values measured at Daxingan Mountain because of the similar vegetation species compositions in the two regions and obtained a CO<sub>2</sub> emission result of 26.06 Tg. Our result was similar with that calculated from CO emissions of former research by using emission ratio. This paper proposes a new way to evaluate CO<sub>2</sub> emissions from forest fires using remote sensing data, although there are many limitations that must be overcome in the future.

### Key words:

Forest fire; CO<sub>2</sub> emissions; GOSAT data; BBM

## Community Resilience against Natural Hazards: Case Studies from the Pacific Islands

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### Abstract

Disaster Risk Reduction policies have made good progress on national and regional levels in the Pacific Island Region. However, in most countries the connection between the national level and community levels has been insufficiently addressed. The integration of local level disaster risk reduction and climate change adaptation into development planning is essential. Here additional efforts are required to reduce disaster risk and enhance effective recovery following major disasters.

The paper synthesizes lessons learnt on community resilience in Pacific Island Countries. It discusses case studies of several disaster events from a grass-root level perspective. We find that local-level institutions and networks, both formal and informal, play an important role in people's agency and interaction. The paper also considers how hazards add to other challenges people are facing, such as poverty and tenure insecurity. It highlights the importance of social capital for disaster risk and disaster recovery and rehabilitation.

Our findings suggest that in assessing community resilience and devising disaster risk reduction strategies particular attention needs to be given to local land tenure systems, ethnic differentiation, remittances, and safety networks.

In conclusion, the paper calls for integrated approaches that link national and local level interventions and that take into consideration that people's capacities to face the various aspects of climate change and natural hazards may become overstretched when they have to deal with too many and/or too severe challenges at the same time.

### Key words:

Disaster risk; climate change; Pacific Islands; community resilience; social capital

## Construction of Elderly Vulnerability Assessment Index System in Urban Community

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### Abstracts

Outbreaks of disaster vulnerate urban population worldwide. Add also, the elderly will suffer more losses. Yet previous vulnerability study mostly focuses on certain systems such as financial system and eco-system and leans much on statistical analysis thus field investigation defaults. Based on questionnaire survey and field work data, this paper conducts a vulnerability assessment on the aged in 39 communities located in Beitapingzhuang subdistrict in Beijing, combining AHP methods and Delphi method to confirm the weight of index. The result shows that due to massive old residents living in this area, the overall vulnerability is considerably high. Moreover, the completion time, function and characteristic of those communities have major influence on its vulnerability. Notably, college and university nearby reduces its vulnerability significantly. Meanwhile, disaster prevention education and organization of those activities are needed to be improved.

### Key words:

Vulnerability Assessment; Analytic Hierarchy Process; The Elderly; Urban Community

## Do Spatial Heat Vulnerability Assessment Studies Influence Policy?

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### Abstract

Human vulnerability to heat varies at a range of spatial scales, especially within cities where there can be noticeable intra-urban differences in heat risk factors. Mapping and visualizing intra-urban heat vulnerability offers opportunities for presenting information to assist support decision-making. For example the visualization of the spatial variation of heat vulnerability has the potential to enable local governments to identify hot spots of vulnerability and allocate resources and increase assistance to people in areas of greatest need. Recently there has been a proliferation of heat vulnerability mapping studies, all of which, to varying degrees, justify the process of vulnerability mapping in a policy context. However, to date, there has not been a systematic review of the extent to which the results of vulnerability mapping studies have been applied in decision-making. Accordingly a comprehensive review was undertaken of 37 recently published papers that use geospatial techniques for assessing human vulnerability to heat. In addition, an anonymous survey of the lead authors of the 37 papers was conducted in order to establish the level of interaction between the researchers as science information producers and local authorities as information users. Both paper review and author survey results show that heat vulnerability mapping has been used in an attempt to communicate policy recommendations, raise awareness and induce institutional networking and learning, but has not as yet had a substantive influence on policymaking or preventive action.

### Key words:

heat waves; heat risk; vulnerability mapping; climate risk management; policy

## Drought Adaptation Capacity Assessment of Agricultural System---Take Xingtai District in North China as An Example

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### Abstract

Drought is the biggest challenge for agricultural In North China. With temperate monsoon climate, high water consumption crop structure and intensive land-use, agricultural drought occurs almost every year. Irrigation by over-exploitation of both surface and groundwater is popular. This in return drives the hydro-ecological environment drying up and amplifying drought intensity. For sustainable development, systematic adapting to drought is the best way. This paper take Xingtai district in North China as an example, analyzed the impacting factors of agricultural drought, including each zone's physical environment, natural resources combination, social-economic conditions and restricts, management of farm households respectively in its western mountainous and hilly zone, the medium piedmont plain zone and eastern lowland. An index system and model for agricultural drought adaptive capacity assessment was established on the villages and town level. Using GIS, we assessed the adaptive capacity, classified its degree and made a set of maps. The result shows that on growing season and yearly time scale, Xingtai's agricultural drought adaptive capacity in the medium piedmont plain zone is relatively high, in eastern lowland zone is medium and in the western mountainous and hilly zone is low. But on the decades time scale and from the view of sustainable ecology, the eastern lowland zone is the most vulnerable and low adaptive capacity due to its severe drying of hydrological-ecological feedback caused by long term sustaining overdraw of groundwater. Furthermore, we put forward adaptation strategies on spatial scale of farm household, villages and towns, county.

### Key words:

Xingtai in North China ; Agricultural Drought, Adaptive Capacity Assessment

## Global Agricultural Drought Vulnerability and its Spatial Characteristics

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### Abstract

Agricultural drought vulnerability is an important component of agricultural drought risk. By quantifying agricultural drought vulnerability as well as identifying the spatial characteristics, it would be helpful to prevent and alleviate drought impact reasonably. In this paper, we chose the global agricultural region as the study area, and selected six main crops (rice, maize, wheat, barley, sorghum and soybean) as the hazard bearing body, for the first time to assess agricultural drought vulnerability at the global scale and to reveal the spatial characteristics. The results indicated that area percentages of high and very high agricultural drought vulnerability zones were 25.37% and 7.26% of the total agricultural area in the world. Moreover, those zones mostly were distributed in northern and southern Great Plains, eastern Pampas Steppe, most of Iberian Peninsula, western Turan Plain, western Iranian Plateau and Deccan Plateau, most of Loess Plateau, southeast and west coastal area of Australia. Meanwhile, approximately 40% area in high and very high vulnerability zones were located in semi-humid and humid regions, and only 15% population in this study were located in high and very high vulnerability zones.

### Key words:

drought ; vulnerability; agriculture; spatial distribution; global

## Land Use and Land Cover Change Detection and Its impact on Hydrological Hazards and Sustainable Development: a Case Study of Alaknanda River Basin, Uttarakhand, India

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### Abstract

Anthropogenic activities are continuously disturbing the natural system and its impact on hydrological behavior of river. The important factor causing flood and also accelerate several hydrological hazards during monsoon periods in Alaknanda river are heavy rainfall, cloud burst, GLOF, landslides, Slope failure, deforestation, drainage congestion due to urbanization. Natural hazards have had significant impacts on life, livelihood and property in areas with high population density and land use intensity. The escalation of risks and vulnerability has come about through population growth and land use intensification in the areas, both of which have encroached upon hazard zones and in some case, such as road construction on slopes, have exacerbated the hazard of slope failure. These hydrological hazards are mainly responsible for several socio-economic consequences (cultivated land degradation, infrastructure loss, human casualties, loss of transmission lines, and so on). Factors causing these changes have been attempted to be understood through the use of GIS and LANDSAT TM. Geospatial technique is used to find out the land use/cover change detection for three time periods (1976, 1999, and 2015). Toposheet (Survey of India) and secondary data has been taken for to carry the analysis work. Preliminary studies conducted on this subject indicate that human interference, unscientific developmental activities, agriculture extension and road construction are some of the activities which are creating the hydrological imbalances in the Alaknanda River Basin. This paper has identified the vulnerability issues and suggest to adaptation method for sustainable development strategy for the development in the Alaknanda river basin, Uttarakhand, India.

### Key words:

Anthropogenic Activity; Land use change; Geo-hydrological Hazards; Sustainable Development

## Managing Disaster Involving Community: A Case Study of Chamoli District, Uttarakhand, India

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### Abstract

Landslides are one of the most wide spread geological hazards that threaten the human life worldwide especially on the mountain region of the world. Despite the growing scientific and technological development it has been difficult to reduce the impact of natural disaster. Hence if the affected communities are involved in the process of disaster risk assessment and reduction, the impact of disaster can be minimized to a great extent and therefore developing a suitable community based disaster management technique is required. This paper presents a preliminary finding on community engagement in land slide risk assessment and strengthen the capacity of communities to cope up with the disaster in Kandey and surrounding villages of Uttarakhand. The land slide near the Kandey village is very old ( according to villagers it is more than 70 years old) and still active mostly in the monsoon season which poses threats to the villagers and may affect the villagers in coming years. For data collection secondary data and PRA tools has been used widely. This study is conducted in two stage, Emphasis was placed on collection of disaster experience and skills development of locals in the identifying and characterizing of various hazards in villages with special emphasis on landslide and landslide contributory factor and preparedness for coping with disaster. In the first stage hazards, vulnerability and capacity has access to find the landslide and associated hazards risk involving the local community. In second stage emergency preparedness and management plan has drafted out incorporated with the local communities. For emergency preparedness the perception of local communities are generated in a simplified map which include emergency escape route, shelter during the time of disaster hit. In last step for managing the land slide risk reduction community training, community education, resources inventories being practice. Finally the study provide the example of the utility of community based disaster management approach for solution towards the effective mitigation of land slide and associated hazards especially in developing countries.

### Key words:

Landslide; Community Based Disaster Management; Community Participation; Participatory Rural Appraisal (PRA) Tools; Uttarakhand.

## Measuring Social Vulnerability to Natural Hazards in Beijing: from the Perspective of Spatial Heterogeneity

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### Abstract

Presently, the cities of China are facing serious disasters with rapid urbanization. How to reduce urban social vulnerability, promote stable and healthy development of urbanization has become a critical issue of urban research field. As the urban spatial non-equilibrium of urban activities and development distribution, urban social vulnerability shows significant spatial heterogeneity, and affected by social, economic, cultural, institutional, built environment and other factors. To carry out the comprehensive urban social vulnerability, and reveal its spatial heterogeneity, has important academic contributions to disaster and risk management research. Based on the analysis of the latest research progress of urban social vulnerability, there are some challenges facing the vulnerability assessment: namely, without the consideration of the effects of urban multiple disasters and the multidimensional characteristic of the social vulnerability, and the collection, integration, and synthesis of large quantities of heterogeneous data to provide reliable estimations. This situation has led to the neglect of all significant interactions between the considered indicators, despite their being essential to urban social vulnerability analysis. From the perspective of spatial heterogeneity, and Beijing are carried out for empirical research. This article attempts to take a new method to reveals the heterogeneity of urban social vulnerability by using spatial clustering method for the selected core factors of the urban social vulnerability. Using the Hazards-of-Place Model of Vulnerability, the social vulnerability hotspots city and its main influencing factors are explored, under the disturbance of multiple disaster scenarios. The result will reveal the hotspots and key factors of urban social vulnerability by focusing on the locally convergent specific characteristics and processes reinforcing (or reducing) social vulnerability.

### Key words:

natural hazards; social vulnerability; spatial heterogeneity; Beijing

## Regional Feature Analysis of Natural disaster chains in Northeast China

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### Abstract

Although Northwest China are sparsely populated, but disasters such as rainstorms, drought, earthquakes, cold waves happen frequently, and secondary disasters caused by them constitute disaster chains, resulting in loss of population, economy and so on, especially the debris flow of Zhouqu in 2010 make people concern about disaster problem in this area. Based on the disaster system theory, according to disaster database of China provincial newspapers from 1949 to 2013, this paper builds a classification system of nature disaster chains in Northwest China, and analyses their distribution features by the form of case. The results show that Northwest natural disaster chains can be divided into 4 types, including rainstorm disaster chains, cold wave disaster chains, earthquake disaster chains and drought disaster chains, with a total of 64 sub types. Rainstorm disaster chains are the most occurrence times of natural disaster chains (41.8%), among them, rainstorm-flood and waterlogging disaster chains (73.3%) mainly occur in the plain area of Northern Xinjiang and central Shanxi, rainstorm-geology disaster chains (18.9%) mainly occur in the mountain area of Southern Shanxi central southern Gansu, Northeast Qinghai and Southern Ningxia; cold wave disaster chains are the second most occurrence times (25.8%), they mainly occur in Northern Xinjiang, central north Gansu and Northern Qinghai; earthquake disaster chains (20.4%) mainly occur in Tian Mountain region, Gansu Corridor, Ningxia region and Qinghai region; and drought disaster chains (12%) mainly occur in western and northern Xinjiang, central Gansu, central north Shanxi and Ningxia.

### Key words:

Northeast China; natural disaster chains; distribution feature; classification; rainstorm disaster chains; cold wave disaster chains; earthquake disaster chains; drought disaster chains

## Research on Vulnerability of Natural Disasters of the Elderly: A case Study in Beijing

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### Abstract

In recent years, the research on vulnerability of hazard bearing body, especially the elderly is becoming more and more important in disaster risk management. This article build an index system to evaluate the vulnerability of natural disasters of the elderly, including 5 dimensions: Physical, Mental, Household, Community, and Awareness. Then the impact factors can be analyzed based on the demographic characteristics, including Age, Gender, Career, Education level and Location. A questionnaire is designed to get the research data ,people aged 60 and above are chosen as the research objects and Beijing is chosen as the study area, for its various kinds of natural disasters and topography characteristics and serious aging problem. This article expect to put forward a scientific and whole method to analyze the main affect factors of vulnerability of the elderly to natural disasters, and to make contributions to the disaster prevention and reduction.

### Key words:

vulnerability; the elderly; index system; natural disasters; Beijing

## Risk and Resilience in Urban Area Under the Land Use Change

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### Abstract

Flooding damage has been drastically reduced and life loss has decreased, however, Asia Monsoon area is still now troublesome of flood risk in complex phenomena related with human and nature dimension. The strengthening of community based activities for fighting flood should be increased for lifesaving under the natural disaster and new emerging disaster risks. The coastal and fluvial plains in Asia Monsoon area are greatly suffered from flood disasters because of its location, potentiality of rainfall and low relief plain with density population related with sea level change. Regarding to reduction of damages by huge scale flood, the comprehensive measures should be needed including hazard management, resilience of the local society to flood, disaster exposure management and damage management. Suitable disaster science education for understanding factors of natural disaster mechanism, and sustainable and suitable land use planning on site for avoidance and reduction of disaster damages, appropriate watershed management harmonized with nature without threaten of disaster risk increasing, visible local planning between inhabitants and government planner. In this study, the author will explain the specific case study of the Shonai River Basin in Japan.

### Key words:

Flood; risk

## Social Disparities in the Distribution of Air Pollution Risks: Comparing Perceptions and Exposure in Houston, Texas

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### Abstract

While numerous empirical studies have found racial/ethnic minorities and people of lower socioeconomic status (SES) to be disproportionately exposed to environmental hazards, prior research has rarely examined whether individuals facing greater health risks from pollution exposure also exhibit higher awareness or perceptions of such risks. Risk perception studies in the U.S. suggest that racial/ethnic minorities demonstrate higher levels of environmental concern than Whites, but perceived risk levels of local residents have rarely been compared directly to the environmental exposure they experience. Our paper addresses this limitation by comparing perceived health risks from air pollution to health risks from exposure to industrial and vehicular air pollutants in the Greater Houston metropolitan area (Texas, USA)—a racially diverse urban area containing one of the world’s largest petrochemical complexes. We seek to determine if personal health risk perceptions of air pollution are statistically related to exposure from industrial and transportation sources of air pollution; and how this relationship varies across specific categories of race/ethnicity, after controlling for contextual factors such as age, gender, SES, and previous experience with air pollution. We integrate primary household-level survey data with estimates of cancer risk from exposure to industrial releases and on-road mobile sources of hazardous air pollutants obtained from the U.S. Environmental Protection Agency. Statistical analyses are based on descriptive comparisons and spatial autoregressive models that account for geographic clustering of surveyed households. Our findings underscore the need to incorporate risk perception in future empirical analyses on social inequalities in the distribution of environmental hazards.

### Key words:

air pollution; environmental justice; risk perception; race/ethnicity; spatial regression; Houston

## The Geographic and Demographic Determinants of Mortality in the Great East

### Japan Disaster

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#### Abstract

Many papers point out large regional difference in the human damage caused by the Great East Japan Disaster, however, not enough have been revealed about the demographic determinants to the human damage at micro geographic level. Analysis at finer geographical scale is necessary to exploit the knowledge from the painful experience to future mitigation and town planning. We compared the age and sex profile of death and missing people in Yamada Town in Iwate Prefecture to that of the Population Census 2010 Small Area Statistics. As a result death and missing rate in advanced age groups was considerably higher than that in younger age groups. the geographical distribution of the death and missing people is considered to be influenced by the elderly ratio, household composition and the damage of housing of a small area. We analyzed the relationship among the rate of death and missing, the elderly ratio and the flood rate. Multiple linear regression analysis revealed that elderly ratio and flood rate can explain about 50% of the geographical variation in death and missing rate among small areas. The standardized partial regression coefficients of elderly ratio and flood rate were 0.3112 and 0.5857, respectively, thus the flood rate had been better explanatory variable.

#### Key words:

Great East Japan Disaster; tsunami; death and missing rate; elderly ratio; flood rate; geographic and demographic determinants; small area data; multiple linear regression analysis

## The Population in China's Earthquake-Prone Areas has Increased by Over 32 Million Along with Rapid Urbanization

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### Abstract

Accurate assessments of the population exposed to seismic hazard are crucial in seismic risk mapping. Recent rapid urbanization in China has resulted in substantial changes in the size and structure of the population exposed to seismic hazard. Using the latest population census data and seismic maps, this work investigated spatiotemporal changes in the exposure of the population in the most seismically hazardous areas (MSHAs) in China from 1990 to 2010. In the context of rapid urbanization and massive rural-to-urban migration, nearly one-tenth of the Chinese population in 2010 lived in MSHAs. From 1990 to 2010, the MSHA population increased by 32.53 million at a significantly higher rate of change (33.6%) than the national average rate (17.7%). The elderly population in MSHAs increased by 81.4%, which is much higher than the group's national growth rate of 58.9%. Greater attention should be paid to the demographic changes in earthquake-prone areas in China.

### Key words:

China; population exposure; seismic hazard; urbanization; urban planning

## The Use of Remote Sensing Data for Vegetative Drought Monitoring of Mountain Ecosystem (Armenia)

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### Abstract

Drought is a natural phenomenon that has been recurring at a regional scale throughout history. In fact, the monitoring and assessment of drought conditions in a region is usually performed through drought indices. There are several drought indices based on ground (conventional) and/or remotely sensed data. A number of drought indices have been developed based on NOAA-AVHRR, SPOT, LANDSAT data exploiting the remote sensing potential at different temporal scales. Being a mountainous country, Armenia has undergone different kinds of natural disasters, such as droughts.

As a modeling area were selected Syunik marz and Sevan region. The impact of drought on vegetation, referred to as vegetative drought, is commonly monitored at a regional scale using satellite based vegetation indices such as the Normalized Difference Vegetation Index (NDVI), The Vegetation Condition Index (VCI), Vegetation Health Index (VHI), Drought Index (DI). Vegetation conditions can be characterized by the deviation of the current NDVI Values from their corresponding temporal mean NDVI values, usually calculated over a long period such as one or more decades.

Deciphering satellite images through NDVI enabled us to indicate the monitoring and assessment of drought of the mountainous ecosystem of Lake Sevan basin and Syunik region in a period 1973 to 2014. For the last 40 years the study area has displayed were detected changes of drought duration and periodicity and also drought-sensitive areas increased. The results of this study will used for the development of a regional drought monitoring system.

### Key words:

Remote sensing data; NDVI; VCI; vegetative drought; monitoring; mountain ecosystem

## Understanding Community Resilience to Tropical Cyclones in the Mahanadi Delta, India

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### Abstract

Disasters of natural origin cause many fatalities and significant losses every year and exposure to these hazards is growing worldwide as urbanisation driven by greater economic productivity is leading to higher concentrations of population in areas at risk and global warming is posing serious threats to communities. In light of this, the concept of disaster resilience has gained momentum in recent decades and the need to invest in resilience building for disaster risk reduction has been recognised as a global priority in the Sendai Framework for Disaster Risk Reduction 2015-2030; however, there is still little understanding of the nature of resilience and more research is needed to empirically investigate the concept and to develop effective tools for its measurement and operationalisation, especially in developing countries. This research is aimed at investigating community resilience to tropical cyclones in the Mahanadi delta, India, with the ultimate scope of contributing to understanding what disaster resilience looks like in the case study area and of developing a tool for its assessment over space and time. This study builds on available literature to provide a conceptual framework for the measurement of resilience to tropical cyclones in the study site through the identification of key drivers of resilience and their indicators. A data-driven and bottom-up approach with direct stakeholder engagement in the selection of indicators is being used and a model is being developed to capture the interactions between drivers of resilience. The model is meant to facilitate knowledge transferability and aid decision making by providing decision support tools to comparatively evaluate resilience. This study is part of the 'Deltas, Vulnerability & Climate Change: Migration & Adaptation' (DECCMA) project, under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIIA).

### Key words:

Resilience; disaster risk reduction; Mahanadi delta; India

## 10Be Exposure Age Reveals a 12 Ka Seismic Triggered Rock Avalanche in the Tibet-Bhutan Himalaya

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### Abstract

The geological record of prehistoric rock avalanches provides invaluable data for assessing the hazard posed by these rare but destructive mass movements. Here we investigate a previously unrecorded rock avalanche deposit that resulted from a major mountain slope failure on the NW face of Mount Chomo Lhari in Linxila area of the Tibet-Bhutan Himalaya. This research provides detailed mapping of landslide, related Quaternary phenomenon, surface exposure dating of rock avalanche deposits, and reliable analysis on the trigger of failure. Cosmogenic  $^{10}\text{Be}$  exposure ages of 6 deposited boulders revealed a Younger Dryas age of  $11.99 \pm 2.54$  ka for the Linxila rock avalanche. Proxy records for this region of the Himalaya imply a similar cold and dry climatic regime to the present day at this time, suggesting that degradation of permafrost and precipitation were unlikely trigger for this rock avalanche. Given the close relationship with the Yadong fault, we can conclude that the most likely trigger for this collapse was seismic activity which was related to the Yadong fault.

### Key words:

Rock avalanche, Cosmogenic dating, Yadong fault, the Tibet-Bhutan Himalaya

## A Study of the “11.2” Landslide-Debris Flow Characteristics of Chuxiong, Yunnan

### Province

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### Abstract

Landslide-debris flow has always been a difficult problem of mountainous disaster prevention because of its characteristics of wide multi-point coverage, strong concealment, sudden outbreak and short duration. With the combined effect of warm moist flow from the Bay of Bengal and surface cold air, Yi Autonomous Prefecture of Chuxiong, Yunnan suffered a rare autumn continuous heavy rainfall during October 24th to November 2nd, 2008, which triggered “11.02” catastrophic natural disaster. Landslide-debris flow occurred in Dazhulin Village of Shuangbai County, causing the great damage of the village and 39 deaths. Through on-site investigation, fine terrain measurement, diachronic precipitation data and analytical test of provenance and accumulation samples, this paper reveals the forming reasons and move process of the debris flow, and makes a further analysis of forming mechanism of the disaster. The study results can provide scientific reference for the prevention of the widespread mountainous landslide-debris flow in China.

### Key words:

Chuxiong; Landslide-Debris flow; Hazard characteristic; Rainstorm; Forming process

## Agricultural Accidents in a Segment of Lower Ganga Plain

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### Abstract

Agricultural accident, a part of occupational hazards, is an unexpected event or unfortunate mishappening that occurs during hours of work in agricultural activities. This may be in the form of cut, pain, sprain, wound, fracture, bruise, squeezed and crushed injury, etc. that arises mainly by means of agricultural tools/implements/machines, chemicals and others. The major means of accidental injuries in agriculture are ploughshare and leveling bar, sickle, spade, hoe, fodder cutting machine, pumping set, electric motor, thresher, power tiller, tractor, spray machine, vehicle, bullock cart, irrigation tools, etc. Accident may be slight, serious, more or less harmful or damaging and varies in space and time. It leads either to temporary or permanent, partial or total disability of the suffered parts of human body. This seizes a week or more of worker's working period and affects almost the whole family. Sometimes it may cause loss of life too.

Objectives of this study are to: i) examine variation in the pattern of accidents caused by several means during work operations and cropping seasons; ii) demonstrate variation in the pattern of loss of mandays, loss of earning, suffering period, medical cost and gross monetary loss and its household level effect, and; iii) put forth appropriate suggestions to prevent agricultural accidents for well-being of the people.

The analysis of entire work is based on the primary data collected through questionnaire from households of sample villages of a District from Lower Ganga Plain in eastern India.

### Key Words:

Occupational Hazards; Agricultural Activities; Agricultural Tools; Work Operations; Cropping Seasons.

## Analysis of Climatic Hazards of Iran

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### Abstract

Iran located in mid latitude and has different climate type's form intermediate and humid to very arid climates. Each of climates has different climatic hazards in relation to climate types. In this paper the main climate hazards analyzed based on weather station data for 40 years from 1955 to 2004 using statistical calculations and all captured results mapped by GIS in order to spatial and temporal analysis. The results indicated different geographic rejoin on country have all climatic hazard including UV radiation, heat and cold waves, drought, heavy rainfall, storms and son on, but frequency of hazards is very different in various climatic types. The spatial analysis of climatic hazards show in the north of Iran with humid climate we have heavy rainfall, heat and cold wave; while in the south of Iran with arid climate we have high frequency of drought and UV radiation associated with wind storms. Temporal analysis indicated in all climate types of Iran, in the resent years climatic hazards have increase trends. Climatic hazards susceptibility of country says we must have necessary design making in relation to decrease and mitigation approaches in different rejoin of country.

### Key words:

climate hazards; spatial analysis; temporal analysis; Iran.

## **Analysis of Flood Risk Using Spatial Technology in the Southern Coastal Zone of Sri Lanka**

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### **Abstract**

Flood is one of the common natural hazard experience in Sri Lanka. This is more significant in and around Southern coastal zone. In each year, there are many People and properties in this region affected by floods. Geomorphological setting and the distribution of the drainage pattern in the area influence to create floods. It has been observed that many historical floods were recorded in this area during South West monsoon period from May to July. However, few sever past floods were experienced in this region due to sudden change in climatic conditions closer to bay of Bengal. Due to complex nature of factors control floods, it is difficult to manage floods. However, by introducing flood risk maps and monitoring rainfall data, it is possible to minimize the damage create by floods. Main objective of this research is to introduce flood risk map for the Southern coastal zone of Sri Lanka using spatial technology i.e Geographical Information systems and aerial photo interpretation. Also google earth imaginaries are used to locate possible areas affected by floods. First main factors influence on floods were identified and prepared thematic maps using ArcGis software. Different factors influence to create floods in different manner. Therefore, different weightages were assigned for these thematic layers. Also influence to create floods varies when conditions within a factor vary. Therefore, different ranks were introduced to represent different conditions. By weighted overlay analysis flood hazard map was prepared. Finally, flood risk map was introduced by considering human settlements, infrastructure facilities, etc.

### **Key words:**

Hazard, risk, spatial technology

## Analysis of Relations Between Natural Disaster Resilience and Regional Socioeconomic Characteristics

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### Abstract

As climate change incurs abnormal climate, which makes prediction and advance countermeasures difficult to implement, and especially in vulnerable environments, it tends to link with complicated and enormous natural disasters. As a result, both urbanization and climate change, which have contributed to create vulnerable surroundings, could expand the scope of damage when a natural disaster occurs, and also require high expenses and efforts to recover from the disaster. Not only physically vulnerable regions, but also vulnerabilities in populations, society, and economy tend to increase damage by any disaster caused by climate change, and also required considerable efforts to restore. In such context, issues such as climate change, vulnerable populations or environmental justice have been emerging recently. Thus, this study analyzed the impact of regional socioeconomic characteristics to the natural disaster resilience. In other words, it is necessary to study how much efforts would be required to overcome natural disaster, if socioeconomic vulnerability is high. The major purpose of this paper is to analyze the relationship of diverse socioeconomic factors in a region with natural disaster resilience by extracting regions with high natural disaster resilience and those with low resilience at first. For the analysis, we used ArcGIS software program to check the pattern of cost incurrence caused by restoration of natural disasters across the nation, and analyzed influence relations through regression analysis by using regional socioeconomic indicators.

### Key words:

Natural Disaster Resilience; Socioeconomic Vulnerability; Environmental Justice

## Analysis of the Peak Flow Dynamics Based on Information Technologies and Algorithms of the Automatic Hydrograph Separation

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### Abstract

Evaluation of occasional flood runoff is a complex and multifactorial problem. The main difficulty is extremely hard selection of each flood wave. Given the climate variability and the general trend of a climate warming, a growing number of flood waves on the rivers of European Russia is observed. Therefore, the main goal of the study is the development of approaches for automatic hydrograph separation within all hydrological seasons. To analyze the role of peak-flow component in the annual runoff special soft – GrWat was created. The code was written both on Fortran and R-studio software. Algorithm based on the hydrograph separation schemes, carried out by B. Kudelin. Given the characteristics of each particular river, the program, firstly, correctly separates the groundwater and surface component. Then, according to the dates the spring flood and peak flow are calculated. The mathematical description of the individual characteristics of river flow variations set the 12 calibrated parameters. For the separation of rainwater after the main melt water wave the block of the recession curves have been incorporated into the program. For the analysis of the peaks in the summer-autumn and winter period spatial distribution of the air temperature and precipitation (Daily NOAA-CIRES 20th Century Reanalysis V2) was involved. It helps to determine flow-effective precipitation and to derive individual peaks and flood periods. (The study was supported by the Russian Foundation for Basic Research (grant No. 16-35-60080)).

### Key words:

Automatic hydrograph separation; hydrological software; flood wave; peak flow

## Analysis of Vulnerability of Dam Failure in Nigeria Using GIS Technology

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### Abstract

Dam has become a widely distributed and devastating disaster that has caused significant damages both economically and socially in Nigeria. Dam failure has caused more harm than good, Dam failure are caused by flood event, geological/foundation weakness (earthquake), storms and other human activity. Flooding originated from different levels of human environmental system which can lead to Dam failure. Flood event in Nigeria have pushed rivers over their banks and submerged hundreds of kilometers of urban and rural lands. Flash flood are common features in Nigeria during the raining season. This study therefore aims at creating a database and mapping of vulnerable area to dam failure using geospatial techniques. SRTM DEM was developed with ARCGIS 9.3 to identify vulnerable areas in both Towns/Villages as well as LGAs, the DEM was reclassified to highly vulnerable, moderately vulnerable and low vulnerable, using interval of less than 50m, 100m, 200m elevation from Dam 500m Buffer and River 300m Buffer. The study shows that 17 LGAs in Nigeria are vulnerable to dam failure after the buffering analysis was carried out and a total of 33 states are vulnerable to event of Dam failure.

### Key words:

Flooding; Vulnerability; Dam failure; Disaster; Nigeria

## Analysis on Susceptibility of Flood Disaster'S Disaster-Pregnant Environment in Honghu Basin

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### Abstract

The rainstorm, which began July 5 and continued to July 26 2010, dumped more than 580mm, in some part the cumulative precipitation was over 700mm, and the heavy rainfall has caused a serious flood disaster. MNDWI (Modified Normalized Difference Water Index, MNDWI) was applied to extract water body based on the remote sensing image before and after the flood disaster, then spatial overlay analysis was used to extract the flood inundation area. On this basis spatial analysis methods and certainty factor analysis method were applied to analyze the sensitivity analysis of disaster-pregnant environment, such as terrain factor, vegetation coverage, water network, water projects and facilities and road, etc. The research result shows that elevation between 30m and 60m, slope and relief amplitude are less than 30m are conducive to the occurrence of floods; vegetation coverage value is more than 0.75 is prone to floods; the closer distance from water network, the greater chance of flood disaster; the farther distance from road, the greater chance of flood disaster.

### Key words:

flood disaster; disaster-pregnant environment; certainty factor; susceptibility analysis

## Analyzing Changes to a River Network and Its Storage Capacity Under Rapid Urbanization during the Past 50 Years in the Yangtze River Delta, China

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### Abstract

Rapid urbanization has significantly impacted many river networks and their water storage capacity. The Yangtze River Delta region has undergone rapid and profound urbanization in the last 50 years. In this study, the urbanization expansion strength model was used to evaluate the urban expansion in the Yangtze River Delta from 1991 to 2009. Changes in the river network structure from the 1960s to 2010s in five representative sub-basins of the Yangtze River Delta were analyzed using remotely sensed images and topographic maps. Changes in the river storage capacity and flood control capacity under rapid urbanization over the past 50 years were then investigated. Grey relation analysis is used to analyze the impacts of storage-flood control capacity on river network systems. The results indicated that: 1) the sub-basins around Shanghai and Taihu Lake had the highest intensity of urban expansion; 2) the number of river networks were reduced, so did the complexity of river network spatial structure. The average drainage density, water surface ratio, river area-length ratio and fractal dimension of the five representative sub-basins were 3.02 km/km<sup>2</sup>, 9.31%, 44.15, and 1.48, respectively. The attenuation rates during the 1960s to 2010s of drainage density, water surface ratio, river area length ratio (excluding one basin), and fractal dimension were 15.2%, 10.8%, 2.2% and 5.1%, respectively; 3) the storage-flood control capacity of the Yangtze River Delta region both showed a decreasing trend during the past 50 years due to the reduction of the general rivers; 4) the water surface ratio and drainage density had a great influence on the storage capacity and flood control capacity in the Yangtze River Delta.

### Key words:

Urbanization; River network structure; Storage capacity and flood control capacity; Grey relational degree; Yangtze River Delta

## Assessment and Mapping of Sinkhole Susceptibility in Gypsum Karst Terrains (Study Area: Yek-Mahe Sub Basin, Southwest of Iran)

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### Abstract

Sinkholes are very critical hazards in gypsum karst terrains and can damage manmade structures and cause groundwater pollution. Preparation of sinkholes susceptibility maps will help to successful planning in karst terrains. The aim of this research was a sinkhole susceptibility map in gypsum karst area of Yek-mahe sub basin, southwest of Iran. The map of sinkhole distribution was prepared by a geomorphological approach based on direct observations during field and the visual interpretation of satellite images (7338 sinkholes are recognized in 31.9 km<sup>2</sup>). The sinkholes effected factors maps, include geological (lithology, structures), hydrological (drainage systems), and topographical (slope, elevation) were produced using field observations, remote sensing data, and GIS techniques. The susceptibility map was constructed using the linear regression technique. The values obtained were visualized by four susceptibility levels (low, moderate, high and very high). The sinkhole susceptibility map shows that more than 86 percent of the surface studied area are located in the very high and high susceptibility levels. The validation of the susceptibility map was checked by considering 3532 sinkholes, which not had been used in modelling. It seems that the results obtained in this paper can be used as a basic phase of sinkholes hazard assessment in regional planning in gypsum karst terrains of Iran.

### Key words:

Gypsum karst terrains; Sinkhole susceptibility map; linear regression method; Iran.

## Application of UAV Remote Sensing in Urban Atmospheric Environment Disaster

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### Abstract

In the process of rapid development of urban construction, emergency air pollution disasters occur frequently , causing huge environmental damage and economic losses, Unmanned aerial vehicle (UAV) remote sensing, as a new method of environmental monitoring, have broad application prospects. In this paper, based on the two key aspects in the emergency monitoring of air pollution events : "Measurement of atmospheric environmental parameters"and "Post disaster decision support information extraction", we analyze the working principle of the UAV remote sensing platform, research and design the data collection scheme for UAV environmental emergency monitoring, the sensing data post-processing technology, and discuss the existing problems . These work provides a reference and scientific basis for the application of remote sensing in the urban atmospheric environmental disasters.

### Key words:

UAV; urban air pollution disasters; environmental emergency monitoring

## **Assessment of Tourist Risk Perception of Mountainous Rainstorm Hazard: Take Huayang Ancient Town Resort In Qinling Mountains of China as an Example**

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### **Abstract**

In recent years, mountainous rainstorm disasters occurring frequently have a serious impact on regional sustainable development. There is a great significance for tourism safety and hazard risk prevention and mitigation to evaluate tourist risk perception of rainstorm hazard in the course of travel in mountainous ecological resort based on multi-discipline crossing. Taking Huayang Ancient Town resort in Qinling Mountains of China as study area, tourists in this area as study objects, through field questionnaire survey, using methods of AHP, Likert Scale and Exponential Model, index system of tourist risk perception of rainstorm hazard has been set up; weights of questionnaire index have been assigned; tourist risk perception exponent has been calculated quantitatively; Types and differences of tourist rainstorm hazard risk perception have been evaluated; At last, study results have been verified through related methods of bounded rational. The research results show that: in the face of rainstorm hazard risk, there are individual differences from tourists' perception; although tourists have positive attitudes to hazard risk mitigation, but their hazard risk mitigation knowledge is not enough, and their behavior tendencies to hazard risk mitigation need to be improved urgently, their comprehensive ability is poor.

### **Key words:**

mountainous rainstorm hazard; risk perception; tourists; index system of assessment; Huayang Ancient Town Resort in Qinling Mountains

## China's Population Exposure Change Analysis Under Rainstorm Disaster

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### Abstract

Rainstorm and flood is one of the worst natural disasters which occurs frequently in China. Under the background of globalization and global change, frequent occurring of heavy precipitation, more people gathering will increase the impact of rainstorm disaster risk on population in the future. The research was based on 6 times' Chinese census data and day precipitation data from 1951—2010. Through analysing the spatial relationship of rainstorm and population (6 decades), population exposure change under rainstorms were studied. The results showed that: from 1950s-2000s (1)High volume rain region and high populated region were overlapped in space: they were mainly in the Yangtze River basin, south-eastern Rivers Basin, the Pearl River Basin;(2) High proportion heavy rain region and high population density region were overlapped in space: they were mainly in the North China Plain, the Yangtze River Basin, Sichuan Basin, southeast coastal areas; (3)"high rain - high population density levels" regions increased in the number: area with rainstorm grade  $\geq 6$  ( $\geq 2500\text{mm} / \text{decade}$ ) and population density levels  $\geq 6$  ( $\geq 200 \text{ people} / \text{km}^2$ ) was increased from 315,000  $\text{km}^2$  to 608,000  $\text{km}^2$ .(4) The population exposed to high level heavy rain was in an increase. Population under rainstorm was increased from 560 million to 1.29 billion; population under rainstorm grade  $\geq 6$  was increased from 220 million to 540 million. In the nearly 60 years, China's population exposure under rainstorm increased significantly. The study set up a foundation for population vulnerability and risk assessment under heavy rain disasters.

### Key words:

Rainstorm disaster; Population; Exposure; China

## Coal Mining and Rural Livelihood in Korba Coalfield, India: An Empirical Analysis Based on Livelihood Approach

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### Abstract

India has the fourth largest coal reserve in the world with 9 per cent global share of coal. This coal reserve is distributed in different parts of the country; Chhattisgarh has second largest coal reserve (87 BnT) and contributes 18% national production. This fact clearly indicate that economy of the district is mainly coal-based. The inhabiting tribes and marginalized community of this area are backward and has experienced with both the positive and negative consequences of mining activities. The present study aims to estimate the differences in the household living environment, health and education across mining affected and non-mining affected villages. Also, the study tries to analyse the nature and extent of occupational diversification and its association with migration in the mining affected villages and the role of government. The proposed study will collect primary data from proximate to mine village and non-mining affected and secondary data 70th round (2014) of the National Sample Survey (NSS) and Annual Health Report, Government of India (2014). The result reveals that the distribution of the five capitals (namely, natural, human, social, physical and financial capital) are affected on local people and people are leaving under risk due to high coal mining and land acquisition. The present study sought to highlight the occupational diversification and its association with migration in Korba Coalfield also illustrated that the human wellbeing and Natural Hazards risk coverage.

### Key words:

Coal Mining; Rural Livelihood; Health Risk; Natural Hazards; Migration; Land Acquisition.

## Contamination and Health Risks of Arsenic and Heavy Metals at Different Land Use Types in Tianjin Qilihai Ancient Lagoon Wetland, China

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### Abstract

A total of 36 surface soil profiles sampled from wetlands in Tianjin Qilihai Ancient Lagoon Wetland (TJQW). In this study, we investigated topsoil (0–20 cm) sampled at different land use types to provide information on the concentration levels of heavy metals in a coastal wetland in China. Total concentrations of arsenic (As), cadmium (Cd), copper (Cu), lead (Pb), chromium (Cr) and zinc (Zn) were determined using inductively coupled plasma atomic absorption spectrometry (ICP-AES) to investigate the level of pollution in the sampling spots. The results demonstrated that the levels of Cd, Cu in all surface soil followed the order: the human intensive soil (HIS) > the wetland soil (WS) > the farmland soil (FS) > the vegetable community soil (VCS). As, Cd and Cu were the highest levels in human intensive area, while the level of Pb and Zn were the highest levels in farmland area. The average concentrations of Cu, Cr, Cd, Pb, Zn and As in the surface soil were 38.74, 83.52, 0.19, 34.27, 121.7 and 18.77 mg kg<sup>-1</sup>, respectively. The contamination indices of As were high pollution level in the FS and HIS, Cd for moderate pollution level in WS and FS while high pollution level in HIS. The comprehensive contamination index values demonstrated that As was the content variation of maximum in four land use types, Cd pollution to a high level. Geoaccumulation index showed that As and Cd characterized by moderate pollution, other land use types of heavy metal pollution in human intensive area. This study provides a sound information that land use types can play a significant role in heavy metal contamination.

### Keywords:

Heavy metal; different land use types; Geoaccumulation index; Qilihai Ancient Lagoon wetland; Tianjin

## **Coseismic Landslips and Associated Newmark Displacements in the Bhote Koshi Watershed of Central Nepal by the 25 April 2015 Gorkha Earthquake**

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### **Abstract**

The Mw 7.8 Gorkha earthquake of 25 April 2015 and its many large aftershocks generated about 2000 landslips in central Nepal. We have assessed the relationship between shaking and coseismic failures in the most severely-affected region of Bhote Koshi watershed. The study revealed that the distribution of slides is strongly controlled by their position in the landscape. Many slides were found to originate at a high crest or a peak. A comparison of Newmark displacement with landslide distribution shows that the slides are not positioned in the area with a maximum displacement. The slopes that had the highest internal relief suffered the most from the seismically-triggered failures. Similarly, the old and large failures, which are confined mainly to the river valleys, were rather insensitive to earthquake shaking. Back analysis of seismic hazard in the area affected by the Gorkha earthquake revealed that Newmark displacements are not the only factors to be considered during shaking, but the secondary effects can also play a decisive role in triggering shallow falls and slides on rock slopes. The investigation indicates that ground vibrations were significantly higher at the top of the slope and along crests than those at their respective bases. This process could be attributed to the resonance of shear waves comparable with the dimensions of the mountain.

### **Key words:**

flood disaster; risk analysis; urbanization; climate change; Shanghai

## Crop Drought Risk Assessment Based on Vulnerability Surfaces——a Case Study of Global Maize

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### Abstract

The intensity and frequency of drought had constantly strengthened under the background of climate change mainly characterized by global warming. The largest agricultural losses were caused by drought compared with other natural disasters. It is significant to reinforce the research of crop drought risk and reduce agricultural drought risk. Based on the EPIC model, this paper adopted the methods of irrigation scenarios to fit vulnerability surfaces of “Loss- Disaster intensity-Environment (L-D-E)” by constructing a database suitable for risk assessment on large regional scale, and completed the quantitative drought risk assessment of global maize. Global maize drought risk was quantitatively assessed according to the optimal vulnerability surface. The results showed that R square of optimal vulnerability surface is 0.9934 with coarse fragment content as the environmental indicator. The yield loss rate of expected annual risk is 19.18% on average. The yield loss rate of drought risk with different return periods (10a, 20a, 50a, 100a) is 29.18%,32.76%,36.89% and 38.26% respectively. From a global perspective, Central Asia, Iberian Peninsula, Eastern Africa, Midwest America, Chile and Brazil are the areas with high maize drought risk. The drought risk assessment based on vulnerability surfaces considers the impacts of environmental changes on drought risk, better reflects spatial heterogeneity of crop vulnerability and applies in large-scale risk assessment research.

### Key words:

Vulnerability surfaces; Drought risk assessment; EPIC; Maize

## Debris Flow Series In Kerala Western Ghats, India

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### Abstract

Many factors such as hill slope, relative relief, attitude of joints, shear strength of slope materials, type of vegetation and landuse practices make a hill slope vulnerable to debris flow. During the monsoon period, slope failures are a common natural disaster in the Western Ghats in the southern part of Indian peninsula. Its ferocity depends upon the material properties and thickness of the loose unconsolidated overburden formed by the weathering process. The triggering factor for the debris flow is found to be continuous heavy rainfall for a couple of days. The paper examines the influence of shift in rainfall pattern and its variation on debris flow events. The failure surface is identified and located from the field and its interaction with material properties and hill slope is critically examined. Highly weathered rock samples were collected from the failed areas for the determination of material property such as friction angle. Geometrical method is used for understanding the role of joints in the slope instability.

### Key words:

Debris flow; Western Ghats; Rainfall Pattern; Discontinuities; Friction Angle.

## Detecting Fire Disturbance and Monitoring Post-Fire Vegetation Recovery in

### Greater Khingan Mountain

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#### Abstract

The Greater Khingan Mountain is a typical fire-prone ecosystem in which many species have a recognized ability to regenerate after fire. There was a severe fire occurred during May and June, 1987 in this region. In the present study, the spatial characteristics of fire disturbance were detected by disturbance index (DI), which was developed by EVI2 and LST derived LTDR dataset at  $0.05 \times 0.05^\circ$  spatial resolution. The difference DI (dDI) between post-fire and pre-fire was used to identify the burnt pixels. Our results show that there are 436 burnt pixels in Mohe (70%) and Tahe (30%) county of Helongjiang Province. According to standard deviation of dDI, the magnitude disturbed by the fire was classified into three levels: slight, moderate and severe. Therefore, percentage of burnt pixels for slight, moderate and severe level is 50%, 32% and 18%, respectively. Annual post-fire vegetation recovery trajectories were analyzed by EVI2, NDV and NPP time series for all burnt pixels. The three indicators show a similar trend with fast increasing during 1987 and 1990, which means vegetation exhibit a better recovery in post-fire period in burnt area. In addition, EVI2 and NDVI time series exhibit clear differences among various disturbed magnitudes in 1987, and then the differences peter out as times goes on. Instead, the differences for various magnitudes in NPP time series are obvious except the year of fire occurred (1987). The study provides a unique sight to understand the vegetation responds to fire disturbances in Greater Khingan Mountain.

#### Key words:

Fire disturbance; Greater Khingan Mountains; Disturbance Index (DI); LTDR dataset; Vegetation recovery

## Distribution of Debris Flows Along the Sichuan-Tibet Highway from Kangding to Qamdo

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### Abstract

The intense tectonic activities and complex geomorphology have made the Tibetan Plateau the highly potential area of mountain hazards, which often pose a serious threat to traffic lines. For example, benefiting from the road reconstruction and disaster mitigation countermeasures, the annual interrupted traffic time of the National Highway G318 from Sichuan to Tibet has been shortened from more than 3 months to several days at present.

Spatial distributions of debris flow were analyzed through satellite image interpretation and field investigation along Sichuan-Tibet highway from Kangding to Qamdu. In addition, there exist high correlations between debris flows and other factors including topography, lithology, seismic factor and climatic conditions as follow:

- (a) debris-flow gullies are concentrated at an altitude of 3000–3500 m with slope ranging from  $10^{\circ}$  to  $25^{\circ}$ ,
- (b) gradient of most debris-flow gullies (84%) are in the range of 10%-40%,
- (c) the viscosity of debris flows is decided by lithology, and 93 percent of the viscous debris flows are distributed in the soft rock region,
- (d) the activity frequency of debris flows is positively correlated with the distribution of precipitation, which gradually decreases from West to East line,
- (e) 74 percent of the debris flows gullies are distributed in the region with 0.15 to 0.25 g peak ground acceleration, except the debris flows gullies around Kangding city where GPA exceeds 2.5g.

### Key words:

Sichuan-Tibet highway; Distribution of debris flows

## Ecological Sensitivity Analysis in Key Ecological Function Areas: Taking Wanan, Jiangxi Province as a Case

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### Abstract

Ecological sensitivity analysis in Key ecological function areas is an important basis and foundation of such regional ecological protection and construction and appropriate development of space. In this study, using the 12 initial natural environment information on terrain data, vegetation, soil, and ecological environment, etc, applying to Analytic Hierarchy Process (AHP) and entropy method, with the support of GIS space technology to evaluate ecological sensitivity of Wanan County. We can draw spatial distribution of comprehensive sensitivity of ecological environment, the ecological environment Sensitivity will eventually be integrated 5 grade : non-sensitive , slight sensitive, moderate sensitive, highly sensitive and extremely sensitive. The results showed ,(1) Wanan was moderate ecological sensitivity of the area, in which the smallest moderate regions 44.18%; slight and non-sensitive sensitive area being about 28.58%, in which the percentages were 5.46% and 23.12% respectively. Highly sensitive areas accounted for 17.3% of the total area, and the extremely sensitive area was large, accounting for 9.94%. (2)The area below the slight sensitive is adapted to concentrate the socio-economic factors; (3)high sensitive areas had ecological environment problems easily, such as Soil Erosion and Species diversity decreased, and they are the key area of ecological environment recovery and protection.

### Key words:

Key ecological function areas; ecological sensitivity; Analytic Hierarchy Process

## Extreme Precipitation on the Territory Mountain Crimea

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### Abstract

In Crimea, 80-85% of annual precipitation falls as rain. In watersheds of the Crimean mountain rivers rains cause floods that destroy bridges, wash away roads, erode the fertile soil layer. Most often heavy rains and downpours occur within one day and only in winter are possible within a few days.

The analysis showed that on the territory in question is most frequently observed maximal quantity rainfall is 71-90 mm (27.3%), for the formation of flood warm season is characteristic rainfall is in the range 31-70 mm (total probability - is 40, 9%).

The distribution of rainfall of 1% probability of exceedance also has a different character depending on the exposure of the slope.

To the north-western slope of the maximum rainfall of 1% probability of exceedance it is characteristic for warm period. The opposite pattern is observed for the southern coast of Crimea; on it is dominated by peaks in the cold season. For station Simferopol is located in the north-eastern slope of the Crimean Mountains is sufficiently homogeneous distribution, and the maximum rainfall of 1% probability is typical for July. For the steppe part of the territory is characterized by displacement the maximum in the earlier period - June.

Thus, the formation of the catastrophic floods of different origin on the territory of Crimea is possible throughout the year, for this reason the maximum flow calculations should be carried out on the cold and the warm season, and as designed to choose the bigger of the two maximum discharges.

### Key words:

extreme precipitation; flood; maximal runoff

## Flood Inundation Mapping in Greater Dhaka District Using Satellite Data and Geomorphological Land Classification Map

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### Abstract

Floods are a common feature in rapidly urbanizing Dhaka and its adjoining areas. In this paper, flood hazard assessment in Greater Dhaka of Bangladesh was examined using an integrated approach of GIS and remote sensing. The objective of the study is to examine the Assessment the flood risk based on the satellite data and geomorphological land classification map under the land use change. Elevation heights, land cover classification, geomorphic land forms and drainage network data generated from remote sensing and GIS approach. For each geomorphological unit, geological characteristics, geologic process and probability of inundation is investigated based on field survey. Among the various units, especially river channel, flood plain, marshy land and former river course are the most vulnerable to flood inundation. The map showed that 70% of greater Dhaka district were within moderate to very high hazard zone, especially fringe areas. It is projected that these areas will be fully urbanized by the year 2020. Only a little portion (8%) was found to be the least vulnerable. It is anticipated that proposed land use policies can contribute to effective flood forecasting, relief and emergency management for future flood event. Based on this study, comprehensive flood hazard management strategies for land use planning decision were proposed for the efficient management of future flood disasters.

### Key words

Flood hazard; Geomorphological lad classification map; Greater Dhaka; GIS.

## Flood Risk from Extreme Water Level Driven by Sea-Level-Rise Under the RCP Scenarios

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### Abstract

High water levels always lead to coastal flood and sea-level rise induced by global climate change exacerbate this flood risk. This paper explores the flood risk triggered by extreme water levels, which are joint occurrence of storm surge and high tides with sea-level rising. With Rongcheng City as a case, once encountered extreme events and without any adaptation, 52.32-64.37% of low-elevation coastal zone was expected to be flooded with 63.98-79.51% of gross demestic production (GDP) and 55.41-76.10% of population more than exposed to high tide. Under global mean sea-level rise, the exposed area, GDP, population and flooding depth will be increased, respectively. Results indicated that inundated area would be increased by 3.39-10.35% in 2050 and greater as much as 5.13-17.87% in 2100. The effected GDP and population would be amplified by 4.18-10.04% and 5.98-12.89% in 2050, while even added up to 5.64-18.49% and 8.70-25.33% in 2100. Our results emphasize that, in the absence of adaptation, sea-level rise induced by climate change makes the flood risk of extreme water levels worse and is likely to affect coastal human habitability and sustainable development.

### Key words:

flood risk; climate change; sea-level rise; potential flood damage

## Floods Occurred by a Collapse of an Earthquake-Induced Dam, Gongar, Dolakha, Nepal in April 2015

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### Abstract

This study detailed the occurrence of a series of floods caused by a collapse of an earthquake-induced temporary dam developed in the upper tributary of the Tamakoshi River, Nepal in 2015. The village of Gongar (1280 m) is situated at the confluence of the Tamakoshi River and the Gonagar Khola, a tributary draining from the west. This study conducted field surveys in and around the village between November 2015 and February 2016; namely, interview survey with the local residents and collection of videos taken by the residents. Further, this study took photographs by a drone in February 2016. A fresh landslide scar exists on the south-facing slope in the upper basin of the Gongar Khola (3600–4400 m). One of the Google Earth images on 4th December 2014 clearly shows a small scar on the same slope. Another Google Earth image on 6th May 2015 shows much larger fresh scar and fresh deposits along the Gongar Khola. The fresh scar was formed when a large landslide occurred on 26th April 2015, which was identified by the interview survey and by the videos taken by technicians of the hydropower station in Gongar. The videos show debris cloud started in the upper basin and reached Gongar in 30 seconds. From 15<sup>th</sup> to 25<sup>th</sup> June, a series of floods occurred from the dammed lake, three of which were recorded by local smart phones in Gongar. One pedestrian bridge and many containers of the hydropower station were washed away on 23<sup>rd</sup> and 25<sup>th</sup>, respectively.

### Key words:

Landslide; debris flow; debris cloud; flood; Nepal

## Fractal Dimension for Earthquake in Sichuan and Chongqing Based on GIS

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### Abstract

Based on the fractal theory and research methods applied in current seismic studies, this paper takes “Sichuan Earthquake Record”, “Sichuan Tectonic Unit Map” and “Sichuan Province Geological Map” as basic data, taking GIS as technical support platform, adopting grid method, capacity dimension, information dimension and G.R etc. as formulas to calculate dimension value of earthquake space, time and energy for each tectonic unit in Sichuan and Chongqing. And using these formula to calculate fault dimension value for each tectonic unit in Sichuan and Chongqing. Then reveal earthquake seismic fractal mechanism from the different research perspective. The main contents and conclusions of this paper include:

(1) Systematically discussed spatial fractal characteristics of tectonic unit in Sichuan and Chongqing area. Seismic spatial distributions of tectonic units within a certain space scale have significant fractal characteristics. Seismic spatial distributions of fractal dimension values of secondary tectonic units is clearer than that of first tectonic units. Seismic spatial distribution fractal dimension value is negatively correlated with average distance between most two adjacent earthquake points. There is no corresponding relationship between seismic spatial distribution fractal dimension value and times of earthquake happened in tectonic unit, while it shows a positive correlation between seismic spatial distribution fractal dimension value and spatial distribution density. Generally speaking, seismic spatial distribution fractal dimension value interrelated with complexity of tectonic units and strength and weakness of crustal movement. Its information dimension is quantitative indicator for strength and weakness of tectonic units activities.

(2) Systematically discussed the temporal fractal characteristic of tectonic unit, and of time series before and after the earthquake as well in Sichuan and Chongqing areas. Seismic time distribution structure of tectonic units within a certain time scale have significant fractal characteristics. Seismic time fractal dimension value reflects in-homogeneity of time of earthquake happened. There are some corresponding relationship between seismic time distribution fractal dimension value and time of earthquake happened. The greater the proportion earthquake point occupied (Surface wave magnitude  $\geq 5$ ) is, the smaller the information dimension value of time distribution of earthquake point becomes. Seismic time series fractal characteristics of Sichuan-Chongqing region existed within a certain range of time scales objectively. Fluctuations in seismic time series

fractal dimension can reflect the strength of seismic activity. Before the earthquake, dimensional seismic time sequence information may appear abnormal rise, abnormal decline and transition variation.

(3) Systematically discuss energetic fractal characteristics of tectonic unit in Sichuan and Chongqing area. Seismic energy distributed structure of tectonic units has a scale in-variance fractal characteristic. Energetic fractal dimension values can quantitatively reflect the strength and weakness of the regional tectonic movement. Seismic energetic distributed fractal dimension value is negatively correlated with ratio of earthquake quantity (Surface wave magnitude  $\geq 6$ ) to earthquake quantity ( $4 \leq$  Surface wave magnitude  $< 6$ ). The smaller the proportion of big earthquake happened in tectonic units is, the greater energy fractal dimension value of earthquake point becomes.

(4) Systematically discussed the fractal characteristic of fault lines of tectonic units, and the relationships between earthquakes and fault lines in Sichuan and Chongqing areas. Fault spatial distributed structure of tectonic units has significant fractal characteristics within a certain time scale. The fractal analysis indicates that a more complex spatial distributed structure of fault and stronger tectonic activity and a better development tectonics followed a bigger fault capacity fractal dimension. There is no corresponding relationship between fractal dimension value of fault spatial distribution and quantity of fault in first -level tectonic units, while it is significantly correlated with quantity of fault when this number is under 0.05 in the secondary tectonic units. Certain corresponding relationship exists in spatial distribution between earthquake point and fault. Earthquake points mainly distribute around deep fault zone. Moreover, there is a certain corresponding relationship seismic spatial fractal dimension and fault fractal dimension. A higher seismic spatial fractal dimension value follows a higher fault fractal dimension value.

**Key words:**

spatial and temporal distribution of earthquake; fractal dimension; fault; grid method; Sichuan and Chongqing areas

## Geohazard Map of Collapse Sinkholes in the Sahel of Doukkala-Abda (Morocco)

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### Abstract

This paper reports the methodology developed to draw up a geohazard map of cover-collapse sinkhole occurrences in the Doukkala-Abda area. In this area, a Mesocenozoic cover, mainly consisting of gypsum, marls, limestone, sand and clay. The thickness of this cover ranges from a few meters to more than 100 m. The surficial morphology of the area show karstic structures as sinkhole.

The karstification which is a shape of specific erosion / precipitation because of the dissolution of the carbonated formations generates, in Doukkala-Abda, karstic galleries. These last are often at the origin of the dangerous downfalls in the region. These karsts are of shapes and variable sizes, their distribution depend on several parameters (nature and thickness of the rock, cracks, circulation of waters...) they are more frequent on the coastline that behind country.

Recent works suggested that the collapses are set off from reactivated paleokarsts. The paleokarsts studied in the area proved to be the result of a particular weathering of the limestone.

In order to draw up the geohazard map geological data (lithology and tectonics), hydrogeological (hydrographic network), climate (precipitation), geomorphological (slope, aspect elevation), and anthropogenic (road network and land use) factors will used. These data and a digital elevation model of the area were integrated into a geographical information system (GIS) to produce a coherent 3-D description of the study area.

### Key Words:

karst; collapse; sinkhole; Doukkala-abda; GIS; Morocco

## Goharroud River Flood Zone Determination within Rasht Using GIS and HEC-RAS Hydraulic Model

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### Abstract

Drainage of surface runoff is one of the management problems in Rasht metropolis. Rising of river water due to flood, blocked drainage channels, and river low slope in northern regions are the main factors of flooding in streets. The terrain geometry simulation was implemented with high accuracy and speed by the use of geographical information system. For this purpose, the geometry and marginal lands across Goharroud River were simulated by using HECGeoRAS rider and river's plan. Also, the discharge with different return periods were estimated. At the next step, the river hydraulic behavior was simulated by the use of geometry information and river marginal lands. Finally, the flood zone was delineated by GIS. This research is done in a part of Goharroud River in Rasht city. This area located between Lakan Shahr up to Siahroud with 15 kilometer length. The maps provided by 50 years return period show that the overflow in a 500m range in a northern region is called Siah Estalkh located after river passage from Shohadae Gomnam Blvd. According to the type of land use, flooding is divided into low, medium, and high risk zone.

### Key Words:

Flood zone; Hedgerows rider; Goharrud River.

## Grassland Fire Spatiotemporal Pattern Evolution During 2000-2014 In China-Mongolia Border Regions

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### Abstract

Grassland fire is one of the serious natural disasters suffered both in China and Mongolia. In view of the grassland fire occurred in 3 banner of East Ujimqin banner in China and adjacent Mongolia as research area, by using GIS spatial analysis method and MCD45A burned products data, the spatiotemporal patterns of grassland fire on the study area in 2000-2014 were examined, The effects of vegetation, climate and human disturbance on the grassland fire were also analyzed. The results are as followings: In total burned area is  $8.09 \times 10^3 \text{ km}^2$ ,  $76.8 \times 10^2 \text{ km}^2$  area in Mongolia, 95% of the total area in located in the territory of Mongolia in recent 15a, highest frequency reached 7 times in Khalkhgol of Mongolia. Inter annual variability of burned area in 2000-2014 is indicated that, burned area was firstly reduced and then growth trend, the 2008 reached the least value. Negative correlation between rate of fire and precipitation, and with NDVI has been positive correlation. It was found that Inner Mongolia had much higher human population and livestock density then Mongolia ,but lower burned area radio, suggesting that human disturbance was the major factor inducing the different patterns of grassland fire between Inner Mongolia and Mongolia.

### Key words:

Grassland Fire; Spatiotemporal Pattern Evolution; China-Mongolia Border Regions

## Hazard Distribution Assessment of Debris Flow Alluvial Fan based on Remote Sensing in Xiaojiao Valley

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### Abstract

Debris-flow alluvial fans in mountainous areas are good places for dwelling and industrial development while are posed a threat by serious debris-flow hazards. The debris flow hazard assessment and mapping are of great significance for the reasonable land use in mountainous. As a new technology developing fast in recent years, remote sensing could provide plenty of information about terrain and ground surface mulch of mountainous. In this paper, a new model of assessing hazard distribution on the alluvial fans is applied, which considers fan's morphological characteristics and debris-flow occurrence frequency. And then, the NDVI and LAI were interpreted from TM remote sensing images from 1988 to 2015 by ENVI software in Xiaojiang river basin, southwestern China. Combining model assessment and vegetation coverage, grade assessment result of debris-flow alluvial fans as low-risk, middle-risk and high-risk. By field survey, most of low-risk and parts of middle-risk debris-flow alluvial fans could be used for agricultural production and industrial development in Xiaojiang river basin.

### Key words:

Debris flow; Alluvial fan; Hazard assessment; Remote sensing

## Heat Waves in Romania. Regional Features and Changes

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### Abstract

Climate changes, including changes in extreme weather events, have currently become one of the major social, economic and environmental threats. The main aim of this study is to present the spatio-temporal features and changes that occurred in heat waves in Romania over a period of 53 years: 1961-2013. The identification of heat waves was made considering the maximum daily temperature data series recorded in 22 weather stations based on the 95<sup>th</sup> percentile threshold, and a minimum duration of three consecutive days. Four parameters of the heat waves were considered for further analysis: heat waves number, heat waves day frequency, heat waves mean duration, and heat waves maximum duration. The main results are: the most and the longest heat waves are specific to the Southern and Western regions of Romania, while the less and the shortest ones were recorded in the Southeast part of the country; in terms of trends, most of the slopes calculated are positive and the great majority of weather stations recorded increasing trends to all heat waves parameters (77-95 %); more than 70 % of the slopes were found statistically significant.

### Key words:

heat waves, trend, 95th percentile threshold, Mann-Kendall and Sen's slope, Romania

## Impact of Rockfalls and Scree on Human Activity

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### Abstract

Rockfalls and scree cause problems for the following kinds of human activity and structures: (1) residential construction; (2) transport (motor, rail, pipeline); (3) transmission facilities; (4) agriculture; (5) hydropower engineering.

Impact on residential construction resulted in the destruction of settlements located at the foot of a mountain. Such example is a rockfall off Rossberg in the Alps on 2 September 1806 when total of 953 people, 126 occupied houses, 85 barns, and other buildings were wiped out.

The effects on transport include blockage of highways and railways by the deposit layer, damage to roadbeds, and destruction of engineering structures, which result in traffic disturbances. Sometimes, wreckage of transport vehicles due to immediate impact of rockfalls has been noted. In March 1981, part of a passenger train was buried at a distance of 182 kilometres from Belgrade as a result of a rockfall. Sixteen people were killed, and 35 were injured. Quite often, rockfalls and scree damage pipelines and transmission facilities.

The impact on agriculture consists of destruction of arable and grazing lands as a result of their being buried underneath rock fragments. When a rockfall occurred in 1881 near Elm (Switzerland) the event destroyed 90 hectares of arable land. The influence on hydropower engineering is in decreasing the capacity of reservoirs, which results in reductions in electricity production. One indirect influence of rockfalls on human activity is related to the falling of blocks into water bodies, which results in the formation of waves.

### Key words:

Rockfalls, scree, residential construction, transport, transmission facilities, arable lands, hydropower engineering

## Inhabitants' Awareness of Prevention and Preparation towards Hazards in the Settlements along the Tamakoshi River, Dolakha, Nepal

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### Abstract

An earthquake with magnitude of 7.8 hit Nepal on 25th April. This study focused on the settlements along the Tamakoshi River, an upper basin of which has one of the most dangerous glacial lakes, called Tsho Rolpa. The objectives of this study are: (1) to identify damages by the earthquakes; (2) to make an accurate terrain model; and (3) to predict the inundated areas by a future glacial lake outburst flood (GLOF) from Tsho Rolpa. Questionnaire surveys about the damages by the earthquakes were conducted. A drone (UAV) was used to take photographs of the major settlements. To predict the inundated areas, a HEC-RAS model was used. In Singati, the largest settlement in the upper area, 66 households were interviewed in total, among which 57 were completely destroyed. The questionnaire survey shows that almost all inhabitants do not understand a hazard map, and that the preparation for next hazard is not also conducted well. In Singati there are three river terraces, and 110 houses are distributed on the lowest and the middle terraces. The result obtained by the HEC-RAS model suggests that the area approximately 20 m higher than the riverbed would be inundated when Tsho Rolpa is bursts, and 60 houses would be flooded. In spite of this prediction, some houses already have started re-construction on the lowest terrace. To prevent and mitigate further damages, education on hazards and discussion on escape routes to a safe site will be important.

### Key words:

Nepal; earthquake; glacial lake outburst flood; drone

## **Kosi Flood Disaster and its Impact on Women: A Case Study of Kheriya Village, India**

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### **Abstract**

The Kosi River is known for frequently changing its course and severe flood. Kheriya village is situated at confluence of Ganga and Kosi River and worst affected by Kosi flood. Women are more adversely affected by flood because of their vulnerable physical, economic, social, political and psychological status. Being an agrarian and caste based society, majority of population belonging to the 'lower caste' have to migrate for livelihood. Women are economically more vulnerable, because they can't migrate like their male counterparts due to social limitations and face high risk of flood.

The aim of the paper is to analyze the Kosi flood (2008) induced vulnerabilities among women in Kheriya village in Katihar district of Bihar. The study employed both quantitative and qualitative methods. This study is based on individual interview of 50 women and Focus Group Discussion. Quantitative household questionnaires and qualitative key informant interviews are used to collect the data. The paper reveals that poor and disadvantaged women are more vulnerable to disasters than men due to the conditions that predispose them to severe disaster impacts. Women also suffer from domestic violence and are subjected to harassment when taking shelter or refuge at community centers. These particular vulnerabilities and problems interrupt women's mitigation efforts and adaptation capacities in disaster risk reduction.

### **Key words:**

Flood; Vulnerability; mitigation; disaster risk reduction

## Landslide Susceptibility Assessment by the Statistical Index Method and the Analytic Hierarchy Process technique

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### Abstract

This study aims to present a landslide susceptibility assessment enable integration of expert knowledge and existing landslide inventory to optimize the processing chain for LS assessment. At first, the Statistical Index Method (SIM) was used to develop relationships between landslide-controlling factors and the distribution of landslides. Eight landslide causing factors were considered including Elevation, slope, aspect, lithology, land cover, distance to a fault, distance to a road, distance to a river and precipitation. SIM was used to determine the weighted value ( $S_i$ ) for classes of every landslide causing factor. Then, the Analytic Hierarchy Process (AHP) was utilized to determine the weighted value ( $W_i$ ) for every factor, and then the landslide susceptibility index (LSI) value for every pixels was gained by the summation of the product of  $S_i$  by  $W_i$ . Based on the derived LSI value, the study area was grouped into five susceptibility classes: very low susceptibility, low susceptibility, moderate susceptibility, high susceptibility and very high susceptibility. The high and very high susceptibility classes mainly distributes in the settlement and sparse forest area with layered moderate hard to hard mixture of clastic rocks and massive moderate hard to hard mixture at the elevation of 0-200 m, implying that the slope failure in Huizhou affected by human activity seriously. There is a satisfactory agreement between the susceptibility map and the actual landslide data. The landslide densities and the ROC (receiver operating characteristic) curves suggest the model is suitable and acceptable for study area.

### Key words:

landslide susceptibility assessment; Statistical Index Method; Analytic Hierarchy Process

## Monitoring of Hydro Geological Conditions around Nuclear Power Station in Permafrost Areas in Russia

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### Abstract

If a nuclear power station is situated in permafrost areas, so called “talik” - an unfrozen layer of rocks – may be developed under the station or/and around it. Monitoring of the talik-zone (and other hydro geological phenomenon) is an important part of the safety measures. The purpose of the research was modeling of talik-zone changes in permafrost areas after nuclear power station seized to function. The monitoring system includes observing a temperature and borders of the talik-zone, waters and rock composition (chemical and radiochemical), etc. through boreholes.

### Key words:

permafrost areas; talik-zone; nuclear generating station; monitoring system

## Moraine-Dammed Lake Distribution and Outburst Flood Disaster Risk in the Chinese Himalaya

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### Abstract

To improve understanding of glacial lake outburst flood (GLOF) disaster risk, we have analyzed synthetically the spatial distribution and evolution of moraine-dammed lakes and potentially dangerous glacial lakes (PDGLs) in the Chinese Himalayas, established a county-based assessment system of GLOF disaster risk combining PDGLs outburst hazard, regional exposure, vulnerability of exposed elements and adaptation capability (risk management) using the Analytic Hierarchy Process, finally, evaluated synthetically the county-based GLOF disaster risk using the Weighted Comprehensive Method. The remote-sensing data results show that there are 329 moraine-dammed lakes (larger than 0.02 km<sup>2</sup>), with a total area of 125.43 km<sup>2</sup>, in the Chinese Himalaya in the 2010s, of which 116 lakes with a total area of 49.49 km<sup>2</sup> are identified as PDGLs. The zones at very high and high risk of GLOF disaster are mainly concentrated at Nyalam, Tingri, Dinggyê, Lhozhag, Kangmar and Zhongba, in the mid-eastern Himalaya, whereas low- and very low-risk zones are located in the eastern Himalaya. On the county scale, Lhozhag and Lhunze have the highest hazard degrees of hazard and exposure, respectively, while Zhongba and Zando have the highest degree of vulnerability and lowest adaptation capacity. The regionalization results for GLOF disaster risk degrees in the study are consistent with the distribution of history disaster sites across the Chinese Himalaya.

### Key words:

moraine-dammed lake; potentially dangerous glacial lakes; disaster risks; assessment and regionalization; the Chinese Himalaya

## Multi-Level Analysis of Vulnerability to Flooding in Lagos Metropolis, Nigeria

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### Abstract

Flooding has become a common hazard in Nigeria especially in the low-lying coastal areas of Lagos in recent times where many communities had suffered losses. Lagos is a rapidly developing coastal megacities and is at risk of flooding and majority of her population are particularly vulnerable to its impact. This study is a post-flood disaster assessment of some communities in five Local Government Areas (LGA) of Lagos metropolis in 2011. We adopted the integrated vulnerability assessment approach using indicators of exposure, susceptibility and adaptive qualities. A total of 1065 affected respondents were interviewed coupled with geoinformation techniques such as Geographical Information Systems (GIS) for generating the flood extent and vulnerability maps. All vulnerability indicators were subjected to descriptive analysis and correlation analysis of some selected indicators at 0.05 significant level. The results revealed that Ajewole/Ajejunle/ Ikorodu LGA are the most vulnerable being very close to the lagoon and with an elevation <13m while Apata/Shomolu LGA is the least with an elevation of >30m. About 70% of the affected buildings/population are within the 50m and 100m flood extent. Hence, the multi-level risk using distance and risk (hazard x vulnerability x amount) indices show different levels in vulnerability exposures from high-moderate-low. The study established the need to enhance geoinformation techniques with other flood mitigation techniques by risk managers/government so as to ensure a sustainable flood mitigation strategies that will assist in appropriate planning of developmental works.

### Key words:

Vulnerability assessment ; Vulnerability indicators; geoinformation techniques; GIS; exposure; susceptibility; adaptive qualities

## Potential GLOF Hazards and Initiatives taken to Minimize its Impacts on Downstream Communities and Infrastructures in Nepal Himalaya

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### Abstract

With the increasing temperature in recent years the glacier lakes are developing as a great threat to the infrastructure and the communities living downstream. There are more than 2000 Glacier lakes in Nepal and out of them some are really dangerous such as Tso Rolpa, Imja, Barun and Thulagi Glacier Lake. The objective of this study is to 1) to present the research results of the glacier lakes study that has been carried out in Nepal Himalaya in the past; 2) to present recent research results Bathymetric studies of the lakes; 3) to talk about the possible infrastructure damages specially millions dollar Hydropower's that are under threat of GLOFS; 4) to talk about the on-going Imja lake lowering project which represent the highest altitude lake, that is attempted to lower down the existing water level by three meters to keep safe the tourism, community and the infrastructures of the Everest region of Nepal.

Research results show that lakes are growing very fast and threat is increasing day-by-day, downstream areas of some dangerous glacier lakes, required immediate attention before the disaster happens. Initiation taken by Nepal government to mitigate the risk by lowering lake by 3m is a good step ahead in this direction.

### Key words:

Glacier Lakes; GLOF; Hydropower; Imja lake; lake lowering

## Quantitative Assessment on Regional Risk of Debris-Flows, Case Study: Southwest China

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### Abstract

This paper presented a comprehensive risk analysis model with an integrated hazard zoning and intensity-frequency analysis to investigate the population risk loss of debris flows quantitatively in county units, with the purpose to increase our understanding of debris-flow risk. Results show that the hazardous places mainly spread in mountains around the Sichuan Basin, the border area between Sichuan and Yunnan provinces, the eastern and southern part of Yunnan province and the eastern part of Guizhou province. The extremely-high vulnerable zones are characterized by a fragility rate of 3.89 persons per 10,000, which are distributed in 80 counties including some from the west and southwest of Sichuan Province, Zhaotong in Yunnan Province, and Bijie in Guizhou province. The risk loss increases gradually from the southeast to the central, reaches the highest (more than 100 persons/yr) on the Jiangyou-Zhaotong-Baoshan Line, then gradually reduces to its lowest in the northwest. Accounting for scales of the disasters, the extremely-large scales are the major factor of casualty. Appropriate risk management and mitigation solutions should be determined comprehensively based on debris hazard levels together with fragility rates in vulnerable zones in these hazardous places.

### Key words:

debris flows; risk loss; similarity-based method; Southwest China

## Rainfall Aggressiveness in Relation to Morphological and Hydrological Processes in the Margin of the Eastern Himalaya

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### Abstract

The study area is located in the Darjeeling and Bhutan Himalaya just north of the gap between the Deccan Plateau and the Meghalaya Plateau. The multiscale interaction of monsoonal circulation with the local topography cause that area experiences the highest annual rainfall (3,000-5,000 mm) and most frequent heavy rains (up to 800 mm/day) along the whole Himalayan margin.

Four precipitation concentration indices, predisposition of a site to produce overland flow as well as rainfall thresholds between 1 and 3 days for triggering shallow landslides were calculated on the basis of daily rainfall for period 1981-2010. The results show that the precipitation concentration values are lowest in the Himalayan foothills where annual total precipitation is highest. The margin of Himalaya and narrow belt along foothills have highest predisposition to produce of overland flow. The probability of shallow landslides triggering increases from 0.2-1.4% for one day rainfall threshold of 144 mm to 2.3-7.1% for 3 days rainfall threshold of 181 mm. The spatial differentiation of the probability increases together with the number of days of the rainfall threshold. It is significantly higher in the Bhutan Himalaya in comparison to the Darjeeling Himalaya.

### Key words:

rainfall aggressiveness; overland flow; shallow landslides threshold

## Reconstruction Processes of the Radioactive Contamination Area in Fukushima, JAPAN

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### Abstract

Kawauchi village was damaged by the 2011 Off the Pacific Coast of Tohoku earthquake. The most serious damage was nuclear hazard. This village evacuated in 16, March, 2011. The refuge continued until January, 2012. In Kawauchi village, the administration functions were returned earlier than municipalities around, and temporary storage sites for contaminated materials were secured early. This is because it is used as a model case of reconstruction from a disaster in this article. Now decontamination of the land is nearly completed and introduction of a system of real-time monitoring of temporary storage of the contaminated materials is in the progress. Hence, the overall countermeasures against radioactive materials are well under way. There are also various signs of reconstruction such as setting up of major convenience stores, planning of commercial facilities and plants, etc. However, although currently residents' returning to the village is under way, the number of fixed domicile residents seems to reach a ceiling. Moreover, recovery of the coastline areas is not promoted and most part of basis of residents' living is still missing.

### Key words:

The great east Japan earthquake; nuclear disaster; Kawauchi village; Fukushima

## Relationships between the Loess Slide Size, Slope Relative Height and Slope Gradient Within Different Slip Surfaces

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### Abstract

Based on intensive landslide surveys and interpretation of remote sensing image, we established a landslide inventory. According to slip surface we grouped the loess slides into 3 classes, they are landslide in loess, red clay contact landslide and bedrock contact landslide. Results indicated that the overwhelming majority of loess slides in the Yan'an region were small and the size of individual landslides varied largely. Although the landslide size span multiple orders of magnitude there was an obvious power law relationship and self-similar behaviour among loess slide length, area and volume. In addition, intermediate slope relative height and slope gradient was more prone to landslides, and the frequency of landslides was low at high and low slope relative height and slope gradient. However, there were different distribution rules for the loess slide number and area. Further analysis revealed that the landslide size became larger with slope relative height increasing and there were obvious linear or power law relationship between landslide size and slope relative height. On the contrary, the landslide size gradually decreased with slope gradient increasing at the certain significance level. In future, we will further study the relationship between loess slide size and other causative factors and apply the study results to improve the approach of regional landslide susceptibility assessment.

### Key words:

Landslide; Size distribution; Slip surface; Slope height; Slope gradient

## Research on the Driving Force of Soil Salinization and Ecological Risk Assessment in the Yellow River Delta

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### Abstract

Saline soil is a series of soil influenced by salinity-alkali components, which are composed of saline soil, alkaline soil and other soil in varying degrees of salinity and alkalinity, including coastal saline soil and inland saline soil. The formation of soil salinization is closely related to the topography, climate, soil parent material, groundwater, and human activities while the secondary soil salinization may occur when regional water and salt migrates in unsuitable conditions. It is of great significance to study the distribution, migration and risk assessment of salt & water. Six indicators, i.e. the elevation, groundwater level, groundwater salinity, the condition of irrigation and drainage, soil organic matter and population density, were selected as the main factors, which were analyzed by cluster analysis methods. By introducing the soil salinization ecological evaluation models, taking into consideration the reality of the Yellow River Delta, choosing the above seven elements as the evaluation factors, regarding NDVI index as the ecological endpoint, and taking advantage of ArcGIS and Matlab programming, we established the ecological risk assessment model suited for soil salinization of the Yellow River Delta and then did the evaluation. The findings showed that, first, the elevation and the groundwater level were the main controlling factors, and both were internal factors in controlling soil salinization; however, human activity factors, such as population density and drainage irrigation district were the external factors for the development of soil salinization. Secondly, the great and severe risk areas were mainly located in the southeast and northwest coastal areas and the small parts of the northeast district. Such risk areas were influenced seriously by marine and accounted for more than 58% of the total area.

### Key words:

Soil salinization; Driving forces; Ecological Risk Assessment; YRD

## Research on Time and Space Symmetry in Earthquake Disaster

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### Abstract

An earthquake trend judgment, falling into the research scope of scholars, usually has the medium-term or long-term earthquake trend as its focus, and describes macroscopic earthquake possibilities in 1-2 years or about 10 years. With its nature between an earthquake risk and earthquake prediction, an earthquake trend judgment is a judgment involving three earthquake elements, and aims at providing prediction data for earthquake functional departments and forewarning signal for people in the study area. Therefore, this book is designed as a work on earthquake trend judgments, instead of prediction, and let alone forecasts. Symmetry is the key to understanding the secrets of nature. The author thinks that only part of natural disasters at some places and in some periods (active periods) have certain symmetry; namely all natural disasters do not have space-time symmetry. Consequently, it is necessary to discriminate different cases and find symmetry regularities through in-depth study. In this book, only space-time regularities of earthquakes will be discussed. This book systematically introduces a space-time symmetry method for studying major earthquakes, investigates the space-time symmetry laws of earthquakes within the typical scope of the circum-Pacific seismic belt and the Eurasian seismic belt (Mediterranean-Himalayan seismic belt) by this method, discusses the space-time window period of earthquake occurrence, and preliminarily forecasts the occurrence trends of major earthquakes in these regions. And many forecast cases of earthquake trends have been verified by disaster facts. In addition, more details can be found in the book "Research on Time and Space Symmetry in Earthquake Disaster".

### Key words:

time and space symmetry; earthquake disaster; trend judgment;

## Resilience to Green Famine: Dimensions, Magnitude and Ethno-Culture Disparity in the Green Famine Belt

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### Abstract

Up-to-date, theories about famines in Ethiopia have focused mainly on drought. In contrast, theories meant to explaining and understanding the 'green famine' are either inadequate or absent. The 'green famine belt' has been generally overlooked by the government, humanitarian agents and researchers. The overall purpose of this study was to increase insights into the vulnerability context and establish theories about the 'green famine' and people's resilience to it based on cross-sectional study of households in a case study district. The study revealed that the impact of 'green famine' and hunger, amidst of flourishing green vegetation and ample rainfall, was as severe as that of the conventional famines. Cultural-institutional, socio-economic, and climate-induced shocks other than drought, biophysical and demographic factors were found to have triggered 'green famine'. Aspiration to change, social safety net, cultural bond and practices, income and food access, stability, access to basic services, asset possession, and adaptive capacity were observed locally relevant dimensions of household resilience to 'green famine' shocks/stresses. The study also established and proposed a theory and approach (ethno-culture approach being the base of its framework) that may be universally applied to explain and understand 'green famine'. The famine (food insecurity) that has had prevailed in most parts of Ethiopia was largely due to drought though observations show this cannot be an explanation to the 'green famine' of the green belt. Hence, policies of intervention should take into account those factors which are in operation in this regard.

### Key words:

Green-famine; shock/stress; theory; resilience; ethno-culture; green famine belt.

## Rock Fall Hazard and Risk Assessment Along Araniko Highway, Central Nepal Himalaya

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### Abstract

Rock falls are frequent along the steep slopes of highway cuts in mountainous areas like Nepal. Araniko Highway is a major highway connecting Nepal and China that has suffered from several instability problems. Recent earthquake activity in Nepal has generated many landslides, including rock falls along the highway, mostly between Lamosangu and Liping. These landslides have deposited huge piles of debris along the highway, as well as in the hill slope above, which has increased future risk of rock fall. Here, we have tried to analyze the distribution of rock falls along the highway, their mode of failure and the associated hazard and risk. The analysis show that most of the rock falls are concentrated along steep rock cliffs and are of wedge and plane failure type. For the rock fall hazard and risk assessment of the highway, we have slightly modified the original Rock fall Hazard and Risk Assessment (RHRA) method to fit the condition of the Araniko Highway. The developed hazard and risk map effectively indicates various levels of rock fall hazard and risk along the highway. Thus, based on the level of hazard and risk, the maintenance and inspection work can be carried out. In addition, the study reveals that this system can be effectively used to prioritize the severity of potential rock falls along other highways with similar geological and morphological settings.

### Key words:

Rock fall; Steep slope; Hazard; Risk

## Spatial and Temporal Pattern Discovery for Fire in China Using Statistical Probability Distribution

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### Abstract

Revealing the spatial and temporal pattern of fire across the whole China is very important for both the government and the researchers. Especially in the case that the straw burning which is closely related with the PM<sub>2.5</sub> and PM<sub>10</sub> has become the concern of the whole country in recent years, indicating the possible big anthropogenic impacts on the environment. This study investigates the probability distribution of fire hotspots and burn area in China. The long term MODIS based hotspots and burn area dataset for eight climatic zones are collected. The fire hotspots products are generally produced from MODIS 4- and 11-micrometer radiances, while the burn area data are derived from both the Terra and Aqua MODIS daily surface reflectance. The trends, the Probability Density Functions (PDFs) and the four higher moment statistics – mean, variance, skewness and the kurtosis for each of the climatic zone have been calculated. Great spatial heterogeneity in the statistical characteristics has been detected. The uncertainty and the possible reasons are discussed.

### Key words:

Spatial and temporal pattern; the Probability Density Function; spatial heterogeneity

## Spatial Characteristics Analysis and Potential Risk Evaluation of Heavy Metals in Jiaojia and Jincheng Mining Areas of Shandong Province, China

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### Abstract

In order to reveal the influences that anthropogenic factors, especially mining activity, made to soil environment quality, thirty five topsoil samples were collected from JiaoJia and Jincheng mining area, Shandong province, China and determined the contents of Cu, Pb, Zn and Cr. Spatial variation structure, concentration distribution, contamination probability and risk areas were analyzed via spatial statistic analysis with respect to these heavy metals. Results showed that the average concentration of Cu、Pb、Zn and Cr was 17.52mg/kg, 27.31mg/kg, 50.7mg/kg and 37.39mg/kg respectively. Semivariance analysis demonstrated that Cu and Zn were fit for exponential model, and Pb and Cr were fit for gaussian model; in addition, nugget coefficients of all calibrations were all above 0.75, which illustrated the variation characteristic of four heavy metals were considerably apparent. Cu、Pb、Zn and Cr in the topsoil were distributed in island duing to the effects of local factors. The result of hotspot analysis and indicator kriging interpolation collectively revealed that Jincheng town, the boundary zone of Xinzhuang town and Canzhuang town were the common high risk areas in terms of the four heavy metals, while the south part of study area was relatively the safe zone. Pb had a bigger probability exceeding threshold than others, and the middle or high contamination risk areas of Pb distributed widely as well.

### Key words:

Soil heavy metals; Spatial variability; Hotspot analysis; Indicator kriging; Pollution risk area

## **Spatial Characteristics of Physical Environment for Human Settlements in Jinsha River Watershed (Yunnan Section), China**

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### **Abstract**

In recent years, earthquake, landslide, debris flow, collapse, drought, high and low temperature and other disasters occur frequently in Yunnan Jinsha River watershed, causing deterioration of physical environments for human settlements in some areas of the watershed. Therefore, it is important to identify the spatial distribution of physical environments for human settlements to support population distribution planning. This study includes 10 factors (topography, landform, vegetation, elevation, fault, rock, soil, earthquake intensity, temperature, and precipitation) as indicators for the assessment of human settlement suitability based on AHP (analytic hierarchy process) and Gray Correlation methods. GIS functions such as 3D trend analysis, 3D perspective view and spatial variation law were used to help understand the spatial distribution of human settlements and the causal factors. The study concluded that the middle section of the watershed has the best quality of living environment, while the quality of living environment deteriorates in the downstream and upstream sections, and the upstream watershed has the worst living environment. This study reveals different spatial units of the watershed suitable for human habitation from the viewpoint of physical environment, and provides recommendations for urban planning and siting, land use planning, and disaster mitigation in the watershed.

### **Key words:**

Jinsha watershed; human settlements; GIS; AHP (analytic hierarchy process)

## Spatiotemporal Analysis of Typhoon Disaster Chains in Southeast China

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### Abstract

Under the background of global climate change, frequently occurring extreme events has been causing intensified natural disaster risk. Typhoon is one of the most frequently and extensive worldwide meteorological disaster, and usually caused winds, storms, and storm surges. China is one of the countries influenced frequently by typhoon events, and the agriculture, population and economy are threatened dramatically as its high population density and intensive economy in southeast coast. In this study, we used tropical cyclone data and meteorological data from 1949 to 2014, applied disaster risk theory and spatial analysis, analyzed the typhoon's spatial distribution influencing southeast China in the north-western Pacific and the south China sea region. Mapping the spatial distribution of typhoon-wind, typhoon-storm, and typhoon-storm surges, and finally zoning the typhoon disaster in the southeast China and obtained the frequency of typhoon disasters. The results showed that: 1), typhoon formation and landing in the north-western Pacific and the south China sea region had significant differences between years, the values peaks of formation and landing occurred in 1960-1969, with 412 and 102 respectively; 2), there are two regions affected most by typhoon—— Beibu Gulf regions, along with Guangdong Coast, and the Taiwan Strait. 3), the typhoon disaster chains indeed exist, typhoon-wind, typhoon-storm, and typhoon-storm surges affected differences in different regions.

### Key words:

tropical cyclone; typhoon chains; spatiotemporal analysis; typhoon-wind; typhoon-storm; typhoon-storm surges

## Study on Early-warning of Typical Regional Coastal Zone Carrying Capacity in the Beibu gulf, Guangxi, Southern China

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### Abstract

Coastal zone, where terrene, ocean and atmosphere interact on each other, is the richest region on the earth. Integrated coastal carrying capacity (ICCC) is one of the important bases for coastal and marine major function oriented zoning. It not only reflects the supporting capacity of the coastal environment, resources and ecosystem to human activities, but also could warn the state of environment and resource and make ecosystem staying healthy. Nevertheless, as a marine-terrestrial interlaced zone, the coastal vulnerability is inevitable. Under the background of the strategy of “the Belt and Road Initiative of China” and “the 13th Five-Year Plan”, it has become increasingly emergently in discussion of the carrying capacity, especially in the Guangxi Beibu Gulf. In this study, taking the Guangxi Beibu Gulf coastal zone as a case area, we constructed of early warning index system of ICCC based on the model of the “driving force-pressure-state-impact-response”(DPSIR). And then, we quantitatively assess the coastal carrying capacity and early warning from 2010 to 2014. The result shows that: the ICCC decreased and its alarm is not serious in the Beibu Gulf coastal zone. In space, it exhibited a pattern of high in the East and South, low in the west and North. Based on the contribution rate analysis of secondary indicator carrying capacity, the key driving forces of ICCC are the rate of the pollutants, energy consumption, regional economic development, and the environmental pressure respectively. ( Foundation: National Natural Science Foundation of China(41361022), the scientific and technological development projects of Guangxi zhuang autonomous region(2014DD29090), the Natural Science Foundation of Guangxi (2014GXNSFDA11803))

### Key words:

integrated coastal carrying capacity; warning; DIPSIR; coastal zone; Guangxi Beibu Gulf

## Study on Monitoring for Soil Sodium Chloride Content Based on Hyperspectral Reflectance

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### Abstract

In order to improve the soil sodium chloride monitoring accuracy, research the high spectral estimation method of soil sodium chloride content in the north of Weifang. using Spectral measurement technology. Taking the typical area of salt water intrusion in Wei-fang city as the research area, 41 soil samples were collected in the field, and the physical and chemical properties were measured. The mathematical transformation of the measured hyperspectral reflectance, and the soil sample sodium chloride content analysis, and the use of partial least squares regression analysis method to establish the soil sodium chloride monitoring model. The research results show that: the first derivate reflectance, the second derivate reflectance soil sodium chloride content monitoring model of the determination coefficient are higher than 0.8, the modeling accuracy is higher. After the test, the reflectance of the second derivate reflectance is the best spectral index for predicting the content of soil sodium chloride, the modeling coefficient is 0.859, the total root mean square error is 0.274.

### Key words:

Hyperspectral reflectance; Sodium chloride content; Partial least squares regression

## The Distribution of Educational Infrastructure on The Vulnerable and Areas of of Potential Disaster in Metropolitan Bandung Area

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### Abstract

This study aims to identify the inventory and distribution of educational infrastructure in areas that have the potential and vulnerable of disaster in Metropolitan Bandung Area. The information obtained provided early warnings in the form of distribution of disaster-prone spots in the educational infrastructure. The research method uses descriptive-analytic survey and geographic information systems (GIS). The use of GIS-based modelling was intended to create and produce a spatial distribution map of the region. The population of the research was the whole area of Metropolitan Bandung Area. The population of the educational infrastructure consists of the location of schools and colleges in Metropolitan Bandung Area, from kindergarten to the university. The results showed that the location of educational infrastructure in the affected areas are spread. The reason for this is because the location of the educational infrastructure (schools) were in many affected areas. For example, the areas with potential earthquake are mostly located in West Bandung (Lembang District) and Bandung Regency, especially in Pangalengan District. Meanwhile, the Bandung and Cimahi Municipality are dominated by flood and fire. There are also some scattered areas of potential landslides in West Bandung regency, Bandung and Sumedang Regency. The infrastructures should not be located in an area that has a severe impact with high potential of disaster because it will cause losses and a bottleneck in the learning process in schools. The existing location can use disaster friendly construction concepts and they will become schools or education infrastructures that are prepared for any kinds of disaster.

### Key words:

Disaster; Educational Infrastructure; Distribution; Bandung Metropolitan Area

## The Impact of Climate Changes on the Coastline of the State of Kuwait

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### Abstract

Climate change is one of the most serious problems facing the coasts of the world in general and the State of Kuwait in particular. Where 90% of the population of the State of Kuwait live in the coastal region, and most of the urban areas are concentrated on the coastal zone of Kuwait. Thus, tracking sea-level changes during the Holocene era is one of the methods to adapt the environment in order to avoid the risks that probably exposed the coastal area because of the changes of the sea level.

The preliminary field study monitored the many references throughout to the function changes the sea level along the coast of Kuwait, Such as marine terraces, Coastal ridge, coral reefs and Coastal sabkhas.

This paper consists of three elements:

1. Monitor the most important human activities in the coastal zone in Kuwait.
2. Work of imaginary model of the sea-level changes (+ 1) meters.
3. Determine the impact of the sea level in the coastline.

The aim of this paper is to follow and assess the impact of climate changes on the coastline of the state of Kuwait.

The study uses several methods such as; 1- comparing maps of the old space image with the new one . 2- The field study to collect evidence and monitor climate changes down the bottom of the Gulf and on the beaches. 3-The researcher will make coring to tracking the sea-level changes in different soil depths.

### Key words:

Kuwait; Climate changes; Geomorphology; GIS; Remote Sensing.

## The Livelihood Vulnerability of Rural Households In earthquake-Stricken Areas: A Case Study Of Ning'er, Yunnan Province

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### Abstract

Earthquakes happen suddenly and are immensely destructive. They not only destroy entire societal production and infrastructure systems but also seriously interfere with daily life and reduce opportunities to earn income in earthquake-affected areas. In this paper, using the Ning'er Ms 6.4 earthquake in 2007 as an example, we analyzed the livelihood vulnerability of rural households in Ning'er County, Yunnan, based on data from questionnaires and on-site interviews. The results showed that on the whole, local rural household livelihoods are relatively vulnerable in the earthquake-affected area of Ning'er. The main reason for the high level of vulnerability of rural households is the lack of single or multiple incomes. Due to the shortage of household income, the capacity of rural households to manage the aftermath of an earthquake is low. Improving the income allocation and transformation level and expanding methods of earning income is an effective way for rural households to decrease livelihood vulnerability in earthquake-prone areas. Some suggestions are given for local rural households to enhance their livelihood income levels in the event of earthquakes.

### Key words:

vulnerability; earthquake; livelihood; rural household; Yunnan

## The research on flood disaster risk zoning in Chaonan district of Shantou

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### Abstract

The investigation found that the studying area has complex topography landforms, which influenced by the high density of town constructions, with various artificial slopes that lead to serious soil loss. Over the years, when the annual flood season or typhoon comes, this area is always damaged by certain degrees of flood with the secondary disasters. Therefore, this region is the area with frequent geological disasters in Guangdong Province.

Depending on the typical nature of this region, the article is based on the theory of regional disaster system and the general consideration of natural environmental factors and human-economic activities, we used AHP method to determine the evaluating index, and then constructed the evaluating model. GIS and spatial statistical methods are used to analyze the risk of disaster-inducing factors, the sensitivity of subsequent environment and the vulnerability of hazard-affected bodies in Chaozhou district of Shantou. Then, we got the flood disaster zoning map and the risk tables of every village in Chaonan County. The results show that the towns of Chendian, Leiling and Jingdu are the biggest risk coefficient. The shape of the risk area is distributed by block and strip, which is influenced by river and terrain factors greatly. Meanwhile, moderate risk area is distributed in the secondary risk area that affected by population. According to social practice, the result satisfied the disaster area. Moreover, risking factors table could also be seen as the basis of risk management for villages.

### Key words:

GIS technology; flood disaster; Shantou

## Variability of Geotechnical Parameters of Slope Covers and Its Influence on Landslide's Vulnerability – Case Study from Polish Flysch Carpathians

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### Abstract

Rainfall-induced shallow landslides are common phenomena in the world. Observations of past events reveals that especially prone to landsliding are pastures and meadows. Our research were concentrated on determinations of geotechnical parameters of soil cover located within meadows in two mountainous of catchments in the Gorce (Jaszczce and Jamne, Polish Flysch Carpathians). The test were done in the context of analysis of slope stability failures, that were caused by heavy rains in July 1997 and 2008.

Site investigations included making a few open pits in order to collect soil samples, determination of soil density and estimation of hydraulic parameters of the soil. The laboratory tests included determination of a grain-size distribution, soil consistency limits, permeability coefficients and shear strength parameters, which were determined using direct shear and triaxial tests. In order to determine slope stability conditions in both catchments, was used SINMAP model.

Our research revealed that slope covers from analyzed catchments are in general coarse-grained, medium permeable and low-cohesive soils, which geotechnical parameters are not very diversified. However, shear strength tests revealed that higher values of internal friction angle and lower values of cohesion were obtained from triaxial tests. Slope stability analysis confirmed that the Jamne and Jaszczce catchments are prone to shallow failures caused by intense rainfalls, mainly due to high slope inclinations, low cohesion and medium permeability of slope cover soils. The other significant factor controlling instability processes in the area is process of the saturation of the slope covers.

### Key words:

Gorce Mountains; landslides; geotechnical parameters; SINMAP

## C12.18 Hazard and Risk

### Participation, Geo-Technology and Risk Governance



#### Oral

1. [Catastrophe Experience, Risk Perception, and The Transformation of Social Space in Post-Disaster Communities](#)  
Alex Y Lo (University of Hong Kong, HongKong SAR, China), Lewis TO Cheung (The Hong Kong Institute of Education, HongKong SAR, China)
2. [Global Disaster Risk Reduction Knowledge Service System in IKCEST](#)  
Wang Juanle (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
3. [Influence of Climate Change on Environmental Hazards and Human Well-Being in the Urban Areas - Warsaw Case Study](#)  
Marek Degórski, Bożena Degórska (Institute of Geography and Spatial Organization, Poland)

#### Poster

1. [A Hybrid Approach to Assessing Urban Flood Vulnerability Using Expert Opinions and Participatory Planning](#)  
Seongyun Cho; Heejun Chang (United States, Portland State University)
2. [Problems in Geographic Emergency Visualization and a Rapid Solve Method by Template Technology](#)  
Shulei Zheng; Yufen Chen; Jianzhong Liu (China, Zhengzhou Institute of Surveying and Mapping)

## Catastrophe Experience, Risk Perception, and the Transformation of Social Space in Post-Disaster Communities

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### Abstract

This presentation explores the relationships between catastrophe experience and risk perception, social interaction, and household economic resilience to future catastrophes. Our main argument recognizes the geographical context in which social capital is formed and reproduced. Social relationships and norms adjust to the social landscape, which can be transformed by the spatial consequences of natural catastrophes. We argue that sources of household resilience may be derived from the spatial transformation of social practices, and not necessarily from catastrophe experience and risk perception directly. Case studies in Mainland China, Hong Kong and Australia will be presented, which are primarily based on household surveys and in-depth interviews with local residents and victims of catastrophic earthquakes and flooding. The findings challenge the assumption that catastrophe experience and risk perception are related to residents' intention to prepare for future catastrophes. Nonetheless, the relationship may be mediated by social relationships and social norms. Catastrophe experience and risk perception can be construed as a geographical contextual factor. Increased proximity between residents facilitates neighbourly interaction and risk communication across a neighbourhood. We will discuss the non-linear, dynamic relationships between the variables examined and the grounding of social capital in space.

### Key words:

Natural disasters; risk perception; social interaction; catastrophe experience; household behaviour



## Global Disaster Risk Reduction Knowledge Service System in IKCEST

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### Abstract

More and more hazard and disaster events occurred frequently recently not only in regional scale and global scale. UNESCO has paid more attention on disaster risk reduction for long term. catering to the UNESCO need of building a data and knowledge platform, a Global Disaster Risk Reduction Knowledge Services System was initiated supported by International Knowledge Centre for Engineering, Science and Technology (IKCEST) in Chinese Academy of Engineering. The service mission is mainly aimed to establishing global disaster metadata standard or best practice and global disaster meta-databases; setting up natural disaster warning and relief mechanism by regions in China and its neighboring regions. The paper introduces the general architecture, common and specific functions of the Global Disaster Risk Reduction Knowledge Service System. Earthquake disaster relief in Nepal and drought monitoring in Mongolia Plateau is discussed as typical cases.

### Key words:

disaster risk reduction, knowledge service system, disaster metadata standard, earthquake, drought

## **Influence of Climate Change on Environmental Hazards and Human Well-Being in the Urban Areas -Warsaw Case Study**

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### **Abstract**

During relatively rapid changes of climate, urbanized areas are particularly vulnerable to increasing frequency of heat waves and intensification of torrential rainfalls. Such areas are characterized by the high density of population, specific spatial structure, with a large share of built-up areas and decreasing share of biologically active compounds. This results in an enlargement of the areas under impact of urban heat island, which as a consequence of a synergy effect with aging residents, triggers the lowering of the quality of human life and even increased mortality risk in terms of inflow of hot air waves. Aim of this presentation is to show on the example of Warsaw, how changes in land use structure during next 50 years may worsen the quality of life of residents, increase the risk of floods or increase the risk of elderly people and children mortality due to heat waves. Moreover, the demographic standing of Polish cities will be shown in terms of the structure of inhabitants age. Particular attention will be driven to the issues of changes in land cover, the functioning of ecological corridors and wedges aerating the city, with urban sprawl as a result of strong sub-urbanization processes. Negative consequences of climate changes will be presented along with proposals of adaptations of the environmental system to their courses.

### **Key words:**

climate change; land use changes; urban sprawl; green infrastructure; urban heat island

## **A Hybrid Approach to Assessing Urban Flood Vulnerability Using Expert Opinions and Participatory Planning**

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### **Abstract**

Urban flood risk management has mainly been focused on reducing physical vulnerability in the city. Such a narrow focus inadequately addresses equitable, effective, and efficient solutions to urban flooding problems, failing to investigate city's internal and systemic capacity to deal with diverse population characteristics. The concept of social vulnerability, which represents comprehensive a priori conditions of urban communities and neighborhoods, thus becomes critical for sustainable urban communities. It is necessary to assess urban flood vulnerability based on a broader understanding on social capital and social relations that are closely linked to the common good and the exercise of authority. From this point of view, this research conducts surveys on university researchers and urban practitioners to investigate how the perceptions of each group differ by their sociodemographic and academic backgrounds and work experience. Under the assumption that urban population may be disproportionately affected by climate change within the city, this research also attempts to explore various ways of characterizing flood vulnerability and how physical and social vulnerability are interrelated each other over space. Moreover, this research explores the possibility of developing an index approach for assessing flood vulnerability as the practice of consensus building and joint fact-finding, and its potential as social learning tools.

### **Key words:**

Urban floods; vulnerability; social vulnerability; physical vulnerability; survey; participatory planning; index approach; consensus building

## Problems in Geographic Emergency Visualization and a Rapid Solve Method by Template Technology

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### Abstract

Nowadays, natural dangers and manmade emergency cases such as traffic jam and air pollution have ascended sharply. During geographic emergency preparedness, warning, response and recovery process, map played important roles for its good abilities in visualization, localization, query and analysis. But there are still problems weakened its visualizing effect at present.

This contribution deals with problems in geographic emergency visualization and situations rapid creation. After conception and functions introduced, problems which troubled user cognition and personalized information transmission were analysed. To solve problems above, multidimensional conditions consist of different user and equipment and task were researched firstly. Then some design rules were brought up, mainly including foremost rapid mapping, personalized visualization for specific environment condition, templates combination and repeat use to simplify process, attention to indication of colours. In the following part, a new method of emergency thematic map by template technology was demonstrated.

Templates making and rapid combining methods for base-map, thematic symbol, colour and other elements were all referred to basing on questionnaire analysis results. Especially, qualitative eye tracking trace and hot-map on emergency thematic map pictures in eye movement tracking experiments validated their effectiveness. Also quantitative parameter statistical analysis of Time to First Fixation and Fixation Count supported the template method. More sufficient preparation ensures successful selection for similar emergency cases. More personalized mapping process lessens the cognition of map user. More simple decision-making process advanced rapid mapping as soon as emergencies burst out. We believe the significant method has a bright and broad future. (Project supported by the National Nature Science Foundation of China (NSFC, No.41501507, 41301125& 41171353) and the National High Technology Research and Development Program("863"Program) of China(No. 2012AA12A404 ).)

### Key words:

geographic emergency visualization; thematic map template design; rapid mapping technology; eye movement experiment

## C12.18 Hazard and Risk

### Cold Socio-ecological Systems Under Hazards and Risks: Harmonious Approaches to Resilience Building



Home

#### Poster

1. [Multi-hazard risks and Challenges for Society in High Mountain Regions – The Barsem Debris Flow Disaster, Pamir \(Tajikistan\)](#)

Margreth Keiler; Markus Zimmermann (Switzerland, University of Bern, Institute of Geography)

## **Multi-Hazard Risks and Challenges for Society in High Mountain Regions – The Barsem Debris Flow Disaster, Pamir (Tajikistan)**

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### **Abstract**

Changes in high-mountain environments are responsible for new and challenging multi-hazard conditions and materialize in particular through cases such as the Barsem disaster (Pamir) in July 2015. At least 14 major debris flows occurred in the Barsem Valley within four days during a period of exceptional meteorological conditions. The flows transported large volumes of debris on the fan where the village Barsem with about 1,500 inhabitants is located.

As a result, 80 homes were completely destroyed, and one person went lost. Moreover, the debris dammed the Gunt River, forming a lake of two kilometers length and endangering the local power supply. The lake interrupted the Pamir Highway and the potential lake outburst threatened the downstream communities along the valley as well as Khorog, the capital of the Gorno Badakhshan Autonomous Oblast. The damage was caused directly by the debris flows deposits and by subsequent flooding as a consequence of dammed Gunt River.

This contribution will provide a first analysis of the processes sequences, process-process interactions but also on emerging multi-hazard risk situations and the local and regional risk management strategies. In this context interactions of environmental and social components on different scales will be analysed based on a coupled human-landscape system approach. An additional focus will be on the challenges of resilience-building for the communities and society in this regions under changes in the high-mountain environment.

### **Key words:**

Process chains; multi-hazards; coupled human landscape systems; dynamic systems; high mountains; Pamir; communities at risk

## C12.19 Health and Environment

### Environmental Change and Health



Home

#### Oral

1. [A Calendar Visualization of Fine Particulate Matter Time-Series in Beijing during 2014](#)  
Jianzheng Liu; Jie Li; Weifeng Li (The University of Hong Kong, China)
2. [Air Pollution and Its Impact on Human Health](#)  
Myagmarsuren Dash; Otgonbayar Erdenetsogt (University of the Humanities, Mongolia)
3. [An Exploration of Longitudinal Impacts of Built Environments on Childhood Obesity](#)  
Peng Jia (University of Buffalo, United States)
4. [Arsenic and Contamination of Drinking-water and an Approach for its Mitigation in parts of Ballia District UP India: A Public-health Perspective](#)  
Abhishek Kumar (Research Scholar, India)
5. [Assessing Urban Environmental Impacts on Human Health in Kolkata Metropolitan City, India: A Case Study](#)  
Senaul Haque (Department of Geography, University of Delhi, India), Ram Babu Singh (Department of Geography, University of Delhi, India)
6. [Biogeography of Transmitting Vectors of Leishmaniasis in Area of Sugarcane Expansion and Forest Remnants, in Brazil](#)  
Baltazar Casagrande; Patricia Matsumoto; Raul Guimarães (FCT/UNESP, Brazil)
7. [Cancer Villages in China: A Study Based on Media Reports](#)  
Shengsheng Gong (College of Urban and Environmental Science, Central China Normal University, China)
8. [Characteristics and Health Effects of Air Pollutants in Shenzhen](#)  
Zhang Fengying Zhang (China National Environmental Monitoring Centre, China); Wuyi Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China); Thomas Krafft (Maastricht University, Netherlands)
9. [Diversity in the Geography of Natural Focal Diseases in the European part of Russia](#)  
Pestina Polina; Malkhazova Svetlana (Lomonosov Moscow State University, Russian Fed)
10. [Dynamic Variation Relationship between Climate Change and lung function of Chinese Adolescent Students](#)  
Jinwei He (Yan'an University, China); Miao Ge (Shaanxi Normal University, China)

11. [Environment Exposure of Heavy Metal Lead to Children, P. R. China: An Investigation from Systematic Literature](#)  
Xiaoping Li; Ting Wu; Yanan Zhao; Dongmei Liu (Shaanxi Normal University, China)
12. [Health Outcomes of Tourism of Chinese Tourists: A Study Based on Tourists' Travel Blogs](#)  
Shuangyu Xie; Dan Ye (Central China Normal University, China)
13. [Integrated Approach to Dengue Vulnerability in Delhi: From Illness to Wellness Approach](#)  
Subhakanta Mohapatra; Girish Kumar (Indira Gandhi National Open University, India)
14. [Latest Trends in Public Health in Russia](#)  
Natalia Shartova; Svetlana Malkhazova (Lomonosov Moscow State University, Russian Fed)
15. [Legacy Impacts of Historical Anthropogenic Mercury Releases on Modern and Future Global Source-Receptor Relationships](#)  
Chen Long (Peking University, China); Wei Zhang (Renmin University of China, China); Xuejun Wang (Peking University, China)
16. [MeHg Exposure and Risk from Rice Consumption for Vulnerable Populations in a Traditional Fish Eating Area](#)  
Yindong Yong (Tianjin University, China); Langbo Ou (Peking University, China); Wei Zhang (Renmin University, China); Xuejun Wang (Peking University, China)
17. [PMs and Mortality of A City with Relative Good Air Quality in South China](#)  
Fengying Zhang; Yong Ni (China National Environmental Monitoring Center, China); Wuyi Wang (Institute of Geographical Sciences and Natural Resources Research, CAS, China); Haijiang Luo (China National Environmental Monitoring Center, China)
18. [Population Health Index – A Multidimensional Tool to Analyze Health Inequalities at Different Geographical Levels](#)  
Paula Santana; Carlos Bana e Costa; Monica Oliveira (CEGOT UC, Centre of Studies on Geography and Spatial Planning, University of Coimbra, Portugal, Portugal)
19. [Progress of Medical Geography & Health Geography in China](#)  
Linsheng Yang; Hairong Li (Institute of Geographical Sciences and Natural Research, CAS, China); Yang Cheng (Beijing Normal University, China); Binggan Wei (Institute of Geographical Sciences and Natural Research, CAS, China)
20. [Research on Geographical Distribution in Pulse Reference Values of Healthy Chinese Children](#)  
Shaofang Yang; Miao Ge (College of Tourism and Environment, Shaanxi Normal University, China);

Congxia Wang (Department of Cardiovasology, the Second Affiliated Hospital, Medical School of Xi'an Jiaotong University, China); Jinwei He (College of Tourism and Environment, Shaanxi Normal University, China); Mingxin Zhang (College of Resources and Environment, Ningxia University, China)

21. [Spatiotemporal Differentiation of Ground-Level Fine Particulate Matter \(PM2.5\) Pollution in China](#)  
Mingsheng Li (China National Environmental Monitoring Center, China)
22. [Spatiotemporal Variation of Vehicular Traffic Emissions and Its Impact on Urban Health: An Empirical Case Study of Kolkata Megacity](#)  
Indrajit Roy Chowdhury (Post Graduate Department of Geography, Prabhu Jagatbandhu Jagatbandhu College, Howrah, India)
23. [Strategies of Air Quality Control on Health and Health Equality Impact in Europe, a Systematic Review](#)  
Li Wang; Thomas Krafft(Maastricht University, Netherlands); Sotiris Vardoulakis( Public Health England, London, UK); Wuyi Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
24. [Study on Air Pollution and Mortality in Chaoyang District, Beijing](#)  
Bai Yu (China National Environmental Monitoring Centre, China)
25. [The Spatial-Temporal Distribution and Environmental Mechanism of Plagues in the Ming Dynasty](#)  
Tao Zhang (Centra China Normal University, China)
26. [The Spatio-temporal Characteristics of Children's Outdoor Activities in Large Cities: A Case Study of Shanghai](#)  
Baoxin Zhai; Wei Zhu (Tongji University, China)
27. [Trends of Air Pollution and Impacts on Human Health in Mumbai, India](#)  
Aakriti Grover; RB Singh (Department of Geography, Delhi School of Economics, University of Delhi, Delhi, India)
28. [Which Indicators Are Considered Relevant for the Evaluation of the European Population's Health?](#)  
Paula Santana; Angela Freitas; Claudia Costa; Iwa Stefanik; João Bana (CEGOT UC, Centre of Studies on Geography and Spatial Planning, University of Coimbra, Portugal, Portugal)

## Poster

1. [Distribution of Polycyclic Aromatic Hydrocarbon and Its Health Risk of Surface Dusts from Parks of Kaifeng, China](#)  
Haijing duan (China, Institute of Natural Resources and Environment, Henan University); Xiaoqiang

- Cai (China, Kaifeng Environmental Monitoring Station,); Xinling Ruan (China, Institute of Natural Resources and Environment, Henan University)
2. [Spatial and Temporal Variations of Evapotranspiration and its Influencing Factors in Loess Plateau in Shaanxi-Gansu-Ningxia Region](#)  
Pengtao Wang; Junping Yan (China, College of Tourism and Environment, Shaanxi Normal University)
  3. [Temporal and Spatial Distribution Characteristics of Air Quality Index in Shandong Province, China](#)  
Haichao Xu; Zijun Li; Jinkuo Lin (China, Shandong Normal University)
  4. [The Concentrations and Sources of PAHs and PCBs in Oil Field and Estuary Soils from the Yellow River Delta, China](#)  
Jianrong cao (China, Liaocheng University)
  5. [The Determination of Sources of Allergenic Airborne Pollen in Beijing Using Backward Trajectory Analysis](#)  
Xiaoxin Qin; Yiyin Li (China, Peking University)
  6. [The Spatial-Temporal Evolution Characteristics and Influencing Factors of the PM<sub>2.5</sub> in China in 2000-2011](#)  
Liang Zhou (China, Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing);  
Dan Shen (China, Faculty of Geomatics, Lanzhou Jiaotong University, Lanzhou); Fan Yang (China, School of Geographic and Oceanographic Sciences, Nanjing University)
  7. [The Study of the Relationship Between the Development of Marine Economy and the Marine Environment in Guangxi](#)  
Huamin Zheng; Jianbing Zhang (China, Guangxi Teachers Education University )
  8. [The Use of Mathematical Models of Living Biological Systems for the Study of Climate Change and Environmental Conditions at Different Spatial Scales in Chinese Cities](#)  
Olga Lopatovskaya (Russian Fed, Irkutsk State University)
  9. [Urbanization and Its Environmental Health Hazards of Bangalore City, Karnataka - South India](#)  
Dr. Rajasekaran Deshi (India, Bangalore University, Govt. Arts College, Bangalore.)
  10. [Water Quality Changes in Tavantolgoi-mining area, Mongolia](#)  
Oyun-Erdene Boldsaikhan (Mongolia, Institute of Geography and Geoecology)

## A Calendar Visualization of Fine Particulate Matter Time-Series in Beijing during 2014

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### Abstract

The overly high fine particulate matter (PM<sub>2.5</sub>) concentration in Beijing has become a new symbol of Beijing in addition to its figure as capital city in China. “Capital of Smog” used to denote London 60 years ago now falls upon the city of Beijing, posing a critical challenges to the sustainable development of Beijing that leads to major public health concerns. In order to formulate mitigation measures and policies, knowledge on PM<sub>2.5</sub> variation pattern should be obtained. While previous studies are limited either due to data availability, or because of problematic priori assumptions that PM<sub>2.5</sub> concentration follows subjective seasonal or monthly or weekly patterns, our study aims to let data show itself rather than imposing an arbitrary periodic pattern upon the data. To achieve this, we conduct a time-series cluster analysis on a full-year PM<sub>2.5</sub> data in Beijing at the year of 2014, and provides an innovative calendar visualization of PM<sub>2.5</sub> measurements throughout the year. Intuitive insights from the cluster analysis on temporal variation of PM<sub>2.5</sub> concentration show that no weekly patterns are found, and seasonal pattern does exist but doesn’t follow a strict temporal division. Our findings contradict the result of previous studies and offer a different perspective which can help with policy formulation regarding PM<sub>2.5</sub> mitigation.

### Key words:

Fine particulate matter; Beijing; Calendar visualization; Cluster analysis

## Air Pollution and Its Impact on Human Health

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### Abstract

Due to uncontrolled expansion of city and population growth, air quality issue had been on fire for the last decade in Ulaanbaatar city. The research study aimed to monitor Ulaanbaatar air quality changes, air pollution measurement research study was conducted at the “Environmental monitoring laboratory” University of the Humanities. The number of sampling of precipitation and soil was prepared. The laboratory experiment result shows that of the research, sources of burning organic fuel have been increased heavily in Ulaanbaatar city, which emits  $\text{NO}_2$  and  $\text{SO}_2$  into the atmosphere,  $\text{NO}_2$  and  $\text{SO}_2$  react to hydrogen ion in the atmosphere and forms  $\text{SO}_4^{2-}$  and  $\text{NO}_3$ . The amount of the ion has increased in the snow – water. Snow-water is considered as mild type, but its solidity has increased to 2.2-4.6 mg eqv/l for the last years. The soil water sample is 11.46-12.2 mg eqv/l, very hard. The amount of  $\text{NO}_3$  in snow-water and soil water is low, and the amount of  $\text{NO}_2$  in the atmosphere is 2 to 3 times more. According to the average amount of total pollutants, it is higher in the samples from the air quality points in Bayanzurkh district. As a result of the research, it is shown that the air quality index will be increasing for the last years and it has a clear impacts on human health.

### Key words:

air pollution;  $\text{NO}_2$  and  $\text{SO}_2$  into the atmosphere; soil water

## An Exploration of Longitudinal Impacts of Built Environments on Childhood Obesity

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### Abstract

Although numerous efforts have been made to associate built environments with the prevalence of childhood overweight and obesity, most studies are cross-sectional which disallows them to conclude with a strong association between them. To conclude with significant impacts of built environments on children's weight status, I examined if changes in built environment factors over time would impact children's Body Mass Index (BMI) z-score and weight status. Children's individual records were extracted from two waves of the Early Childhood Longitudinal Study – Kindergarten class (ECLS-K) data (2000 and 2007). The street intersection density, housing unit density, population density, and average speed limit at the census tract level were used as main predictor variables in this study, with children's individual factors including age, gender, race, parents' highest education, and annual household income controlled for. There were a total of 9,438 children followed up from 2000-2007. Overall, children living in the census tracts with a higher street intersection density in 2000 have experienced a slower increase in BMI z-score during 2000-2007, which is significant for those children living in the suburb. Also, children living in the census tracts with lower speed limit on average showed a smaller BMI z-score increase, which implied that children living in those tracts may have more physical activity to prevent them from overweight and obesity. The built environments were found having significant impacts on children's weight status. This is the first study to observe this association based on a national representative dataset, which enables us to approach their causality.

### Key words:

Built environment; obesity; overweight; street intersection density

## **Arsenic and Contamination of Drinking-water and an Approach for its Mitigation in parts of Ballia District UP India: A Public-health Perspective**

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### **Abstract**

Arsenic contamination of groundwater is common on the Gangetic plain, which stretches from Pakistan, across northern India, and into Bangladesh, where the Ganges flows into the sea. The arsenic, along with lead and chromium and other heavy metals, has been deposited in Sediments carried by the rivers flowing out of the Himalayas. Although the sediments date back tens of millions of years, arsenic contamination is a recent development: it has become a serious health problem only since the advent of tube well technology. Medical symptoms of slow arsenic poisoning range from skin lesions to cancer of internal organs. The contamination is spotty. Arsenic above permissible limit in ground water of phreatic younger alluvium of Ganga and Ghaghara rivers along meandering course and shallow aquifer, has reported as the main source of arsenic contamination. Due to excess of Arsenic in ground water people are reported to be suffering from diseases like skin cancer, ulcer and pigmentation in skin and hardening in palm skin. This situation warrants immediate measures to be taken up for planning and implementation of various management programs for mitigation of arsenic.

### **Key words:**

GIS; Arsenic contamination; Aquifer; Seasonal variations; Water pollution; Ground water; Health effects

## Assessing Urban Environmental Impacts on Human Health in Kolkata Metropolitan City, India: A Case Study

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### Abstract

The environmental conditions of big cities in less developed countries are most of the cases not found to be in a healthy situation and the case of Kolkata Metropolitan City in this regard is not an exceptional one. The biggest problem that a megacity faces from environmental point of view is deteriorating air quality and paucity of sufficient water for drinking and sanitation purposes. In Kolkata, it has found that the concentration of pollutants ( $\text{NO}_2$  and RPM) in the ambient air have gone much beyond the prescribed national standards and recorded as critically and highly polluted in all the total 17 monitoring locations. The availability and accessibility of purified supply of piped water is equally a pressing problem in Kolkata and lack of that people extracts underground water which found to be contaminated with heavy metals like arsenic and mercury. Covering questions on environment and health, people's awareness and avoiding nature to pollution; a survey has conducted at dispensaries run by Kolkata Municipal Corporation (KMC). Three dispensaries have been selected based on spatial concentration of pollutants (one each from critical, high and low polluted areas) and only those patients were interviewed whose are having either respiratory and water borne diseases. The data thus generated have revealed that people with respiratory ailments (*Acute Respiratory Infection*) are more frequent and these are among the children than those of the water borne diseases. An attempt has been made to address some suitable measures in bringing sustainable urban development in Kolkata.

### Key words:

urban environment; air quality; water quality; health; sustainability, Kolkata.

## Biogeography of Transmitting Vectors of Leishmaniasis in Area of Sugarcane

### Expansion and Forest Remnants, in Brazil

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#### Abstract

The objective of this study is to evaluate the similarity, dominance and diversity of sandfly communities in area of sugarcane expansion and in the remaining forest. This work was carried out through night capture of sand flies using Shannon traps and CDC. Data were analyzed by PAST and Dives software, in order to calculate the similarity (Sorensen index), dominance (Simpson index) and diversity Shannon-Wiener. In forest remnants were found four different species of sandflies, and 190 specimens of *Nyssomyia neivai*, 128 *Pintomyia pessoai*, four *Evandromyia carmelinoi* and 2 *Nyssomyia whitmani*. In the areas of sugarcane expansion we found 5 different species of sand flies, and 1620 specimens of *Nyssomyia neiva*, 12 *Nyssomyia whitmani*, 4 *Evandromyia Lenti*, 1 *Psathyromyia aragaoi* and 1 *Brumptomyia brumpti*. By considering these data, it was found that the index of similarity between the sand flies communities on the sugarcane expansion and in the remaining forest was 0.44, the dominance index was 0.50 and diversity with a significant difference was 0.015. Certainly, identifying the characteristics of the species, can help control and minimization of leishmaniasis.

#### Key words:

leishmaniasis, Phlebotomine sand flies, sugarcane expansion and Biogeography.

## Cancer Villages in China: A Study Based on Media Reports

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### Abstract

A Cancer Village is the village whose cancer morbidity or mortality is remarkably higher than the national averages. The first Cancer Village in China was reported in 1954, and 351 Cancer Villages were reported by 2011; The number of Cancer Villages increased slowly before 1988, but rapidly since then, 186 amongst Cancer Villages (53%) were reported in 2000-2009. The spatial distribution of Cancer Villages was significantly different between zones, the number of Cancer Villages in the eastern zone was more than in the central zone, and in turn more than in the western zone; The mainland of China could be divided into four-level regions: rather dense areas, relatively denser areas, sparse areas and blank areas. In the last thirty years, the gravity centers of Cancer Villages in China moved continuously from west to east, and 60 % of them located within a 3 km distance from rivers, and 81% within a 5 km distance. Of all Cancer Villages, 95.16 % were caused by chemical factors, 1.99 % by virus factors, and 1.14 % by physical factors, it is obvious that water pollution was the chief cause of Cancer Villages.

### Key words:

Cancer Village; distributional change; carcinogenic factor; Pollution; period 1980-2015 China

## Characteristics and Health Effects of Air Pollutants in Shenzhen

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### Abstract

During 2013, daily average levels were  $10.9\mu\text{g}/\text{m}^3$  for  $\text{SO}_2$ ,  $39.6\mu\text{g}/\text{m}^3$  for  $\text{NO}_2$  and  $1207.2\mu\text{g}/\text{m}^3$  for CO. Daily AQI ranged from 24 to 179. There were 39 days had air pollution. According to the China National Ambient Air Quality Standard (GB3095-2012) and Technical Regulation on Ambient Air Quality Index (on trial) (HJ 633-2012),  $\text{NO}_2$  was the third main air pollutants in Shenzhen, which had 61 days as primary pollutants and 3 days as non-attainment pollutant. There were no polluted days for  $\text{SO}_2$  and CO. Monthly/hourly average AQI and concentrations of  $\text{NO}_2$  and  $\text{SO}_2$  in center city area were higher than tourist area. Annual AQI and  $\text{NO}_2$  concentration showed higher value in west parts of Shenzhen.  $\text{SO}_2$  level showed higher value in eastern Shenzhen; lowest CO concentration appeared at Luohu District. Relative risks (RRs) in the all-cause mortality number would increase with  $\text{SO}_2$  or  $\text{NO}_2$  level increase. When  $\text{SO}_2$  or  $\text{NO}_2$  concentration changes, female were more sensitive than male, and people elder than 65 years seemed to be affected more easily than younger people.

Key words:

Patterns; air pollutants; all-cause mortality; Shenzhen



## Diversity in the Geography of Natural Focal Diseases in the European part of Russia

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### Abstract

At present medical geography pays considerable attention to the study of regularities of influence of natural and social conditions of concrete territories on the health of the population. It is possible to insist that even potentially effective prophylactic arrangements will not be successful if they don't take into account data on spatial differences in spreading of diseases. The aim of this investigation is to determine diversity in the geography of natural focal diseases in the European part of Russia on the basis of the special database. There was analyzed spreading of 7 diseases, the parasitic systems of which are members of natural ecosystems. Offered approaches to the study of spatial differentiation of territory can be used for the analysis of diversity in health level of population for different diseases and characteristics of the environment.

### Key words:

natural focal diseases, diversity, spatial analysis of epidemiological data

## Dynamic Variation Relationship between Climate Change and lung function of Chinese Adolescent Students

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### Abstract

To evaluate the effect of climate change to human health, vital capacity of Chinese adolescent students aged 7 to 19 years age old in cities from 1985 to 2005 was collected. At the same time, five climate indexes were derived from China Meteorological Data Sharing Service System, including annual mean air temperature, annual precipitation amount, annual mean relative humidity, annual mean wind speed, annual sunshine duration. Time series of five climate indexes and Spatio-Temporal Variation of vital capacity were analyzed, and explored the relationship between them. The annual average temperature increased significantly, while the annual average relative humidity, annual average wind speed and sunshine hours have drop trend. The increase of precipitation was not obvious. Adolescent students' vital capacity substantially decreased year by year. Successive growth rate of vital capacity was higher in north, while lower in south. Climate change is more likely affect higher aged students' vital capacity. There are significant negative correlations between vital capacity and annual mean air temperature, annual precipitation amount, annual mean relative humidity, while positive correlation with annual mean wind speed, annual sunshine duration.

### Key words:

Adolescent; Vital Capacity; Climate Change

## Environment Exposure of Heavy Metal Lead to Children, P. R. China: An Investigation from Systematic Literature

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### Abstract

Lead (Pb) is a kind of toxic metal, widely distributing in the environment. It has seriously effects on the children's abilities of mentality and behavior. This paper presents a systematic analysis from the lead dataset in urban soils ( $n=11365$ ) and children Blood Lead (BL) ( $n=50038$ ) in 35 Chinese cities collected from 2000-2014. We combine SPSS software, ArcGis techniques and assessment model to evaluate the spatiotemporal complexity of lead in soil and in children's blood variables with an aim to understand their relationship and its spatiotemporal changes. Thematic analysis results that the soil lead (SL) with the mean of  $50.82 \text{ mg}\cdot\text{kg}^{-1}$  and mean of  $66.39 \mu\text{g}\cdot\text{L}^{-1}$  in children blood. The studies identify an empirical curvilinear association between children's BL and SL dataset in tracts:  $\text{BL}=21.06+11.92\times\ln(\text{SL}+0.17)$   $R^2=0.2838$  (28.38%). The relatively low  $R^2$  value shows the contribution of SL to children's blood lead is about 30%. The spatiotemporal maps of BL and SL are observed that the distributions of them in eastern China are higher than others, smaller observed in the middle areas of China, and the southern areas are higher than those of north. However, the extram are observed in bigger cities or industrial urban. Extrapolating from the results, it is not neglected the environment exposure of lead to children in China even though lead in gasoline was phased out after the year of 2000. These results reinforce the proposal that prevention of childhood Pb exposure must include SL remediation as demonstrated by a chinese pilot project and aproactive chinese government program.

### Keywords:

Environment exposure; lead; blood lead (BL); soil lead (SL); children's health

## Health Outcomes of Tourism of Chinese Tourists: A Study Based on Tourists' Travel

### Blogs

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#### Abstract

It is widely believed and empirically proved that to be healthy or to relax from hard work or urban life is one of the motivations driving tourists to go travelling. However, whether tourists can really benefit in health wellbeing from tourism has been neglected in tourism literature, except that Muso et al. (2004) investigated the health consequences of visiting Sagarmatha National Park, and Coghlan (2015) explored tourism experiences that enhance participant mental health. Therefore, this study aims to investigate the health outcomes of tourism in China. It will collect the travel blogs tourists write during or after their travel in recent two or three years and implement word frequency analysis and content analysis to get their comments on their tourism experience, especially on their emotion and their feeling about their body and health. After exploring the overall health outcome of all tourists, it will analyze the difference of the health outcome among different tourists in terms of gender, age, educational attainment, motivation, type of destination, season of travel, type of travel, and so on, by using the method of analysis of variance.

#### Key words:

Health outcome of tourism; travel blogs; Chinese tourists

## Integrated Approach to Dengue Vulnerability in Delhi: From Illness to Wellness

### Approach

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### Abstract

Dengue fever has emerged as one of the major health challenges in Delhi. Objectives of the study are to examine spatio-temporal distribution and analyze the degree of vulnerability to Dengue fever. The study looks dengue from health ecology perspective by combining disease ecology and political ecology of health. Data related to dengue fever and meteorological parameters were obtained from Municipal Corporation and Indian Meteorological Department respectively to show the seasonal variations and relationship among temperature, rainfall, humidity and the dengue fever cases. GIS mappings were used for analyzing incidence and spread of disease. 3 to 5 percent cases from each vulnerable cluster were selected as sample by using stratified random sampling technique. Qualitative methods were used for understanding the adaptive behaviour and negotiating processes. Out of 12 zones, maximum dengue incidences were reported from South, East and North Zone which mostly occurred during September and October. Zone wise analysis (2003-2015) revealed variations in cases. Ward level analysis revealed no specific pattern as cases were reported from both affluent colonies and slums and urban villages. The findings of the study give emphasis on processes i.e. move from Illness to Wellness approaches rather than outcomes. Rainwater storage is being promoted as an adaptation option to increase availability of freshwater; however unhealthy storage practices increases mosquito breeding. For effective control of the disease there are requirements to improve environmental sanitation along with improvement of storage practices and facilities to eliminate vector breeding, storm water disposal, health services and to increase public awareness.

### Key words:

Spatio-temporal analysis and mapping; vulnerability; health ecology, adaptive behaviour; negotiating processes; wellness approach

## Latest Trends in Public Health in Russia

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### Abstract

Public health is one of the main criteria for the sustainable development of regions. It is characterized by health and demographic indicators as morbidity, mortality, life expectancy, disability, temporary disability; its status is an indicator of the quality of the environment. The research presents the characteristics of the rate of public health in the regions of Russia (in 2002-2012). Changes in rate of public health have been identified in comparison with data of years 1990-2001. For comparative assessment of public health in Russia by its regions, an integrated parameter was used, specifically, the index of Public Health (IPH) which combines coefficients of infant mortality and life expectancy for men and women. Five groups of regions with different rates of public health have been determined and analyzed. Linked analysis between mortality rate and some environmental and socio-economic factors for 168 towns has been performed with a view to a possible interpretation of current public health.

### Key words:

Public health in Russia, mortality, life expectancy, territorial differentiation, correlation analysis

## Legacy Impacts of Historical Anthropogenic Mercury Releases on Modern and Future Global Source-Receptor Relationships

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### Abstract

Growing concerns about the risk associated with increasing Mercury (Hg) levels in the environment have resulted in a focus on the relationships between intercontinental emitted and accumulated Hg. We use a global biogeochemical Hg model with eight continental regions and a global ocean to evaluate the legacy impacts of historical anthropogenic releases on global Hg source-receptor relationships. Two inventories including anthropogenic emissions to air from 2000BC to present and riverine discharges to ocean from 1850 to present are used to drive the model. Results indicate that historical anthropogenic releases from Asia account for 8% of soil Hg in North America, which is smaller than the proportion (~17%) from previous studies. Human activities contribute more to the global ocean than continents (84% and 59%, respectively). The largest anthropogenic contributors to the oceanic Hg reservoir are North America (26%), Asia (16%), Europe (14%) and South America (14%). Although anthropogenic releases from Asia have exceeded North America since the 1970s, source contributions to the global ocean and combined continents from Asia have not exceeded North America by far. Future projections indicate that if Hg emissions are not effectively controlled, Asia will exceed North America as the dominant contributor to the global ocean in 2019 and this has a long-term adverse impact on the future environment. Accounting for the legacy impacts, sufficient efforts should be made to accelerate and better coordinate the implementation of Hg control policies, such as the Minamata Convention.

### Key words:

mercury, legacy impacts, source-receptor relationships, future projections, mercury controls

## MeHg Exposure and Risk from Rice Consumption for Vulnerable Populations in a Traditional Fish Eating Area

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### Abstract

The circulation of rice from contaminated areas could escalate exposure risk from a local problem to a national issue and affect a wider population beyond the region of origin, as confirmed by the “Poison Rice Incident” in May, 2013, in Guangzhou, China. In this study, we established a food chain model based on the equivalence method to identify major sources of methylmercury (MeHg), estimate the levels of MeHg, and quantify exposure to MeHg via rice and aquatic food consumption. Different kinds of organism samples from the Haihe River were also collected to verify the calculated values. The MeHg intake in pregnant women was 1529.1 ng/day from aquatic food chain and was as high as 2804.0 ng/day from rice, although the intake varied among scenarios. The maximum possible MeHg concentration in blood of the pregnant women was 5.21 µg/L, higher than the threshold value of MeHg recommended by the USEPA (4.4 µg/L), indicating that pregnant women could face risk from MeHg exposure. We also assessed the risk of MeHg exposure in pregnant women and their breastfed infants using a new index ( $HQ_{Equivalent}$ ). In four scenarios, the  $HQ_{Equivalent}$  indices ranged from 0.42 to 1.18 for pregnant women and from 0.29 to 0.83 for breastfed infants.

### Keywords

Rice; MeHg levels; Human exposure; Risk assessment; Vulnerable populations

## PMs and Mortality of A City with Relative Good Air Quality in South China

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### Abstract

Most studies on associations with air pollution and human health in China have focused on the heavily polluted areas or mega-cities, and studies on cities with comparatively good air quality are still rare. Only a few studies have attempted to analyse particulate matter for Shenzhen in the Pearl River Delta. So far no systematic investigation of PMs spatiotemporal patterns in Shenzhen has been undertaken and understanding of pollution exposure in urban agglomerations with comparatively low pollution is still limited.

The results show that annual average PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were 61.3 and 39.6µg/m<sup>3</sup> in 2013. About 8.8% days had heavy PM<sub>2.5</sub> pollution and PM<sub>2.5</sub> was the main air pollutant. Daily PM<sub>2.5</sub>/PM<sub>10</sub> ratios were high. Hourly PM<sub>2.5</sub> concentrations in the tourist area were lower than downtown. PM<sub>10</sub> and PM<sub>2.5</sub> concentrations were higher in western parts of Shenzhen than in eastern parts. Excess risks in the number of all-cause mortality with a 10µg/m<sup>3</sup> increase of PM were 0.61% for PM<sub>10</sub>, and 0.69% for PM<sub>2.5</sub>. The largest ERs of PM<sub>10</sub> and PM<sub>2.5</sub> were in 2-day cumulative measures for the all-cause mortality, 2-day lag for females and the young (0–65 years), and L02 for males and the elder (> 65 years). PM<sub>2.5</sub> had higher risks on human's all-cause mortality than PM<sub>10</sub>. Effects of high PM pollution on mortality were stronger in the elder and male.

### Key words:

Spatiotemporal patterns; Particulate matter; All-cause mortality; Shenzhen

## Population Health Index – A Multidimensional Tool to Analyze Health Inequalities at Different Geographical Levels

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### Abstract

The increase of health inequalities across Europe has been recognized as a key issue in the European policy agenda. At the core of the EURO-HEALTHY project (which stands for "Shaping EUROpean policies to promote HEALTH equity") is the construction of a Population Health Index (PHI) that will be used to assess population health in multiple dimensions at the NUTS 2 regional level and in ten representative metropolitan areas. The EURO-HEALTHY PHI is intended to be the starting point for the evaluation and selection of policies with the highest potential to reduce health inequalities across European regions.

The construction of the PHI was informed by scientific evidence on the relationship between multiple determinants and health outcomes, and it adopted a multi-criteria decision analysis (MCDA) methodology. Specifically, the MACBETH approach was combined with interdisciplinary and participatory processes to capture the views of stakeholders and experts. After outlining this socio-technical approach, this communication will discuss how the PHI can be the starting point for: i) assessing how alternative policy options for health policy development may reduce health inequalities, through the use of MCDA resource allocation models, conflict analyses, analysis of policy feasibility and scenario analyses; ii) performing space-time analysis of geographical patterns and comparing population health across regions through a WebGIS platform.

Generically, the PHI will allow for monitoring, foreseeing and discussing the impact of multilevel policies on overall health and well-being at European, national and regional levels. The methods in use will contribute to enhancing the literature in the area, with the results advancing the understanding of regional, national and European policy-makers regarding the major health problems affecting their regions, and to illuminating priority areas for policy intervention. (This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 643398)

### Key words:

Population health; Population Health Index; Health inequalities; Transdisciplinarity; Policy; Policy evaluation; Europe

## Progress of Medical Geography & Health Geography in China

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### Abstract

A total of 20,891 articles published in SCI/SSCI journals (WEB OF SCIENCES) and the papers published by Chinese scholars since the end of 1990s were analyzed through literature metrological analysis. The results show that medical & health geography has been rapidly developed both in the world and in China. The publications in SCI journals published by Chinese scholars and the citation frequency of these publications have greatly increased. In the developed countries, researchers pay more attention to health care accessibility/health equity and their relationships with space, place, neighborhoods, landscapes, area, economy, culture, population aging and other social determinants, as well as the health impacts of global environmental change and the environmental quality degradation at a large scale. In China, researchers concern more about health risks of local environment pollution (either heavy metals or POPs in air, soil or water) and the prevalence of diseases at a local scale. As China is the largest developing country with rapid development, researchers in medical & health geography in China should focus on health related challenges occurred in both the developing and developed stages.

## Research on Geographical Distribution in Pulse Reference Values of Healthy Chinese Children

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### Abstract

**Objective:** This paper aims at supplying a scientific basis for standardizing the normal reference value of values Chinese children aged 6-12 years. **Methods:** The pulse reference values of 126468 healthy boys and 156793 girls were collected from 69 units from 30 provinces (cities) in China. The variance, correlation and stepwise regression analysis were used to find the correlation between nine geographical factors besides age and the pulse reference value. Then distribution maps in pulse reference values of children were drew. **Results:** there was significant relationship between geographical factors besides age and the pulse reference value. The geographical distribution in pulse reference values of healthy boys and girls both were gradually decreasing from west to east, inland to the north coast. Age increased each year, the Chinese boys' reference pulse decreased by 0.98 ~ 11.36, while the girls' reference pulse decreased by 0.89 ~ 10.32. The girls' pulse reference value was 2.16 numbers one minute higher than boys' in same age and environment. **Conclusion:** The important factors that influenced pulse reference values of Chinese healthy children were altitude, annual sunshine duration and age. There was greater difference of functional status of cardiovascular system between boys and girls with age. However, the geographical distribution in predict pulse reference values of healthy boys and girls was roughly similar.

### Key words:

Pulse; Children; Stepwise regression analysis; Distribution

## Spatiotemporal Differentiation of Ground-Level Fine Particulate Matter (PM<sub>2.5</sub>)

### Pollution in China

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#### Abstract

PM<sub>2.5</sub> is the primary pollutant which affecting air quality in China. The statistical method and GIS technology were used to analyze the ground-level PM<sub>2.5</sub> observation data in 2015 from 338 routine monitoring sites in urban air quality monitoring network. The results were also compared to PM<sub>10</sub> which can be summarized as follows. ① The daily mean PM<sub>2.5</sub> concentration obviously accorded with lognormal distribution showing main distribution range of 15-60  $\mu\text{g}/\text{m}^3$ . 17.5% of the days' mean PM<sub>2.5</sub> concentration failed to meet the prefectural level this year, and only 22.5% of the cities' yearly evaluation results at or above prefectural level according with currently in effect ambient air quality standards. The pollution level was far more serious than European and American developed countries. ② The PM<sub>2.5</sub> pollution was relatively light in summer, finally spring, early autumn compared to heavy pollution in winter. ③ Daily PM<sub>2.5</sub> concentration variation followed indistinctive bimodal curve with minimum value around 16:00 and maximum value around 10:00. The pollution level was relatively high in the small hours of the day. ④ The PM<sub>2.5</sub> pollution was serious in Beijing-Tianjin-Hebei region and its surrounding area, as well as Hubei, Hunan, and Anhui province in the central China area. The light polluted area was contagious distributed in southeast coast and Yunnan, Tibet in southwest China. ⑤ The spatial distribution of PM<sub>2.5</sub> pollution was significantly correlated with wind speed, air relative humidity, and land cover. Generally, the serious polluted area has been linked to slow annual mean wind speed, high air relative humidity, and high proportion of crop land and urban and build up land. ⑥ The correlation coefficient between PM<sub>2.5</sub> and PM<sub>10</sub> was 0.86. However, the PM<sub>2.5</sub> pollution was more serious than PM<sub>10</sub>. Pollution days with PM<sub>2.5</sub> as the primary pollutant accounted for 70.7% of the total pollution days, outclassing that of PM<sub>10</sub>. ⑦ The average value of PM<sub>2.5</sub> and PM<sub>10</sub> concentration ratio was 0.591, which has spatial pattern of gradually increasing from northwest to southeast, and south region higher than north region. The high ratio value of PM<sub>2.5</sub>/PM<sub>10</sub> centralized in south of Yangtze River to Tibetan Plateau (except Yunnan-Guizhou Plateau). ⑧ Monthly PM<sub>2.5</sub>/PM<sub>10</sub> ratio was basically stable in the range of 0.55-0.6, excluding higher in January, February, and lower in May. Diurnal PM<sub>2.5</sub>/PM<sub>10</sub> ratio variation presented sinusoidal distribution, with peak value around early in the morning, following downward trend until reached peak-valley value toward evening, after then increased.

#### Key words:

PM<sub>2.5</sub>; Spatiotemporal differentiation; PM<sub>10</sub>; air pollution

## Spatiotemporal Variation of Vehicular Traffic Emissions and Its Impact on Urban Health: An Empirical Case Study of Kolkata Megacity

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### Abstract

Kolkata Megacity experiences high emissions rate of vehicular pollutants from the vehicles which are plying on the major arterial as well as through major traffic intersection points. 65 percent of the vehicles are diesel run and these are very toxic and carcinogenic in nature. Bharat Stage – IV compliant vehicles have higher toxicity than the petrol counterpart. Petrol fuel emits high percentage of carbon monoxide and hydrocarbon and it is approximately 24 to 30  $\mu\text{g}/\text{m}^3$  per day (WBPCB, Annual Report 2014 – 2015) compared to diesel fuel where the rate is nearly 18 to 21  $\mu\text{g}/\text{m}^3$  per day. To assess the status of automobile pollution load, twenty traffic intersection points has been selected from different quadrants of Kolkata in order to estimate the automobile pollution status. Study reveals large and small buses are the principle sources of NO<sub>x</sub>, CO, HC, Pb, CO<sub>2</sub>, SPM and RPM in the city. The average age of the passenger cars is about 10 years but over one quarter of the large diesel trucks are over 30 years. As an effect these pollutants create various respiratory diseases has cropped up like Bronchial Asthma, Chronic Bronchitis, Breathing problem followed by other diseases like Eye irritation, High pressure found among the respondents in Kolkata because of high rate of exhausts from the on-road running vehicles. This paper explored the study of traffic air pollutants and its impact on urban health followed by various long term strategies to control automobile air pollution for improvement of the quality of life.

### Key words:

Kolkata, emissions, diesel vehicles, carcinogenic, quadrants, respiratory diseases, urban health

## Strategies of Air Quality Control on Health and Health Equality Impact in Europe, a Systematic Review

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### Abstract

**Objective:** To identify the effectiveness of the interventions relating to air quality control on health and health equality in Europe. **Method:** Systematic review. Three databases, Web of sciences, PubMed, and Trials Register of Promoting Health Interventions (TROPHI), were searched for scientific literatures investigating the effectiveness strategies on air pollution control and health quality and health equality from 1995 to 2015. **Results:** A total of 17 scientific papers are included. Four groups of strategy types, namely, general regulations, traffic related emission control interventions, energy emission control interventions and greenhouse gas emission control interventions from climate change mitigation strategy where air pollutants emission cut as a co-benefit are identified. All of the strategies s gained laudable or modest air quality improvement and health quality improvement. The studies regarding the impact on health equality are very limited, 3 out of 17, and no consistent and systematic result is found that those strategies could gap the health inequality caused by air pollution. **Conclusions:** particulate matter, particularly fine particulate matter, and nitro dioxide are the main air pollution concerns in Europe recently. Health benefits were gained either as main goal or as co-benefit from all of the strategies, but no consistent impact on health equality from the strategies was found. The strategy types on air pollution in Europe and the health impact assessment methodology are also discussed in this review.

### Key words:

Air quality; Strategy; Health assessment; health equality; Systematic review

## Study on Air Pollution and Mortality in Chaoyang District, Beijing

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### Abstract

In this paper, the association between concentration of ambient air pollutants and daily number of mortality in an urban area of Beijing was studied. Different age groups, gender groups were taken into consideration. The results showed that, for all the groups, the average daily number of mortality showed an increasing trend from June to January of next year, and a decreased trend from February to June. When the concentration of air pollutants increased, the health risk also increased. In multi-pollutants models, the pollutants had a decreasing order  $\text{NO}_2$ ,  $\text{PM}_{10}$ ,  $\text{SO}_2$  for the different gender groups when the concentration of pollutants increasing, and had a decreasing order  $\text{NO}_2$ ,  $\text{PM}_{10}$ ,  $\text{SO}_2$  for different age groups when the levels of pollutants increasing. The lag effects of air pollutants and seasonal differences were also found. The results of our study could serve to strengthen the local evidence base for air pollution-related health effects that is imminently needed for better air quality management, and also add valuable information from Beijing.

### Key words:

ambient air pollutants; daily mortality; Chaoyang District; Beijing

## The Spatial-Temporal Distribution and Environmental Mechanism of Plagues in the Ming Dynasty

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### Abstract

The plague is one of the climax natural disasters which is company with the human beginning to end. Based on the historical materials of plagues, climate changes and natural disasters in the Ming Dynasty, we study on the spatial-temporal distribution of plagues and the environmental mechanism, using spatial analysis and mathematical statistics methods.

In the temporal distribution, the Chongzhen dynasty is the most serious, the spring and summer are the high incidence seasons of plagues, the general trend is on the rise, the number of plague counties adds 9.5 every ten years, and there exist two scales of the fluctuation cycles which are 100 years and 50 years. In the spatial distribution, the plagues decrease from the northeast to the southwest in the whole, there are totally 1009 counties exist plagues, the hot spots of plagues mainly locate in the three regions in the northeast, the cold spots of plagues mainly locate in the three regions in the southwest.

The environmental mechanisms of plagues can be interpreted to be the environmental elements which influence the plagues, the influence extent and the action mechanisms. There are five main natural environmental elements which influence the plagues of the Ming Dynasty, including the cold and warm changes of climate, floods, droughts, locusts and earthquakes. The influence extent of the five environmental elements can be ordered by "droughts (74.1%) > locusts (46.4%) > floods (33.1%) > earthquakes (29%) > cold and warm changes of climate (23%)" from high to low.

### Key words:

the Ming Dynasty; plagues; spatial-temporal distribution; natural disasters; environmental mechanism

## The Spatio-temporal Characteristics of Children's Outdoor Activities in Large Cities: A Case Study of Shanghai

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### Abstract

With the increasing severity of children's health problems (especially obesity), children's outdoor activities are receiving more and more attentions. Especially in large cities, factors such as high population density, limited supply of the activity spaces, traffic and community safety all affect children's outdoor activities. This paper presents a case study of Shanghai to recognize the spatio-temporal characteristics of the health, outdoor activities, and their relationships of the children and adolescents between 6-18 years old. The data were collected through an internet questionnaire survey which received 403 valid responses from children's parents. Using descriptive statistics, statistical testing, spatial analysis and other methods, two aspects of analysis are conducted: First, it analyzes the statuses and spatial distributions of the self-rated health and BMI of the children, describes the intensity, frequency, periodicity of the children's outdoor activities, and tests the relationship between the children's health and outdoor activities. The results show that 23% of the children are obese, more than 74% of the children's activities do not meet the requirements of the World Health Organization, and there is a significant correlation between the children's health and vigorous activity. Second, it analyzes the spatial and temporal distributions of the children's outdoor activity, activity time and place, and tests their relationships. The results show that the children's activity times and spaces closely vary with age. Activity place and vigorous activity are also significantly related: sidewalks, street space, nearby schools are the main places where high intensity activities occur.

### Key words:

Spatio-temporal characteristics, Children's outdoor activity, Health, Shanghai

## Trends of Air Pollution and Impacts on Human Health in Mumbai, India

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### Abstract

Air pollution is critical environmental problem worldwide. An analysis of the changing air quality of financial capital of India, Mumbai, is presented in the paper. The ambient air quality data (1990–2011) of four pollutants-Sulphur Oxide (SO<sub>2</sub>), Nitrogen Oxide (NO<sub>2</sub>), Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM) is studied for three stations: Parel, Bandra-Worli and Kalbadevi.

The annual average data for SO<sub>2</sub> reveals that lowest (4 µg/m<sup>3</sup>) is recorded in 2011 that were high with 61.5 µg/m<sup>3</sup> 1990. The NO<sub>2</sub> decreased in Parel while increased in Kalbadevi and Bandra-Worli (1990-2011). Nearly 41 µg/m<sup>3</sup> NO<sub>2</sub> concentrations were recorded in Bandra-Worli. The average from 1990 to 2011 reflects that while SO<sub>2</sub> and RSPM are highest for Parel; NO<sub>2</sub> and SPM in Kalbadevi.

The month wise trend reveals that all pollutants except SO<sub>2</sub> observe a dip in monsoon season. The overall trend however shows that the pollutants have decreased substantially in all the stations post 1999-2000 but again tend to increase post 2003.

Primary survey of 75 respondents was conducted using random sampling method to analyze people's perception on air quality and rise in respiratory illness.

### Key words:

air quality; seasonal trend; pollutants; human health; Mumbai; India

## Which Indicators Are Considered Relevant for the Evaluation of the European Population's Health?

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### Abstract

The process of selecting indicators plays a crucial role in constructing the Population Health Index (PHI), a tool designed to consider multiple aspects and simultaneously deliver an aggregate score on the population's health in different regions. The PHI will be applied to evaluate the population's health across European regions and be used to foresee and discuss the impact of policies on health equity.

This presentation reports on the approach, methods and outcomes regarding the selection of indicators and related dimensions and areas of concern considered relevant for the evaluation of the European population's health. In order to gather the views from a broad spectrum of experts and stakeholders representing transdisciplinary backgrounds and to assure the selection of a wide range of indicators from diverse health-related areas of concern, an innovatively designed Delphi process was built and a web-platform established for implementing and monitoring that process. The panel consisted of 81 participants, of which 51 were Consortium experts and 30 stakeholders. The level of consensus was assessed through the analysis of the level of agreement or disagreement on a 5-level Likert scale determined for each indicator from a list of 130 (previously identified in the literature) and by making frequency distributions of the responses. After an enchainned two-round Delphi process, a consensus was reached on the relevance of 80 indicators. The selected indicators are related with the following areas of concern in terms of the population's health: i) Economic and Social Environment; ii) Demographic Change; iii) Lifestyles and Health Behaviours; iv) Physical Environment; v) Built Environment; vi) Healthcare Services and vii) Health Outcomes. (This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 643398)

### Key words:

Population Health Index; Indicators; European regions; Participatory Process; Delphi; Interdisciplinarity

## Distribution of Polycyclic aromatic hydrocarbon and Its Health Risk of Surface Dusts from Parks of Kaifeng, China

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### Abstract

Fifty-three surface dust samples were collected from four parks (Longting Park (PL), Tieta Park (PT), Qingmingshanghe Park (PQ), Xiangguosi Park (PX)) located in Kaifeng City, China. The concentrations of sixteen priority polycyclic aromatic hydrocarbons (PAHs) in dusts were determined by GC-MS. The status, source and health risk of dust PAHs were discussed. Results showed that the  $\Sigma$ PAHs concentrations in the surface dust ranged from 332.20 to 7535.10  $\mu\text{g}\cdot\text{kg}^{-1}$  with the mean being 1320.10  $\mu\text{g}\cdot\text{kg}^{-1}$ . Dominant PAH compounds were 4 rings and 5 rings PAHs (Such as Phe, Ant, Flu, Pyr, BaA, BbF, BaP). The Maliszewska-Kordybach from the 4 Parks indicates that  $\Sigma$ PAHs of dust in PX, PL and PT polluted seriously, PQ polluted moderately. The hazard health risk for children exposed to urban dust PAHs was thought to be greater than that of adults, dermal contact appeared to be the predominant exposure route. The average CR decreased in the order of  $\text{PX} > \text{PT} > \text{PL} > \text{PQ}$ . The average CR of  $\Sigma$ PAHs in the PX was higher than  $10^{-6}$ . Source apportionment indicated that the PAHs originated mainly from burning, mainly oil burning.

### Key words:

park; surface dust; PAHs; health risk; Kaifeng city

## Spatial and Temporal Variations of Evapotranspiration and Its Influencing Factors in Loess Plateau in Shaanxi-Gansu-Ningxia Region

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### Abstract

Based on MODIS-ET data, spatial-temporal variation patterns of evapotranspiration of Loess Plateau in Shaanxi-Gansu-Ningxia Region during 2000—2012 was analyzed. Meanwhile, the influencing factors of the ET's variations in Loess Plateau in Shaanxi-Gansu-Ningxia Region were analyzed by statistics observation data of the meteorological stations and calculating correlation coefficients of ET to climate elements. The results showed that:(1) The average of ET of Loess Plateau in Shaanxi-Gansu-Ningxia Region increased rapidly In 2000-2002 and peaked in 2003(378.6mm).(2)The spatial distribution pattern of annual ET was apparently various. ET increased gradually from the northwest to the southeast, and ET of Southern-most forest regions were higher than that of other parts of Loess Plateau in Shaanxi-Gansu-Ningxia Region.(3) Different land use/cover types had different contribution to the ET distribution in Shaanxi-Gansu-Ningxia Region. The highest contribution rates were made by grasslands and croplands, closely followed by closed shrublands and open shrublands, while the contribution evergreen needle leaf forest and woody savannas contributed less for ET distribution.(4) The influencing factors of ET were as the following : ET in its main part was positively correlated with forceful factor of ET change, wind speed affect the ET of the region most. The thermodynamical factor mainly negatively correlated with ET changes. The air temperature was negative correlated with ET in most areas whereas sunshine hours in less regions had negative correspondence with ET than air temperature. Besides, it can be found that moisture condition like precipitation and relative humidity all had strong positive effect on the ET.

### Key words:

Loess Plateau in Shaanxi-Gansu-Ningxia Region ; evapotranspiration ; Spatial and temporal variations ; correlation analysis

## Temporal and Spatial Distribution Characteristics of Air Quality Index in Shandong Province, China

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### Abstract

Based on the daily monitoring data of air quality index (AQI) of 17 cities in Shandong province from November 1, 2013 to October 31, 2015, and combined with geographical location and each season's climatic characteristics of every city, to analyze the spatial and temporal distribution characteristics of air pollution in Shandong province from the macroscopic angle. The results showed that the air quality has obvious regional differences in Shandong province, which the air quality is generally good in the eastern coastal areas and relatively serious in the inland cities, and the AQI are gradually increasing from the southeast to the northwest in coastal cities. The change of AQI has obvious seasonal characteristics in Shandong province, winter air pollution is most serious and summer is the lightest. Although the frequency of air pollution in the spring is higher than the autumn, the pollution degree in autumn is more serious than the spring. The air quality in the peninsula region is the best, followed by southern region, and worst in central and northwest region of Shandong province.

### Key words:

air quality index (AQI); spatial distribution; seasonal characteristics; Shandong Province

## **The Concentrations and Sources of PAHs and PCBs in Oil Field and Estuary Soils from the Yellow River Delta, China**

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### **Abstract**

A study was conducted to assess the occurrence of organic pollutants i.e. polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) in the soil samples of two different sub-regions (Oil Field versus Estuary) from the Yellow River Delta, China. Total concentrations of PAHs and PCBs in soil were in the range of 157.8-481.7 and 5.6-56.6  $\mu\text{g kg}^{-1}(\text{dw})$ , respectively. The average concentrations of PAHs in Oil soil samples and in Estuary soil samples were 274.0 and 244.4  $\mu\text{g kg}^{-1}$ , and the contribution of low molecular weight (two- and three-ring) PAHs was more larger in the Oil soil samples than that in the Estuary soil samples. Both PAHs and PCBs contaminations in Estuary Area were weaker than that in Oil Area. Using diagnostic ratios analysis, the main source of PAHs was attributed to petroleum input which caused by the fuel oil or light refined petroleum products in the Gudong Oilfield. The average concentrations of PCBs in the Oil soil samples and Estuary soil samples were 24.2  $\mu\text{g kg}^{-1}$  and 10.8  $\mu\text{g kg}^{-1}$ , respectively. The low-chlorine congeners (3-4 chlorine atoms) PCBs in Oil soil samples were more abundant than that in Estuary soil samples. Congeners analysis of PCBs and the correlation index between PCBs and PAHs were employed, which showed that the emission of PCBs in YRD were influenced by both Godong Oilfield and other industrial sources.

### **Key words:**

polycyclic aromatic hydrocarbons (PAHs); polychlorinated biphenyls (PCBs); proportion; distribution; sources

## The Determination of Sources of Allergenic Airborne Pollen in Beijing Using Backward Trajectory Analysis

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### Abstract

Trends in airway allergic disease caused by airborne pollen have shown a substantial increase in prevalence all over the world. To understand the atmospheric dispersion of pollen in Beijing, we used Burkard 7-day spore-recording trap to monitor daily pollen concentrations in 3 different locations. We used HYSPLIT model of backward trajectory analysis to explore the relationship between air-mass movements and the peak values of pollen concentrations during the pollen season. The results of HYSPLIT model showed that peaks of pollen concentrations occurred in different time. While *Humulus* and *Artemisia* belonging to strongest allergenic taxon have accounted for more than 80 %. Comparing the curves of daily pollen concentrations, 4 peak dates were chosen in the same period, including 23<sup>rd</sup>, 24<sup>th</sup> and 28<sup>th</sup> April and 2<sup>nd</sup> September. 128 trajectories were identified from April to September in 2015, and clustered into 9 types of air-mass movements distinguished by direction and distance. The main source included north-northeast, east-northeast and slower northeast movement featured by 49 % frequency in total; the second largest group contained local north and north air-mass movements with the total frequency of 23 % ; the third group comprised west-northwest, faster northwest and north-northwest movements, which has occupied 17 %; the frequency of southwest movement was 12 %. The 48-h back trajectories of peak dates during autumn pollen season in each monitoring site indicated the sources from northeast were closely associated with the highest daily pollen concentrations in Beijing.

### Key words:

HYSPLIT; backward trajectory analysis; allergenic airborne pollen; source determination; Beijing

## The Spatial-Temporal Evolution Characteristics and Influencing Factors of the PM2.5 in China in 2000-2011

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### Abstract

Haze pollution has become a severe environmental problem for people's daily life as well as their health in China, related research has the extremely profound significance. Based on the remote sensing data retrieval by the NASA from 1998 to 2012, takes advantage of GIS spatial statistical analysis, being the first time systematically analyzed the spatiotemporal distribution features and regularity of PM2.5 concentrations for long time series in china, further selectively exploring causes and driving factors of PM2.5 concentration change. The results show that (1) PM2.5 concentrations presents the trend of firstly rapid increase and subsequent stability from 2000 to 2011 in china and 2007 is an inflection point of the change of PM2.5 concentrations. (2) PM2.5 pollution presents the trend that the north is higher than the south, the east is higher than the western, and high concentration value concentrated distributes the four heavy pollution areas of Huanghuaihai Plain, the Yangtze river delta plain, Sichuan basin and the Taklamakan desert. (3) The main area of PM2.5 pollutions obviously showed eastward trend between 2000 and 2006. The center of gravity of high value area of pollution concentration obviously showed the eastward trend since 2007. (4) Spatial autocorrelation analysis show that PM2.5 annual average concentration emerge strong local spatial positive autocorrelation. high-value zone of PM2.5 continuously distribute North China, and low-value zone concentrations intensively distributes southeast coast and islands. (5) Geography detectors method testifies that straw burning, population density, residents of car ownership are main anthropogenic driving factors of PM2.5 concentration change.

### Key words:

PM2.5; Air pollution; Spatial-Temporal Evolution; geography detector; China

## The Study of the Relationship between the Development of Marine Economy and the Marine Environment in Guangxi

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### Abstract

The marine environment is the carrier of the marine economy development. To study the relationship between them is conducive to explore the marine environment's carrying capacity and economic development potential. Based on the data of Guangxi's marine economy and environment which during 2010~2014, to analysis the development of them deeply, and based on the mathematical method of the environment kuznets curve and harmonious coefficient, to discuss the relationship between them. The results show that the marine economy in Guangxi has developed rapidly in recent five years. The growth rate of 2010~2014 was 28%, 19%, 15.9%, 18.1%, 9.1%. The proportion of GDP in Guangxi increased from 5.7% to 5.9%. The developmental pattern need further optimize its industrial structure, because it is too extensive. The marine environment is in good condition, seawater quality is up to standard and ecosystem maintains stability. The relationship between the marine environment and the economic development is overall coordination, but the rapid development of economy brings some pressure on the environment. Therefore, this paper suggests that optimizing regional development planning, promoting industrial structure adjustment, transformation and upgrading, making the marine ecological red line clearly and realizing the socialization of environmental responsibility.

### Key words:

marine economy, marine environment, relationship, environmental problems, Guangxi

## The Use of Mathematical Models of Living Biological Systems for the Study of Climate Change and Environmental Conditions at Different Spatial Scales in Chinese Cities

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### Abstract

Theoretical bionics allow us to construct mathematical models of living biological systems, studying internal and external processes, multi variation relationships. This helps to predict the development of micro- and macro- level processes in living biological systems. The intensive activity of the person was accompanied by an increase the anthropogenic pressure on urbanized areas, which affects the environment and changes in global climate. The functional relationship living and inanimate nature is being changed. Comparison of mathematical models allow us to identify critical functional linkages in the system "plant-soil-environment", the borders of sensitivity of biological systems, trigger points of regulation of plant metabolism in optimal conditions and as well as growing anthropogenic pressure. We investigated the relationship of coniferous trees (the trees of genus *Pinus*), soil and environment in optimal conditions, when changing climatic conditions and toxic air parameters of the two of the Chinese cities; including Beijing and Huh-Hot. These cities are belong to the industrial centers and it considered that, they are contemned zone of air pollution. According to the statical and dynamic indicators of living nature (trees metabolism, soil) and inanimate nature (environmental conditions) are described by mathematical models as deterministic, discrete and continuous. Living biological systems have different sensitivity indicators of inanimate nature. It was established functional linkages with multi varieties relationships in the living biological systems.

### Key words:

mathematical modeling, natural biological systems, climate, *Pinus*, environment, anthropogenic pressure

## Urbanization and its Environmental Health Hazards of Bangalore City, Karnataka - South India

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### Abstract

Bangalore is the capital of Karnataka and is the primate city of South India - one of the largest growing metropolitan regions of the world. With the Information Technology (IT) and Bio-Technology (BT) boom, Bangalore is one of the fastest growing cities in India and Asia. Bangalore serves as the global example of the potentials and problems facing mega-cities in the developing nations. Due its rapid development in urban area either in demography, migration, transportation, or industrial sector since last two decades, the Bangalore has the highest demography and the only metropolitan city of Karnataka. It has 95 lacks of population as per the 2011 census. Presently 2015 Bangalore has a population of more than One Crore.

Bangalore is among the top 10 polluted cities in the country as found by the Ministry of Environment. The prime cause for pollution is by emissions of motor vehicles. But, there is no mechanism as such to check the increasing vehicular pollution that is affecting the air quality and health of people. Earlier, commuters had to inhale a lot of petrol and diesel exhaust smoke at signals, but now because of increasing LPG-fuel vehicles, they complain of inhaling more gaseous substances, dust from paved roads and soils, building construction dust are leads hazards to health. Therefore, the study reveals to focus on the effects of the Bangalore City's air pollution especially Particulate Matter (PM10) – exceeds recommended standards levels and which lead to various environmental health hazards are analysed and some of the suggestions are dealt in it.

### Key words:

Urbanization; Ambient-air quality; Air Quality Index; Emissions; Particulate Matter; Health Hazards.

## Water Quality Changes in Tavantolgoi-Mining Area, Mongolia

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### Abstract

Tavan Tolgoi coking coal mine is located in the place Tsagaan-Ovoo bag of Tsogttsetsii of South Gobi province at 98 km in the east from Dalanzadgad at 200 km north from the border of China. Although rivers and streams provide over 60 percent of Mongolia's water resources, underground water is an important source of drinking water and other agricultural needs. Studies increasingly show a decline in the availability of water and its quality putting pressures on increasing demands for drinking water. Gobi region is characterized by very limited precipitation and high evaporation rate under influences of air temperature and wind and the process of salinization in the soil. Tavan tolgoi mine water with coal was formed in the Permian age originated from Tyerrigiyeni is defined as very hard water with high content of minerals. Latest studies showed that micro elements in this content and in vapping have been rapidly increasing. Chemical composition of shallow wells had increased sulfate ions change in the composition of sulfate and chloride class, sodium group. Nutrient pollution indicators of nitrogenous compounds were relatively high and exceeded some of the heavy metal / Se, Sr / standard. Related to the heavy metals concentration, the 59 percent of the sampled drinking waters were over contaminated in 2013 and then the amount of the unfitted water was increased to the 75 percent in 2015.

### Key words:

groundwater; heavy metal; pollution

## C12.19 Health and Environment

### Health and Health Care



Home

### Oral

1. [A Geographic Analysis on Indigenous Medicinal Practices in Tribal Communities a Study of Chamarajanagara in Karnataka](#)  
Ranga Swamy (University of Mysore, India)
2. [A Healthy City Oriented Accessibility Assessment in Singapore: A Perspective from Big Data](#)  
Kai Cao (National University of Singapore, Singapore)
3. [Assessment on Dietary Selenium Intake of the local residents in Lhasa in Tibet](#)  
Guo Yanan (Institute of Geographical Sciences and Natural Resources Research, CAS China)
4. [Challenges of the Romanian Health Care System: Avoidable Hospitalizations and Population Accessibility to Quality Medical Services](#)  
Liliana Dumtrache; Mariana Nae; Gabriel Simion (University of Bucharest, Romania)
5. [Climatic, Geopolitical and Commercial Aspects of Paranasal Sinus Tumors in the Tropics](#)  
Róbert Késmárszky (BMGE, Hungary)
6. [Continuum of Care for Maternal Health in Assam- A Relatively Backward State of India](#)  
Rayhan Sk; Anuradha Banerjee (Jawaharlal Nehru University, New Delhi, India)
7. [Experiences of Community Elder Care by Older People Residing at Home in Beijing, China](#)  
Jie Yu (Queen's University), Mark Rosenberg (Queen's University)
8. [Geographical Distribution of the Serum Creatinine Reference Values of Healthy Adults](#)  
Dezhi Wei (Institute of Health Geography, College of Tourism and Environment, Shaanxi Normal University, China)
9. [Health Care Facilities and Health Problems of Workers of Hajua Tea Estate in Assam](#)  
Parijat Borgohain (Cotton College, India)
10. [Health Inequalities and Environmental Hazards in Beijing: A Spatial Multilevel Analysis](#)  
Jing Ma (Beijing Normal University, China); Guanpeng Dong (University of Sheffield, United Kingdom); Gordon Mitchell (University of Leeds, United Kingdom); Wenzhong Zhang (The Chinese Academy of Sciences, China)
11. [Health Literacy in Tribal, Rural Population: A Geographical Analysis](#)  
Dilip Bhole (Womens college of Arts Commerce and Computer Application, Dongar Kathore, Jalgaon, India)
12. [Impact of Changing Water Supply and Sanitation System on the Quality of Life of Rural Women: A](#)

[Study of Purba and Paschim Medinipur Districts in West Bengal, India](#)

Paramita Roychowdhury (Department of Geography, Krishnagar Government College, Krishnagar, West Bengal, India)

13. [Intergenerational Differences in Social Support for Community-Living Older People in Beijing, China](#)  
Yang Cheng; Jing Xi (Beijing Normal University, China), Mark Rosenberg (Queen's University, Canada)
14. [“I’ll Avoid Where the Big Guys Hang Out”: Gender, Exercise Practices, and Mobilities in Gym Environments](#)  
Stephanie Coen (Queen's University, Canada)
15. [Le système de santé roumain et sa réforme: représentations réelles-virtuelles et interactions dans le cyberspace](#)  
Mariana Nae; Liliana Dumitrache (University of Bucharest, Romania)
16. [Migrants Access to Health Care Services: A Review of the Policy Framework at European, Country and Local Level](#)  
Céline Ledoux; Eva Pilot; Thomas Krafft (Maastricht University, Netherlands)
17. [Multiple Deprivation and Urban Health Inequality in Ilorin, Nigeria](#)  
Usman Raheem (Department of Geography and Env Mgt, Univ of Ilorin, Nigeria)
18. [Neighbourhood Crime and Children’S Cognitive Development - Evidence from the UK Millennium Cohort Study](#)  
Zhiqiang Feng; Chris Dibben (University of Edinburgh, UK)
19. [Out of Pocket Expenditure in Healthcare and Health Equity in India](#)  
Sonali Yadav (Jawaharlal Nehru University, New Delhi, India)
20. [Out of Pocket Health Care Expenditure and Accessibility across Geographical Regions in India: A Poverty Nexus, 2004-2014](#)  
Pushpendra Singh (Indian Institute of Technology Roorkee, India)
21. [Relationship between Deprivation and Accessibility to Health Care Services in Botosani County-Romania](#)  
Teodora Estera Ursulica (University of Bucharest, Simion Mehedinti Doctoral School, Romania)
22. [Research on Health Inequalities of Older People in China](#)  
Mengqi Yang (Queen's University, Canada), Mark Rosenberg (Queen's University, Canada)
23. [Simulation Study of Prevention and Control Measures for Dengue Outbreak in Guangzhou in 2006](#)  
Kong Lingcai; Wang Jinfeng (LREIS, Institute of Geographic Sciences and Natural Resources

Research, Chinese Academy of Sciences, China)

24. [Spatial Analysis on Occupational Health of Unorganized Sector Workers in Ambedkarnagar District, India](#)  
Mahvish Anjum; Nizamuddin Khan (Aligarh Muslim University, India)
25. [The Influence of Psychological Factors on the Morbidity between the South and the North of Philippines](#)  
Chi Zhang; Yongjun Luo (Third Military Medical University, China)
26. [The Limitations of Place Effects: Results of a Mixed Methods Study of Health and Place in Small Town New Zealand](#)  
Sarah Lovell (University of Canterbury, New Zealand); Andrew Gray (University of Otago, New Zealand)
27. [Three Modes of Power Operation: Understanding Doctor-Patient Conflicts in China's Hospitals](#)  
Peiling Zhou (Michigan State University, United States), Sue Grady (Michigan State University, United States)
28. [Toward A Framework for Classifying the Extensions of the Two-Step Floating Catchment Area \(2SFCA\) Method: A Critical Review](#)  
Zhuolin Tao (Peking University, China); Yang Cheng (Beijing Normal University, China)
29. [Urban Rural Differential in Health Seeking Behaviour of Elderly in Siwan District of Bihar \(India\)](#)  
Manju Kumari (Jawaharlal Nehru University, New Delhi, India)

## Poster

1. [Exploring of Walkability of Urban Environment——Sample of Xuanwu District in Nanjing, China](#)  
Shuaiqi Xia (China, Nanjing Forestry University); Jiacheng Liu (China, Harvard University Graduate School of Design); Zhen Xu (China, College of Landscape Architecture, Nanjing Forestry University)
2. [Evaluation of the Visual Analog Score to Assess Acute Mountain Sickness in a Hypobaric Chamber](#)  
Jialin Wu; Yu Chen; Yongjun Luo (China, Third Military Medical University)
3. [Selenium Status of Children in Kashin-Beck Disease Endemic Areas in Changdu, Tibet Autonomous Region](#)  
Jing Wang; Hairong Li; Linsheng Yang (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)
4. [The Spatial Distribution of Aging Population and Its Correlation with Economic Development in Foshan](#)  
Zhiping Zhong; Lin Lin (China, Sun Yat-Sen University)

## **A Geographic Analysis on Indigenous Medicinal Practices in Tribal Communities a Study of Chamarajanagara in Karnataka**

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### **Abstract**

The Poverty in India is one of the Major issues for the comprehensive development in India. Under the public welfare aspect, the primary agenda in front of the state is on tribal health service to its people in Chamarajanagara District. Tribal community is one of the most very backward in the state. The living condition of tribal people is in very bad. The medicinal practices of tribal people still have not decided to put to use in the main practice of medication as in English medicine practice. In Pre modern period the tribal settlements were completely from the main society. The major tribal group who dwell in forest also has no proper infrastructure in terms of housing, portable water, transportation and communication. In this condition people of this region are living in a miserable condition. The tribal people collect honey, gum traditional medicinal plants and use the technique of using medicinal practices of tribe which is vanishing in the present days is one of the significant aspect to be considered to protect them. Hence a systematic geographic analysis in indecencies Medical practice in tribal communities in Chamarajanagar in Karnataka is required.

### **Key words:**

Indigenous; Health care; health service; Tribal health services.

## A Healthy City Oriented Accessibility Assessment in Singapore: A Perspective from Big Data

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### Abstract

As stated by WHO, a Healthy City aims to 1) create a health-supportive environment, 2) to achieve a good quality of life, 3) to provide basic sanitation & hygiene needs, 4) to supply access to health care. Apparently, the accessibility to the health care services plays an important role in the concept of a Healthy City. In addition, the access to green space, recreational facilities, physical activities resource, retail centers, public transit stops, walkability etc. have also been proved important to healthy cities. However, most of these analysis are quite qualitative and not systematic enough. In this study, with the support of GIS technology and the transport big data (mass transport card data), we have compared some representative communities in Singapore quantitatively in terms of the accessibility to health care centers (general hospitals, polyclinics etc.), accessibility to green space (parks), accessibility to retail center and walkability. We believe all of these different categories of accessibilities would affect the health of the residents from different communities differently, more in-depth analysis will be carried out in the coming months, and we believe more impressive findings will show up from a spatial and quantitative perspective. This research would also be supportive to other studies pertaining to Healthy Cities.

### Key words:

Healthy City; Accessibility; Singapore; Big Data Analytics

## Assessment on Dietary Selenium Intake of the local residents in Lhasa in Tibet

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### Abstract

Selenium (Se) is an essential trace element in human life, and insufficient intake of selenium may lead to related diseases like Kashin-Beck Disease (KBD). The major source of Se is through diet. Although KBD is presently controlled in most regions of China, it is still active in the Tibetan Plateau. So in this paper, according the main food dietary intake and the content of Se in samples, we assessed the dietary Se intake of local residents by Monte Carlo method. The results were as follows. The average daily selenium intake of surveyed residents in KBD areas was 12.33 $\mu$ g/d, and the pastoral areas was higher Se intake than the other two (the farming areas and the farming pastoral areas). The Se intake of people was decreased with age. In addition, female dietary Se intake (12.59 $\mu$ g/d) was higher than the male (11.52 $\mu$ g/d). On the whole, over 61% of them are higher than previous selenium intake in KBD prevalence areas (11 $\mu$ g/d). But most of residents' dietary selenium intake is still difficult to meet the selenium minimum physiological needs (20 $\mu$ g/d). Low-selenium environment continues to be a constraint on the dietary selenium intake of residents in KBD areas. (We gratefully acknowledge funding from the National 12th Five-Year Plan scientific and technological issues (No. 2013BAC04B03), and the National Natural Science Foundation of China (No. 41171081).)

### Key words:

dietary selenium intake; Lhasa; KBD

## Challenges of the Romanian Health Care System : Avoidable Hospitalizations and Population Accessibility to Quality Medical Services

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### Abstract

Despite some structural reforms of the Romanian health system, reorganization of hospital sector and reduction of avoidable hospitalizations as well as the disparities in access of the population to health services still remain key issues

Although, through health care reform, it was attempted to correct certain deficiencies, giving more weight to primary health care, organizational malfunctions, lack of GP's in rural areas and weak delivery of primary care services lead to an increased rate of hospital-use, where population access hospitals for simple diagnosis or routine investigations. This explains why almost 25% of the population is hospitalized yearly and also the increased expenditures on hospitals (50% of total health expenditure).

Territorial distribution of hospitals in Romania is consistent with those of the large cities, however, less than 50 hospitals units (from a total of 467) recorded over 80 % of discharges, peoples addressing most to emergency or university hospitals, located in several largest cities, to receive quality care. Many municipal hospitals are poorly equipped, being unable to provide complex medical services so patients are directed towards major hospitals.

The phenomenon increases the healthcare costs and reduces population addressability to health services due to barriers related to mobility (distance, transportation) or affordability (higher individual costs) Also, it contributes to overcrowding hospitals, to overworked physicians and to the depreciation of services delivered within hospitals. Using statistical analysis and GIS, this paper highlights the limits of geographical accessibility of the population to hospital units, as well as the particularities of avoidable hospitalizations in Romania.

### Key words:

Health Care; Hospitals; Avoidable Hospitalization; Accessibility; Disparities; Romania

## Climatic, Geopolitical and Commercial Aspects of Paranasal Sinus Tumors in the Tropics

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### Abstract

Migration, climatic changes and commercial activity may help to diffuse pathogens, vectors, some cultural habits, not to forget about those humans who are genetically prone to acquire some diseases. In the tropical areas all these factors can be present leading to challenging diagnostic and therapeutic situations in the head and neck surgical activities. Besides, even without visiting the tropical areas, the “exotic” dangers are omnipresent, tropical plants are commercialised in many countries, even when toxic effects are known.

The author focuses the presentation about the paranasal sinus tumors in migrants arriving to the tropics, analysing their incidence, diagnostic difficulties and criteria. Though being a rare entity, T-cell lymphomas must be considered especially in patients of Asian origin. disfiguring may imitate facial palsy. Due to rapid progression, diagnostic delay is not allowed to be able to introduce an oncological treatment. Besides the genetic and viral theories the above mentioned factors are analysed as well.

### Key words:

head & neck; migration; climatic changes; tropics; facial nerve; plant; tumor

## Continuum of Care for Maternal Health in Assam- A Relatively Backward State of India

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### Abstract

Assam, a state of India recorded the highest Maternal Mortality Ratio of 328 (SRS 2010-1012). Proper implementation of maternal health care services and ensuring universal utilisation could be the standout interventions to prevent maternal morbidity and mortality. Therefore, there is need to understand the levels, continuum of care and gap for the utilisation of maternal health care. Data from the District Level Health Survey (2007-08), covering 9,980 ever-married women aged 15-49 are used for this study. Three separate logistic regression models with predicted probabilities are employed to identify the factors of continuum care of maternal health. Of the sample women, 74.3% received antenatal check-ups (ANC), but only 37% continued and received skill birth attendance (SBA) and finally 26.7% completed the continuum care of maternal health through postnatal care (PNC). There are significant regional variations in receiving ANC and SBA combinedly in Assam. Maternal age, birth order, education, religion, caste, wealth status, exposure to mass media and regional divisions are associated with the receiving of ANC; consistently these factors are also significantly associated with the continuation from having ANC to receiving SBA. Further, having full ANC and urban residence are significantly associated with SBA. Only a few variables e.g. higher maternal age, muslim women, rich, having full ANC, delivery in private hospitals and urban residence are significantly associated with the continuation from having SBA to receiving PNC. From the above findings, it could be recommended that the health delivery system needs to evolve ways to ensure continuity in maternal health care

### Key words:

Continuum of Care for Maternal Health

## Experiences of Community Elder Care by Older People Residing at Home in Beijing, China

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### Abstract

This paper analyzes older people's experiences of different types of care, caring relationships and how these experiences produce and reproduce caring spaces. Care as discussed here includes physical, emotional and financial supports provided by community that assist older people's everyday living. By using qualitative data of 47 interviews with older people, the following research questions are answered. What are older people's perceptions and experiences of different types of service and care? What are the spatial implications? Community services at this stage are under development and access to community services is unequal. For services that were in place, older people found certain problems existed and improvements were needed for future community service development. They tended to compare current experiences to pre-reform experiences. Despite the positive or negative experiences with communities and community care, older people believed that community care is a feasible and effective solution to help them age in place. They hoped that communities would offer more elder care in the future.

### Key words:

Aging; care; community; caring space

## Geographical Distribution of the Serum Creatinine Reference Values of Healthy

### Adults

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#### Abstract

To reveal the relationship between the Serum creatinine reference values of healthy adults and geographic factors, and to provide the scientific foundations for establishing a unified Scr reference value standard. Collecting 29697 Scr reference values of healthy adults measured by 347 medical facilities from 23 provinces, 4 municipalities and 5 autonomous regions. We chose 11 geographical factors, used them and Scr reference values to do the correlation analysis and worked out what factors correlated significantly with Scr reference values. According to the Principal component analysis and Ridge regression analysis, we constructed two models and finally chose the optimal model by comparing each model's fitting degree of predicted results and measured results. At last, we built the distribution map of Scr reference values through Kriging interpolation method. There are 7 geographic factors correlate significantly with Scr reference values, the overall trend is that the Scr values in the south is high, low in the north. If we get the geographic factors data of a certain region, we will be able to predict the Scr values of this region. Putting the geographical factors into medical analysis will benefit the further researches concerning the regional difference of medical reference values.

#### Key words:

Serum creatinine; Geographical factors; Principal component analysis; Ridge regression analysis

## Health Care Facilities and Health Problems of Workers of Hajua Tea Estate in Assam

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### Abstract

Tea garden workers of Assam are poor and ignorant due to illiteracy and often live in over-crowded and unhygienic living conditions. Health care including availability of doctors, nurses and other medical facilities in close proximity aids in safeguarding the health of the tea garden workers. The present study examines the health care facilities available at Hajua Tea Estate in Sibsagar District of Assam, India, the vulnerability of the tea garden workers to various health problems and the effects of the health problems upon their occupational and social lives. The study also suggests remedies for mitigating the health problems of the tea workers. The study is based on primary survey conducted with the help of a schedule prepared for the purpose. Queries relevant to the theme under study has been included like income, housing, education, medical facilities, health awareness sources, etc. Both male and female workers of Hajua Tea Estate have been surveyed by Random Sampling Method. Secondary information on the subject has been collected from various sources such as books, journals and the Internet. The data collected has been analysed and appropriate statistical methods and techniques used for interpreting the findings of the study. The results illustrate that many workers suffer from some common health problems due to the nature of their work and poor socio-economic facilities.

### Key words:

Healthcare; vulnerability; doctors; medical facilities; health problems; education; income; housing.

## Health Inequalities and Environmental Hazards in Beijing: A Spatial Multilevel

### Analysis

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### Abstract

Environmental pollution is a major problem in China, where people are subject to significant health risks. However, surprisingly little is known about how these health risks are distributed socially or spatially, particularly at the urban scale. Such information is needed to better understand health inequalities, and to develop more effective and just, environmental and public health policy. Drawing upon a large-scale survey conducted in Beijing in 2013, this study investigates associations between environmental hazards as perceived by residents, their self-rated health and geographical context. A spatial multilevel logistic model is developed to account for spatial dependence in unobserved contextual influences on health outcomes. Results reveal statistically significant and robust associations between perceived exposure to environmental hazards (traffic related air pollution, noise, and landfills), and self-rated health, using five point Likert scales. Each unit decrease in perceived exposure to traffic related air pollution, noise and landfills is associated with an increase of 15.2%, 17.5% and 9.3% respectively, in the odds of reporting good health, *ceteris paribus*. Furthermore, geographical context is also found an important role in shaping the distribution of self-rated health, controlling for the compositional effects.

### Key words:

health inequality; environmental hazards; spatial multilevel analysis; Beijing



## Health Literacy in Tribal, Rural Population: A Geographical Analysis

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### Abstract

In this age health care is one of the important aspects of human life. World wide mission has been started by World Health Organization (WHO), Government, Semi government and private organization to develop health consciousness in the population. In this study investigator has studied health literacy in tribal and rural areas in Jalgaon district in Maharashtra state in India. The health literacy were studied in to two phases i.e. consciousness about need of nutrition for health, health care. Research work is based on primary and secondary data. Micro level study analyses by statistical methods.

### Key words:

Tribal; Rural; Health Literacy; Micro level

## **Impact of Changing Water Supply and Sanitation System on the Quality of Life of Rural Women: A Study of Purba and Paschim Medinipur Districts in West Bengal, India**

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### **Abstract**

Provision of safe drinking water and sanitation, the two crucial components of preventive health care has gained national attention in rural India during the last two decades. Handpumps, tubewells and standposts have been installed and sanitation programme have been intensified in rural India to improve the quality of life of rural folk particularly women. These initiatives have resulted from two arguments; first women are more burdened with domestic water collection and second they have to compromise more with their dignity if household latrine is not available. Given this backdrop, the present paper argues that improved water supply and sanitation system is not always conducive for positive change in the quality of life of rural women.

Studying six villages served by handpumps and standposts as water sources and household latrine located in Purba and Paschim Medinipur districts of West Bengal, India, this paper attempts to evaluate the impact of changing rural water supply and sanitation system on rural women. Observation from these villages reveals that any shift from unsafe (surface water) to safe source (ground water) for domestic water supply partially benefits the rural women. Such shift along with the increased demand of water for improved sanitation system hardly reduces the water collection burden on rural women, particularly in the areas with abandoned surface water. Geographical and socio-economic distances from the safe water source are the key determinants for varying impact of water supply and sanitation on the quality of life of rural women.

### **Key words:**

health care; quality of life; rural water supply; sanitation system

## Intergenerational Differences in Social Support for Community-Living Older People in Beijing, China

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### Abstract

The combination of the rapid process of social-economic development, urbanization and population aging brings many challenges for care providers and quality of life of community-living older people in Beijing. This research aims to understand the intergenerational differences of social support for older people and the impacts of the community environment on social support in the socio-cultural context of Beijing. To answer the research questions, we collected 30 semi-structured in-depth interviews from older people aged 60 and over in three types of communities in Beijing. The results show that older people aged 60 to 74 received more formal social support and less informal social support compared to their parents' generation. The formal social support they received was not much different but they received less informal social support compared to the older people aged 75 and over living in the same communities. They expected to receive more formal social support when they become the older old as the informal social support from their children was less due to the one child policy. The physical and socio-cultural environment varied among the three types of community and factors such as the age, health status, daily activities and care providers affected older people's perceptions of the living environment of their communities. Both the differences in the community environment and the older people's perceptions have impacts on the social support that they received. The findings help us understand how socio-economic development and urbanization processes affect the daily life and social support of community-living older people from different age groups and also provides knowledge for improving the quality of life and healthy living environment for older people in Beijing.

### Key words:

Social support; intergenerational difference; community-living older people; qualitative study; Beijing

## **“I’ll Avoid Where the Big Guys Hang Out”: Gender, Exercise Practices, and Mobilities in Gym Environments**

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### **Abstract**

Physical inactivity is one of the most pressing public health challenges of our time, but comparatively little attention has been given to the gendered nature of this health behaviour. Around the world, men and boys are more active than women and girls. When men and women participate in leisure time physical activity, types of activity often differ by gender. What role might an everyday exercise environment, specifically the gym, play in these gendered inequities and differences in physical activity? Geographical research on physical activity has largely focused on obesogenic neighbourhood environments, and not extended to specific sites and facilities where individuals take up physical activities. Drawing from my wider study on men’s and women’s experiences in gym environments, in this paper I report on how gender influences women’s and men’s exercise practices and mobilities in gyms. Methods comprised semi-structured interviews coupled with a drawing activity with 52 men and women aged 25-64 in Kingston, Ontario, Canada. Data were analyzed using thematic coding. Results indicate several themes, including: (im)mobilities and the masculinization of space; gender policing of exercise practices; and agency in navigating gendered gym terrain. Overall, I argue that the socially and spatially embedded gender hierarchies of gym environments help to set the stage for the normalization of gender differences in exercise participation in the gym, and possibly beyond. Thus, while gyms are potentially sites for health promotion, they are also places where gendered inequities in health opportunities emerge. Public health initiatives should work towards depolarizing masculinities and femininities in gyms.

### **Key words:**

Canada; gender; gyms; health; physical activity

## Le système de santé roumain et sa réforme: représentations réelles-virtuelles et interactions dans le cyberspace

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### Abstract

Face aux dysfonctionnements structurels et institutionnels, le processus de réforme du système de santé roumain s'est avéré difficile, engendrant une nouvelle réalité sociale. Même si les dysfonctionnements du système de santé roumain se sont bien forgés sous une forme ou une autre dans le domaine social, un véritable « champ de force » (Bourdieu, 2012 : 258), dans l'espace virtuel, leurs représentations tiennent plutôt du contexte interprétatif et de l'habitus linguistique. L'objectif de cette présentation est de mieux appréhender les représentations des bénéficiaires du système de santé roumain. Sur la base d'un corpus documentaire formé de 250 articles et de la sélection ultérieure de 150 discours, cet article propose une analyse sémiotique des principaux défis de la réforme du système de santé roumain.

### Key words:

système de santé roumain ; réforme de la santé ; sémiotique ; représentations ; cyberspace .

## **Migrants Access to Health Care Services: A Review of the Policy Framework at European, Country and Local Level**

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### **Abstract**

**Objectives:** This study aims at identifying the policy framework for non-European migrant's access to healthcare at European (EU), member country, and regional/local (sub-national) level and at performing a descriptive and comparative analysis of the interventions. **Methods:** A literature review was performed for the European level, a content analysis of official policy documents was undertaken for the country level, the selected countries being Ireland, Spain and Portugal, and qualitative interviews for the local level, represented by the city of Lisbon, Portugal. **Results:** At European level, no comprehensive policy fitting the definition was found but relevant policy instruments recommending more inclusive healthcare policies were found. At country level, the main objective is the improvement of the health status of the immigrant population based on equity and equality principles. The main strategies are the adaptation of services through actions targeting patients and providers, such as the implementation of cultural mediators and trainings for health professionals. While policies on the regional/local level were found to be theoretically fairly adapted to the migrant's needs, implementation was lacking. **Discussion:**

Recent policies seem to go in the right direction of improving access to healthcare services for immigrants, still the interventions require some further reflections. Also while the evaluation is positive for some member countries, this is not the case for the entire EU. Inclusive policies are indeed under threat due to the economic and social crisis and due to the respective nationalistic views on integration. The European Union is challenged to take a more proactive leadership and ensure that countries effectively implement inclusive actions to improve migrant's access to health services.

### **Key words:**

Migration; European Union; inclusive healthcare policy; access to health services

## Multiple Deprivation and Urban Health Inequality in Ilorin, Nigeria

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### Abstract

Lack of access to essential social and environmental services are important dimensions of deprivation. In Nigeria, the impact of these deprivations on health status has not been sufficiently researched. This study examined the influence of inadequacies in social and environmental services on the differences in health status among residents of Ilorin, Nigeria. Data were obtained through a household survey of the twenty wards across Ilorin. A systematic sampling method was used to select one out of every ten houses in randomly selected streets in each ward while one household was selected through a simple random method in each building. In all, 800 household heads were sampled. The indicators of deprivation in social and environmental services were selected in five domains made up of 18 indicators. The indicators used include household access to safe drinking water, safe faecal disposal, presence of septic facility in households, and geographic access to health and education facilities. Health status was measured using hospital admission ratio, disability days and prevalence of childhood diarrhoea among sampled households. Benchmarks were established for each of the indicators using the national averages obtained from secondary sources. The proportion of deprived household was calculated in each ward and a composite Index of Multiple Deprivation (IMD) was obtained by aggregating scores for each domain. A multiple regression analysis was used to determine the relationship between indicators of social and environmental services and household health status. Study finds a positive relationship between deprivation in social and environmental services and admission ratio in households ( $r = 0.44$ ) ( $p < 0.05$ ) as well as disability days lost to illness ( $r = 0.27$ ) ( $p < 0.05$ ). Differences in geographic access to health facilities accounted for 50.9% ( $p < 0.05$ ) of the variation in the use of substandard health care options. Multiple deprivation was concentrated in the inner parts of Ilorin city compared to wards in the suburbia where housing and neighbourhood qualities were better. Public health policies must consider housing characteristics within the city, classify areas according to needs, and determine areas that require positive discrimination in social and environmental services.

### Key words :

Multiple deprivation; inequality; Urban Health; Nigeria

## Neighbourhood Crime and Children'S Cognitive Development - Evidence from the UK Millennium Cohort Study

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### Abstract

This paper investigates the association between neighbourhood level of crime and children's cognitive test scores using the data from the UK Millennium Cohort Study (MCS). The MCS follows around 19000 babies born in 2000-01 over years. Information is collected in face-to-face interviews on a large amount of information about the child, their family, parenting activities and cognitive assessment. We link the crime rate data derived from the Index of Multiple Deprivation (IMD) in England at the super output area level to the residential location of MCS cohort members. The cognitive ability is measured using the British Ability Scales Pattern Construction test, in which children of age 7 constructed a design by putting together flat squares or solid cubes with black and yellow patterns on each side. We use the regression analysis to examine whether neighbourhood level crime rate is related to children's standardised pattern construction test scores. We control a number of variables including birth weight, family income, parenting activities, parents' education. We find that neighbourhood crime rate is associated with reduced cognitive performance measured by pattern construction test scores. In addition we find that children who spent their childhood persistently in a high crime neighbourhood showed the lowest level of cognitive ability, which is indicative of a cumulative effect of neighbourhood crime.

### Key words:

neighbourhood crime; cognitive ability; UK

## Out of Pocket Expenditure in Healthcare and Health Equity in India

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### Abstract

Health represents physical and mental well-being of any individual not merely freedom from diseases. Basic healthcare is not only fundamental right of a person but, it is one of the most vital needs by virtue of being human. India has achieved much after independence and enjoyed accelerated economic growth in last two decades but it is also disheartening to know that it has performed hopeless in terms of human development indicators of health. Till date India has high child mortality and maternal mortality rate, which is higher than most of the south Asian countries with similar of a lesser level of economic growth. The nexus of caste, class and gender has made it impossible to achieve universal healthcare to all and health equity is nothing but a myth in “Asian Pharmacy”. India is on the crossroads of healthcare where it accounts for double burden of diseases where many preventable diseases are growing unchecked and chronic illness conditions are more less became permanent. Despite of achieve a lot, and progress of Indian healthcare system, it is not sufficient in delivering services to those who needs it the most and it is challenging to cope up with long persisting inequalities of caste, class and gender. In this pretext, paper aims to analyze the role of public financing and increase privatization of healthcare in India where, a fatal combination of two is responsible for out of pocket expenditure of private household becoming a major cause of poverty and impoverishment.

### Key words:

Social indicator; catastrophic payments; out of pocket expenditure; health equity.

## Out of Pocket Health Care Expenditure and Accessibility across Geographical Regions in India: A Poverty Nexus, 2004-2014

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### Abstract

India is a multi-cultural, multi-ethnic and having multi-geographical diversity. While struggling with the unfinished agenda of its communicable diseases, increasing the burden of Communicable and Non-Communicable Diseases are imposing unavoidable costs on Indian, a population that exacerbate poverty and dragged many poor further down by heavy medical expenses in different states, due to accessibility and environmental changes. The present study aims to estimate the extent of the health care expenditure of the individuals who has hospitalized due to various diseases in the different geographical area. Also, the study tries to highlight the burden of the health care expenditure on impoverishment level in India. The unit level data from the 62nd (2004) and 71st round (2014) of the National Sample Survey (NSS) is used in the analyses. The burden of medical expenditure and accessibility on a different level of households in India and Bivariate and multivariate logistic regression analyses were used in analysis. GIS mapping for accessibility of healthcare in the different area. The result reveals that the cost of hospitalization due to noncommunicable diseases is three times higher than the communicable diseases in India. The present study sought to highlight the health care expenditure and its effect on the poverty among the hospitalized across geographical area of India.

### Key words:

Impoverishment; Economic burden; Accessibility.

## Relationship between Deprivation and Accessibility to Health Care Services in Botosani County-Romania

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### Abstract

The inequalities in distribution of health resources in Romania and particularly in Botosani County, show a different accessibility to health services, depending on the living environment, but also on some financial, educational and social aspects.

Geographic distribution of health care units, social and development status, represent barriers that limit access of certain population groups to health services, especially in rural areas.

This paper focuses on the analysis and interpretation of the population’s accessibility to health services in Botosani county, situated in an underdeveloped region, in the period 2000-2013, in order to highlight a relationship between deprivation and accessibility to health care services.

The methodology is based on the analysis and interpretation of secondary data from NIS and from health surveys achieved in three administrative units from both areas of life. These were analyzed, processed and converted into relevant indices (the deprivation index and health care services index) to highlight spatial inequalities in accessibility to health care services.

Using statistical and spatial analysis, this paper highlights the inequalities that arise in providing health care services at territorial level, emphasizing concentration of health resources in urban areas and severe shortage in rural areas.

The high degree of deprivation from Botosani county determine urgent health care needs, which exceed the offer of health care services.

The low degree of coverage by medical staff and medical units overlaps with deprived areas, characterized by high levels of unemployment, low levels of education and poor housing, contributing to the overall expansion of deprivation areas, with precarious population’s health status and reduced quality of life.

### Key words:

health care services; deprivation; accessibility; inequalities; Botosani county.

## Research on Health Inequalities of Older People in China

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### Abstract

Previous studies have shown that inequalities in health status among older people in China remain significant. Inequalities can be attributed to both socioeconomic and other health-related indicators (i.e., the environment, health service resources, etc.). This study, therefore, analyses the associated patterns and magnitude of health inequalities, specifically in terms of the relationship between older people's health and health-related indicators at a micro geographic scale. Data are extracted from the Chinese Longitudinal Healthy Longevity Survey (CLHLS). Considering its wide participation, CLHLS is recognized as an accurate source of health information on older people in China. Employing logistic regression, analysis results address the fact that a range of factors affect individual health. This study demonstrates that measures are needed to improve the Chinese health care system to promote equality and efficiency.

### Key words:

Health inequalities; logistic regression; China

## Simulation Study of Prevention and Control Measures for Dengue Outbreak in Guangzhou in 2006

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### Abstract

Dengue fever is one of the most important vector-borne diseases around the world, modelling of the transmission dynamics of it allows to understand the transmission mechanism, to determine the key influential factors, and to evaluate the impact of intervention measures. However, traditional models usually assume that the human hosts and vectors are well-mixed, which is not in line with reality.

Here, we first develop a compartment model including human and adult mosquitoes, using negative binomial distribution transmission functions, both from vector to hosts and from hosts to vector, to model the heterogeneity of mosquitoes' bites on human beings during dengue virus transmission. By numerical simulations, we explored the impact of heterogeneity on the transmission dynamics. It is shown that the heterogeneous bites can slow down the transmission speed on the population level in comparison with homogeneous models' output. Then, we extend the model to incorporate the immature aquatic mosquitoes, and the impact of climate on the growth and development of mosquitoes and on the transmission of dengue viruses. Finally, we use the extended model to evaluate the effectiveness of intervention measures during the dengue outbreak in Guangzhou in 2006. We also simulate the dengue transmission dynamics in different scenarios, which help us to make strategies in controlling dengue.

This study contribute to a better understanding of the transmission dynamics of dengue virus in that the real dengue outbreak is further different from the output of homogeneous-mixing models.

### Key words:

Dengue fever; transmission model; heterogeneous mixing; intervention measures; scenario simulation

## **Spatial Analysis on Occupational Health of Unorganized Sector Workers in Ambedkarnagar District, India**

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### **Abstract**

Health refers as a state of complete physical, mental and social well-being. Health and socio-economic status are interrelated. In developing countries, like India great efforts are directed towards the advancement of cottage industries as these are considered the engine for their economic growth. It is an unorganised sector, mostly run by private establishment. It provides employment for both men and women, mainly those from the lower socio-economic status. People working in unorganised sector are exploited in term of working hours, low and irregular income, unsatisfactory work conditions, no legal protection and exposed to occupational health hazards. Despite growing prosperity and spectacular technological advances, the task of ensuring health and well-being for the world is becoming more difficult and expressive and complicated then even before. The present paper is an attempt to analyse the regional variation in health conditions of workers and its relation with socio-economic status. The entire work is based upon primary sources of data which have collected through field survey. Stratified random sampling has used for selection of data. Total 257 workers have surveyed. For analysis of data Z-score, composite Z-score, percentage, correlation technique is used. The result of present study indicates that socio-economic status and cottage industrial growth has significant impact on health status of workers. Present study would help to solve the problems of workers regarding health status as well as socio-economic conditions in cottage industry sector by adopting suitable policies and strategies.

### **Key words:**

Occupational Health; cottage industry; socio-economic status; workers; well being.

## The Influence of Psychological Factors on the Morbidity between the South and the North of Philippines

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### Abstract

As a member of Association of Southeast Nation, Philippines locates in the western pacific and enjoys the monsoonal tropical rainforest climate, the high-temperature wet throughout the year. Various study has illustrated that there exists difference of morbidity for many kinds of disease between the south and the north of the country, that may caused by the natural environment or the social and humanistic environment. As we know, the bad weather all the year round may leads to some psychological factors, such as depression. After integrating the factors above, we consider that the psychological factors may play a even more important role in the difference. So it's necessary to discuss the influence of psychological factors on the formation and development of high-risk disease. This paper tends to analyze these problems to provide some reference information for the treatment of these diseases.

### Key words:

Philippines; psychological factors

## The Limitations of Place Effects: Results of a Mixed Methods Study of Health and Place in Small Town New Zealand

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### Abstract

Research into 'place effects,' has found that neighbourhoods exert only a modest influence on our beliefs, behaviours and health outcomes that cannot be explained by the demographic composition of the places we live. We draw on a case study examining place effects in small town New Zealand to interrogate Pearce's (2013) assertion that such conceptualisations of place may not adequately capture the assemblage of macro-level social, economic and political processes that determine the outcomes of individuals within a community. One year on from the partial-closure of its meat processing facility in our study town, survey results indicated declines in community capacity relative to three control communities and differences in health status that were more sensitive to the context than the composition of these places. These results are juxtaposed with life-story interviews with six participants affected by the rationalization and decline of this primary industry. Participant narratives describe the implications of globalization on local industry and the composition of place as Main Street shops closed, workers left, and participants lost touch with their neighbours. Triangulating the two data sets, we conclude that methods distinguishing between the composition and context of a community to measure place effects do not adequately capture the extent to which 'compositional' factors such as the resident population and their income levels are determined by local experiences of social and economic change.

### Key words:

Place effects; Health; Globalization

## Three Modes of Power Operation: Understanding Doctor-Patient Conflicts in China's Hospitals

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### Abstract

Doctor-patient conflicts have been escalating in China over the last twenty years. Since 2002, doctor-patient conflicts in China have increased at a rate of 22.9 incidents per 1,000 population annually. Previous health care intervention research provides limited techniques that doctors can use to build trust with their patients. This paper examines the growing problem of doctor-patient conflicts in contemporary China from a health geographic perspective. In particular, this paper considers the ways in which hospitals, as a type of therapeutic landscape, can have a significant impact on health care provision and doctor-patient conflicts. First, a proposed framework that combines three modes of power-relations and therapeutic landscapes is provided to study doctor-patient conflicts. Second, the paper draws on a case study in a small Chinese city to explore how the spatial and temporal arrangements of space, different modes of discourses, and the internal design within hospitals can build upon, maintain, or ruin a harmonious doctor-patient relationship. The paper concludes that an adaptation of the current hospital internal design can help doctors proceed with therapies smoothly and with fewer conflicts.

### Key words:

Doctor-patient conflicts; Therapeutic landscapes; Power-relations; China

## Toward A Framework for Classifying the Extensions of the Two-Step Floating Catchment Area (2SFCA) Method: A Critical Review

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### Abstract

The two-step floating catchment area (2SFCA) method is an important method in the research on spatial accessibility to public service (especially healthcare) facilities, which has been widely applied. Moreover, various extensions of 2SFCA have been developed. However, there is a lack of an effective framework to explicitly classify various extensions of 2SFCA.

Thus, this study aims to propose a framework for classifying 2SFCA extensions, thus to systematically summarize the major extensions of the 2SFCA method. Based on a summarization of existing literature trying to modify 2SFCA, the proposed framework decomposes the 2SFCA method into four components, i.e. (1)the distance-decay function, (2)the catchment area, (3)the competition between demands or supplies, and (4)the travel modes. All the improvements made by different extensions found in literature can be classified into the four components.

The first category focuses on the distance-decay function, replacing the dichotomous distance-decay form of the original 2SFCA by multilevel discrete form as in the Enhanced 2SFCA, or continuous forms such as the gravity-style, Gaussian-style and Kernel-density-style distance-decay functions.

The second category deals with the delimitation of catchment areas, i.e. the service areas of facilities or the searching scopes of demanders. The original 2SFCA form adopts a buffer-ring (BR) method delineating the catchment areas as concentric circles with certain radii of physical distances or travel times. Some extensions improve the BR method, including the variable catchment sizes 2SFCA, the dynamic catchment sizes 2SFCA and the multi catchment sizes 2SFCA. Moreover, a new nearest-neighbor (NN) method, which delineates the catchment areas by identifying a finite number of nearest facilities for each demand node, has been proposed. The third category strives to improve the accuracy of 2SFCA by accounting for the competition among demand nodes or among supply nodes. The initial extension of this category is the three-step floating catchment area (3SFCA) method, following which other extensions such as the Modified 2SFCA and the Huff-based 2SFCA are

proposed to make a further improvement.

The fourth category extends the travel manner of demanders, including the Multi-mode 2SFCA taking into account various potential transportation modes, and the Commuter-based 2SFCA integrating service visits and commuting behavior.

The advantages and disadvantages, appropriate scenarios and future potential improvements of these extensions are also discussed. The framework proposed in this study can contribute for the choice of method for relevant studies and promote the implement and development of 2SFCA method.

**Key words:**

two-step floating catchment area method; extensions; review; distance-decay function; catchment area

## Urban Rural Differential in Health Seeking Behaviour of Elderly in Siwan District of Bihar (India)

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### Abstract

Country like India has a rapidly growing population of elderly. The elderly generally experience different kind of chronic diseases in their later part of life and they treat the disease according to various factors i.e. economy, awareness, personal beliefs and societal attitude, culture, geographical location, accessibility to health care services, family environment and family support among others. There is a clear delimitation of health care services in rural and urban areas of any country. Urban areas are no doubt in better condition whereas the condition of rural areas largely depends on decentralisation policy of government.

The objective of the study is to find out various factors responsible for differential health seeking behaviour among elderly in Siwan district of Bihar (India). The data has been collected through structured questionnaire. In total, 500 elderly people of Siwan district of Bihar state have been surveyed. Statistical techniques include Cross section with chi-square test, correlation and binary logistic regression for better understanding the said issue.

It is found that people generally refer to the nearest facilities available for treatment. The elderly of urban areas have larger options whereas many rural elderly largely depend on self medication. Chemist shop plays an important role in serving medicine to the elderly. There is a tendency to move to private hospital in urban areas whereas in rural areas government facility is opted. Family environment and educational attainment play crucial role during health seeking. Besides, transportation facilities also determine health seeking behaviour of the elderly people.

### Key words:

Rural; Urban; Health seeking behaviour; elderly; family environment;

## Evaluation of the Visual Analog Score to Assess Acute Mountain Sickness in a Hypobaric Chamber

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### Abstract

The visual analog score (VAS) is widely used in clinical medicine to evaluate the severity of subjective symptoms, such as measuring pain, nausea, fatigue, and sleep quality. But there are few research is about using VAS to evaluate Acute Mountain Sickness (AMS), not to mention in a hypobaric chambers, which as a laboratory equipment is wildly used in the high altitude medical research. In this paper, we evaluated the degree of AMS using the VAS in a hypobaric chamber in which the equivalent altitude was increased from 300 to 3500 m and compare which the “gold standard” --Lake Louise score. During the five hours of testing, we measured the resting blood oxygen saturation (SaO<sub>2</sub>) and heart rate (HR). Using VAS to record the subjects’ ratings of their AMS symptom intensity that occurred throughout the phase of increasing altitude at 300 m, 1500 m, 2000 m, 2500 m, 3000 m, and 3500 m. The results showed that patients’ SaO<sub>2</sub> and incidence of symptoms had a significant correlation with altitude(P<0.05). The composite VAS score, which rated the occurrence of four symptoms (headache, dizziness, fatigue, and gastrointestinal discomfort), was significantly correlated with elevation (P<0.01). Based on the experimental data, the VAS can be used as an auxiliary diagnostic method of Lake Louise score to evaluate AMS and can show the changing severity of symptoms during the process of increased elevation in a hypobaric chamber, it also reflects a significant correlation with altitude.

### Key words:

acute mountain sickness (AMS); visual analog score (VAS); hypobaric chamber.

## Exploring of Walkability of Urban Environment - Samples Xuanwu District in Nanjing, China

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### Abstract

21st century witnessed China's aggressive urbanization and urban sprawl, a period when people were living in the forest of reinforcement bars and castle of concrete. What impact it brought to our daily life was the increasing need and dependency for automobile and public transportation. As a result, cities are now planned and designed for the wheels, overlooking the fact the people who don't have cars outnumber those who have, which adversely affects people's living quality. Walking is one of the most significant way people connecting themselves to the nature, thus its accessibility directly mirrors public health and living quality. This paper samples Nanjing city as the research object, a city where human touch and natural resources brewed along the rich history of six dynasties, focusing on Xuanwu District's accessibility and concluding influences environment exerts on public health and living quality.

### Key words:

Public Health Care; Walk ability; Urban Environment

## Selenium Status of Children in Kashin-Beck Disease Endemic Areas in Changdu, Tibet Autonomous Region

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### Abstract

Kashin-Beck disease (KBD), which is considered to be relevant to selenium deficiency, is usually evident between the ages of 7-15 years and grows greatly worse with age if no treatment is done. In this study, we chose Luolong County in Changdu where the KBD prevalence is still severe to collect hair samples of children (aged 6-16), investigating their selenium status and possible influencing factors. The selenium concentration in hair samples was determined by inductive coupled plasma mass spectrometry (ICP-MS). The results showed that the average hair selenium concentration of children in Luolong County was  $0.290 \pm 0.125$  (43)  $\mu\text{g}\cdot\text{g}^{-1}$ , ranging from 0.041 to  $0.550 \mu\text{g}\cdot\text{g}^{-1}$ . The selenium level was decreased with the severity of local KBD increased. There was a significant difference between students and non-students ( $P=0.000$ ), which was likely due to their different dietary structures. The average hair selenium content of boys ( $0.317 \pm 0.132$  (20)  $\mu\text{g}\cdot\text{g}^{-1}$ ) was slightly higher than that of girls ( $0.267 \pm 0.117$  (23)  $\mu\text{g}\cdot\text{g}^{-1}$ ) ( $P=0.189$ ). Children aged 11-16 whose hair selenium level ( $0.273 \pm 0.116$  (19)  $\mu\text{g}\cdot\text{g}^{-1}$ ) was slightly lower than children aged 6-10 ( $0.304 \pm 0.133$  (24)  $\mu\text{g}\cdot\text{g}^{-1}$ ) ( $P=0.425$ ). Although the selenium status of children in Changdu KBD areas is significantly improved when compared with a few decades ago, there are still 44.2% of children staying at low selenium status, most of which are girls. This information obtained is valuable for making more effective selenium supplement strategies to prevent and control selenium deficient diseases.

### Key words:

Children; Selenium; Hair; Kashin-Beck disease

## The Spatial Distribution of Aging Population and Its Correlation with Economic Development in Foshan

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### Abstract

On the basis of the 2010 census statistics, this paper adopted seven indicators of population aging and, by virtue of hierarchical cluster analysis, obtained five rings of Foshan's spatial distribution of aging: the central circle, the central peripheral circle, the intermediate circle, minor outer circle and outer circle. Their corresponding aging degrees are respectively initial senior stage, initial adult stage, later adult stage, initial senior stage, and middle-later senior stage. The Pearson correlation test between selected aging coefficient and GDP as well as gross industrial production in each district indicates that economic development and the level of aging population in different districts of Foshan demonstrate a negative correlation. The paper thus puts forward that uneven economic development exerts significant impact on population aging, which can be manifested by the migration of young adults.

### Key words:

aging population; spatial distribution; economic development; Foshan.

## C12.19 Health and Environment

### Health and GIS



Home

### Oral

1. [A Global Network for Public Health using Geoinformatics Surveillance System](#)  
Tisha Dey; Naresh K Baghmar (Pt. Ravishankar Shukla University, India)
2. [A Linear Programming Based Spatial Equity Evaluation for Health-Care Facilities Considering Risk of Cancer](#)  
Wenting ZHANG (Huazhong Agricultural University, China); Haijun WANG (Wuhan University, China)
3. [A Multi-Phase Environmental Exposure Assessment Framework Based on the Dynamics of Human Activities in Geographic Space](#)  
Guixing Wei; F Zhan (Texas State University, United States)
4. [A Spatiotemporal Analysis of Radon Screening Activities in an Urban Environment](#)  
Dajun Dai (Georgia State University, United States)
5. [Community-based Models for Visceral Leishmaniasis Supported by Remote Sensing and World View II in the Western São Paulo State, SP, Brazil](#)  
Elivelton Da Silva Fonseca (Health Geography Laboratory, School of Sciences and Technology, São Paulo State University, Brazil); Moara de Santana Martins (Pathobiological Sciences Department, Veterinary Medicine School, Louisiana State University, Brazil); Raul Borges Guimarães (Health Geography Laboratory, School of Sciences and Technology, São Paulo State University, Brazil); John B. Malone (Pathobiological Sciences Department, Veterinary Medicine School, Louisiana State University, Brazil)
6. [Ecological and Health Risk of Toxic Metals in Smaller Than 100  \$\mu\text{m}\$  Road Dust from Different Functional Areas of Xi'an](#)  
Xinwei Lu; Huiyun Pan; Qian Wang (Shaanxi Normal University, China)
7. [Estimating the Actual Incidence of HIV/AIDS Cases at the Prefecture Level in Mainland China from 2004 to 2013](#)  
Junming Li; Jinfeng Wang; Chengdong Xu (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
8. [Geoinformation-based Assessment of Primary Health Care Facilities in Oyo Town, Southwestern Nigeria](#)

Oluwatoyin Adeleke (State Hospital, Oyo, Oyo State, Oyo State Ministry of Health, Nigeria, Nigeria);  
Olawale Oluwafemi (Centre for Geodesy and Geodynamics, National Space Research and  
Development Agency, NIGERIA, Nigeria)

9. [Modelling Input-output Flows of Severe Acute Respiratory Syndrome in Mainland China](#)

Li Wang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of  
Sciences, China)

10. [Modelling the Distribution of Suspended Particles in the South of Tehran by AERMOD Model, \(A  
Case Study of Tehran Cement Plant\)](#)

Aliakbar Shamsipour (Associate professor, Faculty of Geography, University of Tehran, Iran); Elham  
Ashrafi (ME environmental assessing/Payam e Noor University, Iran)

11. [Modelling the Impacts of Climate on Hand-Foot-Mouth Disease Transmission in Heterogeneous  
Socioeconomic Space](#)

Jinfeng Wang; Zhoupeng Ren (Institute of Geographic Sciences and Natural Resources Research,  
China)

12. [Neighborhood Environment and Location-based Daily Walking Behavior: A Case Study in Tokyo  
Metropolitan Area](#)

HAO HOU; Yuji Murayama (University of Tsukuba, Japan)

13. [Outdoor PM<sub>2.5</sub> Air Pollution and Hospital Admissions for Hypertension disease in Shenzhen, China:  
A Small-Area Geographical Study](#)

Zhensheng Wang; Yang Yue; Qingquan Li (Shenzhen University, China); Shi Liang (Shenzhen Center  
of Health Information, China)

14. [Seasonal Effects of Weather Factors on Hand, Foot and Mouth Disease in Beijing](#)

Dong Weihua (State Key Laboratory of Remote Sensing Science, Beijing Key Laboratory for Remote  
Sensing of Environment and Digital Cities & School of Geography and Remote Sensing Science,  
Beijing Normal University, China)

15. [Spatial Analysis for Detecting Environmental Risks for Plague Foci in Ulan County, China](#)

Mengxu GAO; Juanle WANG (Institute of Geographic Sciences and Natural Resources Research, CAS,  
China)

16. [Spatial Identification of Potential Health Hazards: A Systematic Areal Search Approach](#)

Boris A. Portnov (University of Haifa, Israel)

17. [Spatial-temporal Distribution and Hotspots of Hand-Foot-Mouth-Disease \(HFMD\) in Guangzhou City](#)

Xiaoyue CHEN (Guangzhou University, China); Yi Xu; Yingqiu Cui (Guangzhou Women and Children's Medical Center, China)

18. [Spatio-temporal Analysis of Schistosomiasis Japonica in the Dongting Lake Regions of Hunan Province, China](#)

Enru Wang (University of North Dakota, United States); Zhongcai Wu (Hunan Institute of Science and Technology, China); Zhihong Luo; Zhengyuan Zhao (Hunan Institute of Parasitic Diseases, China)

19. [Spatiotemporal Analysis of Visceral Leishmaniasis in São Paulo State, Brazil \(1999-2013\)](#)

Patricia Matsumoto; Baltazar Casagrande; Raul Guimarães (FCT/UNESP, Brazil)

20. [Spatiotemporal Change of HIV/AIDS in Visakhapatnam District-A Medical GIS Approach](#)

Peddada Jagadeeswara Rao (Andhra University, India)

21. [The Geographical Distribution of the Number of People With Hemophilia in China](#)

Shaofang Yang; Miao Ge (Institute of Healthy Geography, College of Tourism and Geographical, Shaanxi Normal University, China); Shanxi Liu; Yiguo Liu (Hemophilia Research Group, Hematology Institute of Shaanxi Medical University, China); Minyi Cen; Xinlei Liu; Wen Zhang (Institute of Healthy Geography, College of Tourism and Geographical, Shaanxi Normal University, China)

22. [The Relationship between Built Environment and Residents' Health Based on the Medical Big Data](#)

Yang Cao; Feng Zhen (Nanjing University, China)

23. [The Spatial Distribution of Hepatitis C Virus Infections and Associated Determinants – Targeting Risk Groups Using Geographically Weighted Poisson Regression](#)

Boris Kaulh (Department of Health, Ethics and Society, School of Public Health and Primary Care (CAPHRI), Faculty of Health, Medicine and Life Sciences. Maastricht University, the Netherlands., Germany); Jeanne Heil; Christian J.P.A. Hoebe (Department of Sexual Health, Infectious Diseases and Environmental Health, South Limburg Public Health Service (GGD Zuid Limburg), Geleen, The Netherlands., Netherlands); Jürgen Schweikart (Beuth University of Applied Sciences, Department III, Civil Engineering and Geoinformatics, Germany); Thomas Krafft (Department of Health, Ethics and Society, School of Public Health and Primary Care (CAPHRI), Faculty of Health, Medicine and Life Sciences. Maastricht University, the Netherlands., Netherlands); Nicole H.T.M. (Department of Sexual Health, Infectious Diseases and Environmental Health, South Limburg Public Health Service (GGD Zuid Limburg), Geleen, The Netherlands., Netherlands)

24. [Use Of Geography Information Systems To Determine The Spatial Distribution Of Asthma Patients](#)

Mehmet Fatih Döker; Selin Yıldız (Sakarya University, Turkey)

## Poster

1. [Spatial Analysis of Gastric Cancer Morbidity in Regions of Rapid Urbanization: a Case Study in Xiamen, China](#)  
Jilai Liu (China, Beijing Normal University); Xihu Li (China, Institute of Urban Environment, Chinese Academy of Sciences)
2. [The Regional Variation of the Reference Value of Alanine Aminotransferase Based on Ridge regression analysis](#)  
Li Peng; Miao Ge (Institute of Health Geographics, College of Tourist and Environment, Shanxi Normal University)

## A Global Network for Public Health Using Geoinformatics Surveillance System

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### Abstract

The present paper mainly focuses on the application of Remote Sensing, GIS, GPS, in healthcare such as visual analysis of health management information, health service mapping and geographic analysis of health services and its coverage. The main emphasis has been given to generation of Geospatial Health Management Information System (GHMIS) it will be easier for the governance of health sector and infrastructure in the rural areas. At each level, data would be viewed geospatially which would help to make rational decisions and hence better healthcare. The study area has been chosen as Bemetara District of Chhattisgarh, India. The main objective of the study are to create buffer around the health centers to denote the catchment area; allow for overlay analysis of different pieces of information; calculate distance; permit interactive queries of information in web-GIS. The present study is mainly based on both primary and secondary data.

It has been found that creation of GHMIS design the function of healthcare service and administrative service to monitor health status and service needs according to National Rural Health Mission (NRHM) norms. Identify environmental, socio-economic and other factors like inaccessible areas, geographic and demographic factors. The user can access the data of any level by logging into the central service without having the hassle of visiting every website. It can be act as a single window service station. The range of expectation of health information system will depend on the role of the people involved. "People" comprises of three categories Doers, Users & Viewers.

### Key words:

GIS; GPS; Health Geography; Remote Sensing; Rural; Web based GIS

## A Linear Programming Based Spatial Equity Evaluation for Health-Care Facilities Considering Risk of Cancer

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### Abstract

The equity in accessibility of health-care facility is significant to judge the convenience of health-care system. Existing studies have taken the census data as health-care demand, but the impacts of population structure (gender and age) on cancer risk are missed. A trial on equity evaluation for cancer risk with regard to population structure is carried out. First, facing the fact that traditional methods ignored the heterogeneity of health-care supply and demand in space, a linear programming (LP) is employed to distribute the cancer patients into health-care facilities in space. By results of LP, equity in accessibility can be evaluated. Hong Kong with high population density and scarce public health-care resource is selected as case study area. Due to the mountainous terrain, islands and the heterogeneous spatial population distribution, it is necessary to study the equity in accessibility of health-care facility for Hong Kong. The results indicate that the spatial layout of health-care facility in Hong Kong is general reasonable. Population who reside in isolated places or islands suffer in low accessibility and equity, and they occupy a small part of entire population in Hong Kong. The results can be used in urban planning or health-care facility planning.

### Key words:

Equity; Linear programming; Hong Kong; Health-care facility; Cancer

## **A Multi-Phase Environmental Exposure Assessment Framework Based on the Dynamics of Human Activities in Geographic Space**

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### **Abstract**

Environmental exposure assessment is an important step in studies examining the association between exposure and adverse health outcomes. In environmental exposure assessment, it is important to take into account of the dynamics of human activities in geographic space and time, and consider how the dynamics is related to the environmental conditions under consideration. But few existing approach fully accounts for this type of dynamics. In this study, we propose a new multi-phase framework to assess environmental exposure using trajectories of human activities in geographic space and time. This approach consists of four steps: (1) classifying the trajectory data and segmenting the data into different phases, (2) connecting the segmented trajectory data to environmental conditions under consideration, (3) assessing exposure for each individual during each phase based on the segmented trajectory data, and (4) determining the overall exposure for each individual. We demonstrate the usefulness of this proposed framework through an example.

### **Key words:**

exposure assessment; GIS; health; air pollution



## A Spatiotemporal Analysis of Radon Screening Activities in an Urban Environment

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### Abstract

Radon exposure is the second leading cause of lung cancer after smoking and the leading cause of lung cancer among non-smokers. This research evaluates the spatiotemporal pattern in radon screening rate in a urban county in Georgia, United States. We obtained 25 years of radon test data (n=6,355) from both the local county government and a commercial radon testing company. Geographic Information Systems (GIS) techniques were used to examine the temporal trend of the radon screening services and its interaction with spatial variation. Results suggest that radon tests were the highest in the early 1990s and then decreased greatly since 2000s. Over the 25 years, there were parts of the county that had significantly lower test rates compared to the rest of the area. Further studies will need to examine knowledge about radon and awareness of screening service availability.

### Key words:

Spatiotemporal analysis; GIS; radon; radiation; exposure; health geography; lung cancer

## Community-based Models for Visceral Leishmaniasis Supported by Remote Sensing and World View II in the Western São Paulo State, SP, Brazil

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### Abstract

Background: Geospatial risk assessment models for neglected tropical diseases (NTD) have been usually reported at regional scale. New satellite data systems (Worldview-2) now make it possible to map and model community risk surfaces for multiple NTD at habitat and household scales. **Goal:** The goal was to estimate and stratify the risk areas for Visceral Leishmaniasis at the community-based level in Teodoro Sampaio, west of São Paulo state, Brazil. Methods: Models were developed in the Maxent, using Normalized Difference Vegetation Index (NDVI), N.D. Soil Index (NDSI) and N.D. Water Index (NDWI), extracted at household level risk surfaces. Serological investigations for the diagnosis of canine VL were performed using enzyme-linked immunosorbent assay (ELISA) and indirect fluorescent antibody test (IFAT). Results: The survey analyzed in this study had 997 serum canine samples, from November/2010 to August/2012. The positivity rate (6.5%) can be considered low when compared to other studies. It was possible to identify hot spots of transmission within the city and notice a random distribution of cases around. All sectors analyzed revealed courts with canine VL confirmed by serology. It was noted that most of the 93 confirmed dogs resided in sector one, which corresponds to 64.5% of the tests. Conclusion: In long term, we aim to incorporate protocols and standards based on mapping and remote sensing as facilitators for scanning foci and environments, giving new tools for surveillance and control programs dealing with leishmaniasis. At local level more elements and clues that can enable the clarification of results are needed. Geospatial risk modeling can constitute a strong tool to target the cases. (Imagery Grant - Digital Globe (2014) and São Paulo Research Foundation (FAPESP) research grant - 2014/12494-0.)

### Key words:

Geospatial analysis; Community-based level; Visceral Leishmaniasis, Geography; Remote Sensing

## **Ecological and Health Risk of Toxic Metals in Smaller than 100 $\mu\text{m}$ Road Dust from Different Functional Areas of Xi'an**

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### **Abstract**

Concentrations of toxic metals Co, Cr, Cu, Mn, Ni, Pb, V and Zn in smaller than 100  $\mu\text{m}$  road dust particles collected from four functional areas of Xi'an were measured using X-ray fluorescence spectrometry, and their potential risks to local ecosystem and human health were evaluated using potential ecological risk index and health risk model. The concentrations of Co, Cr, Mn, Ni, Pb, V and Zn in the samples are in the range of 22.6-66.7, 120.1-300.7, 22.7-98.3, 281.7-429.7, 21.9-37.2, 45.5-208.4, 48.3-70.5 and 61.6-898.9 mg/kg, with an average of 34.1, 175.3, 48.9, 339.4, 28.3, 97.6, 55.8 and 164.9 mg/kg, respectively. Compared to the background value of local soil, the samples have elevated Co, Cr, Cu, Pb and Zn, which are 2.1-6.3, 1.9-4.8, 1.1-4.6, 2.1-9.7 and 0.9-13.0 times the corresponding background value of Shaanxi soil, respectively. Due to the influence of local human activities and the diversity of sources, the analyzed toxic metals in the smaller than 100  $\mu\text{m}$  road dust particles of different functional areas have different variation characteristics. Co and Pb in the samples presented moderate ecological risk, while other toxic metals were in low ecological risk. The comprehensive ecological risk levels of toxic metals were low to moderate. Ingestion was the main exposure route of all analyzed metals in the samples to children and adults. The non-cancer risks of the studied metals to children and adults were within the safe range, and the cancer risks of Co, Cr and Ni were also within the currently acceptable range.

### **Key words:**

toxic metal; dust; functional area; ecological risk; health risk; X-ray fluorescence spectrometry; Xi'an

## Estimating the Actual Incidence of HIV/AIDS Cases at the Prefecture Level in Mainland China from 2004 to 2013

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### Abstract

We collected data on the annual incidence of HIV/AIDS cases reported by hospitals from the Center for Disease Control (CDC) in China, covering 338 prefectures from 2004 to 2013. We searched published papers from the China Knowledge Resource Integrated Database and public reports to compile the accumulative living HIV/AIDS cases, which were estimated using the workbook method. The ratio of hospital reported and the actual incidence of cases was calculated. Then the actual annual incidence of cases was obtained using hospital reported incidence data divided by the ratio. The estimated number of new HIV/AIDS infections in mainland China in 2004 was 157,616 (95% CI: 95,435-193,234), and the highest and lowest incidences were 387,089 (95%CI: 168,944-483,938) in 2005 and 142,537 (95%CI:111,118-218310) in 2010, respectively. Overall, there was a decreasing trend from 2004 to 2013. However, a minor increase occurred from 2010 to 2013, and a spatial '2+x' pattern structure formed. The spatial Gini coefficient of the distribution of the incidence of HIV/AIDS cases decreased from 0.808 to 0.505. Although the incidence of HIV/AIDS cases decreased overall, the spatial distribution of new HIV/AIDS infections is homogenous. The estimate result presented here is reliable to some extent based on primary accuracy validation.

### Key words:

spatial patterns; spatial Gini coefficient; HIV/AIDS

## Geoinformation-based Assessment of Primary Health Care Facilities in Oyo Town, Southwestern Nigeria

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### Abstract

This study developed a Geographical Information System (GIS) database and mapped the distribution of Primary Health Care Facilities (PHCFs) in a traditional Nigerian city, Oyo town. The list of PHCFs and ownership in Nigeria obtained from the Department of Health Planning and Research served as database for the study. Also, the National Population Commission census figures provided information on the population of the city. Handheld Global Positioning System (GPS) was used to acquire the locations of 34 existing PHC centers within the study area. Field observation, questionnaire and IKONOS multispectral imagery (1.1m resolution) acquired from National Centre for Remote Sensing were used to ascertain the road network, built-up areas, location and spatial coverage. Geospatial analytical operations employed using ArcView 3.3 include proximity analysis (buffering), overlaying and querying. Data show that there exists inequality in the distribution of PHCFs among the various administrative units in the city with Owode having highest distribution of 17.6%, followed by Sabo 14.7% and Apaara with no PHCF. The study identified three categories of PHCFs- Comprehensive Health Centre (38.2%), Health Centre (38.2%) and Basic Health Centre (23.6%). It was observed that the patient-physician ratio is (1:15), population-physician ratio (1:7035), patient-nurse ratio (1:5) and population-nurse ratio (1:2438) for the three categories of PHCFs. Private organizations dominated the PHCFs ownership in Oyo city with 58.8%, and government 41.2%. Hence, appropriate authorities should endeavour to achieve a more fair distribution of health facilities in the city, taking into consideration health-dependent parameters so as to generate social justice.

### Key words:

Geospatial; database; primary health care facilities; Oyo city; Nigeria.

## Modelling Input-output Flows of Severe Acute Respiratory Syndrome in Mainland China

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### Abstract

Severe acute respiratory syndrome originated in China in 2002, and it spread to 26 provinces in mainland China and 32 countries across five continents in a matter of months. However, the spatial features and potential determinants of SARS input-output flows remain unclear. We used an adjusted spatial interaction model to examine the spatial effects and potential factors associated with SARS input-output flows. The presence of origin-based spatial dependence positively affected the SARS flows from the neighbours of the origin regions. The origin-based and destination-based spatial dependence positively affected migrant flows from the neighbours of origin and destination locations. Similarly, the destination-based spatial dependence also positively affected hospitalization flows from the neighbours of destination regions. Differences in regional income drove the SARS input-output flows, urban income had a positive effect, whereas rural income had a negative effect. Total interregional flows increased by 3.54% with a 1% increase in urban income, and intraregional flows increased by 8.35%. In contrast, the total interregional flows decreased by 3.38% with a 1% increase in rural income, and intraregional flows declined by 2.29%. Railway capacity, PGDP, urban rate and the law of distance decay also affected the flows. Our results confirm that the SARS flows presented significant geographic spatial heterogeneity and spatial effects. Income differences were the major cause of the flows between pairs of regions. Railway capacity, PGDP, and urban rate also played important roles. These findings provide valuable information for the Chinese government to control the future spread of nationwide epidemics.

### Key words:

SARS flows; spatial interaction model; spatial dependence; spillover effects; income difference

## Modelling the Distribution of Suspended Particles in the South of Tehran by AERMOD Model, (A Case Study of Tehran Cement Plant)

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### Abstract

The cement industry has 79 years of record in Iran and with total cement annual production capacity of 66 million tons; Iran is the largest cement producer in the Middle East. In the various stages of production process of the material, many pollutants are released into the environment. Cement industry has always been associated with air pollution. From different types of pollutants, particulate matter is the most important pollutants of the cement plants. In this research, AERMOD has been used for the simulation of dispersion patterns of the particulate matters emission from the cement plant for time average of 1 hour and monthly for both summer and winter conditions. Spatial analyses methods have been done by Arc/map10.1 software on Geographical Information System (GIS) in composite the natural and humanity variables are affected by air pollutants of the factory. According to the air pollution dispersion modelling outputs, Particles in the summer entry to Tehran from the plant origin increased further, and covered to 15km of the source. Considering the concentration of standard particles in Iran and EPA, it is observed that the result for the model output is more multiple than the standard rate. Man-made and natural environments are equally affected by the plant pollutants. Irrigated farms and gardens that are increasingly developing there, urban water reservoirs and also a bit far in the east, the runoff water sources and protected wild life zones are affected and very sensitive to air pollutants.

### Key words:

Air pollution; Modelling; Environment; GIS; Spatial analysis; Cement plant; and Tehran

## Modelling the Impacts of Climate on Hand-Foot-Mouth Disease Transmission in Heterogeneous Socioeconomic Space

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### Abstract

HFMD is the most prevalent disease in China, around 1-3 million new cases each year. The infectious disease spreads by EV71 and Coxsackie virus through fecal-oral rout, that is subject to climate condition, hygiene behavior and social contact structure. We model the socioeconomics using geographical evolution tree. A set of regions in the study area are classified by their industrial and employment structures and are represented by the branches in a tree structure; the regions are also classified into several developmental stages by per capita income and are represented as the twigs linked to the branches; and the regions are finally displayed as leaves on the twigs. A twig is placed near to the root of the tree if it is at higher developmental stage and is placed near to the top of the branch if it is at initial developmental stage. We use multilevel modelling to regress the HFMD and climate factors under the tree structured socioeconomic structure. The results have lower errors than that of global modelling, and the interaction between socioeconomics and climate on HFMD transmission is presented.

### Key words:

Hand-foot-mouth disease; socioeconomic and climate determinants; geographical evolution tree (GeoTree); multilevel modeling; contextual effects

## Neighborhood Environment and Location-based Daily Walking Behavior: A Case Study in Tokyo Metropolitan Area

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### Abstract

Fast development in transport technology has brought great convenience to people's daily life, especially for those who live in highly urbanized areas. However, a significant proportion of people were found to be a lack of physical activity due to the convenient lifestyle. Daily walking behavior is the most popular physical activity and the promotion of it is constructive in improving the physical activity. In this context, the evaluation of neighborhood walkability is important since it provides information on how to build a walkable neighborhood. In this study, utilitarian walkability, which refers to a mobile method to arrive at a destination for further behavior, was evaluated as evidence has shown that it has a higher connection with regular daily walking behavior compared with recreational walkability. Multi-criteria Evaluation (MCE) method was adopted for the evaluation process. Residential density, road accessibility, land use diversity, bus stops density and railway station accessibility, were the five criteria selected to run the MCE approach. The weights of these criteria were determined by the Analytic Hierarchy Process (AHP). After evaluation of the whole study area, the case study was done in two sites which have representative utilitarian walkability for relating the results to social-economical attributes of residents. The daily walking behavior was separated into walking happened within and without neighborhood based on the neighborhood boundary. With the findings from this study, the patterns of daily walking behavior of residents in Tokyo were detected. In conclusion, advice on how to build a walkable neighborhood was proposed.

### Key words:

daily walking behavior; Multi-criteria Evaluation; neighborhood environment; people flow; utilitarian walkability

## Outdoor PM<sub>2.5</sub> Air Pollution and Hospital Admissions for Hypertension disease in Shenzhen, China: A Small-Area Geographical Study

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### Abstract

Hypertension is the leading cause of cardiovascular and cerebrovascular mortality and about 90-95% of cases are categorized as primary hypertension, defined as high blood pressure with no obvious underlying causes. In this paper, we attempted to investigate the association between the hypertension hospital admissions and PM<sub>2.5</sub> exposure and to explore heterogeneity of the variation of relative risks across regions by conducting a small-area geographical study. The research was conducted in a relatively small scaled area of city level, Shenzhen, which is a highly urbanized area in China. We used 762 community geographical units as the unit of analysis and extracted post coded data on hypertension hospital admissions for the study area in 2013. PM<sub>2.5</sub> exposures were interpolated from 19 fine particle fixed-site monitors in the same period, and then the population-weighted exposures were also calculated. Data on potential confounders (age, sex, smoking proxy, alcohol use proxy, socioeconomic status, roadway density, human mobility) were included in this study. To allow for small numbers and unstable rates of hospital admissions, we applied Poisson regression models with an additional random effect term to account for over-dispersion and residual heterogeneity. The results indicated that after adjustment for potential confounders, the relative risk of hospital admissions for hypertension was 1.08 (95% confidence interval 1.05 to 1.17). Although the results were robust to adjustment for roadway density, road traffic noise should be considered in further research. Limitations included the inability to adjust for confounders at individual level.

### Key words:

hypertension; PM<sub>2.5</sub>; small-area geographical study; Shenzhen

## Seasonal Effects of Weather Factors on Hand, Foot and Mouth Disease in Beijing

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### Abstract

The morbidity and mortality of hand, foot and mouth disease (HFMD) are increasing in Beijing, China. Previous studies have indicated an association between incidents of HFMD and weather factors. However, the seasonal influence of these factors on the disease is not yet understood, and their relationship with the enterovirus 71 (EV71) and Coxsackie virus A16 (CV-A16) viruses are not well documented. We analysed 84,502 HFMD cases from 2008 to 2011 in Beijing to explore the seasonal influence of weather factors (average temperature [AT], average relative humidity [ARH], total precipitation [TP] and average wind speed [AWS]) on incidents of HFMD by using a monthly geographically weighted regression (GWR) model. The results indicated that weather factors differ significantly in their influence on HFMD depending on the season. AT had the greatest effect among the four weather factors, and while the influence of AT and AWS was greater in the summer than in the winter, the influence of TP was positive in the summer and negative in the winter. ARH was negatively correlated with HFMD. Also, we observed that there were more EV71-associated cases than CV-A16, and that AT and TP might have a stronger relationship to EV71 than CV-A16, but there is no convincing evidence to show significant differences between the influences of the weather factors on EV71 and CV-A16. These findings could be further tested in future laboratory and epidemiological studies.

### Key words:

weather factors; HFMD; geographically weighted regression; EV71; CA16

## **Spatial Analysis for Detecting Environmental Risks for Plague Foci in Ulan County, China**

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### **Abstract**

The Ulan County in Qinghai Province is belongs to the Qinghai-Tibet Plateau Himalayan marmot plague natural foci, which is the most active plague foci in recent China. The existing plague surveillance technology are far from being able to meet to foci of risk monitoring and management, there is an urgent need to introduce geospatial technical means for plague risk prediction. In this study, we acquired 45 Himalaya marmot position points based on the field monitoring in 2006-2009 carried out by the CDC of Ulan County, combined with our GPS data of field survey in 2010 and 2014. According to the habitat characteristics of Himalaya marmots, the related ecological environment variables including DEM, slope, aspect, slope, NDVI, land surface temperature (LST) and Land Cover were extracted by satellite and remote sensing software. We achieved the Plague risk prediction using ArcGIS and MaxEnt maximum entropy niche modeling method, the AUC value of training and test data were 0.942 and 0.932, respectively. The results show that the maximum entropy model combined with the ecological environment remote sensing variables can predict the spatial risk distribution of Himalayan marmot plague foci, which is more accurate than the administrative statistics in county level. The variables of NDVI and LST have the greatest impact on the plague risk distribution. The research can provide important reference for the control and prevention of plague epidemic in the county and other similar areas.

### **Key words:**

Geographical environment; remote sensing; spatial distribution; risk assessment; Plague foci

## Spatial Identification of Potential Health Hazards: A Systematic Areal Search

### Approach

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### Abstract

Major metropolitan areas often exhibit multiple morbidity hotspots. However, the identification of specific health hazards, associated with the observed morbidity patterns, is not always straightforward. In this study, we suggest an empirical approach to the identification of specific health hazards, which have the highest probability of association with the observed morbidity patterns. According to the proposed approach, the morbidity effect of a particular health hazard is expected to weaken with distance. To account for this effect, we estimate distance decay gradients for alternative locations and then rank these locations based on the strength of association between the observed morbidity and wind-direction weighted proximities to these locations. To validate the proposed approach, we use both theoretical examples and a case study of a major metropolitan area in Israel, which is characterized by multiple morbidity hotspots. In our theoretical examples, the proposed approach helped to identify correctly the predefined locations of health hazards, while in the real-world case study, the main health hazard was identified as a spot in the industrial zone, which hosts petrochemical facilities. As we conclude, the proposed identification method appears to perform effectively and can be used by researchers in cases in which specific sources of locally elevated morbidity are unclear or cannot be identified by traditional methods.

### Key words:

morbidity; air pollution, systematic search approach; wind adjustments; hotspots analysis.

## Spatial-temporal Distribution and Hotspots of Hand-Foot-Mouth-Disease (HFMD) in Guangzhou City

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### Abstract

Hand-Foot-Mouth-Disease (HFMD) is an emerging viral disease, which has been reported for increasing outbreak in Chinese cities. This study aimed to elucidate the phenomenon of HFMD outbreaks from 2005 to 2014 using general statistics and spatial-temporal analysis employing a GIS-based method in the study area of Guangzhou. The spatial analysis examined data at the sub-district level to create a map representing the distribution pattern, mean center, standard deviation ellipse and hotspots for the cases. A temporal analysis was used to analyze the correlation between monthly case data and impact factors as supplement of the spatial analysis. The results indicate that the disease was observed to occur at any time of the year. However, peak appeared regularly in certain months of the rainy and cold seasons. The distribution of outbreaks exhibited clustered patterns. Moreover, the source of the disease sometimes differed from the reported location. With the GIS-based simulation, the actual target area of the disease as well as the diffusion trend can be obtained, which is significant for the control and prevention of the disease.

### Key words:

Hand-Foot-Mouth-Disease; GIS; Spatial-temporal Analysis

## Spatio-temporal Analysis of Schistosomiasis Japonica in the Dongting Lake Regions of Hunan Province, China

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### Abstract

Schistosomiasis japonica, a chronic disease caused by the blood fluke *Schistosoma japonicum*, was one of the most serious parasitic diseases in China with a documented history of over 2,100 years. Over the past six decades, China has made great strides toward reducing the prevalence of schistosomiasis japonica by taking some comprehensive and highly effective strategies. However, further progress towards elimination of schistosomiasis is hampered by factors such as climate change, ecological transformations, socio-economic changes, and the transformation of the health sector; *Schistosoma japonicum* remains a major public health concern in twelve provinces of southern China. With the strategy shifting from morbidity control to transmission control, one challenge is to locate hotspots of transmission risk for precise control in low-prevalence areas. Based on annual parasitological data collected at township and village levels in the Dongting Lake regions in Hunan Province during 2000-2015, this paper presents a fine-scale spatio-temporal analysis of transmission risk of Schistosomiasis japonica in a geographic information system (GIS) environment. We first conduct a spatial cluster analysis using spatial autocorrelation indices to describe the spatial distribution and autocorrelation of schistosomiasis over time. Then, we run spatial regression models to reveal the relationships between human prevalence of schistosomiasis and environmental factors. Results show statistically significant clustering patterns both in space and time. Environmental factors, especially those related to habitats of snails which serve as intermediate hosts, can explain the spatio-temporal variations of schistosomiasis. Spatial regression models fit better than ordinary least square (OLS) regression models and can better show spatial heterogeneity effects.

### Key words:

Schistosomiasis japonica; spatio-temporal analysis; GIS; Dongting Lake; China

## **Spatiotemporal Analysis of Visceral Leishmaniasis in São Paulo State, Brazil (1999-2013)**

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### **Abstract**

The Visceral Leishmaniasis (VL) is a serious disease that affects people, causing a huge problem to public health system. Since 1999, cases were reported in northwest side state of São Paulo and the disease has been spread to other cities. Under those circumstances, the aim of this paper was to map the spatiotemporal data cases disease and its propagation through spatial analyses, considering areal studies. The data source comes from National Diseases Reported Database (in portuguese, SINAN - Sistema de Informação de Agravos de Notificação). We combined geographical and temporal data reported from 1999 to 2013 using Geographic Information System (GIS) tools, especially cluster analysis. Our results show that the disease has its frequency increased aside from a huge geographical expansion. We believe that this study can give an important view to understand the behavior of the disease in São Paulo state, consequently, it guide us some clues in order to understand the disease spread.

### **Key words:**

Visceral Leishmaniasis; spatial analysis; spatiotemporal

## Spatiotemporal Change of HIV/AIDS in Visakhapatnam District-A Medical GIS

### Approach

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### Abstract

Visakhapatnam, the largest Municipal Corporation in Andhra Pradesh, often called as “industrial city” has gained international significance. The study area, the Visakhapatnam District, is well connected by road, rail, sea and air. Floating population and migrants from the rural and tribal areas concentrated in urban slums, besides posh flesh trade, are leading to spread of incurable Human Immuno deficiency Virus (HIV) is one of the causal agent for disease Acquired Immuno Deficiency Syndrome (AIDS). Spreading disease will impact on different socio-economic factors. Therefore, it is important to evaluate and monitor causative factors which are to be controlled by effective measures. Geographical Information System (GIS) is a powerful tool for monitoring and planning the HIV/AIDS control programs based on the geographical location and other parameters. The factors influencing spreading HIV cases in the study area is studied. Study reveals the HIV cases are not increasing in recent years. However, Primary Health Centers’ (PHCs) and other hospitals are to be equipped with necessary medical equipment and medicines in order to curb this disease. Authors opined, Psychologist counseling must be required to get rid from the social stigma besides regular medication for longevity of patients.

### Key words:

HIV/AIDS; Incurable; Medical GIS; Flesh trade

## The Geographical Distribution of the Number of People with Hemophilia in China

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### Abstract

**Summary:** Background: For 50 years, the World Federation of Hemophilia (WFH) has been committed to improving care for people with bleeding disorders regardless of where they live. However, the level of hemophilia care is still far from being satisfactory in China.

**Objective:** To preliminarily explore the geography distribution of the number of people with hemophilia in China during 2005-2014, aim to promote eugenics and provide a new idea for prevention and treatment of hemophilia.

**Method:** The method of thematic mapping with the quality base method and Natural breaks method are used to draw the geographical distribution of the number of people with hemophilia in China.

**Results:** Since the availability of collecting the number of people with hemophilia, the geographical distribution of the number of people with hemophilia is "extremely high or low" and then "high-low alternating in China. Overall, there is a concentration of people with hemophilia in the southeast and central regions, while few people with hemophilia are in northwest and some parts of southwest, as the effects of such population flow, environment and so many potential factors may have a profound effect upon the geographical distribution of the number of people with hemophilia.

**Conclusion:** The geographical distribution of the number of people with hemophilia is "extremely high or low" and then "high-low alternating". (Project 40971060 supported by National Natural Science Foundation of China and the Central College Fund (PhD) (No. GK201504015).)

### Key words:

Hemophilia; Number; Geographical; Distribution

## The Relationship between Built Environment and Residents' Health Based on the Medical Big Data

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### Abstract

Human healthy or disease incidence in different districts is always compared to the investigate district's impact. However, in those investigations, the relationship between urban built environment and residents' health has not received enough attention. Socioeconomic status, community environment and family influence of human beings tends to be ignored. That's because census data used in those investigations is lack on that three factors. Nowadays, information and communication technology (ICT) is applied in the medical and health field, which make us get more detailed and comprehensive record of the residents' daily medical activity information. Also, the era of medical big data make it possible to study from the perspective of residents' medical activities. Though literature reviews of medical geography, this research will fully excavate the patients' medical big data, residential location records and social economic attribute from the perspective of residents' medical activities, which combine with the medical statistics yearbook, field survey data, etc. On the basis of patient's privacy protection and data integrity, this research will analysis the space-time path and spatial-temporal characteristics of medical activities by the aid of spatial analysis, mathematical statistics, qualitative analysis and other analysis methods. We will analysis the relationship between medical services (supply, usage, and accessibility) and built environment furthermore. Using this information, we will in-depth analysis the impact between built environment (especially the neighbourhood environment) and residents' health and summarize the general rule of the main influencing factors and mechanism.

### Key words:

Medical big data; built environment; residents' health; facilities layout optimization;

## The Spatial Distribution of Hepatitis C Virus Infections and Associated Determinants

### – Targeting Risk Groups Using Geographically Weighted Poisson Regression

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#### Abstract

A large proportion of Hepatitis C virus (HCV) infections remain hidden to care due to the mostly asymptomatic characteristics of HCV. Screenings targeted on behavioural risk groups only had not proven to be effective in revealing these hidden infections. Geographic Information Systems (GIS) and spatial epidemiological methods may therefore provide a more feasible basis for screening interventions through the identification of hotspots and local risk factors.

Analysed data included all HCV tests performed in the southern area of the Netherlands between 2002-2008. Population-based data were matched to the HCV data. The spatial scan statistic was used to detect areas with elevated HCV risk. Geographically weighted Poisson regression modelling was then applied to determine local risk factors for HCV.

HCV prevalence varied geographically and clustered in urban areas. The main population at risk were middle-aged males, non-western immigrants and divorced persons. Socio-economic determinants consisted of one-person households, persons with low income and low mean property value. However, the association between HCV prevalence and the identified risk factors displayed strong regional and intra-urban differences.

The detection of local hotspots in our study may serve as a basis for prioritization of areas for future screening interventions. Risk factors associated with HCV show regional differences underlining that risk factors for HCV depend largely on the place of residence. Targeting the identified risk groups within the detected clusters might lead to cost-effective screening interventions aimed at those who are most at risk in specific locations.

#### Key words:

Hepatitis C; Geographic Information Systems (GIS); Geographically weighted regression (GWR); spatial scan statistic (SaTScan)

## Use of Geography Information Systems to Determine the Spatial Distribution of Asthma Patients

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### Abstract

The increasing urbanization process from day to day has become a serious problem that affects people's lives. Approximately %48 of the world's population live in urban areas and this rate is increasing daily. This process of urbanization bring with spatial problems in urban. One of them is the health problems that are caused by urbanization. Today, asthma is one of the most important respiratory diseases raised from human factors such as industry, transportation. In this study, the effects of air pollution and busy traffic on asthmatics was investigated. The relationship between the main Access roads and the places where people live has been demonstrated using Geography Information Systems. Accordingly, information of age, gender and address in selected asthmatic patient records has been examined and spatial datas in this study were analysed using software ArcGIS 10.x The effects of spatial problems in the distribution of asthma patients was researched.

### Key words:

Asthma; GIS; Spatial Problems; Istanbul

## Spatial Analysis of Gastric Cancer Morbidity in Regions of Rapid Urbanization: A Case Study in Xiamen, China

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### Abstract

This paper is purposed to detect the spatial laws of gastric cancer in the rapid urbanization area and analyze relationships between gastric cancer and urbanization. Gastric cancer incidence data in Xiamen between 2006 and 2009 was collected from Xiamen CDC (Centre of Disease Control and Prevention). Urbanization age of Xiamen Island was calculated from remote images and terrain maps. Analysis results showed that 995 gastric cancer cases, accounting for 61.64 % was in Xiamen island, compared with 619 cases, accounting for 38.36 % outside. The average gastric cancer incidence was 32.98/1000,000 in Xiamen Island, compared to 16.13/1000,000 outside. The top ten sub-districts of gastric cancer all located in Xiamen Island, and urban areas have as more than twice gastric cancer incidence as rural area, with 28.62/100,000. The most likely spatial cluster of gastric cancer was Xiamen Island. Correlation analysis results indicated the urbanization age and spatial cluster degree had a significantly positive correlation relationship. Rapid urbanization in Xiamen changed the environment, namely acquired factors including land use change, air–water–soil pollution, less activity, electromagnetic radiation and contaminated sea foods. These are risk factors of gastric cancer. This research indicated that Xiamen Island was prevalent of gastric cancer with a positive correlation with urbanization age.

### Key words:

Urbanization; Gastric cancer; Spatial scan statistic; Xiamen; China

## The Regional Variation of the Reference Value of Alanine Aminotransferase Based on Ridge Regression Analysis

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### Abstract

This paper aims at studying the regional variation of normal reference value of alanine aminotransferase in healthy adults and revealing the relationship between it and geographical environment. This research is made to study the relationship between the normal reference value of 121,977 samples of ALT in healthy adults and geographical factors in 93 units of China via the methods of correlation analysis、ridge regression estimation and trend surface analysis, and one regression equation is inferred the reference value of alanine aminotransferase in the local area by using the simulation equation under the condition of known local geographical factors.: There is a significant relationship between six geographical factors and ALT of healthy adults;2)The normal reference value of ALT in healthy adults in western region is higher than that of eastern region and whole country are divided into three regions. The normal reference value of ALT is influenced by the geographical environment, and showed distribution regularity.

### Key words:

ALT; Healthy adults; Ridge regression; Trend surface analysis

## C12.19 Health and Environment

### Global Health



Home

### Oral

1. [Dengue's Epidemic in Brazil: The Influence of Urbanization](#)  
FRANCISCO MENDONÇA (Brazilian Association of Geographers, Brazil)
2. [Geography of Health, Health of the Geography: Toward A Re-Foundation of a Quartered Discipline](#)  
Gerard Salem (University Paris, France)
3. [Global Health Challenges – Trade Agreements](#)  
Thomas Krafft; Christoph Aluttis; Eva Pilo; Andra Stancu (Maastricht University, Netherlands)
4. [Health Risk for Tourists](#)  
Natalia Łukasiewicz (Faculty of Geography and Regional Studies, University of Warsaw, Poland)
5. [Innovations in Integrated Disease Surveillance at Municipality level in Pune, India](#)  
Eva Pilot; Thomas Krafft (Maastricht University, Netherlands); Vivek Singh (Public Health Foundation India, India); Sudhir Patsute (Disease Surveillance Cell Pune Municipality, India)
6. [New Epidemics Outbreak in Developed and Developing Countries](#)  
Izabella Lecka (Faculty of Geography and Regional Studies University of Warsaw; Polish Geographical Society, Poland)
7. [The Geography of Skilled Birth Attendance and Maternal Mortality in Ghana](#)  
Joseph Oppong (University of North Texas, United States)
8. [Trends and Socio-Economic Inequalities in the Distribution of Body Mass Index of Women in India, 1998-2012](#)  
Praveen Kumar Pathak (Delhi School of Economics, University of Delhi, India)

## Dengue's Epidemic in Brazil: The Influence of Urbanization

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### Abstract

The WHO estimates that 50 to 100 million people are infected with dengue fever annually in the entire world. Approximately 42% of the world's population lives in areas where the dengue virus can be transmitted. The re-emergence of this disease in Brazil occurred from the 1970s on, and the last few years the epidemics reach all regions of the country (around 1.5 million cases in 2015). The occurrences of epidemics and especially the elevation of the number of cases intensify the action of Public Health Care throughout major programs of the disease's contention, notably after the Chikungunya and Zika virus registration in the country. The climatic conditions and the urbanization are the main factors for the dispersion and transmission of the disease in Brazil; the urbanization intensifies the natural vulnerabilities of the population to the disease, which makes the risk more accentuated. Brazilian population lives in cities (around 85%), and also the vector (*Aedes aegypti*) of dengue fever with needs special places to reproduce itself and act to transmit the virus. Spatial organization of Brazilian cities contributes to intensify the risk and the spread of dengue fever. In this study, we analyze the spatial dynamics of dengue's fever in 10 Brazilian cities (Manaus, São Luis, Fortaleza, Recife, Brasília, Campo Grande, Rio de Janeiro, São Paulo, Curitiba and Porto Alegre), and we observed similar and different factors (sanitation, waste, housing, tires and old inner dumps, vehicles and people flux, etc..) between them that influence a lot the epidemic situations.

### Key words:

Dengue fever; epidemics; urbanization; Brazil

## Geography of Health, Health of the Geography: Toward A Re-Foundation of a Quartered Discipline

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### Abstract

Geographical studies of health have known a tremendous development the two last decades, with trivialization of methods as spatial analysis, or of tools as GIS. New approaches as “*One Health*”, “*Pathocenosis*”, “*Health in every policy*”, “*inter-sectorial approaches of health*”, “*contextual and multi-level methods*”, “*impact of places*”, etc. are more or less inspired by geography.

However, is the discipline more recognized and shared? The trivialization of geographical methods and tools could be deadly for the discipline, and as a consequence, the end of the most relevant heuristic contribution of to geography to Health Sciences, and to ... geography. We’ve observed such dilution of geography as a discipline in urban, cultural or environmental studies, and suppression of many departments of geography in Universities. It wouldn’t be a real problem if the stake weren’t the links between health ad geography, social sciences and health sciences, research and action.

It’s one thing to describe spatial heterogeneities of health, to correlate with risks factor, (i.e spatial epidemiology approaches), it’s another one to give sense, to understand process, which lead to these situations.

That’s why it’s urgent to refound the discipline, capitalizing technical progress, experiences with other disciplines, through it’s main aim: simultaneous study of spatialisation of society, and socialization of space, in order to understand socio-territorial construction of health. The three concepts, Space, Place, Territory, dangerously confused or opposed, are in fact inseparable and complementary. By the way, Health geography will contribute to general geography, to Public Health challenges, and to public policy.

### Key words:

Geographical concepts; social sciences; inter-disciplinarity; public policy; training

## Global Health Challenges: Trade Agreements

Thomas Krafft, Christoph Aluttis, Eva Pilot, Andra Stancu

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### Abstract

For new comprehensive trade agreements among the major economic powers have raised questions about the potential global health implications. In the public and scientific debate on the current negotiations on far reaching trade agreements (CETA, TTIP, TPP etc.) concerns are expressed regarding (a) a possible roll back of health protection provided by accomplished standards and legislations and (b) the impact on the future development of standards and regulations. The concepts envisaged for a regulatory cooperation that have emerged from the few preparatory documents available (for example) on TTIP could have a considerable impact on global health. The trade agreement negotiations aim for harmonizing of regulations and reduction of existing or perceived trade barriers that result from non-tariff or technical regulations. Regulatory coherence should be achieved through the introduction of an institutional regulatory framework that oversees the development and implementation of relevant legislation in the signatory states of the trade agreements. Stakeholders will have the right to appeal to these regulatory institutions if they fear potential trade impacts from planned regulatory or legislative initiatives. ISDS (Investor state dispute settlement) instruments that are intended to provide effective investor protection under the trade agreements can have far-reaching impacts on health related policies (emission standards, tobacco control etc.). The transatlantic tensions on the adoption of the precautionary principle as detailed in Article 191 of the Treaty on the Functioning of the European Union (EU) is one example for future challenges related to the trade agreements.

### Key words:

Trade Agreements; Global Health; TTIP

## Health Risk for Tourists

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### Abstract

Nowadays as a result of globalization processes travelling is available to almost everyone. However according to present unstable economic and political situation in countries known as holiday destinations tourist traffic intensity rate are getting lower. That situation refers to numerous Arabic countries such as Egypt, Tunisia not to mention specific situation in Syria. Since Arab Spring protests the tourist market have visibly suffered from lack of tourist. If people decided to spend holiday there, they usually are placed at closed resorts. Recent incidents including terrorists attacks in Paris and Asia shows that tourists could not feel safe anywhere. There are different types of health risk for tourists, except terrorist attacks tourist should face with thefts, various accidents and of course communicable diseases in specific regions of the world. Researches were initiated during fieldwork in Cairo in 2014, where different risk factors have been observed. Presented study is based on surveys conducted on different groups of academic students and pupils at high schools. Questionnaire survey contains pictures of the main world's tourists attractions according to World Tourism Organization. Respondents were ask to rank those places using given health risks scale, specify the type of risks and answer the question if they want to spend their holidays there. That will show if tourists are aware of what to expect during travelling, if and how they prepare themselves for going abroad and what in their minds are the safest holiday destinations. Results are presented on the map of tourist health risk.

### Key words:

Health risk; travel medicine

## Innovations in Integrated Disease Surveillance at Municipality level in Pune, India

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### Abstract

The purpose of the presentation is to analyse the complex and fragmented set up of municipal disease surveillance in the Indian context. With the implementation of the Integrated Disease and Surveillance Program (IDSP) the central Indian government tried to bridge existing surveillance components and programmes and to integrate them under one umbrella. As a case in point the potential and challenges of the implementation within the Pune Municipal Cooperation will be assessed and lessons learned discussed.

**Methods:** The research is based on a literature search, semi-structured expert interviews and infectious disease surveillance concept mapping.

**Conclusion:** the IDSP initiative has improved the traditionally difficult monitoring of disease burden and outbreak control but is still rather patchy and has challenges which needs to be address like the urban area coverage with strengthening hospital based disease surveillance. The IDSP continuous to face serious challenges that needs to be overcome to strengthen the early warning capacity and to bridge the urban rural divide in the interest of public health. This paper discusses the progress made and the challenges remaining also in the context of the implementation of the International Health Regulations (2005).

### Key words:

Innovation; Surveillance; India; Urban

## New Epidemics Outbreak in Developed and Developing Countries

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### Abstract

The main goal of the presentation is to analyze a new outbreak of epidemics as swine flu (from 2009), Ebola (2014/2015) and Zíka virus (2016 ). Emphasis will be placed on the ways and trails determining the spread of these diseases; way to prevent them in the contemporary global world; cultural background of the implementation of different preventive methods in different countries.

Finally it will be presented an evaluation of existing methods to combat new epidemics, especially the role of international cooperation and it will be indicated good practices promising for the future.

### Key words:

geography of health; epidemic

## The Geography of Free Skilled Birth Attendance and Maternal Mortality in Ghana

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### Abstract

Fueled by poor access to skilled birth attendants, maternal mortality is unusually high across sub-Saharan Africa. Many governments have instituted free maternal care as a way to boost health care access, increase delivery by skilled birth attendants, and reduce maternal mortality. Thus, the Ghana government introduced the user fee exemption policy for maternal healthcare in 2003. Nevertheless, use of skilled birth attendance varies significantly across geographic space and maternal mortality remains high.

This paper examines the geography of access to skilled birth attendance across Ghana using DSHS 2014 and 2010 Ghana national population census data. The results show that poverty and place of residence – rural or urban – are significant determinants of skilled birth attendance. Thus, providing free access to skilled birth attendance services does not assure use of these services when enabling factors are not addressed.

### Keywords:

Maternal mortality; Ghana; regional disparities; skilled birth attendance

## Trends and Socio-Economic Inequalities in the Distribution of Body Mass Index of Women in India, 1998-2012

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### Abstract

There has been growing understanding about the coexistence of underweight and obesity in developing countries. However, evidence related to changing socioeconomic differentials in the burden of under-weight and obesity over time have not been assessed across states in India. Therefore, this paper attempts to examine socioeconomic differentials in burden of underweight and obese women across socioeconomic factors over time. Using data on 38762, 50242 and 195928 ever married women 15-49 years of age from three cross-sectional national representative surveys (Indian National Family Health Survey 1998-1999; Indian National Family Health Survey, 2005-2006; Reproductive and Child Health- District Level Household Survey 2011-2012 respectively), socioeconomic differentials in weight status of women was measured through body mass index (kilogram/meter<sup>2</sup>). Indicators of socioeconomic indicators included wealth status, educational status and place of residence (rural and urban). Cross tabulations, chi-square tests, mean score of BMI, One-way ANOVA and panels of multiple regression models were fitted to investigate the socioeconomic patterning of body mass index of women in India. Results indicated stark socioeconomic inequalities in underweight and obesity among women in India. Large proportion of women from high socioeconomic categories recorded obesity contrary to those from poorer categories. On the other hand, burden of underweight predominated among women from under-privileged socioeconomic strata. This pattern remained true over the study period.

### Key words:

Body mass index; Underweight; Obesity; Socioeconomic status, Multiple Regression, India.

## C12.20 History of Geography

### Studies in the History of Geography: Past and Present



Home

#### Oral

1. [A Case Study to Present the Historic Authenticity of the Spatial Morphology of Historic Districts: Take Nanluoguxiang and Beiluoguxiang Area of Beijing as an Example](#)  
Huanxi Zhao (College of Resource Environment and Tourism, Capital Normal University, China)
2. [An ‘Absent Presence’ – New Zealand and the International Geographical Congress 1895 to 1952](#)  
Michael Roche (Massey University, New Zealand)
3. [Aspects of Borders That Create Discontinuity in the Ryukyu Archipelago: A Study of Cultural Territoriality](#)  
Naoki Oshiro (Meiji University, Japan)
4. [Conceptual History and Historical Geography](#)  
Karsten Gaebler (Friedrich Schiller University Jena, Germany)
5. [Concisely Survey on Rivers’ System and the Environment of Waterscape Recorded in the Book of Songs](#)  
Jiesheng An (Fudan University, China)
6. [Footprints of the Past: Reimagining Darjeeling through Conversations with the Colonial Accounts](#)  
Aparajita De (University of Delhi, India); Rajib Nandi (Institute of Social Studies Trust, India)
7. [Geography at the Turn of the Nineteenth Century: A Preliminary Study on the Naval Chronicle \(1799-1818\)](#)  
Yannan Ding (Shanghai Jiao Tong University, China)
8. [Histoire de la géographie/Géographie historique: deux genres différents du discours géographique](#)  
Vincent Berdoulay (Université de Pau, France)
9. [Indian Ocean Toponyms in Idrisi: Between Text and Maps](#)  
Marina Tolmacheva (Washington State University, United States)
10. [Internal and External Spaces of Reality-Borrowing Animation: A Certain Magic Index and Its ‘location’ \(Tachikawa, Japan\)](#)  
Miyo Aramata (Toyo University, Japan)
11. [L’histoire de la géographie comme l’histoire de l’espace](#)  
Rolando Espinosa (Doctorat en Géographie Université Nationale Autonome du Mexique, Mexico),  
Keren Hapuc Hernandez (Faculté d’Économie Université Nationale Autonome du Mexique, Mexico)

12. [Les écrits privés des géographes: des objets de recherche comme les autres?](#)  
Pascal Clerc (Université Claude Bernard Lyon 1, France)
13. [On Geographical Landscapes of Canton in the First Half of 19th Century ----Based on Chinese Repository](#)  
Wu Hongqi (Historical Geographic Research Center of Jinan University, China), Liu Yuqiong (Historical Geographic Research Center of Jinan University, China)
14. [Opening Geography to the General Public: Towards a Genealogy of the International Geographical Exhibitions in Europe \(1871-1902\)](#)  
Toshiyuki Shimazu (Wakayama University, Japan)
15. [Photography, the Rural Landscape, and Geographical Imagination in Japan in the Early Twentieth Century](#)  
Tamami Fukuda (Osaka Prefecture University, Japan)
16. [Russian Orthodox Mission in Beijing: Geographical and Topographical Investigation in the First Half of the XIX Century](#)  
Tatiana Feklova (Saint Petersburg branch of the Institute for the history of science and technology, RAS, Russian Fed)
17. [Sanitation, Modernity and Subject: Contradictory processes of introduction of new system in Modern Japan](#)  
AKIO ONJO (Kyushu University, Japan)
18. [She Speaks: An Oral History of Women in American Geography Today](#)  
Michael DeVivo (Grand Rapids Community College, United States)
19. [Spatial Dimensions in the Classical Geography of China](#)  
Guang Han (College of Resources and Environmental Sciences, Hunan Normal University, China)
20. [Studies on Romania by the French geographer Emm. De Martonne](#)  
Dan Balteanu (Romanian Academy, Institute of Geography, Romania), Mihai Ielenicz (Faculty of Geography, University of Bucharest, Romania)
21. [Studying Urban Areas from the Spanish Geography, Past and Present](#)  
Carmen Delgado Viñas (University of Cantabria, Spain)
22. [The 60th Anniversary of the International Conference of IGU in Rio De Janeiro: On Turning Points and Controversies](#)  
Mariana Lamego (State University of Rio de Janeiro, Brazil)

23. [The 1825 Street-Map of Fribourg \(Switzerland\) as First Modern Geography Lesson](#)  
Patrick Paul Minder (CERF — University of Fribourg, Switzerland)
24. [The First Draft of the French Concept of Pioneering Fringe Produced by Pierre Monbeig \(1930-1935\)](#)  
Larissa Lira (USP/EHESS, Brazil)
25. [The Legacy of Political Geography in Sweden](#)  
Olof stjernström (Dept of Geography and Economic History, Umeå University, Sweden)
26. [The Normal Way: Exploring The Careers Paths of Early Women Geographers In The United States: 1880-1950](#)  
Janice Monk (University of Arizona, United States)
27. [The Reconstruction of Geography: 1950s in P.R.China](#)  
Jiuchen Zhang (Institute for the History of Natural Science, CAS, China)
28. [The Genglubu's Construction Function to Marine Silk Road of the Pattern of the South China Sea](#)  
Zhaoliang; Zhangzhengsheng (School of Geography, South China Normal University, China)
29. [War against War? Arcangelo Ghisleri from Pacifism to Interventism](#)  
Elena dell'Agnese (Università di Milano Bicocca, Italy)
30. [Wu Shangshi-An Outstanding Modern Chinese Geographer as a third Generation Student of P. Vidal de la Blache, France](#)  
Chaoyu Wu (Center for coastal ocean science and technology research, SYSU, Guangzhou, China, China)

## Poster

1. [A Measurement and Analysis on the Coupling Relationship Between Regional Rural Poverty and Ecological Environment -- Taking Hunan Province of China as an Example](#)  
TIAN Yaping (China, Hengyang Normal University); Zheng Wenwu (China, Hengyang Normal University)
2. [Research on the Historical Geography's Mechanism about Evolution of Dalian's Spatial Structure in The Belt and Road Background](#)  
Liu Xu (China, Liaoning Normal University)
3. [Research on the Relationship Between Population Density and Land use: A Case Study of Korqin Left Wing Middle Banner](#)  
Wang Qing (China, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences)
4. [Study of the Spatial Distribution of Bohai Kingdom Sites in DPRK](#)



SHI-ZHU JIN (China, Yanbian University); ROYNG-CHEL GANG (North Korea, Kim Il Song University); GUANG-CHEL SEK (North Korea, Kim Il Song University)

5. [The Change of Land Use and Urbanization in Micro Level of Wuxi in China](#)

YIXIN PAN (Japan, Kyoto University)

6. [The Changing Distribution Patterns of Rural Settlements during the Process of Urbanization: The case of Gongyi \(1929-2013\), China](#)

XU Jiawei; LI Xiaojian; HAI Beibei (China, Collaborative Innovation Center of Three-aspect Coordination of Central-China Economic Region, Henan University of Economics and Law)

7. [The New Culture Movement Heritage Cultural Space Reconstruction](#)

Wei Huijie (China, Capital Normal University)

8. [The Research on Space Structure and the Regional Response of Shandong Section of the Grand Canal Linear Cultural Heritage](#)

Congcong Liu (China, Capital Normal University)

## **A Case Study to Present the Historic Authenticity of the Spatial Morphology of Historic Districts: Take Nanluoguxiang and Beiluoguxiang Area of Beijing as an Example**

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### **Abstract**

In the field of historic districts of Beijing, the discussion concerning spatial morphology still have spaces for further studying. Recent achievements about spatial morphology of historic districts mainly focus on the viewpoint of district planning and architecture preservations. With regard to the authenticity of historic districts, the discussion is relatively few. Historic districts today take root in the spatial morphology of the districts in historical periods. Therefore, deeply analysing these districts in ancient time, and comparing the spatial morphology in certain period of history to today's situation, would be helpful for exploring cultural geography of certain districts in the past and present, and could be meaningful for the sustainable developments of historic districts in the future. This study will also help us to rethink the questions of what the spatial morphology of these districts should be embodied today that homogenization of districts can be avoided, and what the range of restoration of a historic district should be presented. This paper will take the Nanluoguxiang and Beiluoguxiang area as an example, comparing district morphology between Qing dynasty and the present. As to the Qing period, the main research materials used in this article are <Qianlong JingchengQuantu> and other historical documents, base on which the actual patterning of these two districts in Qing dynasty will be presented; and as to the comparing study part, this paper will focus on the differences of overall layouts, base on which can give reference to today's heritage conservations and tourism developments of these areas.

### **Key words:**

historic districts; historic authenticity; spatial morphology



## An 'Absent Presence' – New Zealand and the International Geographical Congress

1895 to 1952

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### Abstract

As a prequel to the centenary of the IGU in 2020, this paper will discuss the connections that have been made since the late 19<sup>th</sup> century between New Zealand and the IGC up to the 1952 IGU Congress in Washington. This commentary will be positioned against both a larger backdrop of the development of university geography in New Zealand since 1937 and the relationship between New Zealand geographers and the IGU since 1952 which forms a larger project. The main focus will however be one the way in which New Zealand featured as an example in the work of others at early IGU Congresses, to the era when New Zealand was included as part of the British Empire, and finally to the first direct New Zealand representation in 1949 and 1952. Consideration will be given to how New Zealand geographers represented themselves and New Zealand to the wider geographical community.

### Key words:

New Zealand; International Geographical Union

## Aspects of Borders That Create Discontinuity in the Ryukyu Archipelago: A Study of Cultural Territoriality

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### Abstract

This report investigates the relationships between culture, politics, and borders in the Ryukyu Archipelago. Two subjects will be dealt with. The first is an attitude toward borders that has become familiar to us in modern times. It is not based on an open territorialism in which the influence of imperial and monarchical centers of power is weakened (a concept that the formation of the modern nation-state erased). Rather, this outlook is founded on a xenophobic value system that highlights the binary opposition between “us” and “them,” “inside” and “outside,” in which the territory is bounded by a closed curve. The second issue covered in this report is how political discontinuity (that is, the formation of borders) interrupted the cultural innovation transmitted in concentric circles from these pre-modern, open centers; this subject is discussed with reference to examples from pre-modern times. In both cases, reference is made to the theme of the “between-ness” of this land, bordered by Amami and Okinawa, the southern and northern extremes of the Ryukyu Islands.

First, the report discusses graves, which are physical manifestations of these themes. The morphological discontinuity between Amami and Okinawa came about in the following manner. When the Satsuma Han invaded the Ryukyu Kingdom in 1609, and the Ryukyu Kingdom surrendered, the Amami Islands were ceded and came under the direct control of the Satsuma Han. Thus, the political relationship between Amami and Ryukyu was severed; at the same time, cultural diffusion was also cut off. This discontinuity must be considered alongside the possibility of basic continuity. To this end, it is necessary to consider the interactions between physical changes and shifts in value systems.

Next, the report considers the treatment of “native” lifestyles under the nation-state in Ryukyu/Okinawa after it became part of Japan through the so-called “Disposition of Ryukyu” in 1879 (that is, when feudal domains were abolished and prefectures established in their place). The relationship with China – to which the Ryukyu Kingdom paid tribute and by which it was granted official status in pre-modern times – was severed, and the “discovery” of “the thing called Okinawa” as a “mirror of ancient Japan” served as a significant turning point in Okinawa’s folk customs. The discovery that temporally “distant” things remained in this spatially “distant” land, one of the ideological paradigms of Japanese folklore studies, has been the target of criticism in recent years. From this point onward, the influence of Chinese culture upon Okinawa began to weaken. We can understand this as another case in which the drawing of national borders dissolved something that had continuously existed until that point, and meanings changed as a new value system took hold.

### Key words:

border; historicity; territoriality; folk geography; Ryukyu archipelago

## Conceptual History and Historical Geography

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### Abstract

Although conceptual history and historical semantics have gained remarkable scientific attention in historiography as well as in social and cultural studies, their impact in geography has so far been comparatively low. With the ascent of non-representational approaches in social and cultural geography, criticism to language-centered approaches has arisen and a shift towards investigating practices and performances seems to have occurred.

However, this paper argues that the conceptual history approach not only helps understand the constitution of past geographical realities, but also has the potential to enlighten theoretical debates about the relationship between concepts and “reality”. With its focus on genealogies and the historical change of meanings in language use, conceptual history carves out society’s (historical and contemporary) self descriptions and offers an interesting bridge between language- and practice-centered approaches.

Using the example of geographical language games like “time-space compression”, the “death of distance” or the “annihilation of time and space”, I will trace back some of the genealogies of today’s spatio-temporal language. In particular, this paper will highlight the specific metaphors that emerged with the introduction of the railway and the telegraph in the 19th century and thus call attention to the semantic continuities and discontinuities in describing (historical) society-space relationships.

### Key words:

historical geography; conceptual history; society-space relationships; social and cultural geography; time-space compression; spatial language

## Concisely Survey on Rivers' System and the Environment of Waterscapes Recorded in *the Book of Songs*

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### Abstract

As a kind of important data and document about the Pre-Qin time of China, *the Book of Songs* surely provided much valuable information about the geographical condition of that time, including rivers' system and natural environment. The history of many ancient kingdoms in pre-Qin time fixed a relation with some rivers that could be called by the name of "Mother River". Many important rivers, that covered the central part of China, could be found out in *the Book of Songs*, and peoples had realized that these rivers made up two giant systems, the Yellow River and Yangtze River, that all finally flows into the sea. There were numerous descriptions about river and waterscape in many songs. Rivers and waterscapes made an important part of the environment of that time. A lot of aquatic plants and birds could easily be found out in these songs. Boats made by wood of cypress and poplar were the popular transport tools to cross river. Fishing was also an essential industry for peoples' living and many writers of songs extolled the taste of fish-dishes. So the author of this paper wants to emphasize that the *Book of Songs* gives us some valuable clues and angles of observation to study the environment of China in the pre-Qin Time.

### Key words:

Rivers' System; Environment; Waterscape; *the Book of Songs*

## Footprints of the Past: Reimagining Darjeeling through Conversations with the Colonial Accounts

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### Abstract

It was largely the colonial administrators and travellers who started documenting and archiving ecological and social aspects of the eastern Himalayas. A substantive part of these studies were developed for the administrative purposes but later became the primary source of data for researchers writing on the eastern Himalayas and sub-Himalayan Bengal. In Darjeeling, a large volume of local writings is on social and political issues that have become a focal point of today's Gorkhaland movement. For the local authors, colonial documents serve as crucial reference point in writing the history and geography of the region. Colonial accounts on one hand contribute to the knowledge building but on the other add a layer of politics through developing colonial categories and methods of analysis. The paper argues that local writings are not mere products of apolitical memories and personal experiences alone but engage with and is highly influenced, consciously or unconsciously, by a set of power relations within which people place themselves in. Thus, they are in a continual dialogue with the colonial literature at times in agreement and at others in resistance to it. This brings us to the main argument of the paper - the epochal division of past and present is a constantly evolving line that stresses the inter-connections between the social and political landscape of past and the present where past cannot be seen in isolation but is subjected to the demands of the present within a complex spatio-temporal nexus between past, present and future.

### Key words:

Mapping the past; politics of knowledge creation; landscapes; colonial knowledge; local writings; Darjeeling; India



## Geography at the Turn of the Nineteenth Century: A Preliminary Study on the Naval Chronicle (1799-1818)

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### Abstract

In the last two decades, historians of science have been attracted to the social and spatial dimensions of scientific knowledge. To understand the production of scientific knowledge is to understand, among other aspects, the place where it takes place. In deed, there is an emerging field of the ‘historical geography of science’ (as per Naylor 2005). In the same vein, geography as a discipline is also under scrutiny. What counts as geography in early modern times, for instance, is a heatedly debated question. New studies have taken a more holistic and contextualized approach. In particular, researchers have found that, contrary to previous conceptions, the eighteenth century is a remarkable era of exploration and discovery (Withers 2006; Withers and Mayhew 2011). Geographical knowledge circulates not only via conventional means, such as books, maps and globes, but also in less tangible ways such as personal and societal communications (Ogborn 2002; Livingstone 2007). The pivotal transition from pre-modern to modern geography later in the nineteenth century is not conceivable without the rich accumulations from the eighteenth century to early nineteenth century. In this paper I will present a preliminary examination on a rich and yet understudied reserve of geographical knowledge produced at the turn of the nineteenth century. The Naval Chronicle (1799-1818) includes many first-hand observations and communications from Royal Navy officers and mariners. It is unquestionably the best and most comprehensive collection of geographical knowledge in early nineteenth century.

### Key words:

Geographical knowledge; Naval Chronicle; History of geography; Nineteenth century; Britain

## Histoire de la géographie / Géographie historique: deux genres différents du discours géographique

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### Résumé

L'histoire de la géographie a souvent été confondue avec la géographie historique. C'est une tendance qui revient actuellement, notamment dans la géographie anglophone. Il y a certes des avantages à cette position. Mais je vais présenter, dans cette communication, le point de vue contraire et je vais proposer une façon de conceptualiser leur contribution respective à partir de la notion de genre du discours géographique.

Premièrement, je montre quelles sont les raisons d'une relation bénéfique, mais ambiguë, de l'histoire de la géographie et de la géographie historique. Deuxièmement, je montre qu'il y a une vraie régression épistémologique si une confusion est établie entre les deux domaines de recherche. Troisièmement, j'insiste sur l'intérêt d'aborder leur relations en les considérant comme des genres différents du discours géographique, qui ont chacun leur originalité propre. L'histoire de la géographie implique une réflexivité particulière, celle d'un géographe-sujet à saisir du point de vue géographique (avec les lieux qui le conditionnent et qu'il contribue à fabriquer), dont le point de vue est à la fois décentré, narratif et prospectif.

### Mots-clés :

histoire de la géographie; géographie historique; genre du discours

## Indian Ocean Toponyms in Idrisi: Between Text and Maps

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### Abstract

This paper focuses on some historical Indian Ocean placenames in the world geography of the 12<sup>th</sup>-century Arab scholar al-Idrisi. Composed in Sicily in the middle of the 12<sup>th</sup> century, *Nuzhat al-Mushtaq* (“Entertainment for the Desirous of Travel”), was highly regarded and often quoted by later Islamic cosmographers, but the accompanying maps were much less frequently copied or imitated. In Palermo Idrisi had access to European and Arabic sources, and his world map has long been recognized as influenced by Ptolemy. Idrisi’s descriptive information includes a mixture of ancient Greek and medieval Arab narratives, but Idrisi the cartographer created a unique system of dividing the Inhabited Quarter of the earth into rectangular sectional maps. His projection significantly distorts the representation of the Indian Ocean, especially the East African coast.

The paper first examines the extent to which the sectional maps of the Indian Ocean correspond to the information from the *Nuzhat al-Mushtaq*. Following the Greeks, Idrisi begins his description of the Inhabited Quarter in the west and numbers the latitudinal climates from the Equator to the Polar Circle. Unlike Ptolemy, however, he does not use degree coordinates for placename location. Next, the paper looks at Idrisi’s own abbreviated version of the *Nuzhat al-mushtaq*, titled *Uns al-muhaj wa-rawd al-furaj*. Despite the much condensed narrative, this version is also provided with sectional maps. Both the text and the maps will be compared with the better known maps and text of the extended *Geography* for the southern/East African Indian Ocean sections.

### Key words:

Medieval geography; Islamic cartography; Indian Ocean; Idrisi; East African coast

## Internal and External Spaces of Reality-Borrowing Animation

### *A Certain Magic Index* and Its 'location' (Tachikawa, Japan)

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#### Abstract

Japanese animations often represent real landscapes within their settings. Recently, there has been a trend wherein spectators visit the 'location' sites. This phenomenon is called 'pilgrimage' or 'animation tourism' ('content tourism'). Many geographical studies are published to use it as a tool of activation of the area, and there have been already examples of effective communication between animation-focused visitors and local communities. However when people visit a location, they see the place through an animation and the local community tries not to disappoint them. Therefore, a pertinent question is how animations represent, cut, and hide the local realities. In this paper, I would like to show a plausible collaborative work of visitors and local community in order to hide the history of the city. To this end, I would like to use a methodology of literary research. A Japanese scholar, Maeda Ai, analysed 'internal space' of texts, which refers to the elements read in the works of literature from the perspective of space. He compared it with real space and time and showed that the two spaces are related but different. This paper analyses the 'internal space' of a science-fiction animation *A Certain Magic Index*. It uses the landscapes of Tachikawa City in a thoughtful manner. Further, Tachikawa Bureau of Tourism has organised animation-related events for visitors. The animation looks successful, but it does not mention the military history of the area, and that phenomenon could help the authorities who want to change the image of the city.

#### Key words:

animation, location visit, internal space, Tachikawa city

## L'histoire de la géographie comme l'histoire de l'espace

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### Résumé

Pour Henri Lefebvre —un des penseurs les plus influents dans la géographie sociale et dans l'urbanisme—, l'histoire de notre société est aussi, au fond, une *histoire de l'espace*. Néanmoins, cette question —proposée à l'origine, en 1941, par l'historien suisse Siegfried Giedion— ne se limite pas à la recherche sur la production, le développement et le crépuscule des espaces sociaux, c'est à dire, autour les conditions qui ont permis la fondation des civilisations dans certains territoires. L'histoire de l'espace comprend également l'histoire des manières dont l'espace même a été conçu ou théorisé : par les philosophes, les mathématiciens, les architectes, les géographes, etc. Si on assume l'histoire de la géographie comme l'histoire de l'espace —selon la formulation de Lefebvre— on est encouragé à rendre compte de la relation réciproque —harmonieuse ou conflictuelle— entre les modes historiques de production de les espaces sociaux et les conceptualisations sur la spatialité environnante. Mais, comment cette proposition théorique pourrait contribuer au développement de la géographie aujourd'hui ? Répondre à cette question, c'est précisément le but de cette présentation.

### Mots clés:

Histoire de la géographie ; histoire de l'espace ; production de l'espace ; Henri Lefebvre

## Les écrits privés des géographes : des objets de recherche comme les autres ?

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### Résumé

Le savoir géographique s'expose dans des livres et des articles, des communications et des conférences. Il est conservé principalement sous la forme d'imprimés (et de fichiers numériques aujourd'hui). Ce sont ces supports textuels et/ou iconographiques, plus rarement sonores, qui constituent l'essentiel des corpus sur lesquels les historien(ne)s de la géographie s'appuient. Ces supports (livres, articles, entretiens, photos, cartes, graphiques, enregistrements... ) ont en commun la caractéristique de circuler dans la sphère publique, au moins dans le petit monde des géographes, et de participer au développement des savoirs disciplinaires.

Mais en amont ou parallèlement à cette production académique, les géographes, comme chercheurs/chercheuses et comme individus, produisent de nombreux écrits<sup>6</sup> qui n'ont pas vocation à être diffusés. Je les désigne ici comme des écrits privés.

Avec cette proposition, mon objectif est double : commencer à établir un état des lieux de ces productions, dans une perspective programmatique, et réfléchir au sens que cela peut avoir de les intégrer dans une recherche lorsque l'on est historien(ne) de la géographie.

La première étape sera de définir ce que l'on peut entendre par « écrit privé ». Au sens le plus étroit, l'écrit privé relève de la sphère intime : on écrit pour soi (le journal intime) ou on écrit à d'autres (la correspondance). Une autre approche concerne tous les écrits professionnels qui ne sont pas destinés à être publiés. Ce sont des productions intermédiaires, préparatoires, des brouillons, des épreuves. Elles prennent la forme de carnets de terrain dans lesquels des croquis sont intégrés, de photos, d'esquisses de cartes, de schémas griffonnés sur des feuilles volantes, de notes diverses... À l'articulation de l'intime et du professionnel peut être identifié un autre genre : le récit de voyage, dont la spécificité est de passer parfois dans la sphère publique.

L'ensemble de ces productions constitue un immense corpus, souvent peu accessible, parfois peu connu, et posant en outre des problèmes de compréhension lorsque l'écriture des auteur(e)s est peu lisible ou en raison des ellipses, sous-entendus, raccourcis que prend celui ou celle qui écrit pour lui-même ou elle-même.

Je m'interrogerai ensuite sur l'intérêt et les limites de ce type de corpus en m'appuyant à la fois sur des travaux de recherche le mobilisant et sur des écrits privés non encore analysés. Ainsi les carnets de terrain de Paul Vidal de la Blache, ceux de Jean Dresch, la correspondance d'Albert Demangeon, le journal intime de Maurice Zimmermann ou les récits de voyage de Jacques Weulersse seront notamment questionnés.

### Mots-clés :

Écrit privé ; histoire de la géographie

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## On Geographical Landscapes of Canton in the First Half of 19th Century: Based on *Chinese Repository*

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### Abstract

*Chinese Repository*, published in Guangzhou, etc. from 1832 to 1851, was a comprehensive English journal edited by several missionaries such as Elijah Coleman Bridgman. It aimed to provide all-sided introductions of China to Western world, and made many reports concerning Canton geographic situation. These reports not only dealt with Canton physical geographic landscapes including geomorphology, climate, rivers and coast, but also recorded human landscapes in Canton such as administrative divisions, agricultural production landscapes and traffic landscapes. Based on *Chinese Repository* mainly and other Chinese historical materials, this paper investigates Western society's intuitive descriptions and scientific measurements on Canton geography in the first half of 19th century, with expectations to restore Canton's geographic condition at that time and facilitate to examine Canton's historical geographic conditions at different periods.

### Key words:

*Chinese Repository*; Canton; physical geographic landscapes; human geographic landscapes

## Opening Geography to the General Public: Towards a Genealogy of the International Geographical Exhibitions in Europe (1871-1902)

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### Abstract

Historians of geography have recently recognized that geography has not a single, seamless history but multiple, spatially differentiated histories. It follows from this that these multiple histories presuppose multiple geographies, that is, varied geographical thoughts and practices. Included in those are geographical exhibitions, which have rarely been touched in the historiography of geography. A geographical exhibition refers to an event where are displayed such items as maps, atlases, geography or travel books, globes, and surveying instruments. It has been valued by geography teachers as facilitating geographic literacy and skills. In the late nineteenth century West, however, the events called “geographical exhibition” or “geographical exposition” could be larger in scale. They were occasionally held as national or international events. This paper focuses on the genealogical thread and meaning of the international geographical exhibition in Europe. It originated as a public event accompanying the first international geographical congress held in Antwerp in 1871. Subsequent international congresses, the second in Paris (1875), the third in Venice (1881), the fifth in Berne (1891), and the sixth in London (1895), had respectively their own geographical exhibition. The fourth congress in Paris was itself held in connection with the Exposition Universelle in 1889. The seventh congress in Berlin (1899) had no official exhibition. Instead Antwerp again hosted an international geographical exhibition in 1902. These were supported by the state, the local government, or the geographical societies. They were intended to popularize the content of geography, and in doing so, to naturalize European supremacy and colonialism.

### Key words:

history of geography; international geographical congress; geographical societies; colonialism

## Photography, the Rural Landscape, and Geographical Imagination in Japan in the Early Twentieth Century

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### Abstract

Since its introduction, photography has been a powerful tool in our engagement with the world, and scholars and critics in a wide range of disciplines have conducted debates over the role of photography from the viewpoints of vision and modernity. Geographers are not exceptional; they have investigated photography for picturing places and fostering geographical imagination. Photography plays an important role when geographical facts are ordered and images of places and landscapes are constructed. This paper focuses on landscape photography of the early twentieth century in Japan. Based on the investigation of pictures in the photography magazine *Asahi Camera*, which was first published in 1926 for a nationwide society of amateur photographers, the All-Japan Association of Photographic Societies, it explores how the rural landscape was represented. Representation is more than an image; in this case, it was an idea regarding the rural landscape that was socially constructed. Thus, this paper discusses the ways in which the geographical imagination associated with the Japanese rural landscape was produced and reinforced according to other social practices, including global trends in photography and the production of geographical knowledge through photography in the discipline of geography.

### Key words:

photography; rural landscape; geographical imagination

## **Russian Orthodox Mission in Beijing: Geographical and Topographical Investigation in the First Half of the XIX Century**

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### **Abstract**

From the XVII century, China entered the sphere of interest of the Russian Empire. Russia has managed to obtain from the Chinese government permission to establish an Orthodox Mission in Beijing. In addition to the priests of the Orthodox mission included scientists from the Russian Academy of sciences, who, under the auspices of the mission have been studying the country closed to foreigners. Not only scientists, but also priest under the rule of the instructions on the Russian Academy of sciences made the ethnographical, zoological and botanical investigations. The geographical and topographical investigations were one of the main task for the Russian scientists and members of the Russian Orthodox mission. Due to the interaction of scientists of the Academy of sciences and Beijing Orthodox Mission in the XIX century, Russian science has been enriched by the knowledge of the closed Chine Empire. The investigation, which were held by the Russian scientists have a major positive impact, both on the development of Russian-Chinese political relations and the cross-cultural ties between Russia and China.

### **Key words:**

Russian Orthodox mission; Beijing; geographical investigations

## Sanitation, Modernity and Subject: Contradictory Processes of Introduction of New System in Modern Japan

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### Abstract

The contradictory processes of 'introduction' or 'translation' of new system and its establishment are one of basic issues of the research of geographical thought. After Meiji Restoration, Japanese society introduced new ideas and technologies, social and economic systems and built environments from West. Especially, the introduction of 'sanitation system (Germany: Gesundheitspflege)' was a large project, because it included not only the issues of 'public health' and 'illness' or 'disease', but also infrastructures like sewage, urban planning and various social organizations. It also matters as ideas and as materials. So this process had an impact on the discursive and bodily practices, perception of environment and social relationships of the people in everyday urban life. This paper examines specific ways in which sanitation project matters in modern Japan politically and socially. By highlighting an important role of 'Neighborhood Sanitation Association' that aimed to produce a self-governing and moral subject through mutual surveillance, this paper traces historical geography of unequal and contested sanitization and urbanization.

### Key words:

sanitation system; subject; modern Japan; neighborhood sanitation association

## She Speaks: An Oral History of Women in American Geography Today

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### Abstract

Oral history became recognized for its inestimable value in charting the course of the geographic discipline shortly after the birth of *Geographers on Film*. Its architect, Maynard Weston Dow, initiated the series in 1970 with an interview of Carl Sauer, and soon thereafter he filmed conversations with other luminaries in the field. Also in the 1970s and 1980s, Anne Buttimer made a tremendous contribution to geographic thought with the *Dialogue Project*, a production of numerous interviews with notable geographers. Regardless, Dow's series persisted until after the turn of the century; before he passed away in 2011, more than 300 interviews were completed. Within weeks of Dow's passing, the *Conversation with a Geographer* oral history series was founded, resulting in a number of filmed interviews on the GRCC TV YouTube network, which have exceeded 5000 views; most of the subjects interviewed are women in American Geography who reflect on the paths they trod, the leaders that inspired them, and their own roles as mentors and scholars. The majority of students in American colleges and universities are also women, and the number pursuing Geography as a major field of study is increasing. Indeed, as many have found inspiration in shaping their own futures by pondering the accounts related in the *Conversation with a Geographer* series, oral history has been shown to be pedagogically priceless. This paper offers a glimpse of this endeavor in the history of Geography and discusses how it may be emulated in academic Geography departments across the globe.

### Key words:

History of Geography; Oral History; Women; Leadership; Mentoring; Geography Education



## Spatial Dimensions in the Classical Geography of China

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### Abstract

Classical Chinese geography (before 1900) is characterized by deeply rooting in daily life and firmly focusing on application to social realities. It, on one hand, endeavours to understand the surrounding settings in order to guide socio-economic activities, on the other hand, seeks to learn remote environments by trade, military action, religion mission, colonization, and the like, to enlarge spatial visions of ancient China for the sake of safety and communication. Historically, styles of farming and living govern the size and distance of settlements such as house, village, town and city for the purposes of convenience and efficiency. The capacities of both man's physical power and transport facilities limit spatial dimensions of administrative divisions, and political, economical, military and diplomatic needs define the spatial extremes. What is more, the perception of spatial dimension varies considerably not only amongst governors, officials, merchants, soldiers and generals, and farmers and herdsman, but also between historical periods or dynasties.

### Key words:

spatial dimension; settlement size; styles of farming and living; transport facilities; man's physical power; administrative management

## Studies on Romania by the French geographer Emm. De Martonne

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### Abstract

An outstanding personality of French and international geography, Emm. De Martonne is known primarily for his *Treatise of Physical Geography* and Geomorphological works and also for the activity he discharged as General Secretary and President of the International Geographical Union. Between 1897 and 1947, Emm. De Martonne paid numerous visits to Romania, publishing over 70 scientific works on a wide range of subjects in the following areas:

Geomorphological studies on the denudation platforms and glaciation in the Romanian Southern Carpathians (*Les Alpes de Transylvanie*), the Subcarpathian relief, river terraces, neotectonic movements, and several extreme phenomena, e.g. strong earthquakes and floods;

Studies on population distribution and density, maps of nationalities in Transylvania, transhumant shepherding; studies of toponymy and rural geography;

Regional and monographic studies on Romania and on some Romanian provinces, e.g. *La Valachie* (1902), *La Dobroudja* (1918), *La Bessarabie* (1919).

Among De Martonne's contribution to the development of Romanian geography, we would recall the courses held at the Cluj University (1921), the lectures delivered at the Royal Geographical Society of Romania, the organization of inter-university trips, he also helping some young Romanian Geographers to enrol at Sorbonne University.

### Key words:

Emm. De Martonne; Romania; contribution

## Studying Urban Areas from the Spanish Geography, Past and Present

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### Abstract

Geography has found in urban areas an attractant challenge. Generally, geographers have understood the city as a subject in itself, as an active element, in permanent construction and reconstruction to the beat of historical socio-economic changes. In line with these premises, my research has consisted of a historiographical analysis on the approaches to the city from the Spanish Urban Geography. I have studied the evolution of the research that the Spanish geography has made about the cities since the early twentieth century to the present.

The first geographic researches about the Spanish cities were elaborated in the thirties of the twentieth century and continued after the end of the Civil War, following the paradigm and methodology of French Geography of the first decades of the century.

The Spanish Urban Geography reached its highest growth since the 1970s, while there was a significant expansion of the space field of study of urban geography and, on the other hand, a great epistemological and methodological renewal.

At the global level, urban areas have experienced large changes since the nineties of the twentieth century, especially due to the processes related to globalization. Since then, the Spanish Urban Geography has been evolving in several directions. On the one hand, there has been a notable increase in the number of researchers working in this field of study. On the other, have been diversified even further the issues under discussion, has reinforced the approach to urban planning and there has been a relative estrangement from history.

### Key words:

Urban historiography; Urban historical geography; Urban Geography, Urban History, Urbanism, Cities, Urban areas.

## The 60<sup>th</sup> Anniversary of the International Conference of IGU in Rio De Janeiro: On Turning Points and Controversies

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### Abstract

Exactly sixty years ago, Brazilian geography had lived a turning point in occasion of the 18th International Conference of IGU, held in Rio de Janeiro, Brazil. The importance of that reunion could not be neglected by any researcher interested on the histories of Brazilian geography (Schimdt 1995; Monteiro, 1975). After a so called period of implementation of scientific geography in Brazil, from the mid-1930s, the 18th International Conference of IGU represents a huge and unprecedented effort of affirmation of Brazilian scientific geography, since it was a reunion of producers of geographical knowledge agents engaged in different projects. Despite their distinctive disciplinary views, teachers and professors, researchers from institutions such as the National Council of Geography, the Military Geographic Services, the Association of Brazilian Geographers and the Pan American Institute of Geography and History, among others, throw themselves on the challenge of organizing and carrying out the first IGU congress in Latin America. Taking into account this recognized turning point, the present paper seeks to bring some light of that episode, focusing on its facts, acts and actors, in order to outline some of the main impacts on the construction of Brazilian geographical knowledge. My ultimate intent is to explore some methodological controversies in Brazilian geography which are manifest in the rich produced material before and after the conference.

### Key words:

The 18<sup>th</sup> International Conference of IGU; Brazilian geography; turning point; methodological controversies

## The 1825 Street-Map of Fribourg (Switzerland) as First Modern Geography Lesson

## Le Plan de Fribourg en Suisse de 1825 comme première leçon de géographie

### moderne

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### Résumé

One of the greatest European pedagogues Father Gregoire Girard of Fribourg (Switzerland) was the author of numerous books on methodology dedicated to education on many subjects. He was the assessor of Pestalozzi, who recognized him as one of his peers. Celebrated all over Europe, he took a great interest in the renewal and the development of the nascent geography on new bases.

His main idea was to reverse the view of the geographical approach, until then classic, starting from the specific — the known and moving towards the general — the unknown. This new approach to geographical science was applied by developing a new street-map of the city of Fribourg accompanied by an explanatory book and by a small brochure created more specifically for teachers.

To mark the 250th anniversary of the birth of Gregoire Girard, our research has provided a better understanding of the process at the origin of his project. Contrary to the misconception, his method was the subject of wide diffusion; the immediate effects being delayed by a difficult context.

Today, the heritage of the Girard's method is firmly established in the teaching practise but also in the approach to urban or cultural geography.

L'un des plus grands pédagogues européens, le Père Grégoire Girard de Fribourg (Suisse), fut l'auteur de plusieurs ouvrages de méthodologie destinée à l'éducation pour de nombreuses matières. Il fut l'évaluateur de Pestalozzi, qui le reconnut comme l'un de ses pairs. Célébré dans toute l'Europe, il s'intéressa à renouveler et à développer la géographie naissante sur de nouvelles bases.

Son idée principale a été d'inverser la perspective de l'approche géographique, jusqu'alors classique, en partant du particulier, du connu, pour aller vers le général, vers l'inconnu. Cette nouvelle façon d'envisager la science géographique trouva son application dans l'élaboration d'un plan de la ville de Fribourg, assorti d'un ouvrage explicatif et d'une notice destinée plus particulièrement aux enseignants.



A l'occasion du 250<sup>e</sup> anniversaire de la naissance de Grégoire Girard, notre recherche a permis de mieux comprendre la démarche à l'origine de son projet. Contrairement à l'idée reçue, sa méthode a été l'objet d'une large diffusion dont les effets immédiats ont été retardés par un contexte difficile.

Aujourd'hui, l'héritage de la méthode de Girard est solidement ancré dans les pratiques de l'enseignement mais aussi dans la manière d'aborder la géographie urbaine ou culturelle.

## **Key words**

History of geography; history of teaching of geography; methodology

## The First Draft of the French Concept of Pioneering Fringe Produced by Pierre Monbeig (1930-1935)

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### Abstract

Pierre Monbeig (1908-1987) was a French geographer graduated from Sorbonne between 1924/1925 and 1929 and rooted in the prestigious school of Vidal de la Blache. After these studies, he spent a short period in Spain (1930- 1932), during which he tried to write his first PhD thesis regarding the Balearic Islands (Spain). However, on occasion of the outbreak of the Civil War in Spain in 1936, he gave up his first PhD project. Then, his subject matter changed so as to highlight the pioneering occupation of São Paulo and after had been invited by the French diplomacy to teach geography in Brazil. Thanks to his courses and research, Pierre Monbeig played an important role concerning the foundation of the Brazilian academic geographic tradition. From the contributions of an intellectual history focused on continuities, we shall attempt to point out, at first, the definition of the pioneering occupation as a network of American and French traditions. As a matter of fact, he then incorporates contributions from American geographer Isaiah Bowman whose book *The Pioneer Fringe* appeared in 1931. However, we may argue that the first draft of the pioneering fringe lands model, which was supposedly developed later (the publication of *Pionniers et Planteurs de São Paulo* dates from 1952) had already been present in his studies during the period ranging from 1930 to 1932 in Spain, therefore prior to his arrival in Brazil (1935) and also previously to the incorporation of contributions from the American geographer supposed dating from circa 1935.

### Key words:

Pierre Monbeig; Pioneer Fringe; Spain; France; Brazil

## The Legacy of Political Geography in Sweden

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### Abstract

In this paper the story of the Swedish contribution to the early 20th century political geography is described and analysed. From Kjellén to contemporary issues in the Swedish Geographical Society. Swedish Geography and Swedish Geographers were rather influential before WWII. The traditional political geography research tradition came to an end in Sweden 1945. A more neutral quantitative based geographical research was emphasized. Swedish geography developed in accordance to the international geography in that matter. Two important directions however characterise Swedish post war geography. Firstly, physical and human geography diverged and the legacy of political geography was never discussed. The paper analyses the development of Swedish geography with a focus on how the post war geographical tradition in Sweden dealt with its history. The paper also discusses the importance of a nuanced understanding of geographical representations, maps in particular, and the problematic power of maps and how that relates to the legacy of political geography.

### Key words:

Political Geography; Political maps; geo-political legacies; Kjellén;



## The Normal Way: Exploring the Careers Paths of Early Women

### Geographers in the United States: 1880-1950

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#### Abstract

In the late 19<sup>th</sup> century with expansion of public education in the United States, women became significant as faculty in “Normal Schools”, institutions that were designed to prepare teachers of children, including the teaching of geography, for the expanding public schools. In contrast geography was marginal in most colleges and universities. In this presentation I will explore how women geographers in such institutions came to, approached, and experienced their work. In addition to teaching, their activities included publishing on approaches to geographic education, writing text books, and being active within the National Council of Geography Teachers (later known as the National Council for Geographic Education). After outlining the larger context, I will present case studies emphasizing two institutions, highlighting transformations in the place of women within them as the normal schools were “upgraded,” first to state teachers colleges and then to universities. In the process, men geographers came to be preferred as faculty. In exploring the women’s pathways I will review their educational backgrounds, approaches to teaching, relations with colleagues, and leadership roles they played in the profession, illustrating how the history of our discipline is shaped by institutional cultures and, in particular, how ideas about gender have permeated the history of higher education and of our profession.

#### Key words:

Women faculty; gender; 20<sup>th</sup> century teacher preparation, United States.

## The Reconstruction of Geography: 1950s in P.R. China

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### Abstract

The movement on scientific critique and "Learning from Soviet Union", which began in the early period of P.R. China, had deal with a wide range and gone for a long time. Therefore, it had a deep influence on Chinese scientific development and discipline construction. Taking geography as a case study, this paper analysis the reasons, contents and characteristics of scientific discipline reconstruction and the changing of geographical classification system in 1950s. Meanwhile studies the influence of the movements of scientific critique and Learning from Soviet Union on geography. From this study, the paper would explore the relationship between science and society.

### Key words

Scientific Critique; Geography; Ideology Remould



## The Genglubu's Construction Founction to Marine Silk Road of the Pattern of the South China Sea

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### Abstract

According to sailing experience, generations of Hainan fishermen have been compiled a road book called Genglubu, which is an important navigation guide book for ancient Maritime Silk Road and records the Chinese history. Its function as a sailing direction book is gradually fade out, on the contrary, the book, bearing the ancient Chinese cultural, political attribution, has huge significance in the construction of spatial pattern of the South China Sea area. Genglubu and Maritime Silk Road are interrelated and promoted each other. Genglubu provides a new research idea and theory support for the building of regional spatial structure of the South China Sea.

### Key words:

Genglubu; Maritime Silk Road; the South China Sea; spatial pattern

## War against War? Arcangelo Ghisleri from Pacifism to Interventism

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### Abstract

Geography has been often accused of being a discipline useful, above all, to make war. Nevertheless, many geographers of the past have been also involved with peace research and peace movements. Between the end of the Nineteenth century and the beginning of the Twentieth, for instance, the anarchist geographers Kropotkin and Reclus (Herb, 2004) promoted the idea that geographic education was a fundamental instrument for the creation of peace. In the same perspective, the Italian geographer Arcangelo Ghisleri he founded journals like “La geografia per tutti” and “Cuore e critica”, in order to demonstrate that there where no scientific bases for gender and racial discriminations. He was also actively engaged against colonial wars. In 1906, together with other Italian exiles in Lugano (like Rensi and Bignami), he founded a journal, “Coenobium”, which motto was “Guerra alla Guerra” (War to war). All the same, as many pacifists of the time (included Nobel Prize winners, like Ernesto Teodoro Moneta), in 1914 Ghisleri embraced the interventionist cause. The paper tries to investigate the reasons of this apparent reversal of attitude, questioning the different meanings that the ideas of peace and of pacifism could have at the time and now, and the difficulties of intercomprehension, not only between different languages, but also between different historical moments.

### Key words:

peace; peace movements; Arcangelo Ghisleri

## **Wu Shangshi-An Outstanding Modern Chinese Geographer as a Third Generation Student of P. Vidal de la Blache, France**

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### **Abstract**

Wu Shangshi (1904-1947) is considered one of the outstanding modern geographers emerging in the early 20th century in China. It is partly a result of the introduction of modern sciences from the West. Wu graduated as a gold medalist in Sun Yat-sen University in 1928. He was then granted scholarship to study geography in France. His first supervisor was A. Allix of the University of Lyon. In 1932, Wu transferred to the University of Grenoble, the leading school of geography other than that of Paris at the time. His major professor was R. Blanchard, one of the best known students of Vidal de la Blache. M. Pardé, who dedicated all of his life to hydrography, was another one of Wu's supervisors. In 1935, Wu finished his study in France and returned to Sun Yat-sen University to serve as a professor of geography. He was head of the department in 1939-1945 during the Japanese aggression. The university moved constantly to flee the flames of war. The thousands of miles across south and south-west China became Wu's research field. Excessive hard work in tough environments ruined his health. Wu died in 1947 at the age of 43.

Wu's work covered a wide range of disciplines of geography: geomorphology, hydrography, climatology, cartography, regional geography, etc. Most of his research involved a combination of keen observation, incisive logical deduction, broad knowledge and professional instinct. The present paper summarizes Wu's major accomplishments which are scientifically significant to the establishment of modern and contemporary geography in China; and reveals Wu's scientific thought and practice that can be traced to the French schools of geography. However, his accomplishments cannot be fully appreciated without understanding of the significant role that traditional Chinese culture played in his consciousness.

A scientific park is under construction by the City Hall of Guangzhou at the site where Wu identified an ancient wave-cut cliff in 1937. A statue of S.S. Wu will be placed in the park.

### **Key words:**

Wu Shangshi; Raoul Blanchard; modern geography; Sun Yat-sen University; University of Grenoble; schools of geography; China; France

## A Measurement and Analysis on the Coupling Relationship between Regional Rural Poverty and Ecological Environment: Taking Hunan Province of China as an Example

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### Abstract

Authors established firstly the index system, which consists of poverty index system including per capita net income, the engel coefficient, electricity consumption per capita, the total output value of agriculture, the proportion of agricultural output, single grain output and the total power of agricultural machinery from two dimensions both the rural poverty and backwardness in agricultural production, and of vulnerability index system including the average slope, the annual rainfall, the rainfall proportion in rainy period, the drought index in less rainfall period, soil erosion area ratio, natural disaster area ratio and the cultivated land per capita mainly for the ecological environment vulnerability mechanism in Hunan province from the drought and flood, debris flows, landslides and other natural disasters common in Hunan of China. Next using X-score method for the original data standardization, using analytic hierarchy process (AHP) in the 1-9 scale method to determine the index weight, by weighted sum comprehensive index model, taking 90 counties outside the urban as basic assessment unit, authors calculated the poverty degree and vulnerability degree of all counties, and then taking poverty degree and vulnerability degree as the basic index, computed coupling degree of regional poverty and ecological environment, the calculation formula was as follows:

$$C = f(x)^k \times g(y)^k / [\alpha f(x) + \beta g(y)]^{2k}$$

Among them,  $f(x)$  for the ranking position of the poverty degree,  $g(y)$  for the ranking position of the vulnerability degree. According to the sorting of the comparative poverty degree and vulnerability degree, the coupling relationship was divided into two sorts of the benign coupling and the malignant coupling, which the benign coupling refers to the poverty degree and vulnerability degree be both low, and the poverty degree sorting be less than the vulnerability degree; malignant coupling refers to the poverty degree and vulnerability degree be both high, and the poverty degree sorting be more than the vulnerability degree.

The calculation results show that: i) 63% counties be ecological environment fragile in Hunan, including 90% state-level poverty-stricken counties and 94% Province designated poor counties; ii) 34.4% counties be height

poverty and extreme poverty, including all state-level poverty-stricken counties and 56% Province designated poor counties; iii) Most of counties be poverty and eco-environment highly coupling, extremely coupling, highly coupled, medium coupling and low coupling counties respectively being 58%, 9%, 21% and 12%; iv) Most of counties be malignant coupling in sort, benign coupling and malignant coupling counties respectively 48% and 52%, and the more high poverty levels be, the more high coupling levels be, and the more high coupling levels be, the greater the malignant coupling proportion be. In all of 20 state-level poverty-stricken counties and 18 provincial and impoverished county, extreme and highly coupled ratio be for 82%, the proportion of benign coupling and malignant coupling be respectively for 42% and 58%. v) The vulnerability, poverty degree and coupling degree shows synchronous regional differences, showed all Great West Hunan > Great South Hunan > North Hunan Around Dongting lake > Chang\_Zhu\_Tan area of Middle Hunan. In west and southern Hunan, 85% counties were ecological environment fragile and vulnerable; 51% counties in extreme poverty and poverty; 82% counties were ecology and poverty extreme and highly coupled; 92% counties showed malignant coupling; while in North Hunan Around Dongting lake and Chang\_Zhu\_Tan area of Middle Hunan, 71% counties showed moderate fragile and not fragile, 93% counties in moderate poverty and no poor, 54% counties were ecology and poverty moderate and low coupling, 61% counties performance for the benign coupling.

**Key words:**

regional rural poverty; analytic hierarchy process; regional rural poverty and ecological environment

## Research on the Historical Geography's Mechanism about Evolution of Dalian's Spatial Structure in The Belt and Road Background

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### Abstract

The evolution of city's spatial structure and sustainable development of region are the very important scientific problem concerned with the researchers of geography, history, and historical geography fields. This paper pays close attention to Dalian which is typical city of the coastal area in modern times. With modern technology, fieldwork and archaeological methods, social investigation and historical documents and so on, we can carry out fundamental research by interdisciplinary methods. Through the exploration of successive profiles of historical development in different times, we can reconstruct the historical process of Military town and Port city's development and evolution. From the aspect of traffic hub, trade contacts, culture exchanges, the function of city spatial structure and urban social spatial structure, we can discuss driving force which makes rapid progress of Dalian city from the value of military geography converting to the value of economic geography. Explaining historical geography's mechanism about the evolution of spatial structure of Dalian city, we can provide academic basis to city cultural landscape heritage protection and sustainable development of Dalian city. Opening up the new way to research city from historical geography's view and docking with national development strategy of the Belt and Road, we can achieve the value of pragmatism of historical geography.

### Key words:

Dalian; Spatial Structure; Historical Geography; Mechanism; The Belt and Road

## Research on the Relationship between Population Density and Land Use: A Case Study of Korqin Left Wing Middle Banner

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### Abstract

The population density is one of the main forms to reflect the population distribution, and it has a close relation with land use. This article selected Korqin Left Wing Middle Banner as the study area, which is a typical farming-pastoral ecotone in the northern China. We based on population data, administrative data and land use data in 1985. With the help of Arcgis, we analyze the relation between population density and land use from the aspects of land use structure, land use degree comprehensive index, the degree of landscape fragmentation. We conclude that: (1) With the increase of population density, the proportion of arable land firstly rise, and then come down. The proportion of grass land firstly fall down and then rise. (2) The comprehensive index of land use degree has directly proportional relationship with population density. With the increase of population density, the influence of human become strong. (3) Population density increase, and the density of plaque first increase, then decreased.

### Key words:

farming-pastoral zone; population density; land use.

## Study of the Spatial Distribution of Bohai Kingdom Sites in DPRK

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### Abstract

The spatial distribution of Bohai Kingdom site in DPRK by using the information of attribute and geographical location of Bohai Kingdom site in DPRK. The results shows that: 1. There are 42 sites of Bohai Kingdom in DPRK which can determine the location. They are distributed in South hamgyong and North hamgyong, and the number of sites in North hamgyong is higher than South hamgyong. 2. In DPR Korea have five types of Bohai Kingdom site, including the town site of plain, the mountain site, the burial site, the construction site, the temple site. They are distributed in the sliver of Sea of Japan coastal from northeast to southwest, which is getting into xinluo called the along xinluo in the period of Bohai Kingdom. 3. The relationship of Bohai Kingdom site and environment. First, Sites are distributed in less than 90m and from 90m to 150m elevation that is accounts for 73.8% of the total number, it is the relationship with the altitude. The sites are distributed in the area elevation obviously. Second, which is the relationship with slope, There are 76.2% of the site distribution in between 0° to 9° slope, that means most of sites are distributed in the wild lower ground. This shows that most of the site point are distributed in the more moderate slope. Third, in the site and aspect, the sites of the whole study area are distributed to the East and south, to the southeast.

### Key words:

Bohai Kingdom site; Sites; DPR of Korea; Spatial distribution;

## The Change of Land Use and Urbanization in Micro Level of Wuxi in China

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### Abstract

As one of the most industrial city in 1990s in China, Wuxi started the process of moving the factories out of the inner city, which has changed the land use of the city in two aspects at least. On one hand, part of the former agricultural land started to be used as industrial land in the form of Industrial Zone, which is also called Economic Development Zone or Area in China. On the other hand, the former industrial land in the inner city was mostly redeveloped for commercial residential building area, which is called Xiaoqu in Chinese. Obviously, the process has brought great influence to the urbanization of Wuxi as well, both on the expansion and the structure of the city.

This paper chooses North Street Sub-district, called Beidajie Jiedao in Chinese, belongs to the former Beitang District of Wuxi as the object of study. Trying to restore the process in details by using the archives of the Sub-district Office as the first-hand data. Obviously, this will be a try to research a macro theme like urbanization in a micro perspective, which is necessary and maybe not that enough at this moment for the research of the urban geography of China. The author believes that this paper will have implications for similar historical geographical research.

### Key words:

land use; urbanization; North Street Sub-district

## The Changing Distribution Patterns of Rural Settlements during the Process of Urbanization: The Case of Gongyi (1929-2013), China

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### Abstract

Rapid urbanization undergoing in China has caused, and will continue to cause, tremendous changes of rural settlements. Regions at various stages of economic development and with various geographical backgrounds may witness different changing patterns. This paper uses data of rural settlements stretching 84 years from 1929 to 2013 in a county-level city -- Gongyi in Henan province, China, to examine whether such changes in a traditional rural area have evolved towards the urban structure. As one of the earliest areas in development of rural industries in China, the rapidly industrial growth since 1980s in Gongyi has dramatically transformed the traditional characteristics of rural settlements. By employing Zipf's index, fractal dimension and Gini coefficient, and village data in the county, we have preliminary found that: first, Zipf's indexes based on village sizes of the past 84 years were generally much smaller than results based on cities, but growing rapidly. The larger settlements were less prominent, but increasing fast in past two decades. Second, fractal dimensions were big but delaying. The larger size in the settlements, the faster increase in their population. Third, Gini coefficient was small but significantly increasing, especially accelerating after the 1990s. Fourth, the spatial patterns have gradually changed from linear concentration pattern along Yiluo River to the more balanced patterns over the plain and the hills. The increases in large settlements and their sizes, were forming hierarchy of the central place in market principles. Along with process of urbanization, centralization of population leads changing patterns of rural settlements, with the first rank settlement dominating rank size hierarchy in a region.

### Key words:

rural settlements; urbanization; rank-size; Zipf's index; Henan

## The New Culture Movement Heritage Cultural Space Reconstruction

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### Abstract

Beijing as a famous historical and cultural city which has profound historical background and rich cultural resources. The internal of urban present a variety of cultural space that have lays a good foundation for the urban cultural development. Currently, the study of the cultural space of Beijing on Modern and Qing Dynasty are in larger quantities, by contrast, less research cultural space of the republic of China. Republic of China refers to the transition from the Qing dynasty perish to the the period before the establishment of People's Republic of China, national unrest is frequent, nature of the state transition from feudalism to the people are masters of the country, everyone's ideology get enlightenment. During this period the most representative event is the New Culture Movement. In this period, the urban cultural space has changed dramatically with the change of ideology, politics, culture and education. In the centenary commemoration of the New Culture Movement, this article attempts to expound the historical track of the New Culture Movement, to discuss Beijing cultural space in the Republic of China, and the impact on that time and modern development and construction of the city.

### Key words:

Beijing; the New Culture Movement; cultural space; Reconstruction

## The Research on Space Structure and the Regional Response of Shandong Section of the Grand Canal Linear Cultural Heritage

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### Abstract

As a typical linear cultural heritage, The Grand Canal has the common characteristic of the linear cultural heritage. The Canal heritage possesses richly historical, cultural and economic value, it mainly composed of itself, the relevant water way engineering, material cultural heritage which is related to its history, and intangible cultural heritage which reflects people's life along the coast. The Grand Canal in Shandong section through the five cities, including eight section of the canal and fifteen sites, occupies one third of the total river, and heritage point more than a quarter, it has an important role in the whole Grand Canal. This paper selects the Shandong section of the Grand Canal as the research subject, has a systematic carding and research of the relevant heritage by the method of combining literature research and on-the-spot investigation, and processes spatial structure analysis of its cultural heritage by using the skill of Arcgis. Finally, analyzing the development and utilization of canal heritage in the current situation, and planning how to make rational and comprehensive protection, in order to realize and promote the heritage and development of the Grand Canal.

### Key words:

The Grand Canal; linear cultural heritage; spatial structure analysis; Arcgis; regional response; Shandong

## C12.22 Islands

### Islands and Future Earth



Home

#### Oral

1. [Are the Islands Sinking? Political Ecologies of the Maldives](#)  
Stefano Malatesta, Marcella Schmidt di Friedberg (University of Milano Bicocca, Italy)
2. [Ecosystem-based Adaptation of Climate Change in Penghu Islands](#)  
Shui Liang Yu (Penghu University of Science and Technology, Taiwan, China), Huei Min Tsai (Taiwan Normal University, Taiwan, China)
3. [Geography of New Arctic Islands Formed due to Glacial Recession](#)  
Wieslaw Ziaja, Krzysztof Ostafin (Jagiellonian University, Institute of Geography and Spatial Management, Poland)
4. [Influence of Economic Activity on Geosystems of Peter the Great Bay Islands \(the Sea of Japan\)](#)  
Kirill Ganzei, Alena Kiselyova, Ilona Rodnikova, Nina Pshenichnikova (Pacific Geographical Institute FEB RAS, Russian Fed)
5. [Islandness and Maritimity as a Philippine Identity](#)  
Yves Boquet (Université de Bourgogne, France)
6. [Resilience Happened on Vulnerability: The Spatial Resistance of New Developed Communities in Remote Islands of Taiwan](#)  
Chin cheng Ni (Department of Environmental and Cultural Resources, Hsin chu University of Education, Taiwan, China)
7. [Sustainable Tourism under Island-Land Linkage Model: A Case Study of Changdao Island, China](#)  
Xingyu Zhou, Xuegong Xu (Peking University, China)
8. [The Meanings of Island Place- a Case Study of Lieyu Island \(Little Kinmen Island\), Taiwan](#)  
Wen Hua Huang, Su Hsin Lee (Taiwan Normal University, Taiwan, China)
9. [The Resilience of Kiribati Atolls \(Micronesia\) to Drought: Comparison between an Urban System and a Rural System](#)  
Esméralda Longépée (Centre universitaire de Mayotte, Mayotte)

#### Poster

1. [Assessment of the Specialized Projects for the Islands Through a Sustainable Development Index](#)  
Sunmi Shin; Byungmin Choi (South Korea, Inha University)

2. [Deforestation, Protection, Local Use and Governmental Policies on Mangrove in Hainan Island](#)  
Ren'ya Sato (Japan, Osaka University)
3. [Grain Size Characteristics of the Surface Sediments on the Intertidal zone in Weizhou Island](#)  
Minjing wang (China, School of Geographic and Oceanographic Sciences, Nanjing University);  
Zhenkai Lin (China, Xiamen Municipal Bureau of Ocean and Fisheries)
4. [Insularity, Eco-frontiers and Environmental Governance. Changes in the Perception of Wetlands in Sardinia \(Italy\)](#)  
Andrea Corsale (Italy, Università degli Studi di Cagliari); Massimiliano Farris (Italy, Universidad de Chile)
5. [Remote Sensing Image Classification of Mapping Satellite-1 Based on SVM Method](#)  
Liu Caixia (China, Capital Normal University)
6. [Spatio-temporal Patterns of Climatic Changes in Hainan Island in Recent 55 years](#)  
Rui Sun; Zhixiang Wu (China, Rubber Research Institute, Chinese Academy of Tropical Agriculture Sciences)
7. [The Measures of the Tendency to Stony Desert of the Li River](#)  
Zhenwen Gao (China, Guilin Zhongshan Middle School)

## Are the Islands Sinking? Political Ecologies of the Maldives

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### Abstract

In 2012, Joe Morgenstern, on *The Wall Street Journal*, commented *The Island President*, the documentary on Mohamed Nasheed, former president of the Republic of the Maldives: “Jon Shenk's fascinating documentary personalizes the threat of global warming, and nationalizes it too.” Two features emphasize the impact of power on the fast changing political and socio-environmental crisis of the country: the personalization of politics and climate change as a “national-building” force. Since the beginning of the Twenty-First century, the Maldives has become a symbol of the vulnerability to climate change; mitigation and adaptation have been converted into keywords of the national political agenda. The peak of this visibility coincided with president Mohamed Nasheed (2008-2012) attending the COP 15 Copenhagen Climate Change Conference on 2009. At the same time Maldivian communities have been coping with a number of transformative forces affecting socio-environmental adjustments, knowledge and practices. The Government has been reinforcing its control on local dynamics, while keeping the fight against global climate change as a key national narrative. We will discuss the ambivalence of political ecologies in the Maldives at two levels: at the national level, presenting Mohamed Nasheed’s role in the national discourse on climate change and its interpretation by the new government; at the local level, presenting, a local entrepreneur’s project, Islands Organic, the first Maldivian organic farm in the Maldives, pioneered by Shahida Zubair and forced off Baa-Maarikilu island by the Government, to keep the control of the island.

### Key words:

Maldives; Political Ecology; Climate Change; Human Ecology of Islands

## Ecosystem-based Adaptation of Climate Change in Penghu Islands

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### Abstract

Ecosystem-based adaptation (EbA) raises much attention recently. It is considered to be cost-effective, and can protect human and ecological communities from the impact of climate change. This includes sustainable management, conservation and restoration of ecosystems to provide ecological services and help people adapt to climate change brought about by the many adverse effects. The study aims to understand the adaptation of climate change in the Penghu islands and propose the action plans such as set up a low-carbon island, national parks and wetland protected areas, as well as the creation of economic values from these conservation initiatives. Currently the concept of marine protected areas are proposed to set up fish body length harvesting restrictions, ban restrictions, limitations of fishing gear and methods of fishing season restrictions. The management of protected areas that need to be taking into accounts the interests and opinions of the local community. Only management plans get public support and it can play its proper function. On the wetland area management, village residents are performing major partners. The NGO's opinions and discussion are also important. Penghu is currently set up adaption plans in response to climate change. These include first marine national parks and wetland areas by cooperation of local residents and government. People wise use of nature resources also take into consideration the public interests. Future cooperation is raised between government and villages to train local residents to perform the management aims of protected areas. This helps local economic improvement with conservation and ecotourism development.

### Key words:

climate change; Penghu Islands; environmental governance

## Geography of New Arctic Islands Formed due to Glacial Recession

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### Abstract

Glacial recession (result of climate warming after the Little Ice Age, i.e. since the beginning of the 20<sup>th</sup> century) accelerated since the 1980s. Hence, many Arctic coasts experienced dramatic changes of their landscape. The biggest changes occurred in places when bedrock of receding tide-water glaciers was situated below the sea level. The majority of such places, flooded by the sea, were transformed into new bays, including fjords. The rarer outcrops (areas) of bedrock elevated above the sea level, surrounded by depressions below the sea level filled by glacial ice, were transformed into new islands. These new islands may appear due to melting of glacial tongues (streams) which: (1) connected rocky peninsulas (headlands, promontories, etc.) with a mainland, (2) surrounded nunataks protruding from bedrock situated below the sea level, (3) covered rocky hills protruding like above. New straits appeared in bedrock depressions, between the islands and their mainland. Greenland coasts are the most predisposed to this process due to a big decrease in thickness of glaciers (flowing out of the ice sheet most often). Ca. 25 new islands appeared there since the 1970s. Next 5 new islands appeared in the European Arctic (Franz Josef Land, Svalbard, Novaya Zemlya). However, the process is ongoing and the new islands will split off from Greenland, Spitsbergen and Hall Island (Franz Josef Land) in the nearest future. They are subject to animal colonization and plant succession. Some new straits may be significant for navigation (e.g. the strait Hornsund-Hambergbukta being just formed in Spitsbergen).

### Key words:

glacial recession; formation of new islands; Greenland; European Arctic

## **Influence of Economic Activity on Geosystems of Peter the Great Bay Islands (the Sea of Japan)**

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### **Abstract**

There are over 30 islands in Peter the Great bay. Economic activity increased at the end of XIX century when the area of Primorskii Krai had been begun developing. Considerable damage has been caused with deer-breeding and military management.

In this paper we study contemporary state of Popova, Rikorda, Reyneke, Bolshoy Pelis and Stenina island geosystems and analyse degree of anthropogenic transformation under different types of economic activity.

Human impact on island geosystems has caused partial destruction of typical polydominant island forests and their replacement with shrub-grass communities; decreasing lichen diversity and common distribution of anthropogenic habitat species; active sheet erosion of soils and landscape diversity reduction. Protected area creation helps to restore relative native geosystems and save native ones on big islands. Succession from grass communities to polydominant forests occurs on Bolshoy Pelis and Stenina islands: young lime-forests replace communities of *Artemisia gmelini* and then change to polydominant broad-leaved forests. Lichen cover consists of natural habitat species, anthropogenic habitat species occur rare. Forest vegetation restoration contributes to processes of "forest" burozem and typical burozem formation.

Geosystems of Popova, Reyneke and Rikorda islands are influenced by high anthropogenic pressure, it leads to spreading of anthropogenic transformed vegetation, common distribution of anthropogenic habitat lichens, developing of soil erosion and depletion, decreasing island specificity. Human impact on landscapes causes disturbance of material-energy flows in landscapes and leads to irreversible island nature destruction. These processes are observed on Russky, Popova, Reyneke islands.

The study was supported by the grant of RFBR (project 15-05-01419).

### **Key words:**

Islands; vegetation; soil; lichen; geosystem; Primorskii kra

## Islandness and Maritimism as a Philippine Identity

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### Abstract

As an archipelagic nation, the Philippines has to deal with spatial discontinuities inherent to the interaction between land and seas. Maritime transportation between the islands is essential and marine biodiversity in the “7107 islands” theme has proven a very popular theme in tourism promotion, while geopolitical issues range from the archipelagic doctrine to tensions over islets on the South China Sea. As a West Pacific country subjected to many seaborne hazards, the Philippines position on global warming issues appears comparable to small island nations.

We have surveyed a sample of Filipinos in diverse parts of the country, coastal and non-coastal, to examine their feelings about the sea and the islands. It appears that the idea of “islands” refers foremost to tourist spots such as Boracay and local islands which are well known by fisherfolk. In contrast, few respondents cite the largest islands (Luzon, Mindanao) as islands, reinforcing the idea of islands being small spaces. Interestingly, in a country exposed to typhoons and tsunamis, the sea is not seen as a source of danger by most respondents, but rather as a clean peaceful space in sharp contrast to city life and Manila.

### Key words:

Island; maritimism; Philippines; perception

## Resilience happened on Vulnerability: The Spatial Resistance of New Developed Communities in Remote Islands of Taiwan

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### Abstract

Recently, small islands were gazed by international societies. In the past, researchers were focused on the issues of sustainability and vulnerability; nowadays, they pay more attention on resilience theory because of unchangeable global development. The study would take two communities, Nanliao and Xihu in Penghu islands, based the similar vulnerability for comparison of their different resilient responses. And the two communities would be realized by the critical approach but different branches, including using critical ethnography for Nanliao and using critical theory for Xihu. Following literature review as the focus in the initial stage, the project then conducts field survey, contextual analysis, participant observation, and in-depth interview for analysis on adaption and resistance of island communities. The results include as following: (1) Through full understanding of the context of these two communities, the community leaders oriented by the retired persons from public sectors. So, the local government could persuade, recruit, and train this kind of people by suggestion of the study. (2) Identified solution by critical approach on island community development has presented the empowerment and negotiation by the professional NGOs would be required and the emancipation also is essential by suggestion of the study. (3) Comparison of spatial adaption and resistance between the class I(Nanliao) and class II(Xihu) remote communities, it is more necessary to create or develop a public sphere(an idea from Habermas) for social issues of the ones belonging to class II. (4) Finally, this study will be offer an emergent and feasible way for island communities in addition to adding casino industry.

### Key words:

resilience; resistance; critical approach; community; remote islands

## **Sustainable Tourism under Island-Land Linkage Model: A Case Study of Changdao Island, China**

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### **Abstract**

Tourism is one of the primary industries in islands especially in that near coast. However, it has a big contradiction among the rapid development of tourism and the scarcity of water resources, limited traffic condition, and low tourism environmental carrying capacity. It is hard for island to resolve these problems. From the view of sea-land coordination, island-land linkage may provide a new opportunity for the sustainable development of island tourism. Changdao Island is the typical research area for island-land linkage. (1) The six different types of tourism population water using quota in Changdao Island are determined by analysis of the balance of water supply and demand including water diversion mode from Penglai land. (2) land-island transportation between Changdao and Penglai traffic capacity is calculated by the condition and set of the ships. There are two aspects to improve the transportation, increasing ship or route. (3) The tourism carrying capacity inside the island is calculated by the mathematical model of tourism environment carrying capacity with minimum law, which including scenic space tourism carrying capacity, service facilities, the largest water diversion capacity and island-land transport capacity for tourists. (4) Finally suggestion is put forward from the angle of island-land linkage, to promote tourism integration between Changdao Island and Penglai coast to achieve sustainable development. This research is supported by the NSFC Project (No.41271102).

### **Key words:**

Island-land linkage, tourism, sustainable development, coast, Changdao Island

## The Meanings of Island Place- a Case Study of Lieyu Island (Little Kinmen Island), Taiwan

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### Abstract

Kinmen County, where is in the stage of economic take-off and rapid changes for past decade in Taiwan's outlying islands. Lieyu is the second-largest island of Kinmen County. This island is near the border between Xiamen and Kinmen. Recently, the rapid development of these Islands affected Lieyu. This small island also launched its large tourism development and construction, and that catch our attention. This study used long-term observation (from 31/7/2013 to date) and interview on Lieyu Island. We used the perspective of human geography: Place to be our research approach and analysis. This study wants to probe: what kind of place is this island? what is the place memory and imagination of islanders? how do they construct and maintain their local culture? what is the meanings of island development? The study found that this small island is a place of historical context, political border and regain the relation with sea. Islanders mainly by religious activities, daily movement (on this island and inter-island), the relationship between villages and clan groups to construct and maintain local culture, but the influence of public sector is raising in these few years. Many islanders believe the current development of Lieyu is a solution of local economy and way out of depression. The construction of Kinmen Bridge (connect Kinmen and Lieyu) is the long-standing imagination of Islanders. This imagination is better for Lieyu to gain more health care, convenient transportation and tourism development. The rustic, battlefield, large vegetation and many elderly is their memories of place.

### Key words:

Island; Place; Lieyu; Kinmen

## The Resilience of Kiribati Atolls (Micronesia) to Drought: Comparison Between an Urban System and a Rural System

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### Abstract

Atolls are fragile environments offering limited resources making them very susceptible to frequent droughts. In the context of climate change, sea-level rise is often presented as the main threat for the habitability of atolls. Yet, IPCC experts emphasize that projections of changing rainfall patterns and drought are very unsatisfying and uncertain.

The Gilbert archipelago in Kiribati (Micronesia) is prone to drought during La Niña phase of El Niño Southern oscillation. This archipelago, where most of Kiribati's inhabitants reside, is composed of one urban atoll and fifteen rural atolls. In the urban atoll of Tarawa, rapid urbanization has led to ecosystem degradation and the pollution of freshwater lenses and coastal waters. In rural atolls, inhabitants who have not migrated to Tarawa live from subsistence economy. When comparing the difference in structure and functioning of an urban atoll to a rural atoll, assessing their respective resilience to drought helps to identify key variables helpful for drought management.

The results of a population survey and semi-structured interviews conducted with key informants were used to build conceptual models of atoll social-ecological systems. From these models, we estimated the resilience of both atolls to drought to be dependent on two key variables: fresh groundwater and food security. In rural atolls, these two variables remain above an acceptable threshold during drought. In Tarawa, dependency on foreign countries for food has decreased the resilience of this urban system to drought.

### Key words:

resilience; social-ecological system; drought; model; urban; rural; atoll; Kiribati; Micronesia

## Assessment of the Specialized Projects for the Islands Through a Sustainable Development Index

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### Abstract

Islands are holding excellent natural landscapes and cultural and living resources. Korea is pushing ahead with the policies to utilize these resources and change the islands into the ones which local residents want to live and tourists want to visit. In particular, Incheon Metropolitan City's islands are located near Seoul and hold excellent ecological and cultural resources, inviting the citizens of the Seoul metropolitan areas to enjoy their charms. However, the policies for the islands have been so far mainly for their development for the convenience of the residents and tourists, putting their inherent characteristics at risk of being extinct. Recent policies for the islands are featured by specialized projects for preserving their inherent characteristics and improving the quality of life of the local residents and the tourists' satisfaction. Incheon Metropolitan City is making efforts to create the tourist resources, trails, and landscapes which reflect the islands' characteristics. The specialized projects for the islands are only the temporary policies, and thus, some lasting policies should be provided to make sure that the local government and residents can play a leading role in highlighting the regional characteristics. This study, therefore, aims to develop an assessment index that reflects the ecological, cultural, and economic characteristics of the islands, and to evaluate Incheon Metropolitan City's ten islands, the target areas of the specialized projects, in terms of a sustainable development.

### Key words:

Incheon Metropolitan City; sustainable development. island tourists want to visit; peace & ecology village

## Deforestation, Protection, Local Use and Governmental Policies on Mangrove in Hainan Island

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### Abstract

This study aims to describe the relationship between the governmental policies concerning mangrove in Hainan Island (China), where mangrove had been both destroyed and tried to be protected with national initiatives, and decline of mangrove use by local people living in small scale economies, who had long been using mangrove in various ways. We used aerial photos taken by US Army in 1940s for the reconstruction of mangrove before destruction, and conducted field survey among villagers around the Dongzhai Harbor Mangrove National Reserve Area in 2012 and 2013, for research on changes of subsistence economy among local people. Mangrove of this area experienced two major destruction since the mid 20th century: a large scale national farm construction (the Sanjiang Farm) in 1970s promoted for strengthening food production, and expansion of aquaculture ponds in the late 1990s. The former was constructed by administrative initiatives, while the latter was advanced by local governmental authorities and farmers being stimulated by national policies for fishery promotion. Meanwhile this area was designated as a mangrove reserve in 1980, and as a result, various traditional uses of mangrove by local people had been gradually controlled or banned and people had been excluded from the access to mangrove. It can be said that both extremes of destruction and protection of mangrove appeared alternately since the latter half of 20th century, and local people who had formerly extracted various resources from mangrove have been tossed about by inconsistent policies.

### Key words:

mangrove; national reserve; fishery; subsistence economy; Hainan

## Grain Size Characteristics of the Surface Sediments on the Intertidal zone in Weizhou Island

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### Abstract

Weizhou Island is located in the Beibu Gulf in the South China Sea. It is the largest and youngest Quaternary volcanic island in China. There are various geomorphic types in the island, with different bed rocks and sediments. Based on the previous research, investigation of 13 profiles and experiment of 40 samples, this paper analysed the grain-size characteristics of the sediment on the intertidal zone in Weizhou Island. Medium sand is the main type; coarse sand and fine sand secondly, and gravel least. The average of mean grain diameter, sorting, skewness and kurtosis are  $1.075\Phi$ , 0.689, 0.174 and 0.973. The distribution of different sediment types can be summarized as follows. Gravels are mostly distributed in the small bay of rock capes and on the wave-cut platform in the southwest, west and southeast coast, where the marine abrasion landform is the main geomorphic type. Sands are mostly distributed on the beaches in the east, north and northwest coast, and Nanwan Bay. The bottom of most beaches in the east and west coast is volcanic rock platform. There are two major reasons for the sediments distribution. Material sources of volcanic rocks and coral reefs are the first reason. Power of wind wave is the second reason, which erodes the rocks and reefs into gravels and sands, then transports them to the intertidal zone. The strong NW wind leads to the result that the sediments in most west and southwest coasts are coarser than that in most east and north coasts.

### Key words:

Weizhou Island; coastal geomorphology; grain-size characteristics; sediment distribution

## **Insularity, Eco-Frontiers and Environmental Governance. Changes in the Perception of Wetlands in Sardinia (Italy)**

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### **Abstract**

Islands can be seen as a multifaceted representation of a frontier. In fact, over the history, they often became confinement areas surrounded by sea. Sardinia (Italy), due to its strategic position at the centre of the Mediterranean Sea, has long been considered a land of conquest and an “internal frontier”. The widespread wetlands located along its coastline crucially contributed to this image, as they were diffusedly seen as worthless and dangerous environments needing strong human intervention in order to effectively and/or symbolically expand productive land uses. Several case studies within the island will be presented through the analysis of the complex relations among traditional economic activities, environmental protection and threats caused by agricultural, urban, industrial and tourism expansion, within changing institutional frameworks. Interesting examples of growing awareness of the value of ecosystemic services will be examined. The overlapping of projects related to recreation, education and tourism and the revitalization of fishing traditions and productions, along with widespread critical issues still related to the expansion of human activities in fragile environments and to a persistently marginal socio-economic context, creates crucial challenges for local development. The analysis of these systems shows their changing character, through complex forms of relations among wetland environments and human societies, and highlights the features of locally managed planning.

The authors will discuss these changing visions of nature through a geographic and a political-ecologic approach. The implications in terms of new territorial perceptions, changing power relations and expansion of new key sectors, primarily tourism, will be discussed.

### **Key words:**

Insularity; eco-frontiers; local development; sustainability; tourism; Nature; wetlands Sardinia; Mediterranean Sea.



## Remote Sensing Image Classification of Mapping Satellite-1 Based on SVM Method

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### Abstract

Remote sensing image classification is a key technology in field of remote sensing applications. Traditional machine learning methods to remote sensing classification mostly are based on the principle of Empirical Risk Minimization, its premise is the need for enough number of samples, and generally requires a greater number of. Unfortunately, the number of samples is actually limited. In this paper, we use theory the statistical approach of pattern recognition with the image of Mapping Satellite-1 as the experimental data. And based on the support vector machine (SVM) method, we set up SVM classifier. And we also analyze the influence of the selection of kernel function and the parameter setting on the classification of SVM classifier. And We demonstrate the superiority of the SVM classification method by comparing with other methods.

### Key words:

remote sensing; SVM; Empirical Risk Minimization; classification

## Spatio-Temporal Patterns of Climatic Changes in Hainan Island in Recent 55 years

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### Abstract

The spatio-temporal patterns of climatic changes in Hainan Island were analyzed based on the observation data of major climatic variables (i.e., daily mean temperature, precipitation, average wind speed, relative humidity, sunshine duration and pan evaporation) in seven meteorological stations from 1959 to 2013. And the results revealed that the annual mean temperature and precipitation of the island displayed a significant increasing trend while the rest four climatic variables exhibited a significantly decreasing trend during the last 55 years. According to the Mann-Kendall method, the abrupt changes of the temperature and average wind speed mainly occurred in the early 1980s, the precipitation jump mostly occurred in 2007 around, and the abrupt changes of the relative humidity, sunshine duration and pan evaporation primary took place in the early 1990s. The warming rate was the fastest in the central mountainous area and the increase rate of precipitation was the largest in the south of the island. And the decrease rates of relative humidity, average wind speed, sunshine duration and pan evaporation were the largest in the northeast, east, north and central mountainous area of the island respectively. Furthermore, the average annual precipitation and relative humidity were the most in the central mountainous area and the least in the west of the island, whereas the spatial distribution of the rest four climatic variables was the opposite.

### Key words:

climatic variables; spatio-temporal patterns; change trend; jump; Hainan Island



## The Measures of the Tendency to Stony Desert of the Li River

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### Abstract

The Li River of Guilin has an excellent geographical position with the typical Karst geography. It has good value of natural science, art, and historical culture. One of the problems is rebuilding and protecting the circumstance of the Karst geography from damage or destruction. There're some measures which follow the basic principle of geography, biology, biological economy aim to solve the tendency to stony desert. All of the viewpoints in this article are just for your reference.

### Key words:

Sustainable development; The tendency to stony desert; Measures

## C12.23 Karst

### Karst Landscapes: Tourism and Conservation



Home

#### Oral

1. [Discussion on Generation Mechanism Matters of Overland Flow on Hillslope with Karst Bare Stone-Teeth](#)  
Xiaoping Chen (Yunnan University, China)
2. [Effect of Urbanization on Hydrogeochemical Evolution of Karst Water System, a case from the Laolongdong Watershed of Chongqing](#)  
Zhang Hai Yue, Yang Ping heng (Southwest University, China)
3. [Evaluation of the Biological and Speleogenetic Interior Towards a Comparison of Karst Area Quality \(South Franconian Alb, Germany\)](#)  
Martin Trappe (Institute of Geography, University Eichstaett Ingolstadt, Germany)
4. [Evolution of Physicochemical Property and Contaminated Characteristics of Karst Groundwater Under the Influence of Tourism Activities](#)  
Ren Juan (South Wset University, China), Yang Ping heng (South Wset University, China)
5. [Karst Spring Water Stable Isotopes \(18O and 2H\) Characteristics in Heilongtan Springs, Kunming, China](#)  
Hong LIU (Joint International Research Center for Karstology, Yunnan University, China), Hua cheng HUANG (School of Resource Environment and Earth Science, Yunnan University, China)
6. [Karstological Contributions of Jovan Cvijić Related to Geohazard Issues in the Dinarides and the Carpatho-Balkanides in Serbia](#)  
Jelena Calic (Geographical Institute "Jovan Cvijic" of the Serbian Academy of Sciences and Arts, Serbia)
7. [Palaeolithic Painting Conservation in Cave Kapova \(Southern Ural, Russia\)](#)  
Elena Trofimova (Institute of Geography, Russian Academy of Sciences, Russian Fed), Yuri Lyakhnitsky (Geological Institute named after A.P Karpinsky, Russian Fed), Shamil Abdullin (Bashkir State University, Russian Fed), Aleksei Trofimov (Russian Geograph)
8. [Paleo Hydrography and Speleogenesis of Serpeng Cave and its Surrounding Area](#)  
Eko Haryono (Universitas Gadjah Mada, Indonesia), Diah Mawarwati (Universitas Gadjah Mada, Indonesia)
9. [The Relationship between a Karst Landscape and Tourism Messages in the Limestone Coast Region](#)

[of Southeast South Australia](#)

Ruth Lawrence (LaTrobe University, Australia)

10. [The Temporal Stability of Soil Aggregates under Different Land Use Patterns in Karst Peak-Cluster Depression Area](#)

Jianbing Zhang (Guangxi Teachers Education University,)

11. [The Theory of Critical Zone and The Review in the Typical Karst Cluster-Peak Depression Areas of Southwest China](#)

Ling Li (Key Laboratory of Environment Change and Resources Use in Beibu Gulf, China), Xiongfa Mai (Guangxi Teachers Education University, China), Baoqin Hu (Key Laboratory of Environment Change and Resources Use in Beibu Gulf, China)

12. [Typical Karst Landscapes and Their Evolution in Southwest China](#)

Jianhua Cao, Weihai Cheng (Institute of Karst Geology, CAGS), Zhongcheng Jiang (Institute of Karst Geology, CAGS), Derek Ford (McMaster University, Ontario, Canada), Hong Liu (Yunnan University, Kunming), Hui Yang

13. [Using  \$\delta^{34}\text{S-SO}\_4^{2-}\$  and  \$\delta^{15}\text{N-NO}\_3^-\$ ,  \$\delta^{18}\text{O-NO}\_3^-\$  to Trace the Sources of Sulfur and Nitrate in Lihu Underground Water, Guangxi, China](#)

Xiao Qiong (Key Laboratory of Karst Dynamics, MLR/ Guangxi, International Research Center on Karst Under the Auspices of UNESCO, Institute of Karst Geology, Chinese Academy of Geological Sciences, Guilin 541004, China, China), LI Rui

14. [Variation Characteristics of Atmospheric Pollutants Concentration in the Urban Area of Chongqing in 2014 and Their Relationship with Meteorological Conditions](#)

Chen Zhiqiu (Southwest University, China)

## Poster

1. [Karst Landforms as the Objects of Tourism Development in Mangystau Region](#)

Farida Akiyanova (Kazakhstan, Kazakhstan National Geographic Society); Aruzhan Bekkuliyeva (Aruzhan Bekkuliyeva, Kazakh National Research Technical University after K.I.Satpayev)

2. [Research on Spatial Structure of County in Underdeveloped Karst Area under the Perspective of Complexity--Use Guizhou as an Example.](#)

Dingyang Fu (China, South China Normal University)

## Discussion on Generation Mechanism Matters of Overland Flow on Hillslope with Karst Bare Stone-Teeth

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### Abstract

Abstract: Due to special surface and underground double space structures of the karst area, overland flow on karst and non karst area is quite different, but there is also short of the karst slope runoff, overland flow on karst area, the author of this paper, especially stone teeth with overland flow on slope surface of the methods, process, characteristics and influence factors, through the study in the sample area, combining the theory of the karst area runoff and general overland flow on karst research, to analyze the slope runoff yield conditions, methods and influence factors. According to the observation, study of slope runoff samples in the critical rainfall of 10mm/h, there are three kinds of runoff way: hydrogels containing aquitard in saturated soil, saturated runoff; Crack surface local rock not development or low surface soil infiltration rate lead to excess infiltration runoff; Stone teeth surface runoff quick replenishment lead to surface karst belt fully saturated, produce saturated surface runoff. We analyzed stone teeth exposed to the influence of karst slope runoff.

### Key words:

karst; overland flow; bare stone-teeth hillslope; generation mechanism matter

## Effect of Urbanization on Hydrogeochemical Evolution of Karst Water System, a case from the Laolongdong Watershed of Chongqing

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### Abstract

In order to study the evolution status of groundwater quality in karst area, the monitoring datas of the underground river of Laolongdong from 2008 to 2012 were chosen to discuss the influence of urbanization. Using some water chemical indicators such as the pH, conductivity, water temperature, potassium, sodium, calciumion, magnesiumions, bicarbonateions, chloride, nitrateions, sulfatideon, phosphateion of Laolongdong, and combines the water quality in Zhaojia springs and upstream of the sewage discharged point, to analyzed the evolution tendency of water quality of the Laolongdong underground river basin. The results indicated that in the process of urbanization, the concentrations of the chemical composition in this water region were changed, the ion concentrations of sodium, chloride, phosphatideon, calciumion, magnesiumions, bicarbonateions rised, because they were directly from human activities. In the meanwhile, the ion concentrations of nitrateions, sulfatideon decreased due to the urbanization effect. The recharge source of Laolongdong groundwater was highly complex, among that, human activities and geological background of the carbonates rocks played a crucial role to the quality of groundwater; the water quality of all water points in this region were polluted in different degrees because of the improvement of the urbanization levels and regional environment change. Some ion concentrations like chloride, nitrateions, sulfatideon in the upstream's sewage discharge points and the groundwater regions exceed greatly, with a V class. What's more, the water quality of Zhaojia spring and Laolongdong underground River was still deteriorating .

### Key words:

Urbanization; Karst groundwater; Water quality, Evolution; Pollution sources; Laolongdong watershed

## Evaluation of The Biological and Speleogenetic Interior Towards a Comparison of Karst Area Quality (South Franconian Alb, Germany)

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### Abstract

Within the scope of the European Union monitoring program on the conservation of natural habitats and of wild fauna and flora (FFH) several caves occurring along the Altmuehl valley (South Franconian Alb, Germany) were studied in terms of cave fauna and cave habitat status. Besides the first documentation of numerous caves main objective of the study is the long-term habitat protection, or at least the conservation of status quo of the cave.

Most of the caves are open to the public. Thus, sometimes they are used for several purposes: visits of local people for private recreation, wild tourism by cavers, esoteric meetings, illegal dump grounds, storage rooms, and show caves. The consequences for cave life, cave morphology and hydrology have to be regarded carefully. Finally, the intention of the study is an overall assessment of the entire Franconian Alb or parts of it to estimate and evaluate the conditions or modifications of caves.

First results of the study show numerous disturbances of the caves by structural alteration or installations, destruction of the cave ground, introduced waste, fireplaces, extensive sooting of walls or ceiling. On the other hand various caves remained unaffected or they show little variations. In conclusion, the data indicate a relatively positive state of the cave habitats and the faunal distribution. However, further interpretation regarding cave size and length, climatic differences and human influence is necessary.

### Key words:

cave evaluation; habitat; fauna; human influence

## Evolution of Physicochemical Property and Contaminated Characteristics of Karst Groundwater Under the Influence of Tourism Activities: A Case Study of Shuifang Spring in the Jinfo Mountain World Heritage Site of China

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### Abstract

To investigate the variation of physicochemical property and pollution characteristics of karst groundwater in the densely populated area, the physicochemical parameters of the Shuifang spring in Jinfo Mountain, which is a typical karst area in southwestern china, were continuously monitored during the peak period of tourism activity. Results indicate that the pH and dissolved oxygen values were decreasing with the electrical conductivity, turbidity increased. Meanwhile, all the physicochemical parameters fluctuated sharply during the the peak period of tourism activity, when the Jinfo Mt hosts tourist; The ion concentration fluctuation of pollutants were dominated by the human activity, which is discharged and introduced rapidly dissolution of carbonate. The indexes of  $\text{Cl}^-$  and  $\text{Ca}^{2+}$ , the particular pollutant and products of carbonate dissolution, were analyzed respectively with other ions via the method of correlation analysis. The concentration variation of  $\text{K}^+$ ,  $\text{Na}^+$ ,  $\text{Cl}^-$  were primarily caused by contaminations of tourism activities, while  $\text{HCO}_3^-$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ,  $\text{Si}$ ,  $\text{Al}^{3+}$  and  $\text{Ba}^{2+}$  were resulted from rapidly dissolution of carbonate due to the discharge of contaminations. The piston and dilution effect of rainfall led to concentrations of  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{NO}_3^-$  increased first and decreased afterwards in the early peak of tourism activities, the latter  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$  decreased as results of the decline of precipitation.  $\text{NO}_3^-$  was barely affected by human tourism activities. The results of the study indicate that the groundwater is susceptible to intensively human activities in short time, and is suffered from pollution easily.

### Key words:

karst groundwater; physicochemical property; tourism activities; pollution; carbonate dissolution

## Karst spring water stable isotopes ( $^{18}\text{O}$ and $^2\text{H}$ ) Characteristics in Heilongtan Springs, Kunming, China

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### Abstract

Heilongtan springs located at foothill of Wulao Mountains in the northern suburb of Kunming City, emerges along east branch of Heilongtan Fault after karst water meets quaternary sedimentary at edge of Kunming Basin. There are three springs, named as Qingshuitan, Hunshuitan and Xiaoshuitan. Isotope technique was used to investigate the characteristics in stable isotope ( $^{18}\text{O}$  and  $^2\text{H}$ ) of spring waters to identify the sources of springs. Through the spring water and precipitation stable isotope composition measurement, characteristics of deuterium ( $\delta^2\text{H}$ ) and oxygen 18 ( $\delta^{18}\text{O}$ ) were analyzed. It is revealed that (1) the contribution of precipitation to three springs is the main source, especially the summer rainfall; (2) the recharge of Qingshuitan Spring is not only from the Yemao Mountain, the proposed recharge area, but also some from the runoff infiltration along groundwater flow paths. For Hunshuitan spring, the recharge sources are distinctly different in wet and dry seasons, which recharged by basalt fissure aquifer and karst aquifer during wet season, and mainly by karst aquifer water during dry season. Xiaoshuitan Spring is recharged by the northern karst aquifer. (3) the  $\delta^{18}\text{O}$  values of three spring samples ranged from -12.60‰ to -11.64‰, -12.22‰ to -10.81‰ and -12.19‰ to -11.27‰ respectively. The values of Qingshuitan Spring are lighter than Hunshuitan and Xiaoshuitan springs'.

### Key words:

Heilongtan; karst spring; water stable isotope

## Karstological Contributions of Jovan Cvijić Related to Geohazard Issues in the Dinarides and the Carpatho-Balkanides in Serbia

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### Abstract

The history of scientific karstological research in Serbia started at the end of the 19<sup>th</sup> century with the works of Jovan Cvijić, who is worldwide regarded as the founder of karstology as a scientific discipline. Although at the time of Cvijić's explorations the notion of geohazards was not used at the extent and context as it is today, it is possible to analyse the elements of natural hazard research in karst areas. Serbian karst is distributed in two belts – Dinaric on the west and Carpathian-Balkan on the east. Limestones cover about 9% of the territory of the country, and they occur mostly in smaller patches, which are under the strong influence of the surrounding non-carbonate terrains. The aim of the paper is to overview and analyse the karstic processes and landforms studied by Cvijić and his successors, which would, by contemporary criteria and terminology, be categorized as geohazards. These include the examples of various types of collapse and/or subsidence, occurring either at the time of the study or in previous phases of morphological evolution. The questions of conservation of karst landscapes, subjected to the geohazard issues, are considered.

### Key words:

karst; Jovan Cvijić; geohazards; conservation; Dinarides; Carpatho-Balkanides; Serbia

## Palaeolithic painting conservation in cave Kapova (Southern Ural, Russia)

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### Abstract

Kapova Cave is the one of the most known caverns of Russia, situated on the Southern Ural. In 1959 the masterpieces of the Cave Palaeolithic were found in this underground cavity (the pictures of animals and different geometric signs). As for today the unique Palaeolithic scenery of Cave Kapova is in the danger of degradation in relation with the influence, on one hand, of the man-made and, on other hand, of the natural negative factors. The man-made factors are caused both by unregulated visits of tourists, leaving the recent graffiti directly over the Palaeolithic masterpieces, and by the artificial opening of paintings. The natural factors are due to, mainly, by the microclimatic and hydrological peculiarities of underground cavity. In 2003 a free access inside to the cave was stopped: the tourist path by the length of 230 m was elaborated including the review of Palaeolithic scenery copies. Concurrently some measures diminishing the negative actions of natural factors to the Palaeolithic decorations were carried out: the tamponage of ponor in the canyon Shulgan-Tash, the creation of summer polyethylene screen between first and second levels of underground cavity, etc. Now the Catalogue of pictures and signs of cave Kapova contains the descriptions of 195 images.

### Key words:

Palaeolithic paintings; Kapova Cave; Southern Ural

## Paleo Hydrography and Speleogenesis of Serpeng Cave and its Surrounding Area

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### Abstract

Serpeng Cave is situated in the northern border of Gunungsewu karst with the Wonosari basin. The cave drains the surface runoff from the basin, therefore the speleogenesis and the development of the cave is associated with the hydrography of the basin. There should have been different hydrography during the early initiation of the cave and in the present situation. The research documented here is an effort to reconstruct the paleo environment especially paleo hydrography surrounding the Serpeng Cave and its influence to the speleogenesis of the cave. The results show that formerly the surrounding area of Serpeng Cave used to be a lake. The paleo lake is proven by the distribution of lake sediment in the the surrounding area of Serpeng Cave. Lake sediment of the area is composed of clay in the bottom and overlaid by volcanic ash. The dry out of the lake must have coincided with the enlargement of ponor in the base of the lake. The ponor then developed to be a cave forming Serpeng Cave. The cave is characterized by vertical shaft with the depth of 60 meter before finally sloping and ended to the underground lake. Such cave is typical for point recharge cave develops under base of doline or other karst depression.

### Key words:

Speleogenesis; Gunungsewu; Java; Wonosari basin

## The Relationship between a Karst Landscape and Tourism Messages in the Limestone Coast Region of Southeast South Australia

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### Abstract

The 'Limestone Coast' is a term used to describe both a geological region and one of twelve designated tourism regions in the State of South Australia. Being about 100,000 km<sup>2</sup> in area, Limestone Coast tourist attractions feature several wine districts, primary production outlets, extensive coastal plains and world-heritage cave and karst environments. The purpose of this study was to explore the relationship between karst landscapes and tourism in the Limestone Coast region through the analysis of tourist literature and interviews with managers. Firstly, the relationship between regional geology and tourism was explored by identifying karst features promoted for tourism and assessing similarities between karst sites and significant tourist developments. Secondly, the way in which a scientific understanding of karst landscapes were interpreted at touristic sites in the Limestone Coast were explored. Several guides, managers and owners of karst-related tourism sites were interviewed to see how they both obtain their understanding of karst features and processes and deliver those messages to the public.

### Key words:

Caves; karst; geology; tourism; interpretation; Limestone Coast; Australia

## The Temporal Stability of Soil Aggregates under Different Land Use Patterns in Karst Peak-Cluster Depression Area

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### Abstract

As one of the main karst geomorphology, peak-cluster depression area suffer from serious soil erosion, which influenced by land use patterns. It is important to study the soil anti-erodibility, mainly reflected by soil aggregate composition and stability, for soil erosion research and soil conservation. The objectives of this paper were: (1) to study the soil aggregate composition under four land use patterns, including conservation tillage, sugarcane planting, corn planting and forest land; (2) to analyse the temporal stability of each soil aggregate grade. The soil aggregate composition presented by the content of each soil aggregate grade, consist of >10cm, 7~10cm, 5~7cm, 3~5cm, 2~3cm, 1~2cm, 0.5~1cm, 0.25~0.5cm, <0.25cm. The temporal stability of soil aggregate was presented by the content of each grade after the continuously shake of 5、10、15、20、25、30、40、50、70、90 minutes by electric shaking sieves. Results shows that soil aggregate content (>10cm) of conservation tillage and forest land more than sugarcane planting and corn planting significantly, and this phenomenon appear to the contrary when it comes to the soil aggregates content of <0.25cm. There was no significant difference was observed between conservation tillage and forest land, sugarcane planting and corn planting. With the same tendency, the content of soil aggregates grades changed when the shaking time increasing. Soil aggregate content (>10cm) decreased and the content of smaller grades increased. However, the decreasing rate and increasing rate among the four land use patterns have different order, in sequence of corn planting, sugarcane planting, conservation tillage and forest land. It is proved that small soil disturbance is favorable to promote the temporal stability of soil aggregates and beneficial to soil erosion resistance.

### Key words:

soil aggregates; temporal stability; land use patterns; soil anti-erodibility; karst peak-cluster depression area

## The Theory of Critical Zone and the Review in the Typical Karst Cluster-Peak Depression Areas of Southwest China

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### Abstract

Karst Cluster-Peak Depression is a typical Karst landform in Southwest China. Basing on the environmental geological background, the region has the characteristics such as the high altitudinal gradient, the complex of the landform and the closure in the material energy cycle. There are many environment problems in this region, such as lack of the available water, the soil fertility deterioration, the backward economic development, and improper human activity. The Karst Cluster-Peak Depression area is one of the senior fragile ecological environment region. In order to solve those problems advanced, Basing on the earth critical zone theory, the paper proposed the concept of Karst Cluster-Peak Depression critical zone (KCD-CZ), and analysis the characteristic and contents in the KCD-CZ. This study is a karsts area in the development of cutting-edge academic issues, not only of theoretical significance, but also for different regions of Karst Cluster-Peak Depression in the region to provide reference for sustainable development. The paper structure including five parts. 1. The first part is introduce the earth's critical zone science, including the definitions, the boundary, and general characteristics of the critical zone; 2. Basing on the earth's critical zone science, the paper propose the theory of Karst Cluster-Peak Depression critical zone (KCD-CZ), analyzes and discusses the contents of the KCD-CZ, and then Researches on the framework such as forcing, coupling, interfacing, and scaling; 3. Analyzed and discussed key technologies in KCD-CZ: the standard of the critical zone observatories; the interdisciplinary research; the Evolutionary mapping-monitoring-modeling framework; the integrating and sharing information; 4. In order to provides a perspective on the current state of the research on CZ and Karst Cluster-Peak Depression, there was reviewed on these subjects; 5. In the end, the paper made a discussion.

**Key words:** Karst Cluster-Peak Depression; Critical Zone; reviewe; Southwest China

## Typical karst landscape and their evolution in Southwest China

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### Abstract

In Southwest, there 540,000 km<sup>2</sup> exposed carbonate rocks distribute from the foot of Tibet plateau to sea beach of Guangzhou and Guangxi. With the tectonic movement and climate variation, the karst landscapes are developing in different types: the calcareous tufa related to over 1000m deep buried karst on the elevation 3500-4000asl(foot of east Tibet Plateau), for example, Huanglong tufa in northwest Sichuan and Baishuitai tufa in northwest Yunnan; karst faulted basins in east Yunan and karst tableland south Chongqing on the elevation 2000-2500masl(Yunan-Guizhou Plateau), cases of Mengzi, Jianshui and Luxi karst faulted basins and Jingfoshan karst tableland hill; Tiankeng(big collapse dolines) and very deep shaft on the top of the slope from Yunnan-Guizhou Plateau to Guangxi basin with elevation 1000-2000masl, cases of Tianxing and Qiken shafts with 600-1000m deep in Chongqing, and Dashiwei Tiankeng with 60m long, 420m wide and 613m deep; Fengcong(peak-clustter) mainly locates on the middle of the slope; and Fenglin mainly locates flatland or plain in east Guangxi and Guangdong. Most karst landscape sites already listed Global Geopark and World Natural Heritage site.

### Key words:

Karst landscape; southwest China; calcareous tufa; faulted basin; karst tableland; Karst Tianken; Shaft; Fengcong; Fenglin

## Using $\delta^{34}\text{S-SO}_4^{2-}$ and $\delta^{15}\text{N-NO}_3^-$ , $\delta^{18}\text{O-NO}_3^-$ to Trace the Sources of Sulfur and Nitrate in Lihu Underground Water, Guangxi, China

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### Abstract

To reveal the temporal and spatial variation of groundwater water chemistry in Lihu, ascertain  $\text{SO}_4^{2-}$  and  $\text{NO}_3^-$  sources, expose the reasons for the change of water quality, provide scientific basis for reasonable exploitation and protection of karst water resources. Several samples, collected from January to December in 2010 and May, October in 2014, has been analyzed. The result shows that ① The hydrochemical style of the underground water is  $\text{HCO}_3^-$  - Ca type and effected by the seasonal precipitation and human activity, the temporal and spatial variation of the main cations is obvious. ② The sulfur concentration was slightly decreased after the sewage plant operation. Compared to 2010, the nitrate pollution aggravated in 2014. Impacted by human activity, the concentration of sulfur and nitrate is higher in the upstream Nandan river, Layi cave and the midstream Liangfeng cave, Gantianba than in the downstream Xiaolong cave. ③ The  $\delta^{34}\text{S-SO}_4^{2-}$  values range from -4.12 ‰ to -0.93 ‰, it indicates that the emission of the sulfur oxides by burning coal cause the rainwater acidification, which inputs a large amount of  $\text{SO}_4^{2-}$  into the underground water. ④ The  $\delta^{15}\text{N}$  of nitrate ranged from 0.26 ‰ to 11.58 ‰, with an average value of 7.61 ‰, the  $\delta^{18}\text{O}$  of nitrate ranged from -2.33 ‰ to 21.76 ‰, with an average value of 9.38 ‰, this shows that the main source of nitrate in the groundwater is soil organic nitrogen, manure and sewage.

### Key words:

karst underground water; hydrochemistry; sulfur isotope; nitrate and oxygen isotope;

## Variation characteristics of Atmospheric Pollutants Concentration in the Urban Area of Chongqing in 2014 and their relationship with meteorological conditions

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### Abstract

According to the air quality data in Chongqing from January to December in 2014, air quality index (AQI)  $PM_{2.5}$ ,  $PM_{10}$ ,  $CO$ ,  $SO_2$ ,  $NO_2$  and  $O_3$ , as well as the variation characteristic of atmospheric pollutants concentrations were analyzed in Chongqing. Combined with the monthly average precipitation、 average temperature、 sunshine time、 average relative humidity、 average wind speed and air pressure and other meteorological data, in order to study the atmospheric pollutants impact of meteorological factors in Chongqing through the correlation analysis. The results showed that the changes of concentrations of AQI and  $PM_{2.5}$ ,  $PM_{10}$  on the monthly scale are obviously U-shaped variation, appeared the low in middle and high on both ends. On the quarterly scale, the concentrations feature of AQI and  $PM_{2.5}$ ,  $PM_{10}$  with highest in winter and lowest in summer, it means air quality is the worst in winter and the best in summer. The concentrations of  $PM_{2.5}$  and  $PM_{10}$  are significantly correlated. Correlation analysis showed that the correlation coefficient of mass concentration of  $PM_{2.5}$  and  $PM_{10}$  was 0.99, and the ratio of  $PM_{2.5}/PM_{10}$  was 0.80 revealing a significant contribution of  $PM_{2.5}$  to  $PM_{10}$ . A positive correlation existed between the mass concentration of  $PM_{2.5}$ ,  $PM_{10}$  and high average relative humidity, mainly because of it tended to cause the formation of particulate. And there is a significantly positive correlation existed between the mass concentration of  $PM_{2.5}$ ,  $PM_{10}$  and average air pressure, because of atmospheric circulation is affected by low pressure in summer, but high pressure in winter in Chongqing.

### Key words:

$PM_{10}$ ;  $PM_{2.5}$ ; atmospheric pollutants; mass concentration; meteorological conditions; Chongqing

## Karst Landforms as the Objects of Tourism Development in Mangystau Region

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### Abstract

Mangystau region is located in the Caspian region of Kazakhstan and due to the broad extension of the karst rocks is characterized by the development of karst processes. Within of this region the seashore niches and caves are widely developed and had been used for a long time by the local population for farming and recreational purposes. Moreover, niches and caves have a great scientific importance as they present the preserved traces of ancient states of the Caspian Sea. Karst landforms of the region create a unique karst landscape and they are an important natural resource for recreation and tourism. The main attractions of the region's karst landscape are the karst valley Tamshyly, karstic lake Saura and others. Valley Tamshyly is included in the list of specially-protected areas as a natural monument. The caves are an interesting karst forms for the development of tourism. There are about 30 caves of various sizes and types. The favorite places of cavers and tourists are Buly-Oyyk, Otebay and Karagan-Bosaga caves characterized by distinctive ecosystem. The artificial karstic caves (Becket ata, Shopan ata, Surule, Sultan apa, Kapam) represent the whole complex of natural and man-made structures. They were constructed in karst rocks and used in the past by hermits. Nowadays they are the objects of pilgrimage tourism. Thus, in Mangystau region the development of karst processes and karst landforms which create unique landscapes and ecosystems has a great resource for extension of tourism and will contribute to their conservation and management.

### Key words:

Mangystau region; karst processes; unique karst landscapes; karst landforms; caves; development of tourism.

## Research on Spatial Structure of County in Underdeveloped Karst Area Under the Perspective of Complexity-Use Guizhou as an Example

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### Abstract

Karst plateau basin is flat terrain, Guizhou's cities and medium-sized towns are concentrated in this terrain, the study for karst plateau basin area Settlements mainly to large settlements or urban settlements, and use GIS technology to research land use structure in karst area cities, to a certain extent, can reflect the spatial characteristics of karst city settlements. Fully aware of the karst plateau basin settlements spatial distribution and evolution is of great importance for the regional town planning, building a new socialist countryside and sustainable development. Previous studies showed that karst plateau basin settlement spatial distribution and evolution of karst region with a strong genetic and spatial distribution distribution exhibits complexity. Currently, the city as a complex adaptive system has become a general consensus. Based on the unique karst in Guizhou, in view of complexity research and development characteristics of urban space in this unique landscape, combining relevant spatial development of urban space structure pattern of elements in order to provide a study of the spatial structure of the city for its karst new perspective.

### Key words:

Karst; spatial structure

## C12.24 Land Degradation and Desertification

### Land Degradation and Environmental Change



#### Oral

1. [<sup>137</sup>Cs Profile Distribution and Estimation of Erosion Rate in Opencast Mine Area of Zhundong](#)  
Wei Liu, Yuee Cao, Jianjun Yang (Xinjiang University, China), Jun Wang, Guo Wang (No.216 Geology Party, Helium Industry, China), Xiaohua Li (Xinjiang University, China)
2. [A Quantitative Method to Long-Term Soil Erosion Impacts on Productivity in Huaihe Watershed, China](#)  
Lin Degen (School of Geography, Beijing Normal University, China), Yang Huimin (School of Geography, Beijing Normal University; College of Life Science & Technology, Hebei Normal University of Science & Technology, Qinhuangdao, China), Lian Fang
3. [Analysis of NDVI Time Series for Assessing of Vegetation Dynamics on the Baikal-Gobi Meridional Transect](#)  
Bair Tsydypov (The Baikal Institute of Nature Management SB RAS, Ulan Ude, 670047, Russia, Russian Fed)
4. [Analysis of Rainfall Erosivity under Monsoon Regime in Maharashtra State, India](#)  
Shruti Pethkar (Sndt Women's University, India)
5. [Assessing Soil Erosion by Remote Sensing in the Middle Reaches of the Yarlung Zangbo River, Tibet](#)  
Jianrong Fan (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences & Ministry of Water Conservancy, Chengdu, 610041, P. R. China), Xiyu Zhang (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences & Ministry of Water Conservancy, Chengdu, 610041, P. R. China)
6. [Characterizing Land Surface Temperature and Vegetation Changes near Son-Ganga Confluence, India, during 2000-2015 period using MODIS Products](#)  
Aman Arora (Jamia Millia Islamia, New Delhi, India)
7. [Coal Mining Subsiding Land and its Consolidations in Jining City](#)  
yuanyuan chen (1. Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences; The University of Chinese Academy of Sciences, China), changhe lü
8. [Coastal Land Suitability Evaluation for Fishponds in Indramayu, Indonesia Using Landsat Thematic Mapper Imagery and Geographic Information System](#)  
Nandi Nandi, Lili Somantri (Universitas Pendidikan Indonesia, Indonesia)

9. [Crop Salinization Vulnerability Curve Construction Based on EPIC Model—A Case Study of Global Maize](#)  
Fang Lian, Degen Lin, Jing'ai Wang (School of Geography, Beijing Normal University, China)
10. [Desertification & Land Degradation Status Mapping of North East India: Special reference to Assam and Meghalaya](#)  
Bijay Mipun, Amritee Bora (North Eastern Hill University, India)
11. [Desertification Causes, Effects and Solutions: A Study in Environmental Geography.](#)  
Ashok Sinha (Dept.of Geography, M.U. Bodh Gaya, Bihar, India, India)
12. [Determining Sources of Sediments at Nkula Dam in the Middle Shire River, Malawi, using Mineral Magnetic Approach](#)  
Maureen Kapute Mzuza, Zhang Weiguo (State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, P.R. China., China)
13. [Ecological Sustainability and Land Management in Aravalli Hill Ranges of Tonk District, Rajasthan, India](#)  
Dr Rama Prasad (University of Rajasthan, India)
14. [Environmental Change And Conflict In Nigeria: An Overview](#)  
Aliyu Baba Nabegu (Kano University Of Science And Technology, Wudil, Nigeria)
15. [Factors Influencing Land Degradation: A Case of Zuunburen soum, Mongolia](#)  
Khishigjargal Budjav (Institute of geography and Geoecology, Mongolian Academy of Sciences, Mongolia)
16. [Gully erosion mapping in the Sancha River Catchment of Northeast China based on multi-scale remote sensing data](#)  
Ranghu Wang, Shuwen Zhang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
17. [Hopf Bifurcation and Hysteresis Route in Arid Ecosystem; a Tool to Predict Desertification](#)  
Adel Sepehr (Dept of Desert and Arid Zone Management, Ferdowsi University of Mashhad, Mashhad, Iran)
18. [Human migration on the Pamir Plateau 2500 years ago based on Strontium Isotope Analysis](#)  
Xueye Wang, Zihua Tang, Jing Wu (Institute of Geology and Geophysics, Chinese Academy of Sciences, China),
19. [Identification of Soil Erosion Hotspot Areas for Sustainable Land Management in the Gerado](#)

[catchment, northeastern Ethiopia](#)

Asmamaw Bahir, Mohammed Ahmed (Addis Ababa University, Ethiopia), Lulseged Desta (International Center for Tropical Agriculture (CIAT), Malawi)

20. [Integrated Landscape Policy](#)

Robert Gale (James Cook University, Australia)

21. [Integrating Measures of Grassland Function Using Remote Sensing](#)

Xulin Guo (University of Saskatchewan, Canada)

22. [Land Use and Topographic Effects on the Spatial and Temporal Soil Physicochemical Properties on the Uplands of Rwizi Catchment in the Lake Victoria Basin](#)

Yazidhi Bamutaze (Department of Geography, Geo Informatics and Climatic Sciences, Makerere University, Uganda), Brigitta Shuett (Free University Berlin), Joshua Wanyama (Makerere University), Mike Meadows (University of Cape Town), Hosea Opedes

23. [Landscape Mapping of Selenginsky Middle Mountains \(on the example of the Ubur-Dzokoysky hollow\)](#)

Daria Sayapina, Bair Tsydypov, Endon Garmaev (The Baikal Institute of Nature Management SB RAS, Ulan Ude, 670047, Russia, Russian Fed)

24. [Marshland Degradation in Xingkai Lake and The Restored Strategy for Habitat](#)

Xiaohui Liu, Ming Jiang, Lin Wang, Sijiang Zhang (Northeast Institute of Geography and Agroecology)

25. [Monitoring and Analysis of Soil Erosion in the Loess Plateau of China based on CSLE - A Case Study on Dongzhiyuan in Loess Plateau](#)

Jianxiang Zhang, Duoyong Zhang (Longdong University)

26. [Pasture Use in the Eastern Zambezi Region, Namibia; a People - Cattle grazing system under a flood – drought regime](#)

Alfred Colpaert, Timo Kumpula (University of Eastern Finland, Finland), Augustine Gbagir (University of Eastern Finland, Nigeria)

27. [Reflection of Land Use in Landforms and Sediments of Small Catchments \(Meghalaya Plateau, NE India\)](#)

Zofia Rączkowska, Anna Bucala, Paweł Prokop (Institute of Geography and Spatial Organization PAS)

28. [Research on the Application of Structural Vegetation Coverage in Soil Erosion](#)

Gao Yuan (Beijing Normal University, China)

29. [Research on the Rocky Desertification Poverty Effect and Benefit Evaluation of Poverty Reduction by Control Project in Typical Villages](#)

Taian Zuo (Guizhou University of Engineering science, China)

30. [Socio-Economic Factors and Consequences of Desertification Process in Mongolia](#)

Darima Darbalaeva, Anna Mikheeva, Valentin Batomunkuev, Daba Zhamyanov (Baikal Institute for Nature Management SB RAS, Russian Fed)

31. [Soil Characterization and Land Evaluation in the Kemite Watershed: A Way Forward for Sustainable Rural Land Use Planning in Ethiopia](#)

Berhan Gessesse Awoke (Entoto Observatory and Research Center (EORC), Ethiopia)

32. [Spatiotemporal Analysis and Mapping of the Relationship between Gully Erosion and Controlling Factors in Northeast China](#)

Maojuan Li, Tianqi Li (College of Environment and Planning, Henan University, Kaifeng, China)

33. [TETIS model based runoff and sediment simulation of Wuyuer River Basin, black soil region of Northeast China](#)

Zhiying Li, Haiyan Fang, Min Guo (Institute of Geographic Sciences and Natural Resources Research, CAS, China)

34. [The Carbon Payments to Control Land Degradation in the Guanzhong-Tianshui Region](#)

Zixiang Zhou (Northwest A & F University, China)

35. [The Changing Distribution of Rocky Desertification in the Guangxi Region, 1930s to 2000](#)

Zhaoqing Han (Fudan University, China), Youhua Ran (Cold and Arid Region Environmental and Engineering Research Insitute, CAS, Lanzhou, China)

36. [The Current State of Desertification in Mongolia](#)

Nyamtseren Mandakh (Institute of Geography and geoecology, Mongolia)

37. [The Impact of Land Use on Morphology and Sedimentology of Streams Draining the Margin of the Darjeeling Himalaya in India](#)

Pawel Prokop (Institute of Geography and Spatial Organization, Polish Academy of Sciences, Department of Geoenvironmental Research, Jana 22, 31 018 Krakow, Poland), Łukasz Wiejaczka

38. [The Soil heavy metal in the Khovd city area, Western Mongolia](#)

Lkhagvasuren Choijinjav (Khovd state university, Mongolia), Batkhishig Ochirbat (Institute of Geography, Mongolia)

39. [The Spatio-Temporal Dynamic of Saline Land in the Lower Reach of Taoer River Basin from 1983 to 2013](#)

Zhiyong Wang (IGSNRR, China), Lijuan Li (IGSNRR, China)

40. [Vegetation of Eolian Relief Ubur-Dzokoyskoy Hollow of the Selenginsky Middle Mountains \(Republic of Buryatia\)](#)

Margarita Zharnikova, Zhargalma Alymbaeva (The Baikal Institute of Nature Management SB RAS, Russian Fed)

41. [Wind Erosion Measurement Circle](#)

Baoyuan Liu (Beijing Normal University, China)

## Poster

1. [Decadal Changes of Sediment Regime as an Integrated Response to Multiple Human Practices in the Yanhe River, China](#)

Qiang Tang; Shuai Wang; Guangyao Gao (China, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences)

2. [Dynamic Changes of Vegetation Coverage and Driving Forces in Ebinur Lake Wetland National Nature Reserve\(ELWNNR\) During the 1972-2013](#)

Zhang Fei; Jing Yunqing (China, Xinjiang University)

3. [Land Use Land Cover based Spatiotemporal Ecosystem Service Value Change Assessment in Sriniketan Santiniketan Planning Area, India](#)

Srikanta Sannigrahi; Somnath Sen; Saikat Paul (India, Indian Institute of Technology, Kharagpur, West Bengal, India)

4. [New Indices to Evaluate the Effects of Rainfall Pattern on Runoff and Soil Erosion under Different Vegetation in the Loess Plateau, China](#)

Jianbo Li; Guangyao Gao; Lei Jiao (China, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences)

5. [Quantification of Deflation-induced Soil- and Nutrient-loss on Chernozem Types, Based on Field Wind Tunnel Experiments](#)

Andrea Farsang; József Szatmári; Károly Barta (Hungary, University of Szeged, Department of Physical Geography and Geoinformatics)

6. [Soil Moisture Dynamics under Different-aged Caragana Korshinskii Shrublands in Wuzhai County of the Loess Plateau, China](#)

Liang Haibin; Shi Jianwei; Li Zongshan (China, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences)

7. [Soil Nutrient Dynamics in Relation to Vertical Root Distributions in the Riparian Zone of Three Gorges](#)

## [Reservoir, China](#)

Ronghua Zhong (China, Asian International Rivers Center of Yunnan University); Yuhai Bao; Xiubin He (China, Institute of Mountain Hazards and Environment, Chinese Academy of Sciences)

## 8. [Spectral Identification of Main Control Factors of Soil Phosphorus Loss from Typical Agricultural Land in Taihu Basin](#)

Junfeng Xiong (China, School of Geography and Remote Sensing, Nanjing University of Information Science & Technology); Chen Lin (China, Key Laboratory of Watershed Geographic Sciences, Institute of Geography and Limnology, Chinese Academy Sciences, Chinese Academy of Sciences); Zhioeng Wu (China, School of Geographic and Oceanographic Sciences, Nanjing University)

## 9. [Study on Carbon Storage of Pinus Elliottii Artificially Forests in Lakeside Sandy Desertification of Poyang Lake, China](#)

Cao Yun (China, Jiangxi Normal University)

## 10. [Study on Landscape Classification and Ecological Restoration Strategies of Shangyi County](#)

Li Ma; Chong Tang (China, Capital Normal University)

## 11. [Temporal and Spatial Variation of the Chinese Terrestrial Measured NPP Simulation from 1960s to 2000s](#)

Erping Shang; Hongqi Zhang; Fang Liu (China, Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

## 12. [The Impact of Wind-blown Sand on Crushed-rock Embankment along the Qinghai-Tibet Railway \(QTR\), China](#)

Ruiping Zu; Zhilin He; Jianjun Qu (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)

## 13. [The Research of the Straw-checkerboard Fencing Life Based on Its Characteristics of Erosion and Deposition](#)

Wangyang WU (China, Key Laboratory of Environmental Changes and Natural Disaster, Ministry of Education, Beijing Normal University); Dengshan Zhang (China, Qinghai Academy of Agricultural Forestry Sciences); Lihui Tian (China, College of Earth and Environmental Sciences, Lanzhou University)

## 14. [Using Geospatial Approach in Estimating the Impact of Climate Change on Desertification in Northern Borno, Northeast, Nigeria](#)



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Vincent OJEH (Nigeria, WASCAL WACS- Federal University of Technology Ak); Philip Henah; Felix Nkeki (Nigeria, Department of Geography and Regional Planning, University of Benin)

## **$^{137}\text{Cs}$ Profile Distribution and Estimation of Erosion Rate in Opencast Mine Area of Zhundong**

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### **Abstract**

To quantitatively estimate soil erosion of Zhundong opencast mining area,  $^{137}\text{Cs}$  tracer technique was employed to analyze radioactivity of 7 soil profiles in study area. The results showed that  $^{137}\text{Cs}$  existed in 0-15 cm and 0-20cm of soil in non-cultivated and cultivated land, respectively. The erosion characteristics of 7 soil profiles were analyzed based on the profile distribution and activity of  $^{137}\text{Cs}$ . It was found that the YN<sub>7</sub> and YN<sub>15</sub> were typical soil eroded profiles, while YN<sub>5</sub> was a sedimentary profile and YN<sub>18</sub> was farmland profile. In YN<sub>2</sub>,  $^{137}\text{Cs}$  distribution layer of  $^{137}\text{Cs}$  were quiet complete and showed negative exponential distribution curve, which can be regarded as an ideal sampling site of  $^{137}\text{Cs}$  background value. YN<sub>19</sub> was an erosion-deposition profile, in which  $^{137}\text{Cs}$  mainly distributed in shallow soil and showed high activity. Based on the profile distribution of  $^{137}\text{Cs}$ , we analyzed the soil erosion rate in the 7 profiles and found that soil erosion rate of farmland was very low (0.240t/ (hm<sup>2</sup>·a)) due to the effects of farming activities. However, serious erosion occurred in the sampling site. On semi-fixed dune, the wind erosion particles were accumulated due to the terrain features. The compaction of surface soil greatly prevented wind erosion and even resulted in accumulation of wind erosion particles, which mainly depended on soil types. Generally, in arid area, vegetation coverage, land-use type, terrain and soil type should be considered in estimating wind erosion rate by  $^{137}\text{Cs}$  technique.

### **Key words:**

$^{137}\text{Cs}$ ; wind erosion; erosion rate; opencast mine area; Zhundong coalfield;

## A Quantitative Method to Long-Term Soil Erosion Impacts on Productivity in Huaihe Watershed, China

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### Abstract

Water erosion results in reducing productivity of farmland. With cultivation time increased, the agricultural productivity is facing significantly increased vulnerability. Therefore, it urgently needs to quantify the assessment of productivity vulnerability of farmland. This paper, based on the APEX model and global hydrological watershed unit, selected the Huaihe River watershed as a case to explain the methodology of cumulative loss surface. Erosion variable controlled method was used to make soil and water conservation measures scenarios to study the relationship with the long-term erosion and productivity loss and fit the surface of soil erosion - loss of productivity - cumulative years. Results showed that: 1) The “water erosion intensity-cumulative years-loss rate surface” fits well. The highest R-square is 0.92 and the lowest R-square is 0.36. It has important significance to understand the long-term effects on productivity. 2) There is a significant pattern regional difference of potential productivity loss of all basins located at middle and upper reaches of the Huaihe River. It indicates that long-term water and soil loss have a significantly impact of productivity loss, especially to the southern region of middle and upper reaches of the Huaihe River. 3) Using the accumulating loss surfaces can conduct the potential loss of productive under long-term soil erosion, the maximum loss of productivity, and the time when the maximum loss happens. Namely, the earlier of 100% loss occurs, the more vulnerable of watershed productivity is due to soil erosion, and the more urgent of reforestation measures should be taken.

**Key words:** Long-term Soil Erosion; Productivity loss; APEX model

## Analysis of NDVI Time Series for Assessing of Vegetation Dynamics on the Baikal-Gobi Meridional Transect

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### Abstract

Land degradation and desertification processes are widespread in natural and economic territories of Russia and Mongolia. A number of model monitoring polygons was established in different latitudinal zones of the Russian and Mongolian territories along the Baikal-Gobi meridional transect (51-43 °N, 105-107 °E). These polygons include a wide range of territories with dry climatic conditions. This investigation revealed the main factors, agents, and trends of desertification processes development in different climatic zones.

Monitoring of the status and dynamics of vegetation cover of the key sites are conducted on the basis of processing and analysis of multitemporal Landsat and MODIS Terra imagery.

During the field expedition studies, the in-situ landscape indication of NDVI areas with different values was conducted. The natural and anthropogenic factors of the dynamics of their changes were studied. Phytocenotic diversity is revealed on the model key sites, geobotanical profiles are laid, and characteristics of the spatial organization of vegetation cover are given. Landscape indication of the key sites is held based on satellite imagery and complete geobotanical descriptions. Created large-scale vegetation maps will allow to evaluate the ecological state, to determine the dynamics of vegetation cover changes and provide a comparative analysis of the dynamics.

The conducted analysis of NDVI indicates current trend of aridization of already sparse vegetation on the Mongolian polygons.

### Key words:

desertification; vegetation degradation; dry climatic zone; aridization; Landsat; NDVI; landscape indication; geobotanical description

## Analysis of Rainfall Erosivity under Monsoon Regime in Maharashtra State, India

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### Abstract

About 57 % of total geographical area of India is suffering from various forms of degradation. Maharashtra, basically is an agrarian state with soil being the crucial resource. But rapid industrialization and development by acquisition of more agricultural land is exerting pressure on available land resources. This necessitates the proper analysis of the climatological, pedological, physiographic and anthropogenic parameters which plays a major role in degradation of soil resources. Rainfall is the main source for the supply of energy to detach and transport soil particles from soil profile. The aggressiveness of the rain to cause soil erosion is termed as Rainfall erosivity which depends upon the Kinetic energy and intensity of the storm.

Maharashtra, displays diversified landscapes, which is responsible for the differences in distribution, duration and intensity of rainfall which ultimately controls the erosivity. Much of the rain is brought by the south-west monsoons during summer. About 90 percent of the rain falls in the four months from June to September with average annual precipitation of 795 mm.

Daily rainfall data for 367 stations obtained from India Meteorological Department is used for the analysis of the rainfall erosivity. As per the eight rainfall zones identified based on distribution of rainfall, a regression analysis was performed to obtain an approximate relationship between rainfall data and the rainfall erosivity. The higher values of correlation coefficient signifies that relationship between Rainfall and Erosivity fit to a power function. Accordingly two equations were formulated for high and low rainfall zones.

### Key words:

Rainfall Erosivity; degradation; kinetic energy; duration and intensity of rainfall

## Assessing Soil Erosion by Remote Sensing in the Middle Reaches of the Yarlung Zangbo River, Tibet

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### Abstract

The middle reaches of Yarlung Zangbo River, in the south of the Tibetan Plateau, is the political, economic and cultural center of Tibet Autonomous Region. However, with many types of serious soil erosion, this area has a fragile ecological environment. In this paper, based on multi-source and multi-temporal remote sensing data, land use/land cover types was obtained by object-oriented classification method, with the overall accuracy of 90.62%. Then, utilizing the land cover types data and the Normalized Difference Vegetation Index (NDVI) data in the peak of the growing season, the vegetation coverage was estimated by density sub-pixel model and non-density sub-pixel model with 90.60% overall accuracy. Moreover, we extracted other soil erosion factors including slope, aspect, annual precipitation, and annual freeze-thaw cycle days, and phase transition water content in freeze-thaw process. Afterwards, criterion and weight of these factors for different erosion types were formulated respectively by establishing soil erosion discrimination and evaluation models. Combining remote sensing, geographic information system and field investigation, we completed a comprehensive soil erosion evaluation at 1: 50,000 scale. The accuracy of evaluation is 93.60% with 125 field verification points. Finally, we analysed the spatial distribution characteristics and causes of different erosion types. The results illustrate that, 1) soil erosion area is 46588.51 km<sup>2</sup> (accounting for 69.89% of the study area), of which 80.36% suffers moderate to severe erosion; 2) different soil erosion types have significant spatial distribution pattern. The evaluation methods and results are of great significance for soil erosion research in Tibetan Plateau.

### Key words:

remote sensing; soil erosion evaluation; land use/land cover types; vegetation coverage; Yarlung Zangbo River

## Characterizing Land Surface Temperature and Vegetation Changes near Son-Ganga Confluence, India, during 2000-2015 period using MODIS Products

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### Abstract

Uninterrupted monitoring of land surface temperature (LST) and vegetation cover is one of the results of advancement in space technology. Understanding surface temperature variations and vegetation changes at the Son-Ganga confluence zone in the Middle Ganga Floodplain (MGF), Bihar, India, is main objective of this study. LST and Normalized Difference Vegetation Index/Enhanced Vegetation Index (NDVI/EVI) MODIS satellite products onboard Terra (1km spatial and 8-day composite temporal resolution for LST, and 250m spatial and 16-day composite for NDVI/EVI) for the period 2000-2015 were used in the study. LST product (scale factor of 0.02) was analyzed over the period starting from March 05, 2000 to December 27, 2015. NDVI/EVI MODIS product (scale factor 0.0001) used in the study spans over the period from February 18, 2000 to December 19, 2015. Day time LST indicates a slightly decreasing monthly trend with average pixel temperature 301.62K on March 5, 2000 and 293.64K on December 27, 2015 and night time LST shows the declining monthly trend with average pixel temperature 288.29K and 282.76K on the same corresponding dates. NDVI values for the area reveals an increasing trend (NDVI ranges between 0.09-0.23) and EVI during the same period also shows the same rising monthly trend (EVI ranges between 0.26-0.34). Increasing values of NDVI/EVI and decreasing trend of LST in the area least affected by human settlements (because of frequent flooding around confluence zone) indicates an inverse relationship between temperature and vegetation. This study signifies the use of satellite derived data in environmental monitoring in floodplain areas.

### Key words:

Land Surface Temperature (LST); Middle Ganga Floodplain (MGF); Normalized Difference Vegetation Index/Enhanced Vegetation Index; MODIS

## Coal Mining Subsiding Land and its Consolidations in Jining City

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### Abstract

Jining City, located in the North China Plain, is a typical coal resource-based city, the coal mining has caused a lot of land subsidence in the last fifty years. In this paper, we accorded to the field survey data and Landsat OLI remote sensing images of Jining in 2015, through visual interpretation to extract the distribution and type information of coal mining subsidence area, proposed the direction and mode of consolidation and use for different type. The study found that the total area of coal mining subsidence of Jining in 2015 is 27,343.15 hectares, accounting for 16.23% of the total land area, mainly located in the south of Rengcheng, the "Golden Triangle" area at the junction of the Yanzhou, Qufu and Zoucheng, the east of Weishan Lake. According to the degree of subsidence, coal mining subsidence area can be divided into mild, moderate and severe subsidence area, the consolidation direction should be reclamation into arable land, comprehensive development of agriculture, forestry and fishing or as ecological land.

### Key words:

coal mining subsidence area; consolidation mode; Jining city

## Coastal Land Suitability Evaluation for Fishponds in Indramayu Indonesia Using Landsat Thematic Mapper Imagery and Geographic Information System

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### Abstract

The coastal area has the potential for development. This potential can be inland and marine fisheries, which could be a high potential development aspect. Inland fisheries have not become a major source for local revenue due to the low management of the region, particularly on the coastal areas fisheries utilization. The goal of this study is to evaluate the suitability of fishponds in relation to the physical characteristics of the coastal areas. It aims to provide accurate data and precise information regarding the suitability of land for the fishponds by using remote sensing and geographic information systems (GIS). The specific objectives to be achieved in this study were (1) to analyse the characteristics of the coastal areas (2) to evaluate the land use of coastal areas for the fishponds using remote sensing and GIS, and (3) to analyse the direction and planning of the coastal area, especially in the use of fishponds. The method used was remote sensing and GIS by using survey techniques. Research findings reveal that the fishponds are suitable, fit reasonably, and they are very appropriate. The results of the evaluation of the suitability of fishpond can be used for the selection of the best fishpond location and in determining how to develop coastal areas in the Indramayu, Indonesia.

### Key words:

Land Suitability; Land Evaluation; Coastal Area; Fishpond; Indramayu (Indonesia)

## Crop Salinization Vulnerability Curve Construction Based on EPIC Model: A Case Study of Global Maize

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### Abstract

This study addressed on exploring the method of crop salinization vulnerability curve construction. Current researches mostly concentrated on using the experimental method or model simulation to quantitatively assess the relationship between productivity and single index such as soil salt concentration or electric conductivity, and the curve's application had regional limitation. Considering multiple environment elements, salinization stress index as a comprehensive index was designed in this study. With variable controlling and IPCC AR5 RCP2.6 climate data, global maize production losses in different salt concentration irrigation scenarios were simulated by EPIC model. Then global maize salinization vulnerability curves were constructed in  $0.5^{\circ} \times 0.5^{\circ}$  grid scale and continent scale. The results showed: 1) The curves were excellent in fitting with R-square range from 0.68 to 0.99. Curves varied from grid to grid and showed a regional vulnerability difference in different environments. 2) The curves had three basic shapes judged by the inflexion, namely 'standard S-shape', 'slow growth' and 'rapid growth'. 3) Max production loss can be used as the criteria of vulnerability assessment, i.e., the larger max production loss, the more vulnerable. With this criteria, Asia is most vulnerable of salinization, then comes Europe, North America, Africa, South America and Oceania. This study can provide basic data and serve as reference for quantitative assessment of salinization risk.

### Key words:

Vulnerability curve; Salinization; Global; Maize; EPIC

## Desertification & Land Degradation Status Mapping of North East India: Special reference to Assam and Meghalaya

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### Abstract

The causes for desertification are mainly improper management practices, overgrazing, tree felling, over cultivation etc. The vegetal degradation, erosion processes, water logging and salinization lead to loss of soil fertility, soil compaction and soil crusting. Urbanization, mining and recreation also cause land degradation. The objective is to assess the status of desertification in some areas of North East India at 1:50,000 scale using Resourcesat and LISS III data and collect information on various land degradation processes and their severity. As 2011 report the total forest cover in Assam is 27673 km<sup>2</sup> (35.28%), in Meghalaya is 17275 (77.02%). The total area under the process of desertification/land degradation in Assam is about 21.31% and in Meghalaya is 38.07%. The most significant processes are vegetal degradation and water logging. In Assam the area under desertification/land degradation processes is vegetal degradation 15.77%, water logging 5.54%. The area under no apparent degradation is about 71.88% and water body/drainage 6.18%. In Meghalaya the area under desertification/land degradation processes is vegetal degradation 35.59%, water logging 0.55%, water erosion 1.93%. Area 61.89% comes under no apparent degradation and water body 0.04% and 0.3% respectively. DSM for 5 vulnerable districts of Assam and Meghalaya viz Golaghat, Hailakandi, Kokrajhar of Assam, Jaintia Hills and West Khasi Hills of Meghalaya are carried out on 1:50,000 using three seasons LISS-III data of two different time series so as to compare the change in the status of the desertification over the years. Three seasons LISS III data used are of 2003-04 & 20012-13.

### Key words:

desertification; degradation; and apparent; vulnerable; status

## Desertification Causes, Effects and Solutions: A Study in Environmental Geography

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### Abstract

Desertification is a global phenomenon. It affects over 1.2 billion people living in more than 110 countries around the world and it also affects about 10 million square kilometers area. Seventy percent of the agricultural land in arid, semi-arid and dry sub-humid lands is already degraded. Desertification causes poverty with social economic and political instability.

Desertification is a process in which soil becomes bare and dry, and cannot support vegetation. It can happen very quickly over a few seasons. It is caused by climatic factors such as climatic change and drought, as well as over cultivation, over grazing, bad farming or irrigation methods and deforestation. Desertification damages soil and makes it infertile for growing crops, it destroys communities of plants and animals which reduces biodiversity. It leads to poverty, famine and ill-health and encourages social and political unrest.

Desertification in China is a major environmental problem which has been mainly caused by deforestation and overexploitation of land for farming and grazing resulting 1.65 million square kilometers of area and sixty percent of China's population lives in desertified areas.

Mesopotamian (modern Iraq) marshlands have been reduced one-tenth of their original size i.e. 1500-2000 square kilometers and is expected to disappear in the next 5-10 years. The reason is that water from the Tigris and Euphrates rivers was diverted from its normal flow via canals and ditches and construction of dams on the rivers to store water – this leads to desertification of the region. It affected badly to Marsh Arabs or Madan who lived in the marshlands for over 5000 years in which they learned to live in harmony with their environment. Biodiversity of the region has been destroyed.

Barsa Kelones used to be an island located off the north-western coast of the Aral Sea in Kazakhstan has now been turned into a peninsula due to no water flow from the Amu Darya and Syr Darya rivers to the Aral sea which used to irrigate huge areas of cotton and rice that were grown on the land around the sea. The wildlife and biodiversity of Barsa Kelones have been badly affected by the desertification of this region these are the few examples of desertification and its bad impacts.



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Harmful human activities and harsh climatic conditions are causes of desertification all over the world. Hence we should educate ourselves about the causes and consequences of desertification and promote awareness of desertification in our community at all levels through various programmes and actions in the interest of good environment and humanity.

**Key words:**

Meaning of desertification; causes; impact and its solutions

## Determining Sources of Sediments at Nkula Dam in the Middle Shire River, Malawi, using Mineral Magnetic Approach

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### Abstract

Shire River is the largest and longest river in Malawi. Siltation is now a major problem in the Nkula Dam on Shire River due to catchment degradation. This study analysed sediment samples from western and eastern tributaries of the Shire River to determine sources of sediments that cause siltation in the Nkula Dam using mineral magnetic approach. Representative samples were collected from tributaries of western and eastern sides of the Shire River and Nkula Dam, and subjected to magnetic measurements on bulk samples and sized fractions (<250  $\mu\text{m}$  and >250  $\mu\text{m}$ ). Our results show that, eastern tributaries have significantly higher ferrimagnetic mineral contents and ferrimagnetic to antiferromagnetic ratios than western tributaries. Rock geology is interpreted to be the main reason for magnetic contrast between the two sides of the river. It is suggested that most of the sediments in the Nkula Dam originate from the western part of the Shire River, which is caused by intensive erosion in the western side of the middle Shire River. This study demonstrates that magnetic method is a promising approach in assessing fluvial sediment source.

### Key Words:

Concentration parameters; Mineral parameters; Particle size; Ferrimagnetic minerals; Western Tributaries; Eastern Tributaries

## Ecological Sustainability and Land Management in Aravalli Hill Ranges of Tonk District, Rajasthan, India

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### Abstract

The Aravalli hill region of south Rajasthan served its area and the people as a rich resource area providing forest products. Ecosystems are frequently disturbed by natural factors and humans actions leading to the degradation of land and also lead to the extinction of species of plants. Land degradation resulting disturbances in ecological stability causes problems at three levels. At the local level, it reduces productivity; at the national level it increases the effects of natural disaster like floods, drought and depletion of natural resources. At the global level, a complex cause- effect may impact soils as a terrestrial carbon sink, increase of greenhouse gases, climate change, famine in arid and semi- arid areas. Degradation and destruction of the natural resources is now assuming massive proportion in many countries.

The study area is located in central Aravalli in state of Rajasthan. The climate on the whole is semi-arid. This study examines the nature, spatial pattern, degree and causes of land degradation in central Aravalli hilly tract, which has ultimately disturbed and affected the ecology of the area. Main objectives are to analyze the factors responsible for ecological imbalance, to correlate the frequency of the rainfall with forest ecology under the influence of physical factors, to diagnose the spatial distributional pattern of forest ecology (flora and fauna) at different level. Further, the sustainable development has been put forth, which is the development without destruction and deterioration of natural resources.

### Keywords:

arbon sink; flora, fauna; sustainable



## Environmental Change and Conflict in Nigeria: An Overview

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### Abstract

Although, the relationship between environmental degradation as seen in Northern state of Nigeria and poverty is clear, its linkage with violent conflict in the region is subject to debate. This paper assesses the change to Nigeria's environment and its impacts on livelihoods and associated human response. The paper observes that the main impact pathways for environmental change induced conflict include competition for land especially arable land and clean water, habitable land, which is likely to become scarcer, more crowded, and more costly as a result of continued rapid disruption to landform and landform processes, these factors will cause large-scale poverty, and deadly human migrations that will also push populations dependent on rainfall or irrigated agriculture to fierce competition for productive resources. As the conflict intensifies it aggravates old divides of religion and ethnicity, which threatens not only the states but the entire country and the West African sub-region as a whole. The paper recommends that conceptualizing the challenges posed by environmental change in Nigeria will allow it develop strategies for dealing with the consequences of environmental change in a coherent and rational manner.

### Key words:

land degradation; climate change; desertification; natural resources; ecosystem

## Factors Influencing Land Degradation: A Case of Zuunburen Soum, Mongolia

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### Abstract

Recently, land degradation has increased due to inappropriate land-use such as rangeland overgrazing, mining activities, road expansions, and steppe and forest fire in Mongolia. Approximately 72 percent of total rangeland areas in Mongolia have been classified as degraded to the certain degree as a result of poor management of rangelands and some other factors.

The objective of this study was to identify the ecological state of rangeland located in the forest-steppe zone of Mongolia and define factors that influence land degradation. In this study, we used several variables including livestock number in sheep forage unit, air temperature, precipitation and vegetation cover, the forage yield, soil humus, density, and texture. We defined that 60.7 percent of total rangeland had been degraded with the twice higher number of livestock as compared to the actual carrying capacity.

### Key words:

Land use; vegetation cover; soil; climate condition; degradation

## Gully Erosion Mapping in the Sancha River Catchment of Northeast China Based on Multi-Scale Remote Sensing Data

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### Abstract

Gully erosion generally is considered as an indicator of desertification and land degradation. The objective of this research was to develop an overall methodology based on multi-scale remote sensing data for gully erosion mapping in the Sancha River catchment of Northeast China where gullies extend over a vast area. The research compared various remote sensing data including satellite images (such as Landsat 8, SPOT-4, ALOS, SPOT-5, ZY-3, GF-1, Pleiades-1A), aerial images and unmanned aerial vehicle (UAV) remote sensing data on gully mapping for the different temporal, spectral and spatial resolution (ten meters and meter level to decimeter and centimeter level). Image visual interpretation with field verification were used to map gully geometric features and evaluate gully erosion. The results showed that the study area suffered more serious gully erosion, which mainly occurs in cultivated land, and the highest gully density occurs at the northeastern of the catchment. We also found that sub-meter images have a good ability in the recognition of ephemeral gully and obtained satisfactory result. In addition, UAV remote sensing data showed great potential for reducing the data gap between field scale and satellite scale by providing digital terrain model and orthoimage with very high resolution on a centimeter level. This study provides information on the location of gullies, gully dynamics over a period of time, and the degree of land degradation (gully density) for developing comprehensive soil and water conservation management in the study area.

### Key words:

land degradation; gully erosion mapping; multi-scale remote sensing data; UAV; gully density; ephemeral gully; Northeast China.

## Hopf Bifurcation and Hysteresis Route in Arid Ecosystem; a Tool to Predict Desertification

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### Abstract

An ecosystem with a tipping in equilibrium state shows a bistability point with two equilibrium states for one set of conditions. In this case, changing the internal conditions and external perturbations can both cause the ecosystem to jump from one stable state to the other. Emerging desert landscapes is a consequences of non-linear responses of ecosystem to these outgoing environmental perturbations. These reactions are with resilience oscillations and equilibrium states alterations in an ecosystem. This paper presents chaotic behaviour of arid ecosystem over far from equilibrium where bifurcation points in stability route of ecosystem can represent a stable state of desert landscape over time. Adding one or more dimensions of periodicity to the ecosystem lead to a periodic orbit. In other word a path of stable equilibria is replaced by a periodic orbit which is a common behaviour in all of ecosystem with naturally periodic characteristics. This switch is called a Hopf bifurcation. This article shows that analysing ecosystem behaviour close to the tipping points (thresholds) can be a useful tool to predict desertification process. In this paper base on equilibria route concepts, has been explained desertification phenomenon over Hopf bifurcation and resilience oscillations in arid ecosystems. The results shows that less stable ecosystem indicated a higher amplitudes of fluctuation; conversely, a cessation of periodicity can signify a collapse in ecosystem which called desertification state.

### Key words:

Hopf Bifurcation; Hysteresis route; Desertification; Chaotic; Arid ecosystem

## Human Migration on the Pamir Plateau 2500 Years Ago Based on Strontium Isotope

### Analysis

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### Abstract

Archeological researches have proposed arguments for human mobility and long-distance trading over the Eurasia before the Silk Roads. Here we utilize biologically available strontium isotope analysis to assess the extent of pre-Silk Road population movements and cultural communications across the Asian interior. From an early Iron Age cemetery (ca. 2500 yr B.P.) on the eastern Pamir Plateau, mean  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios from 34 individuals display considerable isotopic variability, and 10 individuals are distinguished as migrants based on the local strontium isotope range of 0.710296 - 0.710572 by 12 ovicaprine bones. Comparison of the fraction (10/34) with the regional census data conducted in 1909 A.D. (3% non-locals) suggests a highly migratory behavior on the plateau 2500 years ago. Furthermore, exotic mortuary objects, such as silk fabrics from eastern China and angular harp originated from the Near East, clearly demonstrate an active interaction between the pre-Silk Road cultures on the plateau in the early Iron Age.

### Key words:

strontium isotopes; migration; pre-Silk Road; Pamir Plateau

## **Identification of Soil Erosion Hotspot Areas for Sustainable Land Management in the Gerado Catchment, Northeastern Ethiopia**

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### **Abstract**

In Highland Ethiopia, soil erosion is one of the main forms of land degradation which has a wide range of undesirable on-site and off-site impacts. It is therefore essential to mitigate soil erosion through site-specific and problem-oriented management practices. The research employed Revised Universal Soil Loss Equation (RUSLE2) model to identify hotspot areas of soil erosion and prioritize land management intervention in the Gerado catchment, North-eastern Ethiopia. The parameters required for the model were acquired from different sources and integrated with ArcGIS tools to estimate soil loss rates of the study catchment. Mean annual soil loss rates were estimated to be between 5 and 100 t ha<sup>-1</sup> yr<sup>-1</sup> on flatter and steeper slopes respectively. Over 75% of the catchment area had an average soil loss above the estimated tolerance soil loss rate of 18 t ha<sup>-1</sup> yr<sup>-1</sup> for the country. In order to identify hotspot areas, the catchment was classified into severe, very high, high, medium, low and very low erosion risk categories. Based on the study result, it is recommended that areas with severe, very high and high erosion risk with estimated soil loss of 25 t ha<sup>-1</sup> yr<sup>-1</sup> or over are prioritized for land management intervention. Areas which require the immediate implementation of soil management approximately accounted for 75% (5025 ha) of the total catchment. The results showed that the severity of erosion was linked to the steepness of slope, cultivation of steep slopes, absence/lack of effective conservation measures and sparse nature of the steep slope vegetation cover.

### **Key words:**

soil loss tolerance; RUSLE2; erosion factors; management prioritization.

## Integrated Landscape Policy

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### Abstract

Landscape scale management and conservation involves a range of geographic scales for addressing land degradation and environmental change issues. The bio-geophysical design principles of wildlife corridor planning for biodiversity conservation, for example, are largely established in ecological and bio-geographical literature. In addition to ecological knowledge, however, landscape-scale policy development requires more theorization about geographic scale, scale effects, and place-based spatial phenomena. An understanding of how differences in the evidentiary scale for policy diagnosis and prognosis can lead to other readings of the problem and hence different responses or solutions is critical for policy outcomes.

This paper reflects on Australia's National Wildlife Corridors Plan for biodiversity conservation, a plan to address land degradation and climate change. Although the Plan was not implemented, it continues to provide a partial basis for addressing issues such as: landscape scale connectivity; contested ideas of landscape; land-use planning; multi-scalar analysis in integrated natural resource management; private sector market failure; and government public policy failure. Its major shortcoming lies in its restricted political conception in biodiversity conservation as an election commitment rather than as a component of a comprehensive and integrated landscape scale policy initiative.

Drawing on Irish experience with the European Landscape Convention, the case is made for a broader conception of geographic scale in managing impacts on landscapes that are important for heritage, cultural, economic, and biodiversity conservation reasons. A recommendation is made for an explicit Integrated Landscape Policy that recognizes landscapes as place-based spatial phenomena at local and national levels.

### Key words:

Key words: geographic scale; space; place; change; integrated landscape policy; land degradation.

## Integrating Measurements of Grassland Function Using Remote Sensing

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### Abstract

Grasslands provide vital global ecosystem services, are sensitive to disturbance and invasion, and prone to rapid functional collapse. Critically, grassland ecosystems are carbon sinks or sources depending upon management practices largely surrounding cropping and grazing. Grasslands worldwide have been degraded in recent decades due to intense human activity and climate change and this degradation not only threatens ecosystems but negatively affects ecosystem services. The pressures from degradation emphasize the need to understand, evaluate, and monitor grassland ecosystems. For decades, studies have used remote sensing tools to determine solitary measures of grassland growth and productivity including leaf area index, biomass, canopy height and cover, structural heterogeneity, and burn and grazing effects. While this approach has advanced our understanding of how to monitor specific elements of the grassland community in isolation, a barrier to continued progress in assessing community effects of herbivory and human use for ecosystem services is a comprehensive assessment of vascular, non-vascular, biotic and abiotic features of grasslands. A comprehensive grassland assessment is hindered by uncertainties of optical grassland remote sensing resulting from existing non-photosynthetic vegetation (NPV) and biological soil crust (BSC), and constrained by lack of an effective approach to quantify NPV and BSC. Further, NPV is critical for determining herbivore carrying capacity in winter; however, it is an understudied field for remote sensing. Thus, this study is to make an important advance in large scale grassland ecosystem monitoring and conservation using remote sensing tools through focusing on BSC and NPV and integrate this with established spectral relationships.

### Key words:

grassland; remote sensing; non-photosynthetic vegetation; biological soil crust

## Land Use and Topographic Effects on the Spatial and Temporal Soil Physicochemical Properties on the Uplands of Rwizi Catchment in the Lake Victoria Basin

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### Abstract

Soil properties are an important proxy of the quality and resilience of the land and its associated practices. In this study we investigated the effect of land use and topographic factors on the magnitude and spatio-temporal variation in 12 soil physical and chemical properties in Rwizi catchment, Lake Victoria Basin. Using land use, topographic segment position as fixed factors; we selected 36 locations for composite sampling of soil properties representing 4 land uses, 3 slope segment positions and three replications. The soil samples were tested in the lab using standard techniques. The results show a moderate to high spatial variation of the soil properties. Between the three studies years, the variations were not consistent with SOM, N, P, showing gains while texture shows losses on a short timescale. Land use has a significant ( $p < 0.05$ ) effect on soil texture and SOM, while topographic position seems to be dominant significantly affecting 8 of the 12 studied physicochemical properties. The greatest changes were observed for samples on the lower segment slope positions. Strong and significant correlation between the soil properties and environmental variables (slope gradient, altitude, aspect, latitude and longitude) are observed for SOM, texture, N,P and K.

### Key words:

Physicochemical properties; Land use; Topography; Lake Victoria Basin

## Landscape Mapping of Selenginsky Middle Mountains (on the Example of the Ubur-Dzokoysky Hollow)

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### Abstract

Satellite imagery are widely used in the most different areas of human activity – research of natural resources, monitoring of natural disasters and an assessment of their consequences, studying of influence of anthropogenous impact on environment, construction and design and exploration work, the city and land registry, planning and management of development of territories, town planning, geology and development of a subsoil, the industry, rural and forest farms, tourism, etc. Modern GIS technology and creation of maps of different scales can not do without the use of satellite images and the use of remote sensing methods.

The purpose of work is studying of differentiation of geosystems by creation of the landscape map of the Ubur-Dzokoysky hollow.

In this article we consider the mapping of landscapes and their classification on the example of the Ubur-Dzokoysky hollow. Landscape mapping was made on the basis of the developed structural-genetic classification. The obtained results disclose the modern status of the environment. The analysis of the spatial structure of landscapes was made with defining the dominant and background landscape complexes.

### Key words:

Landscape mapping; landscape classification; geosystem; Selenginsky middle mountains.

## Marshland Degradation in Xingkai Lake and the Restored Strategy for Habitat

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### Abstract

With the rapid growth of population and the national demand for foods, the natural marshlands in northeastern China had been damaged extensively since the 1950s. Global climate change is increasing the frequency and magnitude of the floods and droughts, augmenting the vulnerability of wetland ecosystems. According to the topographic map and remote sensing images in ArcGIS, the marshland area decreased 56.6% during 1954-2010, but the rice paddy area increased 1.28 times from 1980 to 2010. The marshland in the region of Xingkai Lake had undergone the dramatic loss and the patches of marshland were fragmented. By the investigation of the historical rice paddy in the core and experimental areas in Xingkai Lake, the migrated ducks on their paths resulted in the yields loss up to 70%. For the policy maker, the habitat was urgently restored. So it showed that the ecological compensation was conducted where had no production within the one kilometer buffer around Xingkai Lake National Nature Reserve.

### Key words:

marshland pattern; waterbirds habitat; restored strategy

## Monitoring and Analysis of Soil Erosion in the Loess Plateau of China Based on CSLE - A Case Study on Dongzhiyuan in Loess Plateau

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### Abstract

Soil erosion is a worldwide ecological and environmental problems, which has become an important manifestation of the ecological threat to human security. The soil erosion has been listed as one of the top ten environmental issues for the advent of mankind. The Loess Plateau of China is the most serious soil erosion area in the world, while Dongzhiyuan is the largest plateau in the Loess Plateau. There are known as the first loess tableland. According vegetation maps, topographic maps, soil maps, site rainfall interpolation maps, TM / ETM images and other information of the Loess Plateau Dongzhiyuan, we have set up the China soil loss equation CSLE (it has been successfully applied to the 1st national water census and Water Conservation census in china) based on the technology of RS and GIS. The CSLE is based on the US Universal Soil Loss Equation (USLE). Those result can provide a reliable basis for monitoring and analysis the soil erosion area, exploring the cause of the soil erosion and making the soil conservation measures.

### Key words:

Soil erosion; CSLE(China soil loss equation); RS/GIS; Loess Plateau; Dongzhiyuan

## **Pasture Use in the Eastern Zambezi Region, Namibia; A People - Cattle Grazing System Under a Flood – Drought Regime**

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### **Abstract**

Cattle grazing and subsistence farming are still of major importance in the rural areas of northern Namibia. The grazing cycle of cattle in the eastern Zambezi region of Namibia (previously known as the Eastern Caprivi region), is defined by an annual flooding and drought cycle. National Parks and other conservation areas as well as national borders (permanent rivers, Zambezi and Chobe) define the space available for grazing. Increasing numbers of cattle and settlements in the area create pressure on the environment, which results in land degradation and erosion. This paper seeks to analyze the trends during the last 15 years using MODIS NDVI satellite data and aerial photography. Two years of GPS cattle tracking data provides data to relate cattle movement to flooding intensity. An aerial photo mosaic series from 1970 – 2006, provides detailed data on land clearance and degradation for the Salambala conservation area. During the flooding period (March – May) cattle has to leave the grazing areas on the flood plains and livestock numbers on the higher sandy areas increases above the ecological carrying capacity. The same higher grounds are also becoming more and more densely settled, ad settlements are often focused near the main roads, where clean water, electricity health and educational services area more readily available. This negative cycle of settlement concentration, unproductive farming practices, charcoal burning and grazing on confined spaces is easily seen in the environment.

### **Key words:**

Namibia; Zambezi region; cattle; flooding; drought; land degradation; land cover change; MODIS; GPS-collar tracking.

## Reflection of Land Use in Landforms and Sediments of Small Catchments

### (Meghalaya Plateau, NE India)

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#### Abstract

Geomorphological mapping, morphometric and sediment analysis were used as a base for evaluation of human impact on the relief in Meghalaya Plateau. Two small hilly catchments of altitude 1750–1840 m asl. with similar environmental features (lithology, climate) and area (~3 ha) but different land use, was chosen for studies. Both catchments agricultural and with natural forest - so-called "sacred forest" are located in the northern part of Myllem granite batholith, in the Nongkrem village. The climate is monsoonal with 14°C of mean annual temperature and 2400 mm of mean annual rainfall. Slopes are covered by sandy clayey grus weathered up to 15-20 m with developed sandy-loam and silty-loam Ultisols.

The longitudinal profiles of both catchments are a step-like, with thresholds formed by giant granite boulders. Terraces formed with using a giant boulders are characteristic feature of agricultural catchment with intensive root crops cultivation. More distinct thresholds, deeper incision, steeper slopes and presence of branch valleys in its head distinguish the forested catchment. Giant boulders are scattered in both catchments. However, less number of boulders found in agricultural one is related to their selective extraction. In contrast, higher contribution of fine sediment found in agricultural catchment, results from tillage mixing of surface soil horizon.

Morphometric and sediment features evidence dominant role of human impact in recent relief transformation of agricultural catchment. Detailed geomorphological mapping is an useful tool in recognition of land degradation.

The research is outcome of PAS-INSA bilateral cooperation.

#### Key words:

landform; land use; geomorphological methods; Meghalaya Plateau

## Research on the Application of Structural Vegetation Coverage in Soil Erosion

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### Abstract

Vegetation is one of the most important influence factors of soil erosion. In soil erosion research, the influence of vegetation on soil is usually expressed by vegetation coverage. Commonly used projection vegetation coverage has some limitations in the characterization of vegetation's soil and water conservation functions. Structural vegetation coverage is proposed to overcome this limitation and comprehensively reflect the influence of community coverage on soil erosion, but most relevant research is still on theoretical stage. The research is carried out in the Yan River Basin, which belongs to the Loess plateau, mainly through RS and GIS spatial analysis technology, using the daily rainfall data, Landsat 8 OLI images, SRTM DEM, land use map, soil K value map, transfer station measured runoff/sediment data. Based on structural vegetation coverage remote sensing model and dimidiate pixel model respectively, structural vegetation coverage and NDVI vegetation coverage in the study area were extracted and compared in various respects. With the two vegetation coverage as the index of vegetation factor respectively, USLE-based quantitative soil erosion evaluation and validation were conducted to analyse the rationality of structural vegetation coverage, and the applicability of structural vegetation coverage remote sensing model in the quantitative evaluation of regional soil erosion. The results illustrate that structural vegetation coverage can more accurately reflect the actual situation of regional soil erosion, and is more suitable for quantitative evaluation of regional soil erosion.

### Key words:

Yan River Basin; structural vegetation coverage; soil erosion

## Research on the Rocky Desertification Poverty Effect and Benefit Evaluation of Poverty Reduction by Control Project in Typical Villages

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### Abstract

Rocky desertification and rural poverty are the two most prominent issues in Karst Mountains of southwestern China and the basic starting point of this research is to connect them organically. This project is the continuity of my doctoral dissertation and thoughts on the new issue remaining to be studied. The pre-stage research thinks the rocky desertification poverty is the poverty caused by the rocky desertification, which deprives farms' development opportunity of improving life condition through agricultural production. When the rocky desertification causes the changes on resource gift, the accurate, timely and efficient adjustment on rural industrial structure becomes the key for the rocky desertification poverty. But the pre-stage sample only has one village and the research length is too short. In addition, through investigation, after the acceptance of many rocky desertification governance projects, researches on the follow-up efficiency assessment on projects are very few due to the insufficient funds and fail to consider the projects implementation's long-term influence and the sustainable inspection on rural economy into consideration. Therefore, select 4-5 classic villages as sample, combine methods of 3S technology, mathematical analysis, laboratory and field investigation, inspect rocky desertification's specific influencing method on rural economy, make emphasis on the rural social economy situation before the implementation of the project, in the acceptance of the project and after the implementation of the project and make assessment on the poverty decreasing efficiency of rocky desertification governance project. This project provides decision-makings and references for breaking the rocky desertification poverty.

### Key words:

rocky habitat restoration; succession dynamics; poverty reduction; benefit evaluation; natural village

## Socio-Economic Factors and Consequences of Desertification Process in Mongolia

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### Abstract

Change of economic system and system of grassland farming led to negative consequences such as enlarged proportion of goats in herd because of the increased demand for cashmere, increased migrations of population and concentration of livestock breeders around the large regional centers and the cities, pasture overload as a result of overgrazing that involves degradation of pastures. The model territories problems with public and nomadic economy water supply, negative influence of mining on grassland farming are shown up. The structural and logical scheme of factors and consequences of desertification process is offered. The results of sociological poll of the model territories population confirmed the existence of interrelations between desertification processes and life quality deterioration, found out the main reasons for migrations in the perception of local population. In the issue of research, the measures aimed at decrease of negative impact on pastures are suggested.

### Key words:

nomadic economy; pasture degradation; socio-economic consequences; migration

## Soil Characterization and Land Evaluation in the Kemite Watershed: A Way Forward for Sustainable Rural Land Use Planning in Ethiopia

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### Abstract

The quality of agricultural land varies mainly in its soil's physical, chemical, biological and hydrological characteristics. This variation mainly results from soil degradation as well as agroecological and socioeconomic constraints; and these restrictions have highly affecting the quality of soil and farming systems to a great extent. Land evaluation is an essential approach to identify major limiting factors of farming activities, and to optimize yields sustainably. The aim of this study was to explore biophysical land quality constraints for the cultivation of *tef* (*Eragrostis tef*) crop in the *Kemite* watershed, Ethiopia. A physical land evaluation approach of 'the maximum limitation method' was employed. The findings of this study indicated that *tef* crop cultivation was constrained by the deficiency of soil macro-nutrients, poor soil drainage characteristics, shallow soil depth, rooting conditions and frost hazard, though the degree of limitations vary across the different land mapping units (LMUs). However, poor soil drainage systems and soil nutrient deficiencies were the most severe limiting factors. As a result, among delineated twelve LMUs, nine of them were categorized under actually unsuitable but potentially suitable (N1), while three of them were grouped as marginally suitable (S3) for the cultivation of *tef* crop. Considering the severity level of the identified limiting factors in each LMU, land management measures such as soil and moisture conservation, fertility improvement and land-use alternatives were proposed. This can offer inputs for policy briefs to device appropriate land use planning and land management options to enhance agricultural productivity in Ethiopia.

### Key words:

Land evaluation; land management; maximum limitation method; rainfed agriculture; soil characterization; Ethiopia

## **Spatiotemporal Analysis and Mapping of the Relationship between Gully Erosion and Controlling Factors in Northeast China**

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### **Abstract**

Gully erosion in black soil region of northeast China cause mass land degradation. The gully distribution data in 1965 and 2005 was derived from Corona image and Spot5 image respectively, and a field survey was taken to ensure the result of interpret. The relationship between spatial distribution of gullies and controlling factors, such as slope gradient, slope aspect, SPI, as well as land use and lithology are discussed in the Kebai region of Heilongjiang Province. The result showed that average of gully density in 2005 was over 10 times more than in 1965 in study area, and the highest gully density was over 22000m<sup>2</sup>/km<sup>2</sup> for individual area. Farm land with high slope gradient and high SPI value area is the most vulnerable region for gully erosion, over 80% of gully distribution can be explained by these three factors both in 1965 and 2005. Two patterns of gully erosion in different substratum were identified via the overlay analysis. Temporal change of gully erosion showed that human disturbance of the land system, such as exploiting of grassland or forest, is the most promoting factor for gully dynamics. Based on the analysis, a simple method is proposed to identify the region with high risk of gully erosion at large regional scale.

### **Key words:**

Gully erosion; black soil region; spatiotemporal analysis; Remote Sensing; Northeast China

## TETIS Model Based Runoff and Sediment Simulation of Wuyuer River Basin, Black Soil Region of Northeast China

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### Abstract

Soil erosion is one of the severe environmental problems worldwide and modelling approach is an important way to simulate runoff and erosion processes. However, modelling research is inadequate in black soil region of Northeast China. In this paper, the distributed hydrological and sediment model TETIS was used to simulate runoff and sediment in Wuyuer River Basin with an aim to understand runoff characteristics and sediment distribution, and to evaluate the applicability of TETIS model in the black soil region. With daily discharge and sediment data of 1970-1987, we calibrated and validated the hydrological and sedimentological sub-models of TETIS, and evaluated the results compared with other models. The results illustrated that the TETIS model gave satisfactory performance at daily time-step in the study area, with Nash and Sutcliffe model efficiency coefficients (NSE) higher than 0.7 and volume errors (VE) lower than 15%. The total flow is mainly composed by overland flow (54%). Gully erosion plays an important role and sediment yield (SY) during spring and summer accounted for majority of the annual SY. Soil erosion rate in most parts of the basin is less than  $200\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$  and arable land is responsible for most SY. Thus, TETIS model performs satisfactorily compared to other models applied previously in the black soil region. This research will have significant implications for modelling research in black soil region of Northeast China.

### Key words:

TETIS model; black soil region; runoff simulation; sediment simulation

## The Carbon Payments to Control Land Degradation in the Guanzhong-Tianshui Region

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### Abstract

Carbon trading and its resultant market for carbon offsets are one of the policy options to solve the problem of atmospheric climate change. The price on carbon is expected to generate demand for carbon offset schemes. In a market-based framework, the carbon price should be high enough to compensate for the opportunity costs. We studied a highly modified agricultural system in the Guanzhong-Tianshui economic region in China that is the typical one of many temperate agriculture zones of west China. We quantified the economic returns from agriculture and from carbon plantings (e.g. monoculture crops and mixing trees and shrubs) under five carbon-price scenarios. The mean carbon sequestration is  $33.62 \text{ CO}_2\text{-e Mg ha}^{-1}\text{yr}^{-1}$ , and average annual payment increases by  $\text{¥}1145.51 \text{ ha}^{-1}$  at a medium carbon price of  $\text{¥}50/\text{CO}_2\text{-e Mg}$ . Thus, it may be more cheaply in a carbon market to restore and protect the high-priority areas. However, the carbon is less to be sequestered by mixing native trees and shrubs overall.

### Key words:

carbon sequestration; Guanzhong-Tianshui economic region; carbon-price; economic returns; net present value

## The Changing Distribution of Rocky Desertification in the Guangxi Region, 1930s To 2000

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### Abstract

This article begins by defining the stony hills as places where light and more severe rocky desertification occurred in the Republic of China, based on an identification of stony hills found in a contemporary archive entitled *Protection Regulations for Stony Hills and Forest in the Counties of Guangxi Province*. We have digitized all of the stony hill areas that were depicted on 1:100000 scale topographic maps of Guangxi by the Land Survey Bureau of General Staff Department of Nationalist Government of China in the 1930s, and we have compared them with the distribution of rocky desertification in 2000 Guangxi Zhuang Autonomous Region through a graphics overlaying operation, thus revealing the spatial change in the distribution of rocky desertification in Guangxi in the past 70 years. We conclude that: 1, the area of light and more severe rocky desertification in Guangxi in the 1930s comes to 31922.25km<sup>2</sup>, which is 4799 km<sup>2</sup> more than 27123 km<sup>2</sup> in 2000. This shows that rocky desertification in the Republic of China covered a larger area than that of contemporary Guangxi. However, the spatial change varied in different areas: in some places rocky desertification increased while in others it declined. 2, the data of 2000 shows that the area of rocky desertification declined in 47 counties, and the total reduction is 9045.5km<sup>2</sup>. The reduction was mainly observed in the western and central part of Guangxi. The most significant reduction occurred in Du'an County. 3, the area of rocky desertification expanded in 30 counties, concentrated in northeastern Guangxi. The expansion is the greatest in Quanzhou, being 556.55km<sup>2</sup>.

### Keywords:

historical physical geography; rocky desertification; study of historical literature; Guangxi Area

## The Current State of Desertification in Mongolia

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### Abstract

Approximately 90 % of the territory of Mongolia is recognized as arid, semi-arid and sub-humid land and has been undergoing intense land degradation processes in the last few decades, which have resulted in severe degradation of its natural resources. The objective of this paper is to identify degraded areas due to desertification in the country based on the 7 influencing factors of desertification (soil erosion by water and wind, vegetation cover change, aridity index, drought, livestock density and population density), which were calculated for two different periods: 2000 and 2010. Each indicator were assigned weights ranging from 1 to 5 representing the good and the worst conditions, respectively, and indicating classes with low, moderate, high and severe states of desertification. The results indicate that 77.8 % of the country territory is under the certain state of desertification. The areas that are affected by desertification have increased by approximately 5.8 % ( $83.4 \cdot 10^3 \text{ km}^2$ ) comparing to 2005. The result of this assessment and the mapping methodology provides the basis for decision-making that involves mitigating actions.

### Key words:

soil erosion; land cover; desertification; NDVI; NDDI

## The Impact of Land Use on Morphology and Sedimentology of Streams Draining the Margin of the Darjeeling Himalaya in India

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### Abstract

Two pairs of forested (>90% forest) and agricultural (<65% forest) small catchments (~5-25 km<sup>2</sup>) were selected for comparison of land use impact on morphology and sedimentology of streams in the Darjeeling Himalaya. The catchments have similar rainfall (5000 mm annually), lithology (deep weathered gneisses) and soils (sandy loam and silty loam brown soils). It was hypothesized that the streams in agricultural catchment would have significantly higher runoff, discharge, wider channel and finer sediment than the stream in forested catchment. The majority of runoff, discharge, the morphological parameters as well as sediment patterns measured at stream cross-sections in the mountains failed to demonstrate significant differences at the 0.05 probability level. Frequent landslides along streams in both forested and agricultural catchments can mask impact of land use through delivery of large blocks to the channels that locally determine channel gradient, geometry and sediment patterns. In contrast, the same streams in the foreland of the Darjeeling Himalaya reveal consistent and significant differences in the bank stability, channel width and particle size on the stream bed. Land use impact on morphology and sedimentology of mountain streams can be easier recognized in the mountain foreland in comparison to headwater areas of the Darjeeling Himalaya.

### Key words:

extreme rainfall; channel morphometry; sediment pattern; human impact

## The Soil Heavy Metal in The Khovd City Area, Western Mongolia

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### Abstract

The Khovd city is one of biggest city of western Mongolia. Last decades human impact increasing surrounding of Khovd city area and environment condition is worsening. Specially soil quality and soil pollution is becoming threatening issue. Aim of our research is Khovd city vicinity area soil heavy metal content and distribution specifics. Analyzed 32 soil samples with definition of Cr, Pb, Cd, Ni, Zn, Cu content in the soils by Atomic Absorption Spectrophotometric methods.

Study area located north of Khovd city in the Buyant river basin area with elevation 1300-1400 meters a.s.l. According by Mongolian national soil classification system Gobi Brown soil distributed on study area. Average soil Chromium (Cr) content is 17.36 mg/kg, Lead (Pb) is 17.68 mg/kg, Nickel is about 14.01 mg/kg, Zinc is 73.69 mg/kg, Copper is 11.85 mg/kg, Cadmium is 0.05 mg/kg. In the topsoil organic horizons accumulated Lead, Copper, Zinc and soil forming sandy loam sediment characterized by comparatively low accumulation of heavy metals.

The city water sanitation facility area soils marked some increase of heavy metals in the soils. But those values not exceeding Mongolian soil standard (MNS: 5850) guidance. However, these situations threatening Buyant river water pollution and agriculture fields. Further need to be more detailed investigation soil heavy metal contents in Khovd city area.

### Key words:

Soil; heavy metal; Khovd city; western Mongolia; Cr, Pb, Cd, Ni, Zn, Cu; Buyant river; soil standard

## The Spatio-Temporal Dynamic of Saline Land in the Lower Reach of Taoer River Basin from 1983 To 2013

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### Abstract

Land salinization is a severe environmental hazard in the lower reach of Taoer River Basin. Saline land was identified by using a physically based transformation method through Landsat images from 1983 to 2013. The spatio-temporal dynamic of saline land was recognized. The results indicated that the area of saline land showed an upward trend and increased by 2.2 km<sup>2</sup> per year from 1983 to 2013. With a nonlinear change process, the years with relatively large area were from 2000 to 2005, while the area was relatively small in other years. Besides, the spatial dynamic of saline land was depicted by analyzing its distribution gravity. The results showed that the saline land distributed mainly in the northwest part of the salinization region and the change of distribution was irregular. The positive relationship between the gravity change distance and the changed area indicated that the increase of area was induced mostly from the addition of area in the periphery part. With nearly continuous saline land area and water area sets, a quantitative relationship was depicted and the causal connection between land salinization and water cycle change in year scale was confirmed. The results could support operational land and water resources management practices in the lower reach of Taoer River Basin, where climate change and intensive anthropogenic interruption is changing water cycle. (Foundation: National Natural Science Foundation of China, No.41201568; Major Science and Technology Program for Water Pollution Control and Treatment, No. 2013ZX07102-006-04; National Natural Science Foundation of China, No.41201572; Population, National Health and Family Planning Commission of China, No.201011)

### Key words:

Land salinization; Taoer River Basin

## **Vegetation of Eolian Relief Ubur-Dzokoyskoy Hollow of the Selenginsky Middle Mountains (Republic of Buryatia)**

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### **Abstract**

One of the clearest indicators of degradation processes and desertification of lands in the steppe zone are eolian processes.

In this paper we have studied features of phytocenotic diversity sand areas of southern part of Selenginsky middle mountains. Bases of vegetation of sands make psammophytic phytocenoses different stages of development. Vegetation on mobile eolian sands is characterized by small coenotic and taxonomic diversity. The vertical structure of the community is weakly expressed. The coenoflora of the psammo-steppes consist of 45 species of the higher vascular plants. Along with the dominance of species psammophyte (*Oxytropis lanata*, *leymus racemosus*, *Bromopsis korotkiji*, etc.) in the composition of plant communities are well represented steppe plant species, like *Vicia cracca*, *Galium verum*. The applied ordination methods have allowed to explain the ecological differentiation of psammo-steppe vegetation.

Detailed studies of the spatial structure of psammosteppe vegetation were deployed in key areas with the preparation of large-scale maps. The distribution of vegetation depends on the provisions of the relief shape determined of the prevailing wind direction. On the ridges of the dunes and the leeward slopes it is noted the dominance of communities with very low projective cover. In the aligned spaces between the dunes of the general projective cover of the species is increasing. It is marked difference in the composition of phytocenoses developing on modern and ancient mesoform eolian relief.

### **Key words:**

psammophytic phytocoenoses; eolian sands; phytocoenotic diversity; spatial structure; geobotanical description

## Wind Erosion Measurement Circle

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### Abstract

Wind erosion is a serious environmental problem that has been systematically studied for over a century. Numerous samplers have been constructed to efficiently collect aeolian sediment and to accurately measure sediment flux. The field quantification of wind erosion soil loss, however, remains a difficult task. Wind direction and intensity under field conditions usually change instantaneously; it is hard to locate the area from which the collected sediment originates, and for which the measured sediment flux is representative. A novel experimental approach, termed the Wind Erosion Measurement Circle (WEMC) was proposed here, which effectively delimits the field area subject to wind erosion and estimates the corresponding soil loss driven by wind. This approach was applied to monitor wind erosion on a corn field and a grass field in Inner Mongolia, China, and both results are comparable to those quantified with the isotope technique. This new approach benefits from ease of use and owns many advantages over existing methods. It has the potential to be the standard technique for wind erosion research, correspondent to the runoff plot method used in the research of water erosion.

### Key words:

wind erosion; aeolian sediment; field measurement technique

## **Decadal changes of sediment regime as an integrated response to multiple human practices in the Yanhe River, China**

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### **Abstract**

Expansion and intensification of modern human activities represent the most significant anthropogenic disturbance to global denudation system. The semiarid Loess Plateau in China is a fragile landscape with large magnitude of soil erosion, which threatens ecological integrity and ecosystem services. Therefore, a series of conservation measures have been implemented during the past decades. Understanding sediment dynamics responding to principal driving forces is critical for conservation efficiency evaluation and contemporary strategy adjustment. This paper examines the temporal trend of long-term observations on sediment yield in the Yanhe River, and explores the dominant factors that are responsible for the observed changes. It was found that fluvial sediment regime demonstrates decadal changes since the 1950s. Both annual water and sediment has experienced constant decrease, which were mainly contributed to decline in the wet season. Although changes of precipitation and runoff production may have impact on regional erosion and sediment transport, the observed trend of sediment yield was predominantly contributed by multiple human practices. The potential hydrological effect differs depending on the specific trajectory of human activities. Soil conservation measures that were installed on upland hillslopes (i.e., reforestation, land abandonment, terrace building, conservative tillage) contributed to significantly reduce sediment supply from distal source areas, while construction of cascade check dam system has intercepted a substantial proportion of mobilized sediment load and enhanced channel stability. Continuing practicing of restoration measures will lead to constant reduction of water and sediment yield in this region.

### **Key words:**

Sediment yield; Human activities; Soil conservation; Vegetation restoration; Loess Plateau

## Dynamic Changes of Vegetation Coverage and Driving Forces in Ebinur Lake Wetland National Nature Reserve(ELWNNR) During the 1972-2013

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### Abstract

Vegetation coverage of environment and natural environment as a natural system to evaluate the quantitative indicators, the authors studied the change of vegetation coverage is of great significance. Take Ebinur Lake Wetland National Nature Reserve (ELWNNR) as the study area, and this paper selects 1972,1998, 2007 and 2013 Landsat MSS、 Landsat TM and Landsat OLI as the main datum. Pixel dichotomy method is used to get vegetation coverage, and has carried on the classification of vegetation coverage, and then transfer using the transfer matrix method, and we analyzed the dynamic changes over time and the driving force of natural and human factors on the vegetation coverage. The results are as follows: the vegetation coverage of the Ebinur Lake Wetland National Nature Reserve showed a general decrease trend. The results of vegetation coverage classification show that vegetation has greatly increasing in 1972-1998 year, the increasing of vegetation area is 22.44 km<sup>2</sup>. From 1972 to 1998 year, vegetation decrease significantly and the vegetation was decreased by 14.88km<sup>2</sup>. From the point of view of spatial variation, the vegetation coverage of the Ebinur Lake Wetland National Nature Reserve decreased area is 14.88 km<sup>2</sup> from 1972 to 2013. The regions with decreasing vegetation coverage located in the counties of the east of Ebinur Lake Wetland National Nature Reserve. Vegetation coverage change affected by natural and human factors of in the Ebinur Lake Wetland National Nature Reserve, the analysis that natural factors and human factors are not conducive to vegetation healthy growth.

### Key words:

Vegetation coverage; Dimidiate pixel model; Dynamic change; Ebinur Lake Wetland National Nature Reserve(ELWNNR)

## Land Use Land Cover based Spatiotemporal Ecosystem Service Value change assessment in Sriniketan Santiniketan Planning Area, India

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### Abstract

Land Use Land Cover (LULC) based ecosystem service change assessment is very much essential to assess the spatiotemporal nature of various regulating and supporting ecosystem services. LULC change is now considered as a proxy indicator to estimate the trade-off between economic and ecosystem services value of a particular land parcel. In this study, a Light Use Efficiency (LUE) based ecosystem model Carnegie Ames Stanford Approach (CASA) was adopted to estimate actual Net Primary Productivity (NPP) and Value of Carbon Sequestration & Oxygen Production services (VCSOP) and Value of Organic Matter Provision services (VOM) in Sriniketan Santiniketan Planning Area (SSPA) which is now under threat by rapid urban expansion. Mean and total NPP was estimated as  $3.7 \text{ gC m}^{-2} \text{ month}^{-1}$  and  $402.4 \text{ ton h}^{-1} \text{ month}^{-1}$  in 1994 and  $7.0 \text{ gC m}^{-2} \text{ month}^{-1}$  and  $757.47 \text{ ton h}^{-1} \text{ month}^{-1}$  in 2014 respectively. This study has also revealed that the total amount of NPP in SSPA was increased over  $350 \text{ ton h}^{-1} \text{ month}^{-1}$  as the mean Normalize Difference Vegetation Index (NDVI) value was increased from 0.14 in 1994 to 0.17 in 2014 respectively. Spatiotemporal increase of NPP is accounted for the increase of VCSOP and VOM and hence it improve the overall status of different ecosystem services. Uncontrolled expansion of urban land in the North Western part of this study area was mainly accounted for the decrease of NPP. Total VCSOP services of his study region was increased from 710983 US \$ in 1994 to 1338213 US \$ in 2014 respectively. Overall, land use change was accounted for more than 150% of Ecosystem Service Value (ESV) changes during 1994 to 2014 in SSPA.

### Key words:

LULC; Ecosystem Service; Carbon Sequestration; Oxygen Production; Trade-off.

## **New Indices to Evaluate the Effects of Rainfall Pattern on Runoff and Soil Erosion Under Different Vegetation in the Loess Plateau, China**

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### **Abstract**

The maximum rainfall intensity in 30 min (I30) is commonly used to represent the influences of rainfall on runoff and soil erosion, which cannot completely express the information of rainfall. In this study, the peak zone of rainfall intensity (PZRI) and intra-event intermittency of rainfall (IERI) were developed to detect the effects of rainfall pattern on runoff and soil erosion under different cover types in the Loess Plateau of China. The runoff and soil loss in three types of vegetation cover (wood, shrub and grass) and bare land were measured from 2012 to 2015. The PZRI was significantly correlated with average rainfall intensity (I-aver) and I30. However, the runoff coefficient (RC) and soil loss were not significantly correlated with I-aver, but significantly affected by I30 and PZRI ( $p < 0.05$ ). So the I30 and PZRI explained more information about rainfall event. More IERI indicated more proportion of PZRI in rainfall duration. The positive correlation between RC and IERI was found. The fitting degree between RC and PZRI was the best, while the value between soil loss and I30 was the highest under all cover types. Therefore, extending the duration of PZRI ignoring the changes of I30 could promote the runoff productivity of rainfall, but could not significantly affect erosion. In addition, the position of PZRI in the rainfall profile had an important role on runoff and erosion. The occurrence period of rainfall peak played different role in runoff and soil erosion under rainfall events with different intensity levels.

### **Key words:**

Runoff; Soil erosion; Rainfall pattern; Vegetation; New indices; Loess Plateau

## Quantification of Deflation-Induced Soil- and Nutrient-Loss on Chernozem Types, Based on Field Wind Tunnel Experiments

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### Abstract

Long-term forecasts predict rise in summer temperatures and decrease in summer precipitation in the following decades in the Carpathian Basin (Central-Europe). These changes in climatic conditions may result in a 30-50% increase in wind erosion dynamics (MEZŐSI, 1996, 1998). It is important to emphasize that the wind erosion risk of our soils is not exclusively a soil protection problem, but it also poses economic (loss of nutrients, crop reduction), environmental (infill and eutrophication of surface waters and channels due to sediment deposition), and human health problems (GOOSSENS ET AL., 2002; BARRING ET AL., 2003; 1990; FARSANG ET AL., 2013).

Besides the quantification of sediment transport, the element and organic matter composition of the transported material is also important to study. We carried out mobile wind tunnel field experiments on a chernozem area of south-east Hungary, in July 2014. We used a newly developed horizontal active isokinetic sediment trap, the WAST (Wet Active Sediment Trap). It is a wet trap, what samples at different heights with good efficiency at any standard particle size ranges.

Our results show that the eroded soil mass increases with wind speed between 1.5 and 15.4 t/ha in 10 minutes. The amount of eroded humus and nutrients was calculated based on the weighted nutrient content in the sediment traps and the total amount of eroded soil. The amount of eroded humus can reach even 5.5-6.6 g/m<sup>2</sup>, phosphorus (P<sub>2</sub>O<sub>5</sub>) loss can exceed 0.11-0.78 g/m<sup>2</sup>, while potassium (K<sub>2</sub>O) loss is between 1.5-13.9 g/m<sup>2</sup> at the wind speeds of 9-13 m/s.

### Key words:

wind erosion; soil nutrient transport; field wind tunnel experiment

## Soil Moisture Dynamics under Different-Aged *Caragana Korshinskii* Shrublands in Wuzhai County of the Loess Plateau, China

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### Abstract

It was of great significance to carry out a study on soil moisture dynamics of different-aged *Caragana korshinskii* Kom. for vegetation restoration in Loess Hilly Region. In our study, soil moisture dynamics under different-aged *Caragana* shrubs and the abandoned land were monitored to a depth of 0-600cm during the growing season (April to October) in 2013. By analyzing, the main findings were as follows: 1. Soil moisture seasonal dynamics under different-aged *Caragana* shrub lands and the abandoned land were highly consistent with the seasonal variations of precipitation, while the annual variations were quite different. The overall performance of soil moisture was that 10a *Caragana* > 20a *Caragana* > the abandoned land > 35a *Caragana*. 2. Due to the various forest ages, the utilization of soil moisture varied with soil depth and presented different vertical distribution patterns. As well, the difference of soil moisture among soil profiles reached significant level ( $P < 0.01$ ). On the basis of vertical soil moisture variation, the soil profile could be divided into three layers: active layer, second active layer and relatively steady layer. 3. According to the evaluation of soil moisture availability, all sample plots didn't exist most easily available soil moisture and hard-unavailable soil moisture, except for little proportion of hard-unavailable soil moisture in 35a *Caragana*. With the growth of stand age, the average relative soil moisture content in *Caragana* shrub lands was decreasing. Meanwhile, the thickness of easily available soil moisture decreased, but the thickness of moderately available soil moisture increased.

### Key words:

Soil moisture; Dynamic variation; *Caragana korshinskii* Kom.; Loess Plateau

## Soil Nutrient Dynamics in Relation to Vertical Root Distributions in the Riparian Zone of Three Gorges Reservoir, China

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### Abstract

The riparian zone of Three Gorges Reservoir (TGR), has been subjected to seasonal submersion and exposure due to regular reservoir impoundment and the occurrence of natural floods. The severely altered hydrological regime has caused numerous environmental changes. This study was conducted to understand grass root distribution and its impacts on soil nutrient content in the water level fluctuation zone (WLFZ) of TGR. The roots of four prevailing grass species, namely, *Cynodon dactylon*, *Hemarthria altissima*, *Hemarthria compressa*, and *Paspalum paspaloides*, and corresponding soil nutrients, were investigated. Root length density (RLD) and root surface area density (RSAD) were measured using the WinRHIZO image analysis system. The relationship between root distribution with depth and soil nutrient content was tested using Pearson correlation analysis. The results showed that roots were mainly distributed in the upper 0-10cm soil layer. Both RLD and RSAD decreased exponentially with increasing soil depth. RLD values ranged from 0.24 cm/cm<sup>3</sup> to 20.89 cm/cm<sup>3</sup>, and RSAD estimates varied from 0.16 cm<sup>2</sup>·cm<sup>-3</sup> to 13.44 cm<sup>2</sup>/cm<sup>3</sup> for the selected grass species.. Soil organic matter (SOM) and total nitrogen (TN) contents in a bare control area were significantly lower than the corresponding values in the grass lands. TN of *H.compressa* land and natural recovery land were higher than the other grass areas. RLD and RSAD were significantly correlated with SOM and TN content for the four grass lands. The present results suggested that plant roots play a significant role in the distribution of soil nutrients in soil profiles in the WLFZ along the TGR. However, further research is needed to determine the specific mechanisms of interaction between plant roots, soil nutrients and water level fluctuation.

### Key words:

Root distributions; Soil nutrients; Water level fluctuation zone; Three Gorges Reservoir

## Spectral Identification of Main Control Factors of Soil Phosphorus Loss from Typical

### Agricultural Land in Taihu Basin

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#### Abstract

The study was to identify rapidly the key soil properties affecting non-point source phosphorus loss by contrasting the spectral characteristics of soil from cultivated land and orchard land at Meiliang Bay watershed, Taihu Basin. Results showed that using the spectrum directly determine the key soil properties affecting intensity of non-point source phosphorus loss of agriculture land was difficult, however, the correlation coefficients were higher when land-use type was divided into cultivated land and orchard land. Both soil organic matter and moisture were significantly correlated with the intensities of non-point source phosphorus loss in the two land-use types. The intensity of non-point source phosphorus loss was lower in cultivated land where with high soil organic matter and low moisture content. In contrast, the intensity of non-point source phosphorus loss was higher in orchards land where the soil was with high organic matter and low water content.

#### Key words:

Spectrum; Cultivated land; Orchard land; Organic matter; Moisture

## Study on Carbon Storage of *Pinus elliottii* Artificially Forests in Lakeside Sandy

### Desertification of Poyang Lake, China

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#### Abstract

This paper investigated the ecological restoration of desertification land in Poyang Lake area through field survey and laboratory analyses. From 2008 to 2010, 110 hm<sup>2</sup> ecological restoration area was established at Poyang Lake Area, which provides access to the detailed data. The results showed that: (1) The aboveground carbon storage of the tree layer in severe, moderate and mild desertification areas were: 1.88, 3.45, 19.22 t·hm<sup>-2</sup>, the order of each component carbon storage in mild and moderate was trunk > branch > tree leaves; (2) The carbon storage of the soil layer in severe, moderate and mild desertification areas were 0.59, 0.9, 1.3 t·hm<sup>-2</sup>, the carbon accumulated mainly in the surface layer for 0-10cm, with the soil layer deeper, the soil carbon and soil carbon density was diminishing, but in mild desertification area, the tendency shows that surface layer > deep soil > middle soil; (3) The carbon storage of the litter layer in severe, moderate and mild desertification areas were 0.12, 0.59, 1.22 t·hm<sup>-2</sup>. The mild desertification area, where has a better ecological environment with a greater carbon sequestration capacity, is more suitable for vegetation restoration. The high-density simple community structure makes the survival and expansion of understory vegetation more difficult. The land desertification control should start from mild desertification area to severe desertification area. After the pioneer species get settled, other herbaceous and broad-leaved vegetation species should be timely introduced so as to improve community structure and enhance the carbon storage of the desertification area's planted forest.

#### Key words:

Poyang Lake; sand desertification; *Pinus elliottii*; vegetation restoration; carbon storage

## Study on Landscape Classification and Ecological Restoration Strategies of Shangyi County

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### Abstract

This paper discussed the principles and methods of landscape classification on the basis of related theories of integrated physical geography and landscape ecology. Based on the total differences reflected in the alteration and interaction of physical factors and human factors in Shangyi County, we take geomorphy and land use type as the key indicators to classify the landscape. There are two interrelated ways of landscape classification: the “top down” division and the “bottom up” subsumption. Combining site of the two ways is the senior land unit: land system type, along with field verification. The landscape classification hierarchic system is composed of two levels. At the first level, the county’s landscape is divided into 8 categories, which are further divided into 23 subcategories at the second level. The 8 landscape categories are: Grazing and farming landscape on the river and lake beaches; Farming, grazing and forest landscape in the low-relief terrains; Grazing, farming and forest landscape on the high plateaus; Grazing, forest and farming landscape on mountains on the edge of the high plateaus; Farming, grazing and forest landscape in the river valleys; Grazing, forest and farming landscape on the rocky hills; Grazing and farming landscape on the loess tablelands; Forest, grazing and farming landscape on the lightly eroded, middle sized mountains. Corresponded with the natural conditions and environmental problems of each landscape category, the ecological restoration strategies are proposed under the guidance of landscape planning theories and methods, which may act as reference for the environmental rehabilitation, ecological restoration and protective measures against environmental degradation.

### Key words:

landscape; classification; ecological construction; Shangyi County

## Temporal and Spatial Variation of the Chinese Terrestrial Measured NPP Simulation from 1960s to 2000s

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### Abstract

In resolving issues such as the single nature of the current estimate of the measured NPP, uncertainty of the results of the current application of the model to estimate the NPP pattern of vegetation in China, the time short characteristic of using remote sensing data to calculate NPP and other issues, we collected, compiled and compiled measured data of vegetation related to NPP in different periods and regions of China. Then complete the temporal and spatial variation of NPP patterns of 3 main vegetation types of crops, grasslands and forests in China since 1960 based on the data from sample plots. The results show that: the Chinese terrestrial vegetation NPP from northwest to Southeast rise, high value concentrated in the tropical rainforests of southern Hainan and Yunnan; low concentration in Inner Mongolia, Tibet and other desert grassland and farmland; 1960s-2000s vegetation NPP is first decreased and then increased trend.

### Key words:

NPP; measured data; temporal and spatial variation; Chinese terrestrial vegetation

## The Impact of Wind-Blown Sand on Crushed-Rock Embankment along the Qinghai-Tibet Railway (QTR), China

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### Abstract

The crushed-rock embankment, widely used along the Qinghai-Tibet Railway (QTR), has been proved to have active cooling effect and thus could effectively protect permafrost beneath the roadbed. However, with the increasing degree of desertification in Tibetan Plateau, the crushed-rock embankments along the QTR were frequently filled up or buried by wind-blown sand and in addition, the impact of wind-blown sand on the cooling effect of the crushed-rock embankment has not yet clearly addressed. This paper simulated the ground temperature variations of the frozen earth beneath the crushed-rock layer under different situations through indoor experiment. The results show that the bare crushed-rock layer has good cooling effect on underlying frozen earth, but after filled or covered by windblown sand, the cooling effect will significantly weaken or even disappear, and the thicker the windblown sand layer, the higher the ground temperature of frozen earth. This indicates that the windblown sand could be a potentially serious threat to the crushed-rock embankment along the QTR in the long term. It is urgent to establish comprehensively sand-prevention system in some key places in order to protect the crushed-rock embankment from windblown sand damage more effectively.

### Key words:

Wind-blown sand; Crushed-rock embankment; active cooling effect; the Qinghai-Tibet Railway

## The Research of the Straw-checkerboard Fencing Life Based on Its Characteristics of Erosion and Deposition

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### Abstract

In the alpine sandy land of China, there is a great peculiarity and regional difference in the erosive and depositional features of straw-checkerboard, and its fencing life is primarily affected by the erosive depth change of each inner part among years. After a continuous and seasonal observation to the erosive depth of nine kinds of straw-checkerboards, which included three norms (  $1\text{m} \times 1\text{m}$ 、 $1.5\text{m} \times 1.5\text{m}$  and  $2\text{m} \times 2\text{m}$  intervals) and each located in three slope positions (toe, middle and top of the windward areas ) in Ketu sandy land, eastern shore of the Qinghai Lake. There some rules could be concluded. Firstly, the worse erosion always happened in the center and south-oriented parts of those straw-checkerboards with bigger norms and higher slopes, equally, the greater deposition obviously appeared in the north and west-oriented parts of those smaller norms and lower slopes, all those differences were caused by the change of prevailing wind changes which were controlled by the northwest wind in winter and northeast wind in spring. Secondly, through the statistics of erosive and depositional rates in winter and the whole year, the 1.5m intervals checkerboard in the middle slope would have the longest fencing life about averagely 5 years with a stable concave and balanced erosion (deposition) effect, while the 1m intervals in the toe and the 2m intervals in the top had to face an over-erosion or an over-accumulation problem so that made their life time limited to 2 years. Finally, it can be directed for desertification controllers that the straw-checkerboard should be allocated optimally according to the erosion and deposition effects, generally, a medium norm maybe applied in all slope positions, while the small one and the big one are respectively at best paved in the top and the toe. (The study was financially supported by the National Science Foundation of China (NSFC 41461002) , the Provincial Science Foundation of Qinghai (2014-2J-902),and the National Key Technologies R&D Program (grant no. 2012BAD16D0102))

### Key words:

erosive depth; erosive rate; fencing life; norms; slope positions

## Using Geospatial Approach in Estimating the Impact of Climate Change On

### Desertification in Northern Borno, Northeast, Nigeria

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#### Abstract

Nigeria is one of the most desert prone countries in Africa and the problem of desertification is expanding southwards from 12° 30' to 10° 30'. In addition, rivers and lakes are being silted leading to rapid drying up of water bodies. A typical example is the case of the receding Lake Chad. This environmental problem has led many researchers to investigate the magnitude and monitor its spread, as a result, the geo-spatial approach has become the most widely used because of its efficiency. Majority of these studies are focused on the extent of the problem neglecting the fundamental causal factor of desertification. It is evident from available literature that few or no study has estimated the impact of climate change on desertification using a geo-spatial approach. Based on this, this paper investigates how climate change facilitates desertification in the north eastern part of Nigeria within the context of geo-spatial analysis and in addition, to map the magnitude of desertification in the region. The paper utilized climatic data and supervised classified remotely sensed data in Microsoft Excel and ILWIS environment respectively for detecting climate change and desert encroachment in the study region. The results showed that climate change facilitates desertification and that over 31 percent of the land surface of the region has become bare and the problem became worsened during the study period from 1986 to 2006. This problem was highly facilitated by extreme climatic conditions.

#### Key words:

Climate Change, Desertification, Northern Borno, Nigeria.

## C12.25 Landscape Analysis and Landscape Planning



Home

### Oral

1. [Analysis of the Recreational Load on the Green Space Of Kyiv](#)  
Iryna Kochetkova (Taras Shevchenko National University of Kyiv, Ukraine)
2. [Developing Indices of Temporal Dispersion and Continuity to Map Natural Vegetation](#)  
Bingwen Qiu (Fuzhou University, China)
3. [Dynamic Response to Urbanization in Patna Regional Development Area, Bihar, India](#)  
KHUSHBU SHARMA (Jawaharlal Nehru University, India)
4. [Impacts of Landscape Patterns on Soil Ph of Croplands in the Liuxihe Watershed, South China](#)  
Yuan Yuzhi; Guo Zhixing; Chai Min (Guangdong Institute of Eco Environment and Soil Sciences, China); Sun Hui (College of Resources and Environment, Shanxi Agriculture University); Cao Fulong (Guangdong Institute of Eco-Environment and Soil Sciences)
5. [Integrated Circuit Theory to Construct and Evaluate Ecological Corridors](#)  
Lili Song (Henan University, China)
6. [Land Suitability Evaluation for Cropland Based on Boolean and Multi-Criteria Decision Analysis Methods: A case study in the Dornod province of Mongolia](#)  
Munkhdulam Otgonbayar (Institute of Geography Geoecology, MAS, Mongolia)
7. [Mapping of the Selenga River Delta Vegetation Using Hyperspectral Survey](#)  
Zhargalma Alymbaeva; Alexander Ayurzhanayev; Endon Zh. Garmayev; Arnold K. Tulokhonov; Margarita Zharnikova (The Baikal Institute of Nature Management SB RAS, Ulan Ude, 670047, Russia, Russian Fed)
8. [Preventive Assessment of Flood Danger based on Landscape-Hydrological Analysis of Altai \(Russia\)](#)  
Dmitry Vladimirovich Chernykh; Dmitry Vladimirovich Zolotov; Roman Yur'evich Biryukov; Dmitry Konstantinovich Pershin (Institute for Water and Environmental Problems of Siberian Branch of the Russian Academy of Sciences (IWEP SB RAS), Altai State University (ASU), Russian Fed)
9. [Production of Space and Creation of Place at Music Festivals: A case study of Taihu Midi Music Festival, China](#)  
Wang Manman; Zhang Min (School of Architecture and Urban planning, Nanjing University, China)
10. [Socio Economic Change in Urban Mobility and Land Use Land Cover Using Remote Sensing and Geoinformatics-A Case Study of Ajmer City, Rajasthan, India](#)  
SABIR KHAN (M.D.S. University Ajmer, Rajasthan, India, India); G.S. Chauhan (Department of

University Grants Commission, Bhopal, Madhya Pradesh, India, India)

11. [Spatial Modeling of Landscapes Territorial Structures for Landscape Planning Implementation](#)

Viktoriia Udovychenko (The Geographical Society of Ukraine, Ukraine)

12. [Thai People'S Perceptions and Responses to Land Quality Changes in Cultural Landscapes of Mountain Vietnam](#)

An Thinh Nguyen; Pham Minh Tam; Dang Thi Huong Giang (Hanoi University of Natural Resources and Environment (HUNRE), Vietnam, Vietnam)

13. [The Geodesign for the Mekong Delta: A Proposal](#)

Hung Fei Lei (Department of Geography, Chinese Culture University, Taiwan, China)

14. [The Present and Future Landscape Framework of Gerdab-e-Ben Lagoon, a case study from city Ben, Iran](#)

Majid Amani Beni (IGSNRR, Iran)

## Poster

1. [A New Spatial index to Characterize Urban Expansion Dynamics: Multi-order Adjacency Index](#)

Limin Jiao; Jiafeng Liu; Ting Dong (Wuhan University)

2. [Construction of Ecological Security Patterns in Nebula Lake Basin Based on GIS](#)

Jun Zhu (China, YunNan University)

3. [High Scale Landscape Mapping for Mountain of Khamar-Daban \(near Lake Baikal, Russia\)](#)

Polina Rusanova (Russian Fed, Irkutsk State University); Solodyankina Svetlana (Russian Fed, The V.B. Sochava Institute of Geography SB RAS)

4. [Land Use Structural Optimization Based on Grey Liner Programming and Land Degradation Risk in Yunnan Mountain of China](#)

Xiaoqing Zhao (China, School of Resource Environment & Earth Science, Yunnan University); Honghui Yang (China, Yunnan Design Institute Group); Xinhui XU (China, School of Resource Environment & Earth Science, Yunnan University)

5. [Significance of the Hemeroby Index as an Indicator in Landscape Monitoring and Assessment of Mountain Areas](#)

Bilyana Borisova (Bulgaria, Sofia University); Boian Koulov (Bulgaria, National Institute of Geophysics, Geodesy, and Geography Bulgarian Academy of Sciences); Assen Assenov (Bulgaria, Sofia University)

6. [Studies on Ecological Security Assessment Index System of Cultivated land in Guangzhou city](#)

Yao yiyang; Wu dafang (China, Geographical Sciences of Guangzhou University)

7. [Study on Water System Landscape Pattern Planning of Kaifeng in the Basis of Green Infrastructure Theory](#)

SHI Xuemin (China, College of Environment and Planning, Henan University)

8. [The Contributions of Climate Change and Human Activities on the Runoff of the Tingjiang River](#)

Zhang jie (China, South China Normal University)

9. [The Morphometric Characteristics of Gobi Desert Pavement Analyzed by a Rapid Image-based Method](#)

Yue Mu; Xiaoyang Cao; Pu Zhang (China, Institute of Desertification Studies, Chinese Academy of Forestry)

10. [The Research of Decorative Art based on the Data Visualization Platform](#)

Vivian Chen (China, East China University of Science and Technology)

11. [The Risk Assessment of Guangzhou Cultivated Land](#)

Jiixin Wu (China, School of Geographical Sciences, Guangzhou University)

## Analysis of the Recreational Load on the Green Space of Kyiv

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### Abstract

The capital of Ukraine Kyiv located on both banks of one of Europe's largest rivers - the Dnipro.

This has led to the presence of large areas for parks, which contain the remains of the natural elements. These are islands on the Dnipro (Truhanov, Great, Holguin). In the north and in the south of the city, these green space are connected to the forests that surround Kyiv. Kyiv territory unequally provided recreational landscapes. Total in Kyiv 127 parks, 367 garden squares, 77 parkways. Their total area is about 15% of the capital area. Provision of the population of Kyiv green areas is 14,4 m<sup>2</sup>/person, with the state standards of 20 m<sup>2</sup>/person. Almost every residential area in Kyiv within 20-30-minute access to a recreational area that provides opportunities for active recreational activities every day. In 2012 - 2015 years conducted research on the state of Kyiv urban recreational landscapes. We took into account indicators: Quarter area, the average number of floors, building density, demographic population indicators. The results showed an uneven distribution of green areas and a significant differentiation in terms of recreation loads. The values of the recreational load in the range of 6 to 43 pers./m<sup>2</sup> (with an average of 16.5 pers./m<sup>2</sup>). The highest intensity of the recreational load in the parks that are near the new residential areas that were built on the left bank in the early 1990s, as well as quarters that are adjacent to industrial zones.

### Key words:

green space; green urban areas; the recreational load

## Developing Indices of Temporal Dispersion and Continuity to Map Natural Vegetation

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### Abstract

An accurate and updated natural vegetation map is imperative for sustainable environmental management. This paper proposed a novel natural vegetation mapping algorithm based on time series images. Several indices of temporal dispersion and continuity were established for this purpose: Low Density (LD), Medium Density (MD), High Density (HD) and Medium Continuity (MC). These indices were developed based on the particular percentiles-determined section of the EVI2 temporal profiles obtained through continuous wavelet transform. The natural vegetation was generally characterized as with lower temporal dispersion and greater temporal continuity compared with agricultural crops. The proposed methodology incorporated the indices of temporal dispersion and continuity and was applied to 13 provinces in central east China based on 500 m 8-day composite Moderate Resolution Imaging Spectroradiometer (MODIS) Enhanced Vegetation Index with two bands (EVI2) in 2013. An overall accuracy of 92.97% was obtained when compared with 2,715 ground truth sites. There was also a good agreement (kappa index = 0.8049) on the distribution and areas of different vegetation types between the MODIS-estimated image and the Landsat 8 OLI interpreted data on two test regions. This study demonstrated the efficiency of the transform and metric integrated time series classification approaches in the fields of land and vegetation cover mapping.

### Key words:

Vegetation mapping; temporal dispersion; temporal continuity; time series classification; continuous wavelet transform

## Dynamic Response to Urbanization in Patna Regional Development Area, Bihar, India

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### Abstract

River morphological study is a very challenging field of study as fluvial geomorphology deals with a system response that is always in dynamic condition. Moreover, alluvial rivers are more dynamic in nature as well as self-adjusting in any response to the change in the environment. The present study also deals with the response of the river channel with changing condition in an urban metropolitan and its nearby area. The study area is based on the border limit of Patna Regional Development Area that has been delimited by the Patna Regional Development Authority of Bihar in 2014. The present study mainly deals with the plan-form changes in the river channel in near vicinity of the urban hub. The rapid urbanization of the area has affected the river channel. The study has been conducted for short term change in the study area. The study area has three major river channels in its coverage area i.e. Ganga, Gandak and Punpun. The Significant change in the plan-form has been noticed in the Ganga and Gandak channel. There is total area loss of 15 sq. km and 21 sq. km gain in the study area from 1988 to 2014. The Ganga – Gandak confluence near Patna has shifting zone of confluence. The phenomenon of avulsion is visible in the study area of about 7 kms. The city has been expanding and this sensitivity of LU/LC change is dependent on numerous factors. Thus, the study area has much dynamism in all respect.

### Key words:

River Plan-form; Land-use and Land-cover change; Avulsion; Confluence; Patna regional Development Area; Bihar

## Impacts of Landscape Patterns on Soil Ph of Croplands in the Liuxihe Watershed, South China

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### Abstract

According to the *Status of the World's Soil Resources Main Report in 2015*, soil acidity is a serious constraint to food production worldwide, soil degradation caused by soil acidification has become a global consensus. Landscape pattern is an important influence factor of the ecological process, but the relationship between landscape patterns and soil pH was not well understood. We select the Liuxihe watershed as the study area and the soil sample buffer as the research unit, based on 759 samples of croplands top soil and land use in 2010, distribution map of soil pH in 1980s. Research methods included landscape pattern index analysis, spatial analysis, correlation analysis and redundancy analysis. The purpose of this study was to discover the spatial pattern of croplands top soil pH and watershed landscape, to quantitative examine the impacts of landscape patterns on soil pH of croplands. Preliminary study results show that: the overall croplands top soil pH are acidic in this watershed, the pH mean of soil samples is 5.79, the sample of pH value  $< 6.5$  and  $< 5.5$  are respectively occupied 86.1% and 31.3%; The low value area of soil pH appear in the northwest of the upper reaches and southeast of the middle and downstream reaches, The high value area of soil pH appear in southwest downstream reaches; Croplands soil acidification is significant in the last 30 years, the mean of soil pH decrease from 6.49 to 5.79, soil acidification sample occupy 30.5%; We found that there is a significant correlation between the some landscape pattern index and soil pH. The study results provide new information and scientific basis croplands soil acidification control and remediation.

### Key words:

Landscape pattern; soil pH; croplands; Liuxihe Watershed

## Integrated Circuit Theory to Construct and Evaluate Ecological Corridors

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### Abstract

Connectivity is a vital element of landscape structure, Landscape functional connectivity is considered to be a very important factor for a wide range of ecological processes. A least cost path method which integrated graph theory and minimum cumulative resistance model (MCR) can provide a more efficient approach to identify function connectivity in heterogeneous landscapes, and has been increasingly used in the research of ecological corridors and ecological network simulation. Connectivity model based on circuit theory used resistors instead of edges in the graph theory, resistance distance instead of cost weighted distance, can identify current flow centrality and pinch point in corridors, which have important influence on landscape connectivity, consequently, the importance of different areas in corridors can be understood. This paper took simulated landscape as the object, integrated circuit theory to identify ecological corridor and its importance. Also analyzed the influence of corridor width on the location of pinch point, and discussed the Size effects of connectivity model based on circuit theory. We believe that the method can provide certain scientific basis for regional landscape planning and corridor design.

### Key words:

connectivity; least cost path; current flow centrality; pinch point; circuit theory

## Land Suitability Assessment of Crop production using Boolean and Multi-Criteria Decision Analysis Methods: A case of Dornod province of Mongolia

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### Abstract

Agriculture is important as a source of food and income. The main purpose of this study is to prepare land suitability evaluation for cropland based on Boolean and multi criteria decision analysis methods. We selected several factors such as three topographic, two hydrologic, four soil, three climatic and land use indicators to calculate the suitability of land for crop production in Dornod province, Mongolia. We combined suitability assessment with fuzzy analysis to standardize the criteria. We used the analytical hierarchy process to determine the weight of these criteria and used multi-criterion decision analysis (MCDA) to aggregate the criteria. Then we calculated the suitability score for each evaluation unit. The suitability level had categories of highly suitable, suitable, moderately suitable, unsuitable and highly unsuitable using the reprocessing module of ArcGIS according to the FAO land suitability classification. We compared the data of field soil measurements between 1989-2009 obtained from the Organization of Geodesy and Cartography to control kappa index and error of matrix accuracy of land suitability evaluation and validations. General accuracy was 0.81, while classis validation and kappa index were 80-95% and 0.81, respectively. Study results showed that land suitability assessment for crop production can be done by applying geographic information system and remote sensing technology in Mongolia. The method mentioned above for assessing land suitability for crop production saves time for land management and enables making research-based decisions. Further study is necessary to test the accuracy of data and ensure better quality.

### Key words:

Land suitability assessment; GIS; MCDA; Boolean, DEM, Fuzzy analysis; AHP; CR

## Mapping of the Selenga River Delta Vegetation Using Hyperspectral Survey

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### Abstract

The Selenga River is the largest among 365 rivers and streams flowing into Lake Baikal and provides 50–60 % of water runoff and 60 % of sediments that go into the system. Vegetation of the Selenga River delta plays a special and important role in the formation of geochemical barriers and the ecological status of water bodies. The delta surface is under the constant influence of fluvial, erosion and accumulation processes.

The goal of this work is mapping of the Selenga river delta vegetation on base of hyperspectral images obtained in frame of International expedition “Leman-Baikal”. We conducted a survey of the delta surface using hyperspectral camera (400-1000 nm) installed on ultralight aircraft board – trike. The result is a map of the vegetation of the delta with a high spatial resolution of 1 m/pixel and spectral library of delta vegetation species. We spent geobotanic route descriptions for verification of aerial images.

### Key words:

Selenga River delta; vegetation mapping; hyperspectral image; aerial survey

## Preventive Assessment of Flood Danger based on Landscape-Hydrological Analysis of Altai (Russia)

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### Abstract

In terms of hydrometeorological information lack for the Altai (Altai Krai and Republic of Altai), the development of alternative methods of floods forecasting is called.

Based on the author's landscape map (1:500000) a series of interpretive maps of climate-hydrological, lithologic-hydrological and topo-hydrological background was created. The original map units were typified in accordance with the analyzed characteristics.

Climate-hydrological map is composed over the ratio of precipitation and heat (Selyaninov hydrothermal coefficient); lithologic-hydrological map – by the maximum field carrying (water) capacity of the top meter soil layer. Topo-hydrological map is constructed using the author's classification of locations based on the combination of the two priority (out of a possible four) functions of landscape in relation to the runoff formation: autonomous, transit, regulatory and accumulative. As a result, the spectra of background characteristics for 73 catchments including the three internal-drainage basins are obtained.

It is shown that of 70 catchments of the Ob, Katun and Bija first order tributaries, in 36 more than 75 % of the area is occupied by landscapes with all three landscape-hydrological characteristics favorable for the runoff formation. These mountain landscapes are located in excessively humid areas and characterized by low water capacity soils and a predominance of slope surfaces. The Altai territory is exposed to a high risk of floodings.

The hydrological safety assurance and reduction in expenses for post-flooding remedial actions are possible only via preventive evaluation. It should result in landscape planning in the catchment to use landscapes potential for overcoming and minimizing floods risks.

### Key words:

landscape-hydrological background; mapping; catchment

## Production of Space and Creation of Place at Music Festivals: A case study of Taihu Midi Music Festival, China

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### Abstract

Music festival is a cultural geographical phenomenon spreading rapidly in China in recent years. Taking the case of Midi Music Festival, which is the earliest and most famous music festival in China, this paper describes how the music festival space is constructed and explores the underlying characteristics of the space. To better illustrate the liveness of the festival scene, the authors combine the theory of the production of space to the performance theory. Main conclusions are as follow: (1) The integration of the two theories is proved to be useful to understand the specific “realness” of the music festival practice. (2) The triad spaces assimilating the performance theory has new connotations. The spatial practice of the space is dominated by the operation of the social relations. Representations of space include the physical space within which the operation of codes is conducted and the impromptu space generated from the performance. The representational space is a continuation of the performance, having the power to reshape the structure of the festival space and resist the rules of the mainstream society. (3) It’s difficult for the music festival to build into the local place, however, the festival can be constructed as a fluid “place” because of the dialectical process of the production of space. There are dynamic connections between each pair of social relations, festival scene and spatial internalization, embodying as supporting, activating and shaping each other, which contributes to the festival to become a place with cultural context, cognitive value and emotional memory.

### Key words:

music festival; production of space; performance; place; fluid placeness; festival

## **Socio Economic Change in Urban Mobility and Land Use Land Cover Using Remote Sensing and Geo-Informatics-A Case Study of Ajmer City, Rajasthan, India**

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### **Abstract**

Land use/ land cover is an important parameter in understanding the interactions of the human activities with the environment and thus it is necessary for conserve natural resources and monitoring environmental changes. Urban mobility is responsible for a variety of urban environmental issues like decreased air quality, increased surface runoff and subsequent flooding, culmination of water quality, increased local area temperature. The main focus of this study is to analyse urban growth and land use change and its correlation with the demography, migration and urbanization led problems related with water and environmental degradation in Ajmer city during 1975–2015. To calculate urban growth and land use changes, satellite images are utilized in different time spans. Acquire five temporal data for this study, 1975, 1985, 1995, 2005 and 2015 year of data acquired by Landsat series satellite. Supervised classification methodology has been applied using maximum likelihood technique in Arc-GIS 10.2 Software. By applying classification methods to the satellite images five main types of land use were extracted: Built-up, Water bodies, Agriculture, forest and Wasteland. Change detection analysis shows that built-up area has been increased and agricultural land reduced. The city was found to have a pattern for major expansion in three different directions: East, North and south .Information on urban mobility, land use and land cover change study is very useful to government, Private sector and urban planners for the best future plans of the city.

### **Key words:**

Land use/land cover; change detection analysis; remote sensing and GIS

## Spatial Modeling of Landscapes Territorial Structures for Landscape Planning

### Implementation

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#### Abstract

Nowadays humankind deeply depends on nature and natural resources which help to sustain and fulfil human life, but yet in Ukraine the values of nature are typically ignored in decisions or not all its features taken into account. Therefore, landscape planning (LP) are widely seen as the key opportunity to solve such problems and situations, particular driver and catalysts of economic growth and well-being in modern societies. Mapping and modeling landscapes and ecosystems can help to assert the benefit provided to people by nature and distinguished how these benefits might be used under different management options for the purpose of innovation advancement towards and in a knowledge-based economy.

LP introduces specific approaches and methods and should include such stages as: 1) landscape genetic-morphological structure study, mapping, modeling and according to it – landscape diversity estimation; 2) landscape geochemical structure study, mapping and evaluation; 3) defining, mapping, assessment of basin territorial and basin landscape territorial structure with detailed characteristics of its subsystems and topical systems; models for watershed services; 4) landscape positional-dynamic structure: essence, study, map modeling, evaluation; 5) econetworks and its peculiarities, territorial aspect and essence of modeling for the spatial optimization tools implementation; 6) actual state of landscapes, way of its using; estimation levels of anthropogenic changes take places in landscapes; 7) landscape based territorial planning graphic and mapping models creation; 8) an overview of the skills needed to use created models, including recommendations for how to effectively summarize and communicate model outputs to stakeholders and other audiences.

#### Key words:

landscape; landscape planning; method; mapping; modelling; implementation

## Thai People's Perceptions and Responses to Land Quality Changes in Cultural Landscapes of Mountain Vietnam

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### Abstract

In Vietnam, mountains cover about 74% total area, range throughout the Northwest and Central parts of this country, and was settled by ethnic minorities such as Thai, Mong, Dzaio, and etc. The Thai people group has their population about 1.5 million people, is ranked third among the 54 ones in Vietnam. Traditional cultural landscapes of Thai people are formed long time ago by a mosaic of rural settlements, paddy fields, crop patches, and forests; however, it nowadays has changed more and more significantly due to both natural and human driving forces, especially during early 21 century. This paper therefore deals with the application of Pressure - State - Response (PSR) framework based on land quality indicators in study the perceiving and responding of Thai people to land quality changes in Thai people's villages of Son Thinh commune (Van Chan, Vietnam). 90 questionnaires with 65 closed questions and 10 opened questions based on the 5 point Likert scale were collected during 2014-2015. The result shows that: (i) climate-related hazards are the main biophysical pressure on sloping land use, whereas the highest impact of the socio-economic factors is the change in the number of crops due to agricultural development policy at local scale; (ii) the most considerable change of land quality is erosion and land degradation. The increase of economic interesting plants undergoes the considerable change in the state of cultivation system on slope land. The change in agriculture income is the most important state of the particularities of slope agriculture by ethnic minorities; and (iii) traditional farming techniques, cultivation options, land use policies, and land use technologies on slopes are considered as the most significant response factors. The recommendation for responses of cultural landscape are mainstreaming indigenous knowledge to sloping land use and land management, and making decision and implementing sloping land use management policy for Thai people community.

### Key words:

Thai people; PSR framework; perception; response; land quality change; cultural landscape; mountain Vietnam

## The Geodesign for the Mekong Delta: A Proposal

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### Abstract

The working paper aims to present the geodesign for the Mekong Delta and its surrounding area in response to both climate changes and the potential changes of its social environment. A literature review on the geography of the Mekong Delta is presented. It is then followed by a description of the landscape ecosystems of the Mekong Delta, including the probably scenario of the impact from the climate change and the long-term outcomes of the political ecology of this area under the prevalent development. The geomorphic and landscape ecosystem of the area is delineated into landscape units with characteristics that are addressed, and the work is based upon open data being available from web resources. By using these geographical knowledge, the third section offers the characteristics of the Mekong Delta. The main issues in using the Mekong Delta and their implications of physical geography are highlighted. Based upon these works, it is suggested that a geographical framework of the sustainable development for the Mekong Delta and settlements around should include a reinforced development of both a local management system and a regional governance platform where the monitoring system and the decision-making system with the development of modern settlements can be reasonably built up by citizens and their chosen managers for the safety and health of spatial interactions between Human and Nature. Three preliminary suggestions in geodesign for the Mekong Delta is proposed, including schemes for the water head, the lowland, and the channel system of the Mekong Delta. It leaves the guidelines on management and governance for the future sustainable development in the Mekong Delta undiscussed, although some notes are given for these issues.

### Key words:

geodesign; wetland; landscape ecosystem

## The Present and Future Landscape Framework of Gerdab-e-Ben Lagoon, a Case Study from City Ben, Iran

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### Abstract

Urban and sub-urban parks are the important elements in urban landscape. Besides their microclimate benefits, these areas also provide many other ecosystem services such as cultural, educational and economic values. "Gerdab-e Ben" is a national tourist hotspot in the suburban area of city Ben, Iran. Gerdab-e Ben plays important cultural, recreational and economic roles for residents; also it has been recognized as an outstanding national tourist region by the government since 2010. In this study, context and current situation of the site and its challenges and potentials for future development were evaluated through field observation and aerial images. Based on the field observation, plant species, traffic communication and tourists' preferences were identified. According to aerial images, green patches size and density, connection between the green spaces of the lagoon and the city were analyzed using GIS software. The results revealed that although the site has an eye-catching beautiful landscape due to its natural context (lagoon, mountain and trees), it has a considerable potential for improvement, which would help to attract more tourists and offer better ecosystem services as well. Also the study showed that currently there is the lack of evergreen tree species, poor traffic communication, the discontinuous tree lines on the eastern side of the lagoon and the disconnection between the green spaces of the lagoon and the city. Finally an analytical proposal was offered by the authors to overcome the current problems and for future development of Gerdab-e Ben.

### Key words:

landscape framework; Gerdab-e Ben; tourist hotspot; urban and sub-urban parks

## A New Spatial Index to Characterize Urban Expansion Dynamics: Multi-Order Adjacency Index

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### Abstract

Most of the landscape metrics or indexes can only characterize the static spatial pattern at a certain time point and cannot provide adequate information about the dynamic changes of urban expansion. Landscape Expansion Index (LEI) and Multi-order Landscape Expansion Index (MLEI) have been proposed to solve such problems, which could measure the expansion degree of newly grown patches by considering their relationships with old patches and their spatial context in the process of urban expansion based on multi-temporal data.

However, these metrics cannot differentiate the expansion degree of newly grown leapfrog patches since the LEI/MLEI values of the patches with distance from the old patches beyond given threshold will be designated to zero. But the expansion degree of these patches is very important for measuring the degree of urban sprawl. In this study, Multi-order Adjacency Index (MAI) is designed to measure the expansion degree of all new patches no matter how far away from old ones, all of new patch has its own value, and it has clear mathematical definition and scaling of values.

The calculation method for MAI is as follows: series buffers for new patches with a fixed radius will be established until the outermost buffer intersecting with old patches; the ratio of the intersection area to the area of the outermost buffer will be used to calculate the expansion degree of the new patches.

The results indicate that MAI is able to distinguish urban expansion's process information and measure the spatio-temporal changes of urban structure.

### Key words:

Multi-order Adjacency Index; Multi-order Landscape Expansion Index; urban expansion; dynamic changes

## Construction of Ecological Security Patterns in Nebula Lake Basin Based on GIS

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### Abstract

Ecological security patterns of lake wetland was constructed as a commitment to biodiversity protection, maintain of the ecosystem structure integrity, function and process. it is a effective protection to the ecological security ,control of environmental deterioration and the water in urban and agricultural using security. Taking Nebula lake basin in YunNan province as the study area, the factors such as ecological suitability of land, ecological security index and the land quantity structure optimization are gained by using Various GIS spatial analysis technologies and multi-objective programming model based on natural geography and humanity data to construct ecological security patterns in Nebula lake basin that will gives some effective scientific directions to management and construction of the district ecological system, achieving maximization of economic and ecological benefits in land using and further form the harmonious coexistence of more structure, multilevel and diverse ecosystems and integrated ecosystem of "human-economic-ecological".

### Key words:

Ecological security patterns; GIS; multi-objective programming model; ecological system

## High Scale Landscape Mapping for Mountain of Khamar-Daban (Near Lake Baikal, Russia)

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### Abstract

Classification of homogeneous geosystems (landscapes) and its reflection on the map could be a base for effective organization of economic activity. Landscape patterns and landscape units can be used in the assessment of ecosystem service supply. Geosystem defined as uniform territory, with regular and typical repetition of some interrelated combinations of geological structures, landforms, surface and groundwater, microclimates, soil types, phytocoenoses and zoocoenoses. The aim of research is analysis and mapping of the landscape diversity of the key area (125.3 km<sup>2</sup>) of the Khamar – Daban mountain range. This mountain range distinguished by the uniqueness of vegetation related to climate features: significant moisturizing, high snow cover and other. We used the following data: fieldwork (73 test areas), DEM, and remote sensing. Fieldworks were conducted in summer seasons 2010 and 2015 years where collected data about wood and grass species and their projective cover, soil characteristics. Software Quantum GIS (Qgis) 2.10 was used to create the landscape map. At the first step the area was divided on the base of SRTM data on categories of landform: surface of drainage divide, river and stream valleys, several classes of slopes according their steepness, exposure. Then these patterns divided on the base of Landsat 7 image (2010 year) in band combination 753. Results of fieldworks and the geoinformation analysis were used to form the classification of the landscapes which became the map legend. In classification 38 types of landscape defined. On the map 528 homogeneous landscape patterns digitized. Map accuracy was tested under field conditions.

### Key words:

Landscape mapping; geosystems; classification; Khamar-Daban mountain range

## Land Use Structural Optimization Based on Grey Liner Programming and Land Degradation Risk in Yunnan Mountain of China

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### Abstract

Land use structural optimization and adjustment is an effective approach to realize land resource sustainable utilization, allocate limited land resource rationally and reduce the risk of land degradation. Grey liner programming (GLP) model based on land degradation risk (LDR) minimization is constructed and applied to Menglian County in Yunnan province. The result shows that GLP model has more practical applicability, and takes land degradation risk minimization, cultivated land protection and food security guarantee into consideration. There are three programs after optimization. Program I degrade the land degradation risk largest. It can meet the normal food security in the study area, but is insufficient to resist against food security problems caused by sudden natural disasters. Program II is a bigger plan of the land degradation risk reduction. It can meet the needs of the most stringent cultivated land demand in a short time not in a long period. Program III is the smallest plan of the land degradation risk reduction, but there is strong sustainability for cropland demand. Compared to the "Land use overall planning", garden land, forest land and construction land are all increased. The economic, ecological and social benefits and the land utilization rate will all get improved, the land use structure is more reasonable. So land degradation risk reduction, farmland protection and food security will be realized in program III. The study results can support the government to the land resources utilizing reasonably and decisions making.

### Key words:

land use structure optimization; grey liner programming (GLP); land degradation risk (LDR); sustainable development; Menglian County

## Significance of the Hemeroby Index as Indicator in Landscape Monitoring and Assessment of Mountain Areas

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### Abstract

This study posits that, in combination with landscape metrics' methods, the hemeroby index significantly contributes to landscape monitoring and qualitative assessment of its natural capital and respective land use policies.

Hemeroby is interpreted here as an indicator of the degree of deviation of the landscape from its natural prototype under the influence of human activity. The study applies Eurostat's rating scale for the agro-ecological indicator "landscape state and diversity". It studies landscape units as integrated natural-anthropogenic systems and uses selected key indicators to analyze their spatial structures. The investigation traces anthropogenic transformations, in terms of both characteristic landscape neighborhoods and different hypsometric bands.

Five municipalities of the Smolyan District, situated in the Rhodope Mountains of Southern Bulgaria, constitute the object area of the study. Landscape heterogeneity is typically very high. The region stores a full range of representative natural complexes (including 49 protected areas and 8 protected NATURA 2000 sites), and anthropogenic landscapes with historically inherited discontinuous land use.

Study results, including the belt of active anthropogenic presence (600-700 m asl), show a high share (53%) of semi-natural landscapes. Some localities above 1200 m asl exhibit gross violations in the landscape contours and development of fragmentation processes, which carry a high risk of natural capital loss. Field verification confirms that the focus on the small watershed scale is most conducive for monitoring purposes in terms of obtaining representative data. This approach facilitates the accurate interpretation of the spatial landscape structure and analysis of the diverse tendencies of the anthropogenic transformations.

### Key words:

mountain landscapes; Hemeroby Index; landscape metrics; FRAGSTATS; Bulgaria; Rhodope Mountain

## Studies on Ecological Security Assessment Index System of Cultivated Land in

### Guangzhou City

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#### Abstract

Cultivated land is the material basis for human's survival and development which is an important part of land resources. On the basis of reviewing the research progress of cultivated land ecological security, this paper made a deep analysis of its connotation and development status and analyzed the relationship between sustainable utilization of cultivated land resources and the evaluation of cultivated land ecological security as well as discussed the basic ideas, principles, methods and other aspects of the evaluation index system of cultivated land ecological security. Taking Guangzhou for example, we analyzed the factors affecting the ecological security of cultivated land. On the basis of study on the model of PSR model, this paper selected 30 levels of screening three evaluation indicators from the cultivated land natural ecological security, economic and ecological security, social and ecological safety and constructed the evaluation index system of cultivated land ecological security in Guangzhou, so as to lay a foundation for better analysis of the current situation and forecast the future development trend of the cultivated land ecological security. Through this study, we can promote the coordinated development of economy, society and land security, and provide a theoretical basis for the future development of farmland and land security warning.

#### Key words:

Cultivated land; Ecological safety; Index system; PSR model

## Study on Water System Landscape Pattern Planning of Kaifeng in the Basis of Green Infrastructure Theory

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### Abstract

Green infrastructure theory emphasizes on connectivity, network nature and integrity. As an important part of the green infrastructure network system, the city water system space and its carrying ecological service function play significant role in urban ecosystem. Applying 3S technology and landscape analysis methods, this article analyzes the spatial-temporal change characteristics of Kaifeng water system landscape pattern since it began to be considered as “Song Capital water system planning project” in 2002 till 2015, and advances out important planning requirements of water system as a green infrastructure, which will provide a theoretical basis for Kaifeng water system project construction and similar decision making of urban green infrastructure construction in future.

### Key words:

Water system; Green Infrastructure; Landscape pattern planning; Kaifeng City

## The Contributions of Climate Change and Human Activities on the Runoff of the Tingjiang River

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### Abstract

Based on 1965-2012 average daily runoff measured data of control hydrometric station (xi kou) in the Tingjiang basin, and daily precipitation and daily temperature data of three meteorological stations in the Tingjiang basin (yong ding, chang ting, shang hang). This study used in paragraph mean comparison, 5a sliding, trend line analysis, cumulative anomaly and the improved cumulative slope rate comparison method (SCRCQ) to nearly 50 years of climate change and human activities on runoff of Tingjiang for quantitative analysis. The results show that: The Tingjiang river basin runoff changes are volatile, runoff change down - up - general downward trend. The runoff from 1971 to 1980 compared with a 21.8% increase in the 60 s, From 2001 to 2012, runoff was down 10.9% compared with the 90 s. Runoff mutation for 1971, and 2001 years, so the runoff change is divided into three stages from 1965 to 1972, 1973-2001, 2002-2012. Period from 1965 to 1972 as the base period, 1973-2001 and 2002-2001 annual flow rate were 25.8%, 20.2%, precipitation and average air temperature change rate were 16.8%, 10.2%, the contribution of climate change on runoff change were 65.1%, 50.5%, the contribution rate of human activities on runoff change were 34.9%, 49.5%. The results reveal the Tingjiang river basin runoff change since nearly 50 a trend and its main influencing factors of contribution rate, the future of the basins in this play an important guiding role on the development and utilization of water resources.

### Key words:

runoff; climate change; human activity; Contribution rate; Tingjiang River

## The Morphometric Characteristics of Gobi Desert Pavement Analyzed by a Rapid Image-Based Method

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### Abstract

The gobi desert is one of the most widespread landscapes in northwest China. Its prominent feature is that on most of the surface exposed gravels and bare rocks but not sands. The gravel coverage, size distribution and morphological characters are often used to understand the evolution process of gobi desert, even as the evidence for relative age of its formation. However, some traditional methods e.g. sieving and eye estimating, is time-consuming and difficult to quantify accurately. Therefore, this research proposed to analyze the gravel coverage ( $G_c$ ), average size ( $G_s$ ), size distribution and aspect ratio (AR) of an alluvial gobi by methods based on plenty of orthoimages taken in the field-survey.

The main results are listed here:

1) The  $G_c$  and  $G_s$  values were significantly correlated with elevation ( $r^2=0.752$ ,  $p<0.001$  and  $r^2=0.798$ ,  $p<0.001$ , respectively). It means that the nearer to the source area, the larger gravel coverage and average size is.

2) The AR values fell first then rose with decreasing elevation, were not correlated with elevation ( $r^2 = 0.107$ ). It may be codetermined by fluviation, weathering and lithology.

3) The size distribution showed that with elevation drop, fine gravel content is higher, and size distribution is more concentrated.

Compared with traditional methods, the validation results showed the proposed image analysis method is a fast and precise approach to quantify the morphometric characteristics of gobi desert. This method could be extended to explore the source region of deposits and the transport/deposition process in the formation and evolution of gobi desert.

### Key words:

gobi desert; morphometric characteristics; digital image processing; gravel cover; gravel size

## The Research of Decorative Art Based on the Data Visualization Platform—Taking the Ancient Civilian Residences of Minnan as an Example

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### Abstract

Under the trend of long-cherished wish of Planning and Research:"Grasping characteristics, inheriting historical,emphasizing participate and more detailed", the data visualization platform to protect historical and cultural is particularly important. This thesis is initiated from the decorative art of the ancient civilian residences of Minnan, basing on the cross study, generaliztion and discussion of books, information and present research of different historical stages, analysis of the decorative art's database creation to explore the ancient civilian residences of Minnan through the construction data platform system .And digitalizing the traditional data to formed with a wide range of value of data. Accordingly, to explore the activation of the decorative arts' conservation and utilization, to revival of cultural heritage.

### Key words:

data visualization platform; decorative art; ancient civilian residences of Minnan; activation; conservation and utilization

## The Risk Assessment of Cultivated Land in Guangzhou City

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### Abstract

This paper based on statistical data of Guangzhou city, using the statistical analysis, entropy method and GIS spatial to constructed the risk assessment system of cultivated land in Guangzhou city, which include 22 factors from three aspects of natural pressure, economical pressure and social environmental pressure, to explain the risk assessment of each districts of Guangzhou cultivated land, spatial difference and the driving forces from 2005 to 2014, reaching a conclusion that the general regularity about the change of the risk assessment of cultivated land. The result showed that economic factors and policy factors played important factors in change of ecological risk of cultivated land in Guangzhou city, compared and analyzed the driving force and many aspects between the Guangzhou city and other developed cities. We found that between 2005 and 2014, natural and economic risk of cultivated land in general was on the decline, as well as social environmental risk rose up in Guangzhou city. The pressure of social environmental risk in 2014 increased three times than 2005. In the past three years, the trend of rapid growth is still. Therefore, we can't ignore the environmental protection the process of cultivated land resource protection and development in Guangzhou city.

### Key words:

the risk assessment; cultivated land; Driving force; Guangzhou city

## C12.26 Land Use and Land Cover Change

### Comparative Study on Land Cover and Land Use Change (LCLUC) and Their Driving Forces in Different Regions



#### Oral

1. [A Comparison of Urban Growth and their Influencing Factors of Two Border Cities: Laredo in the US and Nuevo Laredo in Mexico](#)  
Jennifer Jennifer (Texas State University, United States)
2. [Assessment of Land Use and Land Cover Changes Along the Middle Shire River Catchment, Malawi, Southern Africa](#)  
Maureen Kapute Mzuza, Zhang Weiguo (State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, P.R. China., China)
3. [Assessment of Land Use Changes and Forest Fragmentation in High Himalaya terrain in India](#)  
Amit Batar (Hokkaido University, Japan)
4. [Assessment of Urban Sprawl and Land Use Changes in the Metropolitan Zone of Budapest](#)  
Zoltan Kovacs (University of Szeged, Hungary)
5. [Assessment the Policy of Returning Farmland to Lake in Poyang Lake, China](#)  
Zhenglei Xie (Key Laboratory of Poyang Lake Wetland & Watershed Research, Ministry of Education (Jiangxi Normal University), School of Geography & Environment, Jiangxi Normal University, Nanchang, 330022, P.R. China, China), Liu Yang
6. [Changes on the Coastal River Basin Landscape: A Case on the Kholpetua Basin, Satkhira, Bangladesh.](#)  
Krishna Prosad Mondal (Beihang University, China), Mohd. Shamsul Alam (Jahangirnagar University, Bangladesh)
7. [Evaluation of Spatio-temporal Dynamics of Land Surface Temperature Change \(LSTC\) and Land Use Land Cover Change \(LULCC\): A Case Study](#)  
Md Surabuddin Mondal (Asst. Professor, Dept. of Geomatics Engineering, Bülent Ecevit University, 67100, Zonguldak, Turkey)
8. [Exploring Local Driving Forces of Increasing Urbanized Area in Java using Geographically Weighted Regression Model](#)  
Andrea Emma Pravitarsi (Bogor Agricultural University, Indonesia), Izuru Saizen (Kyoto University, Japan), Ernan Rustiadi (Bogor Agricultural University, Indonesia)
9. [Impact of Outmigration on Landuse Transformation in Lachi Gad Watershed, Garhwal Himalaya, India:](#)

## Past, Present And Future Trends.

Suresh Kumar Bandooni, Mirana Devi Laishram, Anupama.M Hasija (University of Delhi, India)

10. Land Cover Change and its Driving Forces in the Republic of Korea since the 1990s

Hao Yu (Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences,)

11. Land Use Change in the Eastern Black Sea Mountains, Turkey

Mehmet Somuncu (Ankara University, Turkey)

12. Land Use Change Trends and Land Degradation in Mongolia

Myagmartseren Purevtseren (National University of Mongolia, Mongolia), Myagmarjav Indra (State University of Life Sciences of Mongolia, Mongolia), Zaya Chinbat (National University of Mongolia, Mongolia), Munkhnaran Sugar

13. Land use transitions and their dynamic mechanism: The case of the Huang-Huai-Hai Plain

Yongqiang Liu

14. Land Use/Cover Changes in Selected Protected Areas in Romania

Monica Stefania Dumitrascu, Dan Balteanu, Gheorghe Kucsicsa, Ana Popovici (Institute of Geography, Romanian Academy, Romania)

15. Land Use/Land Cover Change and Water Deficit Estimation for Irrigated Regions: Central Asia, Fergana valley

Aleksandra Nikanorova (Diplomatic Academy of Ministry for foreign affairs, Russian Fed), Elena Milanova, Nikolay Dronin (Moscow State M. V. Lomonosov University, Faculty of Geography, Russian Fed)

16. Peri Urban Growth: A spatio-temporal analysis of large metropolitan cities of India.

Pallabi Guha, Veronica Gomes (Jawaharlal Nehru University, India)

17. Remotely Sensed Monitoring of Dynamics of Coastal Wetlands in the Yellow River Delta and Yangtze River Delta of China

Chunying Ren, Zongming Wang, Kaishan Song (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)

18. Research for the Relationship between the Land Use Change and The Terrain Gradient in Counties in the Loess Hilly Gully Region: as Pengyang County as an Example

Zhuang Zhuzhou (Nanjing University, China)

19. Spatial Patterns and Controlling Factors of Soil Organic Carbon in a Tributary Catchment of the Nanka

[River Basin Across the China-Myanmar Border Basin Across the China-Myanmar border](#)

Zhang Meiling, Fan Hui, Tang Dongmei (Institute of International Rivers and Eco security, Yunnan University, Kunming Yunnan, China)

20. [Spatiotemporal Comparative Analysis of Agricultural Development Processes between the Three Largest Black Soil Regions in the World](#)

Jiuchun Yang (Northeast Institute of Geography and AgroEcology, Chinese Academy of Sciences, China), Shuwen Zhang, Tingxiang Liu (Northeast Institute of Geography and AgroEcology, Chinese Academy of Sciences, China)

21. [Spatiotemporal Conversion from Rural Settlements and Arable Land in the Process of Urbanization in Beijing during 1985-2010](#)

Yuanyuan Yang, Yansui Liu (Institute of Geographic Sciences And Natural Resources Research, China)

22. [Spatio-temporal Dynamics of Cropland in Northeast China during 1990-2013 based on remote sensing](#)

Weidong Man, Mingyue Liu, Zongming Wang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)

23. [Study on Farmland Transfer between Plain Area and Mountainous Area in Northwest Arid Area-- a Case Study of Zhangye](#)

Xiao Xingyuan (College of Geomatics, Shandong University of Science and Technology), Li Xiubin, Tan Minghong (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research)

24. [Study on the Spatial-Temporal Characteristics and Impact Mechanism of Urban Land Expansion—— A case study of Jiangsu in China](#)

Yang Qingke (Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China)

25. [The Controlling Effects of China's National General Land Use Plan \(2006-2020\) on Construction Land Growth](#)

Yan Zhou, Xianjin Huang, Yi Chen (Nanjing University, China)

26. [The driving factors of land urbanization in the semi-market system of China: A time-lag Approach](#)

Cong Liao, Teqi Dai, Lin Sun, Wenxin Zhang, Fang Sun (Beijing Normal University, China)

27. [The Impact of Land Cover Changes on Social-Ecological Systems in Central Environmentally Sensitive Area of Sabaragamuwa Province in Sri Lanka: a Political Ecological Analysis](#)

Chandrasena Urugoda (University of Kelaniya, Sri Lanka)

28. [The Processes of Land Use Change in Slovenia in the Last Two Centuries](#)  
Matej Gabrovec, Peter Kumer (ZRC SAZU, Slovenia)
29. [The Radiative Forcing Due to Black Carbon from Land Use Land Cover Changes in Mt. Kenya Region](#)  
Daniel Mbithi, John Muthama, Joseph Ininda, Richard Onwonga (University of Nairobi, Kenya, Kenya)
30. [The Regional Differentiation of Vegetation Dynamics in Mainland China Based on Time-Series MODIS data](#)  
Jianbin Tao, Yu Wang (School of Urban and Environmental Sciences, Central China Normal University, China)
31. [The Spatial-Temporal Coupling Characteristics of urban land expansion and population growth in China](#)  
Hao Meng, Xianjin Huang (Nanjing University, China)
32. [The Unique Role IGU Commission on Land Use/Cover Change can play for Future Earth](#)  
Yukio Himiyama (Hokkaido University of Education, Japan)
33. [Urban green space, trend and driving forces in world cities](#)  
Ruishan Chen (East China Normal University, China)
34. [Urban Sprawl and Landuse change study in the Pimpri Chinchwad Municipal Corporation, Pune, India](#)  
Anushri Kadam, Virendra Nagarale (SNDT Women's University, Pune, India)

## Poster

1. [An Assessment of the Effect of Abandoned Coastal Wetland Restoration in China- Achievements and Lessons](#)  
Zebing Du (China, Jiangxi Normal University); Zhenglei Xie (China, Key Laboratory of Education Ministry for Poyang Lake Wetland & Watershed Research, Nanchang, 330022 P. R. China); Yue Wang (China, Jiangxi Normal University)
2. [Analysis of Cultivated Land Changes and Causes in 1990-2010 of China](#)  
Shaofeng Jia (China, Institute of Geographic Sciences and Natural Resources / Key Laboratory of Water Cycle and Related Land Surface Processes, Chinese Academy of Sciences); Yuan Liang (China, School of Resources and Environment, University of Chinese Academy of Sciences)
3. [Automatic Identification and Dynamic Monitoring of Urban Ecological Space based on Multi-period Remote Sensing Data](#)  
Sizuo Wang (China, Bureau of Land and Resources Investigation and Planning of Liaoning Province);

Feifei Zhao; Nisha Bao(China, College of Resources and Civil Engineering, Northeastern University)

4. [Dynamic Process of Oasis and its Impact on the Environment \(1986-2015\): a case study of Dunhuang Oasis](#)

Xiuxia Zhang; Yaowen Xie; Lili Lv (China, Lanzhou University)

5. [Growth Paths of China Forest Resources](#)

Liangjie Xin ;Jiayue Wang(China, Institute of Geographic Sciences and Natural Resources Research, CAS)

6. [Impact Assessment of Land use Land Cover Changes on Rainfed Watershed Hydrology Using Remote Sensing, GIS and SWAT Model](#)

SIVASENAREDDY ARAYPALLI (India, Amrita University, Coimbatore)

7. [Integrated Spatial Characteristics of Land Use Influencing Water Quality in Upper Catchment of Miyun Reservoir](#)

Erqi Xu; Hongqi Zhang (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

8. [Irregular Neighborhood Cellular Automata Land Use Simulation Based on GA-MCE Algorithm](#)

Yongheng Zhang (China, Liaoning Normal University)

9. [Petroleum Exploitation as a Driving Force of Urban Growth, a Case of Study from Lago Agrio in the Ecuadorian Amazon](#)

Liseth Fierro; Daysi Cordova; DEBORA SIMON-BAILE (Ecuador, ESPE)

10. [Problems and Perspectives of Land Use Management in the European Russia in connection with Climatic Changes](#)

Gennady Mukhin (Russian Fed, Lomonosov Moscow State University, Faculty of Geography); Tamir Boldanov (Russian Fed, Lomonosov Moscow State University, Faculty of Geography)

11. [Quantitative Study on the Driving Factors of Wetland Change Based on Geographical Detector](#)

Jiping Liu; Changdi Ma; Baojia Du (China, College of Tourist and Geoscience, Jilin Normal University)

12. [Research on Land Use Change Driven by Farmland In Loess Hilly-gully Region](#)

Xiaohu lin (China, Xi'an University of Science and Technology)

13. [Research on the pre-processing of Landsat OLI Images of the Cross-border Region of China, North Korea and Russia](#)

CUI GUIZHAN (China, Yanbian University); XIANG HENGXING (China, Yanbian University)

14. [Scenario Simulation and Landscape Pattern Dynamic Changes of Land Use in the Poverty Belt Around](#)

## Beijing and Tianjin, in China

Sun Piling; Xu Yueqing (China, China Agricultural University); Yu Zhonglei (China, Beijing Normal University)

15. Soil Conservation Benefits of Grain for Green Project at the Forest-steppe Zone of Loess Plateau

Xue Yayong (China, 1.School of earth science and resources, Chang 'an University; 2. Research Centre for Eco-Environmental Sciences, Chinese Academy of Sciences); Wang Xiaofeng (China,School of earth science and resources, Chang 'an University)"

16. Spatial Disparity of Major Cities along Land Silk Road in China from 1970s to 2010

Na LI (China, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences)"

17. Temporal and Spatial Change of ecological services on Loess Plateau of Shaanxi Province

kang liu (China, Northwest University)"

18. The Analysis of Spatiotemporal Varying Relationships Between Urban Expansion and Related Factors Using Geographically Weighted Logistic Regression

Guanglong Dong; Erqi Xu; Hongqi Zhang (China, Institute of Geographic Sciences and Natural Resources Research)

19. The Ecological Footprint in Northeast Asia from 1990 to 2010

Bai Zhang (China, Northeast Inst. of Geography & Agro-ecology,CAS.)

20. The Simulation of Crop Productivity in the Guanzhong-Tianshui Economic Region Basing on the Remote Sensing Crop Model

Liu Yan(China, Shaanxi Normal University)

21. Transition of Rural Settlements Productive Function: Analysis of livelihood strategies and land use of rural settlements in Eastern China

Bailin Zhang (China, Tianjin Polytechnic University); Fengrong Zhang (China, China Agricultural University); Weimin Cai (China,Tianjin Polytechnic University)

## **A Comparison of Urban Growth and Their Influencing Factors of Two Border Cities: Laredo in the US and Nuevo Laredo in Mexico**

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### **Abstract**

The twin cities of Laredo in the US and Nuevo Laredo in Mexico have been growing at an unprecedented pace over the last few decades. The trans-boundary flows of commodities and capital between these two cities, as well as significant population growth in the two cities have created an interdependent system, making this area a unique region for analysis and thus providing an opportunity to thoroughly examine drivers behind landscape changes in the two cities. The aim of this study is to examine urban growth and the influencing factors of Laredo-Nuevo Laredo. Results of initial remote sensing-GIS analysis indicated that there was considerable urban expansion in both cities in the three decades from 1985 to 2014. Spatially, Laredo demonstrated a more disperse growth pattern with a higher speed compared to that in Nuevo Laredo. A logistic geographic weighted regression using data at the pixel level on both sides of the border for the year 1985, 2000, and 2014 are implemented to reveal a number of factors that affected urban growth in different degrees for both cities and different time period. These potential factors included: (1) DEM elevation, (2) distance to nearest urban clusters, and distance to transportation roads, and (3) density of urban pixels, population density and density of highways. Furthermore, globalization factors related to industries/maquiladoras also played a significant role in affecting urban growth.

### **Key words:**

Influencing factors; urban expansion; geographic weighted regression; US; Mexico

## Assessment of Land Use and Land Cover Changes (LUCC) along the Middle Shire River Catchment, Malawi, using GIS and Remote Sensing

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### Abstract

Land use and land cover changes (LUCC) contribute to local and global environmental change as well as human well-being. The Middle Shire River in Malawi, southern Africa, has been heavily affected with silt due to soil erosion arising from land cover removal in its catchment. In this study, spatial and temporal knowledge has been used to determine changes in vegetation cover along the Shire River catchment area to understand the driving forces using Envi v.5.1 and ArcGIS v.10.1 Software. Landsat images of between 1989 and 2015 followed by classification accuracy assessment between 82% and 94% were used. Results show a high rate of deforestation ranging from 1.6 to 3.4% per annum. This may be attributed to rapid population increase and high immigration rate of people from the neighboring countries especially Mozambique. In addition to that, geographical position, artificial surfaces and social- economic factors also contribute to LUCC. There is a significantly strong correlation ( $P < 0.01$ ) between artificial surfaces, population, cultivated lands and increased silt from runoff deposited into the Nkula Dam. This study has demonstrated the importance of using multi temporal satellite imagery in understanding landscape dynamics. This may suggest that use of geographical Information System (GIS) and remote Sensing could provide clues for similar situations in future environmental management plans to reduce or stop further degradation.

### Key words:

driving forces; population; geographical position; artificial surfaces; social economic factors

## Assessment of Land Use Changes and Forest Fragmentation in High Himalaya terrain in India

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### Abstract

The study area i.e., Rudraprayag district is part of the high mountain Himalaya region of India. Three Landsat 2 (MSS), Landsat 5 (TM) and Landsat 8 (OLI) images were extract for land use and land cover map. Post-classification and a cross-tabulation in GIS module detection method was used to detect land use changes. The landscape fragmentation tool was used to map the forest fragmentation and to analyse the forest pattern. The aim is to point out of observed land cover changes and forest fragmentation in last 38 year from 1976 to 2014. The results indicate that the major land cover was forest in this study area and forest have decrease in last 38 years. The increase of built-up (9.13 km<sup>2</sup>) areas and agriculture lands (82.12 km<sup>2</sup>) indicate that increasing of land uses significantly altered in the loss of natural vegetation and contribute to as a non-forest area in the region. An increase in the area of scrub land (43.16 km<sup>2</sup>) and barren land (45.96 km<sup>2</sup>) also contributed to wasteland land or non-forest land. Total area of forest patches increased from 1976 to 2014, which are completely degraded by the edge effect. The main causes of land cover changes were expansion of agriculture land and built-up area. Forest fragmentations were increase by anthropogenic activity such as agriculture expansion, roads, and settlements, hydro-project and other hand, at same time forest fragmentations were also affected by natural hazards such as landslides and floods in last two decades in this high vulnerable mountain terrain.

### Key Words:

LULC changes; Forest fragmentation; High Himalaya terrain; GIS

## Assessment of Urban Sprawl and Land Use Changes in the Metropolitan Zone Of Budapest

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### Abstract

Like other post-socialist cities Budapest was affected by extensive suburbanization after 1990. Urban sprawl became one of the most significant phenomena of the transition. The mass outflow of better off households started right after the collapse of communism and generated a substantial demand for new housing. In addition the suburbanization of industry and services also set into motion in the late 1990s, converting former agricultural land to spaces of businesses. These processes substantially rearranged the spatial pattern of land use and land cover around Budapest. By the middle of the first decade of the millennium when the negative effects of urban sprawl became evident a new Act on Spatial Planning in the Agglomeration of Budapest was adopted, the first law in this regard in post-socialist Eastern Europe. However, the real impact of this law on long-term development proved to be marginal, as municipalities had enough time to create their territorial reserves for development decades in advance. The main aim of this paper is to analyse land use changes and assess the environmental loads of suburbanization around Budapest. Land use and land cover changes will be investigated over a longer period of time (i.e. from the 1950s) with the help of different methods (e.g. topographic maps, Corine, Urban Atlas). The intensity of urban sprawl and its impact on the environment will be assessed. Main triggering factors (transport, land prices etc.) of urban sprawl will be defined.

### Key words:

urban sprawl; land use; post-socialist city

## Assessment the Policy of Returning Farmland to Lake in Poyang Lake, China

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### Abstract

A great deal of high quality cultivated land has been converted to developed land and low quality cultivated land generated from other land use types, which has resulted in a serious threat to food safety. However, research on the impact of policy implementation on people's livelihood and activities and the driving mechanism of lake turning lake into farmland in China is incomplete. Better understanding will not only be helpful to explore the mechanism of land use policy in river-lake interaction change on the occurrence frequency and mechanism of drought and flood disasters of Poyang Lake, but also understanding the driving forces. This study combined the land use change derived from remote sensing images with the household survey to investigated the land use status, agricultural status, land transfer of farmland, in the returned levees. The reasons of farmland in the returned levee are also studied, including the water level caused by the implement of Three Gorge Dam, sand mining, livelihood, soil quality. The above factors have contributed to the farmland activities in the returned levee. Moreover, the policy recommendations on how to protect the people's safety and establish the compensation policy in the storage basin. The government should improve the land transfer policy and stipulate the big farmers to receive the land operation right from the farmers. It is urgent to approve the PL single embankment consolidation plan, compensation mechanism and maintain the single embankment can play ecological function.

### Key words:

Returning farmland into Lake; Land use Policy; Hydraulic change; people livelihood; Poyang Lake

## Changes on the Coastal River Basin Landscape: A Case on the Kholpetua Basin, Satkhira, Bangladesh

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### Abstract

The aim of the research is to know about the changes occurred due to human activity on coastal river basin landscape of the Kholpetua. Kholpetua River is one of the most important coastal river of Satkhira districts in the south western part of Bangladesh. In term of topography, salinity level and drainage pattern, the Kholpetua river basin landscape plays an important role in coastal ecosystem and to the economy. The area is under semi-saline tidal belt. Most of the area is under intense shrimp farming zone. Thereby come under rapid physical transportation, ignoring the consequential effects on hydrological, biological and geomorphic characteristics of the basin. In this context satellite image of two different years (1990 & 2014) were analyzed using unsupervised classification supplemented with ground truthing techniques. The interpretation reveals that landscape has changed substantially. Within an area of 66956.22 hectars (3 km buffer area), the declined area includes natural water bodies' cover 12.08% area, agricultural land 0.17%. The increased area includes Shrimp farming (8.98%) and homestead vegetation area (8.24). Besides, the physical process, human activities are mainly responsible for changing land use crop production to shrimp farming. It is an important positive development that people are aware of the benefits of homestead vegetation (tree) and they try to plant trees as part of their profit maximization effort and ensuring environmental protection against natural adversaries like cyclonic wind. It is a debatable issue of the expansion of shrimp farming promotes benefits to the wider section of the local people or befits to a few needs to examine further.

### Key words:

landscape; land use; shrimp farming; coastal river basin; satellite image; water bodies

## Evaluation of Spatio-temporal Dynamics of Land Surface Temperature Change (LSTC) and Land Use Land Cover Change (LULCC): A Case Study

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### Abstract

An attempt has been made to assess spatio-temporal dynamics of Land Surface Temperature (LST) and to establish the relationship between Land Use Land Cover Change (LULCC) & Land Surface Temperature Change (LSTC) in the study area. Landsat time series data for time period of in between 1985 and 2015 have been used for this study. The results showing that the land surface temperatures (LST) are significantly increased in the study region for the time period between 1985 and 2015. The results also showing that there are positive relationship between Land Use Land Cover Change (LULCC) & Land Surface Temperature Change (LSTC) in the study area.

### Key words:

Landsat Data; Land Surface Temperature (LST); Spatio-temporal Dynamics; LST Change (LSTC); LULCC

## Exploring Local Driving Forces of Increasing Urbanized Area in Java using Geographically Weighted Regression Model

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### Abstract

Urbanization is a world-wide phenomenon. Urbanization refers to a growth in the proportion of a country's population living in urban centers of a particular size. Java is the most populous island in the world and is home to 57% of Indonesia's population although the area is only 7% of the total land area of Indonesia. Number of population in Java was increasing from around 100 million in 1986 and become 143 million in 2014. Urbanization, urban population and urban development in Indonesia have been growing rapidly and centered in large cities, especially those are located in Java. The objective of this research is to explore local driving forces that are affecting rapid urban expansion in Java using Geographically Weighted Regression (GWR). By employing GWR model, it was found that local demographic, social, and economic factors spatially affected urban development in Java. The most influenced area which potentially converted to urban area is located in the western part of Java (including DKI Jakarta, Banten and West Java Provinces), since there are 2 metropolitan areas (Jabodetabek Megacity and Bandung Raya) located there. Higher population and economic activities in Java especially in both metropolitan areas have the implication in the high demand for food, natural resources and excessive utilization of land which results in the conversion of forest region, agricultural area or other greenery area to non agricultural/greenery area.

### Key words:

local driving forces; urbanized area; Java; GWR

## Impact of outmigration on Landuse Transformation in Lachi Gad Watershed, Garhwal Himalaya, India: Past, Present and Future Trends

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### ABSTRACT

Many parts of Himalaya in India and Nepal are facing many problems. Among them the important one are high rate of outmigration, permanent settlement of out-migrants in the place of job , decreasing interest to cultivate the land, increasing area under waste and fallow land and decreasing interest to protect the environment and all these problem are very well inter-related with each other. Therefore, the present study focuses on impact of out migration on landuse/Landcover change in Lachi gad watershed for past, present and future. It is analysed by using the satellite imagery for three time period 1987, 2002 and 2015 (Landsat and IRS), Global positioning system (GPS) and socio-economic survey. It aims to understand the factors influencing the outmigration in house hold level and built the relationship between the environment including agriculture and demography, particularly migration. The field work is conducted to identify the factors behind changing land use and driving force for outmigration in Lachi Gad watershed. Socioeconomic surveys revealed that most of the out-migration is Adult and aging parents are left behind. It is also noted that most land cover change involved the conversion of Agriculture land to pasture, fallow, waste and barren lands. The study also tries to explore the future landuse change by considering the trend of out migration and population size and distribution, marketing of the agricultural product which is based on organic and the technologies etc. Therefore, it will help to facilitate future research and policy consideration in the study area to check the out migration.

### Key words:

Outmigration; landuse/Landcover; Agriculture; watershed and satellite imagery

## Land cover change and its driving forces in the Republic of Korea since the 1990s

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### Abstract

Land cover change (LCC) has become an important aspect of global change studies. Republic of Korea (ROK) located in the southern part of the Korean Peninsula has large population density and experienced rapid economic development in the past decades, which imposed great pressures on the nation's land surface. In this study, based on multi-temporal remote sensing images, ROK's land cover data in 1990 and 2015 were obtained using the object-oriented classification method and LCCs during 1990-2015 were explored. In addition, combined with the socioeconomic data, the paper discussed major driving forces in regard to LCC and possible implications. Results showed that the overall classification accuracy of land cover data is 85.1% and 86.3%, for 1990 and 2015, respectively. Generally, land cover changes of ROK were characterized by shrinkage in lands with vegetation cover and expansion in lands with no vegetation cover. Areas of farmland, forestland and wetlands decreased by 322.3 km<sup>2</sup>, 766.7 km<sup>2</sup> and 707.6 km<sup>2</sup>, respectively. In the same period, built-up land area undergone dramatic expansion (+1731.5km<sup>2</sup>), an increase by 35.9% during the 25 years. Rapidly increased population and fast growing economy were the main driving forces for the expansion of built-up land, while the policies that emphasize the protection of forestland and farmland slowed down the declining trends of vegetation covered lands. Documentation of these changes in a reliable and spatially explicit way forms the foundation for sustainable managements of ROK's natural resources and environments.

### Key words:

Republic of Korea; Land cover change (LCC); driving forces; remote sensing

## Land Use Change in the Eastern Black Sea Mountains, Turkey

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### Abstract

The aim of present study is to evaluate changes in land use and function in the yaylas (*Yayla: a temporary settlement in mountain pastures; plural: yaylas*) of the Eastern Black Sea Mountains, Turkey. For this purpose, four different types of sample have been taken based on a research in 30 yaylas from three provinces of the Eastern Black Sea Region. Both quantitative and qualitative research techniques has used in the study for collection of data. The change in number of homes in the yaylas during years of 1973-2004 has been determined with help of aerial photographs and geographic information system. Primary data have been collected by a household survey during summer of 2010 in which 900 households have participated from 30 yaylas of three provinces. The qualitative data have been collected through personal observations and in-depth interviews with 45 key representatives of local communities. As a result of the analysis it has been determined that pastoralists live in 357 houses and 543 houses are second homes in 30 yaylas located in the Eastern Black Sea Region. The number of second homes in the yaylas has increased respectively during years of 1980-2010. The other change in the yaylas is functional change. The yaylas once primarily used by local people as mountain pastures in summer for grazing activities until the 1980s have been currently used for recreation purposes by amenity migrants and turned into holiday resorts. These changes in land use and function of yaylas have environmental, economic and social effects.

### Keywords:

Summer pasture; land use change; mountains; Eastern Black Sea Mountains; Turkey.

## Land Use Change Trends and Land Degradation in Mongolia

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### Abstract

By the increasing demand of land for agriculture, concentration of urban land in central region, development of mining industry and land privatization the ecological conditions of Mongolian land usages are getting more unsuitable.

The goal of our study was to assess impact to main land use types of Mongolia, change trends since 1975. Using the baseline data of state land cadastre inventory and National Land Information Database we defined land use changes in 40 years. Land use change trend is dividing into two periods from 1975-1990 and 1990-2015, which had been presented by quite different social and economic constraints and stimulations to diverse type of land use.

General land use changes in two periods are: agricultural sector development and destruction, rapid urbanization (rural population in-migration to urban) and transformation of nomadic livestock husbandry to semi-sediment husbandry. Main reasons of land degradation are the overgrazing and desertification, global warming and human impact which have been presented by reduction of forest and surface water areas.

### Key words:

Land pattern; land use monitoring; land inventory

## Land Use/Cover Changes in Selected Protected Areas in Romania

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### Abstract

The paper analyses land use/cover changes with direct impact on the biological resources of protected areas in Romania. The national network of protected areas is formed of 79 scientific reserves, 13 national parks, 130 monuments of nature, 661 nature reserves, and 15 natural parks. A number of 3 biosphere reserves, 19 Ramsar sites and one World Heritage site have acquired international status. In addition, there are 408 Sites of Community Importance (SCI) and 184 Special Protection Area (SPA) which are part of the Natura 2000 protected area network.

Some of these protected areas were affected by land use/cover changes in the wake of farming and forestry works, fragmentation of natural habitats through infrastructural developments and extension of build-up areas, water and air pollution, some industrial activities and tourism.

The political and economic changes that took place in the early 1990s had a great impact on land use in Romania, affecting also some protected areas mainly by deforestations, overgrazing, mining activities, and uncontrolled tourism. Resorting to several geospatial/statistical data-sources and GIS, the major land use/cover changes were identified and highlighted in several protected areas selected for various biogeographical regions of Romania. The intensity of land use/cover changes was estimated based on a number of indicators yielded by analyzing the resulted data for two intervals, before and after the protected areas were established.

The results are aimed at assisting the administrations of big protected natural areas to identify sustainable management solutions.

### Key words:

land use/cover changes; protected areas; Romania

## Land Use Transitions and Their Dynamic Mechanism: the Case of the Huang-Huai-Hai Plain

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### Abstract

Land use transition refers to changes in land use morphology, including dominant morphology and recessive morphology, of a particular region over a period of time driven by various factors. Recently, issues related to land use transition in China have attracted interest among a wide variety of researchers as well as government officials. This paper examines the patterns of land use transition and their dynamic mechanism in the Huang-Huai-Hai Plain during 2000–2010. First, the spatio-temporal patterns of land use transition, their characteristics and the laws governing them were analyzed. Second, based on the established conceptual framework for analyzing the dynamic mechanism of land use transition, a spatial econometric regression analysis method was used to analyze the dynamic mechanism of the five types of major land use transition in the Huang-Huai-Hai Plain at the county level. Land use pattern changes in the study area were characterized by an increase in construction land, water body and forested land, along with a decrease in farmland, unused land and grassland. The changes during 2000–2005 were much more significant than those during 2005–2010. In terms of factors affecting land use transitions, natural factors form the basis, and they have long-term effects. Socio-economic factors such as population and GDP, however, tend to determine the direction, structure, size and layout of land use transition over shorter time periods. Land law and policy factors play a mandatory guiding and restraining role in land use transitions, so as to improve the overall efficiency of land use. Land engineering is also an important tool to control land use transitions. In general, the five types of major land use transition were the result of the combined action of various physical, social and economic factors, of which traffic condition and location condition had the most significant effects, i.e. they were the common factors in all land use transitions. Understanding the spatio-temporal process of land use transitions and their dynamic mechanisms is an important foundation for utilizing land resources, protecting regional ecological environment and promoting sustainable regional socio-economic development.

### Key words:

Land use transition; Dynamic mechanism; Farming area; Huang-Huai-Hai Plain

## Land Use/Land Cover Change and Water Deficit Estimation for Irrigated Regions: Central Asia, Fergana valley

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### Abstract

The Central Asia has one of the most modified land cover under irrigation influence and related ecological problems. The study is devoted to analysis of water security in connection with land cover and land use changes in Fergana Valley with transboundary position in Central Asia at territories of Uzbekistan, Kyrgyzstan, Tajikistan within the Syr Darya river basin. The modern land cover of the Fergana valley differs significantly in terms of irrigation that causes geography of water scarcity, features and intensity of salinization and waterlogging. Geographical information system "Allocation of water resources for irrigation in Fergana valley" was used to elaborate scenarios of water shortage for irrigation and to define how significant the landscape structure, groundwater level and soil texture characteristics impact the differences in irrigation conditions, geography of water scarcity, manifestations of ecological problems. Assessment of current conditions for the development of irrigated agriculture allowed to reveal that the landscape complexes with a high risk of salinization and waterlogging occupy in the Fergana valley respectively 20 and 50%. The most acceptable scenario to avoid water deficit in unstable transboundary irrigation system of Fergana valley is differentiation and updating of irrigation norms according landscapes' characteristics, optimization of crops' composition with the transition to the cultivation of horticulture plantations and winter crops. That will allow to reduce twice the proportion of land to water demand and to enhance up to 80 % efficiency of irrigation techniques. The results of study will be presented in the further volume of the IGU/LUCC Atlas.

### Key words:

Landscape cover; water security; Central Asia; Fergana valley

## Peri Urban Growth: A Spatio-Temporal Analysis of Large Metropolitan Cities of India

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### Abstract

Urbanization in India had occurred at an unprecedented rate making it inevitable for cities to spill over their boundaries into nearby hinterland, termed as *peri urban* regions. The growths of these regions are marked by uneven development and arbitrary land use change.

The aim of the study is to analyse spatial development and changes in six major metropolitan cities, Delhi, Kolkata, Mumbai, Hyderabad, Bangalore, Chennai and their peri urban areas using Census, Remote sensing data over decades 1991-2001 and 2001-2011. The main objective is to identify urban built-up area and measure the changes in urban extension over the peri-urban, based on object oriented hierarchical approach. The spatio-temporal changes would be analysed in two steps, first involving analysis of different parameters, such as absolute real growth, built-up densities and landscape metrics. The second stage involving insight into detailed spatial gradient with respect to increasing distance from the city to peri urban areas, focusing on the complex mechanisms of peri urban growth.

In first stage urban footprints would be computed, using classification of urban types in net diagrams with aid of eight quantitative parameters such as absolute urban area, build up density, landscape shape density, largest patch index, number of patches, patch density, edge density and total edge. The results would be statistically analysed.

In second stage Spatial zonal based pattern would be observed using two parameters built-up density and SHAPE to analyse the zonal based gradient analysis using six zones of concentric rings around the main urban centre.

### Key words:

peri urban; urban footprint; urban expansion; remote sensing.

## Remotely Sensed Monitoring of Dynamics of Coastal Wetlands in the Yellow River Delta and Yangtze River Delta of China

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### Abstract

Coastal wetlands are among the most productive yet highly threatened systems in the world, and the reclamation of coastal wetlands for agricultural, industrial, and urban land use has occurred extensively in coastal regions of China. To make effective conservation and management, it is essential to understand the coastal wetlands' distribution and changes. In this study, China's Yellow River Delta and Yangtze River Delta were taken as the research areas. Based on multi-temporal remote sensing images and field observational data, dynamic trends of coastal wetlands in the study areas were detected from 1970s-2015 and the comparative analysis of coastal wetlands changes were conducted. Results indicated that natural wetlands (including saltmarsh, freshwater marsh, beach and mudflat) and human-made wetlands (including canal, reservoir, aquaculture pond and salt field) both had dramatic changes in the two study areas. In the Yellow River delta, natural wetlands kept decreasing over the 45-year period and the area of mudflat declined from 1696 km<sup>2</sup> in 1970s to 849 km<sup>2</sup> in 2015. The area of aquaculture ponds increased by 1407km<sup>2</sup> during 1970s-2015 and salt field increased by 909 km<sup>2</sup> from 1970s to 2015. By contrast, in the Yangtze River Delta, area of natural wetlands and human-made wetlands showed the same trends over the study period, but fluctuated greatly in different periods. For the two study regions, increased aquaculture ponds and salt fields were mainly converted from natural wetlands (mudflat and saltmarsh), while those lost natural wetlands mostly converted into human-made wetland, cropland and grassland.

### Key words:

Coastal wetland; remote sensing; Yellow River Delta; Yangtze River Delta

## Research for the Relationship Between the Land Use Change and the Terrain Gradient In Counties in the Loess Hilly Gully Region: as Pengyang County As An Example

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### Abstract

Land-Use and land-Cover change (LUCC) is the most direct manifestation of the interaction between human activities and natural environment, and is an important factor to reflect the extent of human activities as well. Based on the DEM data in 1995 and 2014 and the land use status, the quantitative analysis of the characteristics of land use change based on terrain gradient in Pengyang County, which was made with the aid of GIS space analysis and terrain niche index, dispersion index, and the comprehensive index, illustrates three points. Firstly, from 1995 to 2014, the area of cultivated land and unused land decreased dramatically. The grassland area, on the other hand, increased largely, and the area of woodland, waters and construction land also showed an upward trend. Secondly, with the elevation of the terrain niche, the distribution Index of cultivated land, waters and construction land were in decline, while that of woodland and grassland was on the rise, and the distribution Index of unused land first rose then fell. Also, the dominance distribution section of grassland increased two terrain niches, while that of unused land decreased two. Overall, waters' dominance distribution section concentrates on the low position; cultivated land and construction land's dominance distribution section are mainly on the low-to-mid position and woodland, grassland and unused land's dominance distribution section are mainly on high position. Thirdly, Compared with the comprehensive index of the extent of land use in 1995, that in 2014 increased in all terrain niches. This paper provides a theoretical basis for the optimization of land use pattern and sustainable utilization of land resources for Pengyang County.

### Key words:

land use change; terrain niche; distribution index

## Spatial Patterns and Controlling Factors of Soil Organic Carbon in a Tributary Catchment of The Nanka River Basin Across the China-Myanmar Border

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### Abstract

Soil organic carbon (SOC) plays an important role in global terrestrial ecosystem carbon cycling. However, the relationships between land-use and SOC stocks remain unambiguous and poorly quantified, especially in extremely complex mountainous terrain. This paper addressed to investigate the correlations between SOC stocks and multiple confounding factors (e.g. soil properties, topography and land-use type) in a small catchment located in the low-latitude hot and humid valleys across the China-Myanmar border.

We used a grid sampling method to locate 73 sampling points, where 219 soil samples were collected at three sampling intervals along the 60cm-depth soil profiles for each sampling point. After air drying and sieving through 200-mesh and 2mm mesh, physical and chemical properties such as pH, organic matter content, total and alkali-hydrolyzable nitrogen content, and grain composition of soils were measured in laboratory. SOC stocks were estimated in the mineral soil up to 60cm depth by the soil type method. Spatial pattern of soil organic carbon across the study area was simulated by the Kriging interpolation method. Variables associated with topography such as elevation, slope and aspect were extracted from the local topographic map with a contour interval of 20 m. The relationship between environmental factors and soil organic carbon was analyzed using Pearson correlation analysis.

The results highlighted the importance of environmental conditions such as soil properties and topography rather than land-use types on SOC stocks. The SOC is strongly correlated with soil bulk density ( $R=-0.645$ ,  $P<0.01$ ), total nitrogen content ( $R=0.672$ ,  $P<0.01$ ) and topographical variables such as elevation, slope and aspect ( $P<0.05$ ). Higher SOC mainly occurred in the areas with a slope range of  $15^{\circ}$ - $25^{\circ}$  and in sunny slopes. SOC increased with elevation at lower elevations and decreased with elevation at higher elevations. Vertically, topsoil had higher SOC stocks, which accounted for 43% of the total SOC stocks in the whole examined soil layer up to 60cm depth. However, proportion of SOC stocks in topsoil horizons differentiated among land use types. Secondary forests had higher values than planted forests and rain-fed farmlands. Overall, topography has a predominant impact on the horizontal distribution of SOC stocks at a catchment scale in the area of mountainous terrain, whereas land use and management mainly affects the vertical pattern of SOC stocks.

**Keywords:** Soil organic carbon; Spatial pattern; Influencing factors; Mountainous area; Elevation gradient

## **Spatiotemporal Comparative Analysis of Agricultural Development Processes between the Three Largest Black Soil Regions in the World**

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### **Abstract**

Spatiotemporal comparative analysis of land use and land cover changes between the three Black Soil Regions over a long time scale will be beneficial to further understand the processes of agricultural development, corresponding driving forces in different social backgrounds and future sustainability. The Mississippi River Basin in America, Ukraine Plain and Northeast China are the three largest regions of black soil in the temperate zone of the world. The soils are mainly chernozem and black soil with high natural fertility. And they are located between the zones of temperate forest steppe and temperate steppe with flat to gently rolling plains, suitable for farming and having become important grain production bases. This study used the Harmonized Land Use Database (Hurt et al. 2011) and Land Use and Land Cover Database of Northeast China to compare, analyze and map the temporal and spatial change characteristics of cropland, forestland and grassland of the three regions over the past three hundred years. The results showed much differences in processes, historical length, transition sources and present situation of agricultural development in the three regions. It suggested that the processes of agricultural development from Mississippi River Basin and Ukraine Plain which have experienced traditional to mechanized to modern industrial agriculture, would provide rich and advisable experiences for reference to developing China.

### **Key words:**

spatiotemporal analysis and mapping; agricultural land change; Black Soil Regions

## Spatiotemporal Conversion from Rural Settlements and Arable Land in the Process of Urbanization in Beijing during 1985-2010

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### Abstract

Over the past decades of Open and Reform Policy in 1978, urbanization in China has taken place at an unprecedented rate and encroached upon a great lot of arable land and rural settlements, resulting in increasingly prominent conflict between the urban and rural areas. Especially, rural issues, such as depopulation, farmland loss, abandoned residential land, and hollowed village etc, have seriously influence rural sustainable development. In this context, this paper tries to explore the dynamic spatiotemporal characteristics and trend of rural settlements loss and arable land depletion under urbanization, which could offer theoretical basis and scientific support for further research of rural development and rural restructuring. In this paper, we applied non-agriculturization intensity index and GIS-based buffer analysis using the remotely sensed land cover data to quantify this spatiotemporal conversion from 1985 to 2013 in Beijing, China. Results showed that: (1) About 80% of urban growth has been at the expense of rural settlements (23.42%) and arable land (57.14%) in Beijing. (2) An obvious rural non-agriculturization intensive belt was observed in spatial units, mainly distributing between the Fourth Ring Road and the Fifth Ring Road. (3) The spatial distribution of most high-speed, medium-speed and fast-speed non-agriculturization began to transfer from northern area to southern area after 2005. (4) The curves of variation of rural non-agriculturization intensity under urbanization along urban-rural gradient presented inverted “U” shapes away from the socioeconomic center while that along the motorways displayed exponential decay.

### Keywords:

rural-Urban development transformation; rural non-agriculturization; urbanization; rural settlements loss; arable land depletion; Beijing city

## Spatio-temporal Dynamics of Cropland in Northeast China during 1990-2013 Based on Remote Sensing

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### Abstract

Croplands dynamics are undergoing constant changes because of both natural and anthropogenic factors. To obtain the spatio-temporal dynamics of croplands in Northeast China and their driving forces, Landsat TM/ETM+/OLI imageries in 1990, 2000 and 2013 were selected and classified by object-oriented methods. Results indicated that in 2013 the area of croplands was  $41.66 \times 10^4$  km<sup>2</sup> (including 13.76% of paddy land and 86.24% of dry land), which occupies 33.51 percentage of total area of Northeast China. During 1990-2013, cropland increased by  $2.27 \times 10^4$  km<sup>2</sup>, including 451.71 km<sup>2</sup> of paddy land and 1825.68 km<sup>2</sup> of dry land. Spatio-temporal distribution changed obviously during last two decades. Croplands in north of study area increased, while cropland in south regions decreased. More than 32 percentage of the formal croplands transformed to built-up area because of urbanization, these areas were mainly distributed around large cities. Reclamation of wetland, woodland and grassland resulted in the increase of croplands. We also found that regions where croplands changed significantly has those conditions: annual precipitation range from 500 to 700 mm, mean annual temperature between 2 °C and 4 °C, slope less than 3°, and elevation less than 200 m. The area-weighted centroids of paddy land moved to northeast with a distance of 207.41 km, but the area-weighted centroids of dryland rarely changed. During the last 23 years, although climate change impacted spatio-temporal changes of croplands, anthropogenic factors, e.g. policies regulation, population grow, urban sprawl and other factors were main factors contributed to croplands changes.

### Key words:

Northeast China; cropland; remote sensing; object-oriented classification; driving force

## Study on Farmland Transfer between Plain Area and Mountainous Area in Northwest Arid Area: a Case Study of Zhangye

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### Abstract

Using official statistic and farmer interview and questionnaire data, based on the comparative analysis of farmland transfer characteristics between mountainous area and plain area in Zhangye, analysed the reasons for the differences of farmland transfer. The study found that: The farmland transfer form and transfer destination of plain area is complicated than mountainous area. Plain area farmland transfer form is mainly in lease, exchange and subcontract, transfer destination is mainly in producing individuals, cooperatives and family farms. Mountainous area farmland transfer form is dominant in lease and transfer destination is dominant in producing individuals. The transfer scale of mountainous area is significantly greater than plain area. The farmland scale operation area of mountainous area is  $71.33 \times 10^4$  acres. The farmland scale operation area of plain area is  $29.09 \times 10^4$  acres. Among them, mountainous area scale operation area is focused on 100-500 acres, while is focused on 50--100 acres in plain area. Zhangye farmland transfer periods are mainly temporary, mountainous area farmland transfer period generally is shorter than plain area. The difference of transfer purposes and agricultural income level which are caused by the difference of regional physical geography environment and irrigation water is the main reason for the difference of farmland conversion characteristics between mountainous area and plain area. At the same time, the different degree of fragmentation is the main reason. Accordingly, the paper put forward the corresponding policy suggestion, providing a reference for the government to formulate farmland transfer policy according to local conditions.

### Key words:

Farmland transfer; characteristic difference; Plain Area and Mountainous Area

## Study on the Spatial-Temporal Characteristics and Impact Mechanism of Urban Land Expansion: A case study of Jiangsu in China

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### Abstract

China is undergoing an unprecedented urbanization process in which massive amounts of rural land has been converted to urban use. Rapid urban land expansion in China has generated heightened concerns over consequences of urbanization and challenges to sustainable development. Jiangsu is the highly typical of evolution of the human-land relationship caused by urban land expansion, which becomes a typical case in the paper. Using official land use conveyance data from 2004 to 2012 we have found that significant spatial variation at the county level in Jiangsu exists in rapid urban land expansion, particularly the counties locating in the Sunan and municipal districts. There are mainly five aspects of natural factor, globalization, decentralization, marketization and development basis used to analyze the influence mechanism. Due to the significant agglomeration and dispersion characteristics and spatial autocorrelation of urban land change, the spatial lag model (SLM) is chosen to analyze the spatial lag effect. Regression result reveals that the theoretical framework can explain urban land expansion and present empirical evidence to support these arguments. Through the suitability of land development, population aggregation, adjustment of industrial structure, land planning and land use policy, the above five aspects impact on urban land use structure and land development intensity. As a result, they jointly affect the process of land urbanization. This study enriches the urbanization literature by providing a systematic understanding of rapid land urbanization in a transitional economy.

### Key words:

spatial-temporal characteristics; urban land expansion; impact mechanism; Jiangsu province

## The Controlling Effects of China's National General Land Use Plan (2006-2020) on Construction Land Growth

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### Abstract

Assessment on the effect of land use policy implementation research is of great significance for improving the implementation of policy. The purpose of this study aimed to assess whether land use planning has controlled construction land growth. Taking 338 cities as the research object, methods of fixed effects model, random effects model and OLS model were employed. The result shows that China's National General Land Use Plan (2006-2020) is effective in controlling construction land growth during its midterm phrase. The decrease area of construction land reduced about 355.98 ha with a 1% increment of control rate. Furthermore, the study analyzes the "Absolute Effect" and finds that differs among cities on the controlling effects of construction land growth. In addition, the implementation of China's National General Land Use Plan has two phases , and the years 2006-2009 shows better than the years 2010-2012. Finally, considering both the effectiveness and planed objectives achievement, the implementation of China's National General Land Use Plan (2006-2020) is judged to be effective, but not completely successful. The current land management system, national development strategies, regional land-use policies and economic development level may have contributed to the implementation of China's National General Land Use Plan (2006-2020).

### Key words:

controlling effects; city level; land use planning; China

## The Driving Factors of Land Urbanization in the Semi-Market System of China: A time-lag Approach

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### Abstract

China's urban land expansion is extraordinary in the world and happens in a semi-market system, which cannot well explained by theories based on market institutions. Though many factors including institutional variables have been used in the models, the allocation process of construction land quotas in China has not been well included, which requires a time-lag technique. This paper develops a theoretical framework focusing on not only the market factors, but also the China's top-down process of land allocation by governments. According to the framework, we devise a multi-level model with some time lag variables reflecting the land allocation process. And using the official land use conveyance data from 2006 to 2008, it finds that the GDP, total population and the speed of economic development in the planning year have significant influences on the growth of construction land in the later years. And the different land uses have quite different influence factors. Urban land of cities and designated towns are mainly driven by population scale, while stand-alone industrial lands are mainly driven by the added value of the secondary industry and the rate of economic development. With a clearer framework on planning process, the effects of planning system and the market system can be compared in our framework and models, thus a better understanding on the urban expansion can be revealed.

### Key words:

Land urbanization; Land allocation system; Driving factors; Time lag; Multi-level model

## The Impact Of Land Cover Changes on Social-Ecological Systems In Central Environmentally Sensitive Area of Sabaragamuwa Province In Sri Lanka: a Political Ecological Analysis

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### Abstract

This study examines the relationships between the existing social issues of village areas in Central environmentally sensitive area in Sri Lanka and the land use cover changes within the last 100 years. Three different social ecological systems, Palawela, Buthkanda and Niththamaluwa, were studied using land use maps and the perceptions of settlers of the areas which were taken by life history methods and other related anthropological and political ecological approaches. The study further analyses the major land use and cover changes which were made by the last three generations of the villages or the outsiders to those social-ecological systems, in order to utilize their biophysical environment and immediate surroundings to sustain their livelihood.

The main livelihood of the permanent settlers in the three villages is agriculture, which has changed from shifting cultivation, intensive subsistence agriculture, to commercial crop production, both in large estates and in home gardens during the last 100 years. At a broader scale, commercial tea and rubber plantations, managed by private and government sectors in surrounding areas of the study sites, were established in the 1800s and have expanded since that time. Most of the hazards creating fragility in the social-ecological systems of the study sites are the result of land use transformation within the villages and in surrounding areas. Yet the National Physical Plan and other development plans of the Sabaragamuwa Province have categorized the landslides, floods, winds, and droughts as “natural”, rather than human induced hazards. The climate and topographical setting are merely proximate causes of disasters such as floods and landslides, but the root causes are practices of deforestation and monocropping, dating back to colonial times and continuing today. Colonialism itself is a deeper root cause and production for the open market continues as the act of colonialism, even today for the livelihood of the villagers in Sabaragamuwa area.

Under the open market system, commercial crops have been promoted on small scale land and home gardens in the Wet Climatic Zone areas of Sabaragamuwa province. When the prices go up for the mid country and lower country tea, the amount of land cultivated in these crops also increases. The land use pattern of the



study sites of Sabaragamuwa is decided by the market rather than by sustainable outcomes for the villages. These market-driven land use changes are unbearable though the repercussions of biophysical environment, to such transformations creates unsustainability of these social ecological systems in the long run.

**Key words:**

Land use cover change; Sustainable development; Environmental sensitive areas; Sri Lanka

## The Processes of Land Use Change in Slovenia in the Last Two Centuries

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### Abstract

In 2016 we completed the entering of data from the Franciscan Cadastre of the first half of the 19<sup>th</sup> century into the database of land use on the level of cadastral communes. This collection had already contained the data from the land cadastre for the years 1900, 1953, 1961, 1971, 1979, 1994 and 1999. Available for the period from 2002 onwards are the data that have been collected by the Ministry of Agriculture and Environment for the needs of agricultural subsidies. These data are available on the level of land parcels. We also entered the borders of cadastral communes from the first half of the 19<sup>th</sup> century into the database. Even though cadastral communes were the most stable administrative units, rather numerous changes have nevertheless occurred as to their borders over the two centuries. The prevailing processes during the two-century period are presented by means of the established typology of land use changes; presented are the areas with prevailing afforestation, grassing over, land use intensification or urbanisation. In addition, the index of change has also been calculated, which has been prepared following the methodology of Czech geographers. In this way, a comparison between Slovenia and Czechia has been made possible, the two countries that have both developed in similar historical circumstances over the last 200 years.

### Key words:

land use change; franciscan cadastre; Slovenia

## The Radiative Forcing Due to Black Carbon from Land Use Land Cover Changes in

### Mt. Kenya Region

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#### Abstract

The study aims to estimate radiative forcing due to black carbon associated with land use activities and modeling of future temperature change over Mt. Kenya region. Data to be used include climate data spanning 1978-2015 from Kenya Meteorological Department (KMD), mass fraction estimates of BC derived from experimental data, BC Aerosols Optical Depth derived from OPAC model and RF estimates over the area of study. Spatial-Temporal Characteristics of the direct radiative forcing of BC Direct Radiative Forcing Mt. Kenya Region will be determined. The former will be carried out using surfer software while the later will be determined statistically and output determined by time series analysis. Correlation analysis will be done between the main Climatic parameters (Rainfall and Temperature) and  $RF_{(ATM)}$  estimates. Contribution of  $(RF)_{ATM}$  to global warming will be estimated using the IPCC net RF values as reference. The estimates will be mapped over the area of study. Future global warming will be estimated over the area of study using Model for Assessment of Green House gas Induced Climate Change: A Regional SCENario generator (MAGICC SCENGEN).

It is expected that radiative forcing due to black carbon over Mt. Kenya region will be determined and past and future precipitation and temperature scenarios generated. Results of this study will provide information on black carbon induced radiative forcing estimates over Mt. Kenya, radiative interactions and future climate scenarios.

#### Keywords:

Radiative Forcing; Black Carbon; Aerosols; Climate Change; Land Use land Cover; MAGICC SCENGEN

## The Regional Differentiation of Vegetation Dynamics in Mainland China based on Time-Series MODIS data

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### Abstract

Land-cover change and vegetation dynamics is an important issue in the context of global climate change. It's of great value to obtain the regional differentiation of vegetation dynamics on national scale timely and to update it regularly using remote sensing images in remote sensing of vegetation. In this research we presented a new method to address the issue of vegetation process using phenological parameters from time-series MODIS products. Land surface phenology is defined as the seasonal pattern of variation in vegetated land surfaces observed from remote sensing. The 16-day composite Enhanced Vegetation Index (EVI) data from TERRA/AQUA-MODIS with 250 m spatial resolution covering year 2000 to year 2015 were downloaded and processed. The seasonal amplitude, a phenological parameter derived from MODIS EVI by TIMESAT was used for this purpose. Breaks for Additive Season and Trend project (BFAST) was used to detect and analysis the changes since 15 years. By employing this distinct metrics of phenological parameter and the advantages of MODIS data with high temporal resolution and intermediate spatial resolution, a remote sensing based model for mapping vegetation dynamics in mainland China was built through integration with land-cover data. The variation of vegetation dynamics with latitude, longitude, elevation, temperature and precipitation was analyzed. Our study indicates that apparent rule of regional differentiation can be observed. The proposed method provided a novel way to observe and monitor vegetation dynamics by information mined from time-series MODIS data.

### Key words:

Regional differentiation; vegetation dynamics; time-series MODIS data; phenological parameter

## The Spatial-Temporal Coupling Characteristics of urban land expansion and population growth in China

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### Abstract

China is experiencing rapid urbanization and important transition of urbanization. However, under the background of the urban rural dual system for population registration and social welfare, China's urbanization process is different from the western countries. Our research analyses the relationship between urban land expansion and population growth in China during 1994-2013. A coupling model, Coordination Index and Center Coupling Model are used to re-examine the process of urban land expansion and population growth. The conclusions have been drowned below. (1) The Coupling of urban land expansion and population growth in China is weak and decreasing. The speed of land expansion is faster than the rate of population growth. (2) The main types of coupling are rapid population growth, concentrate in East coast, along the Yangtze River and other economically developed regions. The number of rapid population growth and coordination are insufficient, mainly in the central and western regions of China. (3) The number of cities with land expansion has increased significantly, and the distribution has showed a trend of expansion. Meanwhile, the built-up area and population started to decrease in Northeast, north of Chengdu and other resource-based cities.

### Key words:

land expansion; population growth; coupling; temporal and spatial evolution

## The Unique Role IGU Commission on Land Use/Cover Change can Play for Future Earth

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### Abstract

Future Earth is a new grand initiative for sustainable future of the world which started in 2015. It was established on the bases of the achievements of the former big global programmes such as IGBP (International Geosphere-Biosphere Programme), IHDP (International Human Dimensions Programme on Global Environmental Change) and DIVERSITAS, yet put forward new principles such as trans-disciplinarity and enhancement of sustainability.

IGU-LUCC (IGU Commission on Land Use/Cover Change) was established in 1996 in order to support LUCC (Land Use/Cover Change Programme), which was initiated jointly by IGBP and IHDP in the same year. Ten years later, LUCC was merged with GCTE (Global Change and Terrestrial Ecosystems), and was re-named GLP (Global Land Project). GLP moved into Future Earth in 2015 at the conclusion of IHDP and IGBP. Unlike LUCC and GLP, IGU-LUCC has kept its objectives and mission till today since its start in 1996, supporting LUCC and GLP both from inside and from outside.

Land use is now recognized as a major global environmental issue in several different ways, as seen in “Future Earth 2025 Vision” which identifies eight “key focal challenges” such as food-water-energy, climate change, cities and rural areas, which are all related with land use in one way or another. IGU-LUCC has been an important platform for integrative basic and applied studies of land use changes, their backgrounds and consequences in the world. The paper discusses how the expertise and network of IGU-LUCC can be mobilized to consolidate land use research/education/information bases for Future Earth.

### Key words:

IGU-LUCC; LUCC; GLP; IGBP; IHDP; Future Earth; land use; sustainability

## Urban Green Space, Trend And Driving Forces In World Cities

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### Abstract

Green spaces support the sustainability of cities (Rydin, 2010; Hall, 2006; Chiesura, 2004). United Nations stated that, all city-regions should achieve a tree canopy of at least 25% of land area, and meet WHO's suggested minimum of 9 m<sup>2</sup> open space per resident by 2030 in its indicators on sustainable development goals (SDGs). However, statistics show declining urban green spaces worldwide with African situation been critical (Chen, 2014; McDonald et al., 2010; Fuller & Gaston, 2009). Rapid urbanization has changed green space into build up areas in order to hold the increasing population in a lot of cities in developing countries. Moreover, with its multi-function of urban green spaces, government from local to national become take it more seriously. Green space displays different pattern and process in different countries. It covers nearly 40% of land area in Shanghai, however, less than 10% coverage in many African cities (Adjei Mensah, 2014, MaConnachie et al., 2008). We propose that the pathway of urban green space is in a Kuznets curve which are correspondent to the stages of urban development and use data from ten cities all over the world to explore the process of urban green space change.

### Key words:

Urban green space; developing process; land use transition; sustainable development goals, urban health

## Urban Sprawl and Landuse change study in the Pimpri Chinchwad Municipal

### Corporation, Pune, India

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#### Abstract

Landuse study is an important area of urban study. The study of landuse change with reference to change detection and the growth of urban centres have gained prominence in the recent years. This process is termed as sprawl. Urban sprawl is basically another word for urbanization. It refers to the migration of a population from populated towns and cities to low density residential development over more and more rural land. GIS and remote sensing based study is carried out to comprehend the process of sprawl. LISS –III and IRS 1D (PAN) satellite imageries are used to study the phenomena for the years 2001, 2009 and 2011 respectively. Spatial analysis is done using GIS to chalk out the potentials and restraints of the region. The article aims to study the magnitude, growth and trend of urban sprawl taking place along the major transport arteries linking PCMC with the major development hubs of the nation during the last decades.

#### Key words:

GIS; Remote Sensing; Urban Sprawl; Landuse

## **An Assessment of The Effect of Abandoned Coastal Wetland Restoration in China-Achievements And Lessons**

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### **Abstract**

Estuary wetlands have been continuing to degrade under the pressures of natural factors and anthropogenic activities. The goal of restoration is to re-establish the hydrologic connection, and one of the most important methods of restoring abandoned wetlands is supplying freshwater to degraded wetlands. The decreasing Yellow River discharge and the altered flow regime during the last few decades are most likely a factor responsible for problems related to ecosystem deterioration, habitat loss, siltation of the river channel, groundwater depletion, and an increase in soil salinity. The Yellow River Conservancy Commission conducted water transfer engineering during the 10th flow-sediment regulation regime in the flood season of July, 2010. The water transferring project has resulted in significant positive ecological effects, including increased areas of freshwater wetlands, changes in vegetation types and bird diversity. The endangered species of red-crowned crane has increased by 11 and by 19 in 2010 and 2011, respectively, and the oriental white stork has increased by 18, suggesting the improved effects of Diaokou wetland ecological water transfer. It is necessary to establish a mechanism for the periodic monitoring of wetland resources. Coastal ecosystem degradation has led to the diagnosis, a restoration process, and an after-the-fact assessment, showing that adaptive management should be used in the practice of coastal ecosystem restoration. Therefore, future studies should incorporate water quality parameters to compare different restoration scenarios in achieving watershed-scale management goals.

### **Key words:**

Transfer water; abandoned estuary wetland; ecological restoration; Yellow River Delta

## Analysis of cultivated land changes and causes in 1990-2010 of China

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### Abstract

Food security has great impact on stability and development. Cultivated land is an important section of food security, therefore its changes and causes have an important significance for the study of food security of China. With the RS multi-temporal land use data (1990, 1995, 2000, 2005 and 2010) extracted in ArcMap, it's analysed the changes of cultivated land from 1990 to 2010 in China, compared the various provinces and watershed, and explored the main causes of those changes. The results illustrate that the area of cultivated land increased slightly in the whole time, but actually increased only in 1995-2010 while reduced in other periods, and the year of 2000 was the turning point of the spatial change to weaken. The proportion of construction land occupation increased definitely, which is related to the degree of regional development. Conversions from cultivated land to forestland or grassland have regional characteristics: most conversion of farmland to forestland occurred in the northeast and southwest regions, and most conversion of cultivated land to grassland happened in the northwest region. The steady source of added cultivated land is grassland, before 2000 forest was another main source, however exceeded by unused land later.

### Key words:

cultivated land; change; change causes; land conversion; construction land occupant

## Automatic Identification and Dynamic Monitoring of Urban Ecological Space based on Multi-period Remote Sensing Data

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### Abstract

Urban ecological footprint is not only a unified whole forming by interaction between the urban and its environment, but also a special artificial ecological space building up by human's adaption, process and transformation to the natural environment. The scale of urbanization and trends is determined by the urban ecological spatial distribution and succession laws in urban integration process. The automatic recognition and dynamic testing study of urban ecological space based on the majority of remote sensing data can be analysed in the huge impact and far-reaching significance on people's lives that urban ecological space have in urban integration process, and provide a reference for urban integration planning.

In this study, Shenyang as the centre city in Liaoning province is facing the challenges and opportunity during the city expansion, Shenyang-Fushun new district of Liaoning province was selected as the study area. The Landsat images with 30 spatial resolution acquired in 2006, 2010 and 2014 were used. Then, the urban ecology spatial information such as the urban area and urban green space area is extracted by the object-oriented method. Furthermore, the relative calculation and analysis of landscape pattern dynamic characteristics and multi-directional change features in the study region are processed. The features, such as NDVI, NDWI, NDBI and brightness were built to extract vegetation, water and towns algorithms rules by nearest neighbour classification method and fuzzy classification. And based on the semantic and logical relationship between different layers, complete information extraction based on object oriented urban ecological change. The overall accuracy of classification was 82.5%. And finally come to the following conclusions:

1. The total urban area in 2010 had increased by 9.63km<sup>2</sup> than in 2006, and the total urban area in 2014 is 65.35km<sup>2</sup>, up 5.63km<sup>2</sup> over 2010. The Fushun area remains the focus of total urban area increasing, the part of Fushun had relatively higher enthusiasm response to the policy and constantly developed in direction of Shenyang.

2. The urban green space area in 2002 had increased to 20.38km<sup>2</sup> with 10.75km<sup>2</sup> in 2006, and the urban green

space area is up to 25.74km<sup>2</sup> in 2014. The urban green space mainly distributed on the banks of Hunhe River. The urban green coverage rate is increased from 9.85% in 2006 to 18.67% in 2010, and it reached 23.59% in 2014. Meanwhile the increase of urban green space and urban is positively and very significantly correlation. And the correlation is more and more high, which suggested that the urban ecological spatial structure of Shenyang-Fushun had drew closer gradually, and the Hunhe landscape belt will be built flowing the planning.

3. The average patch area and the largest patch index make increasing trend, the distribution-parallel and spread degrees index make decreasing year by year, which suggested that Shenyang-Fushun is uniform and planning, pay more attention to the plants and other large ecological park, urban green space types and the construction of the urban construction and planning.

**Key words:**

remote sensing; urban ecological space; object-oriented; Landscape patter

## Dynamic Process of Oasis and its Impact on the Environment (1986-2015): a case study of Dunhuang Oasis

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### Abstract

Understanding the dynamic process of oasis and its impact on environment is crucial for the management and environmental health. The arid region of northwest China has experienced dramatic oasis expansion and serious environmental problem since 1980s. The purpose of this study is to investigate the change of oasis and influence on its environment. Dunhuang, a typical desert-oasis, located in the western end of the Hexi Corridor in arid northwest China, was used as a case study. Basing on the Landsat TM images, the distribution of oasis were extracted in five years time interval from 1986 to 2015. And the variation of area, spatio-temporal changes and landscape pattern were analyzed by a set of mathematical statistical models and indices of landscape ecology. The results showed that: the area of Dunhuang oasis increased gradually by 60.68% in recent 30 years. The most expansion happened at natural oasis and oasis-desert ecotone in the peripheral of oasis. The expansion of inner oasis included desolated beaches of the ancient river and complicated patches of oasis with the body internally filled expansion and progressively peripheral extension. With the plaque increasing, the oasis landscape patch tended to be simple and uniform. These results also show that obvious widespread change of oasis occur within the study period and result in severe problems of environment (i.e. vegetation degeneracy and reduction of surface water).

### Key words:

oasis; Dunhuang; remote sensing; expansion; environment

## Growth Paths of China Forest Resources

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### Abstract

Using data published since 1949 this study used the system GMM model to check whether or not China has a forest transition phenomenon, and to identify the growth paths behind China's forest growth. The results of this study show that: (1) There exists a good positive relationship between forest cover rate and per capita GDP, which means that China's economic growth effectively promotes the recovery and growth of China's forest resources, although economic growth brings serious environmental pollution. (2) China has already passed the forest transition turning point, and now the growth rate of China's forest resources slows down progressively along with economic development. The turning point of China's forest transition should be the period of the late 20th- and early 21st-century, rather than the 1980s, as some researchers have claimed. (3) China's forestry restoration is affected by both the economic development path and the forest scarcity path. Since 1990s, a large number of arable lands were abandoned and converted into the forest in mountainous areas because of the increasing wage. The marginalization of agricultural land may be the key driving force for forest transition. (4) The efficiency of forestry investment in China's northern provinces were lower than that in the southern provinces, so more China's forest investment should be put into the south.

### Key words:

forest transition; China's forest growth; economic development path; forest scarcity path; the period of the late 20th- and early 21st-century

## Impact Assessment of Land Use Land Cover Changes on Rainfed Watershed Hydrology Using Remote Sensing, GIS and SWAT Model

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### Abstract

Assessing the impacts of Land Use Land Cover (LULC) and vegetative vigor changes on watershed hydrology is critical for planning and management of rainfed watershed. This study aims to assess the impacts of LULC changes on runoff and sediment yield of Kaddam watershed, located in Godavari river basin, India. The study region is a typical rainfed watershed characterized by water scarcity with average annual rainfall of 745 mm and frequent drought conditions. Normalized Difference Vegetation Index (NDVI) fused with digital image classification technique is employed to describe the spatio-temporal characteristics of LULC and vegetative vigor using multi-spectral remote sensing data. A physically based semi-distributed hydrologic model namely Soil and Water Assessment Tool (SWAT) is employed for hydrological modeling, and simulated surface runoff and sediment yield at monthly and daily time scales, and validated with data for three monitoring stations in Kaddam watershed. The impacts of LULC change on Kaddam watershed hydrology for two different LULC scenarios are analyzed. The simulation results of runoff and sediment yield from the sub-watersheds outlet to Kaddam reservoir showed a high variability due to changes in LULC. Most of the sub-watersheds showed a greater increase in runoff, which varies from 2% to 63%. The results also showed increase in sediment yield, which varies from 4% to 50%. The impact of vegetative vigor on hydrological variables is analyzed by defining Change Detection Vegetative Index (CDVI), thereby assessed the change in vegetative status of forest lands, fallow lands and agricultural lands, and used for change detection in runoff and sediment yields in sub-watersheds. Results of the study demonstrated the utility of remote sensing, GIS and SWAT model for assessing the relative impacts of LULC transitions on hydrologic response of watershed.

### Key words:

Watershed modelling; Runoff; Sediment yield; Land use land cover; Remote sensing; GIS; SWAT model

## Integrated Spatial Characteristics of Land Use Influencing Water Quality in Upper Catchment of Miyun Reservoir

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### Abstract

Land use is closely related to eco-hydrological processes influencing water quality. Quantitative structures of land use have been conventionally used to predict water quality variables. Limited studies have tried to individually quantify spatial information, which directly influence the eco-hydrological process of pollutants. Lacking an insight to joint impacts of spatial characteristics could lead a statistical bias and confused understanding. The upper catchment of Miyun Reservoir is studied here as a representative area. Base on mathematic models and spatial techniques, a diagnostic framework of quantifying and integrating three spatial components of land use, including the slope, distance and arrangement, linking to water quality was developed and applied. Total nitrogen, total phosphorus and chemical oxygen demand of water samples from field measurements characterized the water quality in 52 sub-watersheds covering the whole catchment. Landsat-8 images were used to interpret land use. Integrating the spatial distance and arrangement, results detected a joint distribution of arable land and residential land. With a series of parameters calibration and variables determination, joint spatial characteristics were explored and coupled with land use quantitative structures. Compared to traditional methods, results shown a significantly statistical increase and confirmed the effectiveness of our method. Incorporating spatial information increased the explanatory power of land use on water nutrient concentrations. The jointly spatial characteristics of land uses can guide the optimization of spatial land use configuration and spatial setting of vegetal buffers to control water eutrophication.

### Key words:

spatial distance; spatial arrangement; land use; water eutrophication; Miyun Reservoir

## Irregular Neighborhood Cellular Automata Land-Use Simulation Based on the GA-MCE algorithm

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### Abstract

The irregular neighborhood cellular automata land-use simulation determines the condition of cellular neighborhoods and their scope of influence in order to distinguish and calculate the cellular neighborhoods which have a high degree of influence on the central cellular by defining certain rules for the neighborhoods. Compared with the form of a neighborhood of the same size in the traditional cellular automaton model, irregular neighborhood cellular automata is far more realistic and effective. Based on modifying the cellular neighborhoods' range with the irregular neighborhood recognition algorithm and obtaining the parameters of the invert rules through a combination of the genetic algorithm and multi-criteria evaluation, we ran a simulation land-use changes in Jinshitan National Tourist Holiday Resort from 2004 to 2010. The simulation result shows that the coefficient of Kappa is 81.62, which was obtained through Kappa analysis and testing of simulative accuracy and is highly reliable. In addition, the result shows that this approach has certain advantages regarding the simulation between class plots and smash plots plaque, which will improve the simulation model for land-use/cover changes.

### Key words:

irregular neighborhood; cellular automata; land-use change simulation; genetic algorithm; land-use transition probability; Jinshitan National Tourist Holiday Resor

## **Petroleum Exploitation as A Driving Force of Urban Growth, A Case of Study from Lago Agrio in the Ecuadorian Amazon**

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### **Abstract**

The Urban Ecuadorian Amazon is a complex system that developed in years of human exploitation, being the oil extraction one of its main driving forces since the 70's. The above is particularly true for the north of the region where Lago Agrio is the main city. Lago Agrio developed mainly due to the oil boom during the 90's and in that period, the growth of the city and its activities originated great changes in the land use and land cover and a subsequent negative impact. The present research aims at showing the territorial changes experimented in this Amazon area through a multitemporal study using a cellular automata model in order to determine the loss of natural habitat. For that purpose, two ETM Landsat satellite images from 2002 and 2012 were used in order to apply the algorithm of Maximun Likelihood Classification. The predictive model of cellular automata was obtained using IDRISI 17.0. Two maps of land use and land cover were obtained for 2002 and 2012 whose comparison highlights a remarkable growth of the urban sprawl. The predictive model showed that important areas of primary forest and even protected areas could be lost by 2020 due to the urban expansion. On the other hand, the current international contraction of the oil sector may affect the Lago Agrio area where the economic gap left by the petroleum could be filled by organized criminal activities resulting from the proximity to the Colombian border.

### **Key words:**

Cellular automata; Maximun Likelihood Classification; land use and land cover

## Problems and Perspectives of Land Use Management in the European Russia in connection with Climatic Changes

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### Abstract

Global climatic changes appear in different ways at subregional level of the Northern Eurasia. Within 50-60<sup>0</sup> North Latitude in the European Russia meteorologic data show annual average temperature increasing in 1-1,5 °C for XX-th century. Researching warm trend period (1970-2009) has shown an annual average increase as 1,5-2 °C in the central and southern Non-Chernozem regions. The distinct correlation between annual average temperature increment and grain crops productivity has been detected with 0,6-0,75 correlation ratio in some oblasts.

However such favorable climatic trend had coincided with large-scale lands' withdrawal in Non-Chernozem and in South-East regions because of economic reasons. Crop areas had reduced in Non-Chernozem zone more than twice: from 28,8 to 13,2 mln ha during 1990-2009 period, while grain crops areas had decreased from 13,4 to 7,3 mln ha. As a whole crop areas in the European Russia has reduced in 33%, from 87 to 59 mln ha. So change of climatic conditions comes in collision with reduction of grain crops farming. Linear trends of grain crops' productivity have positive growth in the most part of regions. And only some boreal oblasts with unfertile soils haven't positive productivity trends because of low agrotechnical level.

As a whole the withdrawal of agricultural lands may be considered as unreasonable except for obviously non-productive lands. Taking climate warming into account it is necessary to return about 30-35% abandoned lands into agriculture use. Returning productive lands is an actual task for sustainable land-use management in Non-Chernozem regions whereas climatic changes supply favorable background.

### Key words:

land use management; climatic changes; European Russia; crop areas and productivity

## Quantitative Study On The Driving Factors Of Wetland Change Based on Geographical Detector

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### Abstract

The paper takes Sanjiang Plain as an example, for the wetland change is severe in there, resorting to GIS and RS technology, combined with the Geographical Detector methods, and then make the quantitative analysis of driving factors for wetland changes from 1986 to 2010. The results are as follows. Firstly, the loss of wetland area in Sanjiang Plain is severe, which loses 35.5% mainly in the floodplains, the slope of 1 -3 degrees and the elevation of 50-60m, meanwhile, the area of wetland loss decreases with increasing the distance from the river. Secondly, the main driving factors for wetland loss are the altitude, slope, soil, land-form, GDP, the annual average temperature, the distance from river and slope direction, the power of determinant to wetland loss of each driving factors are 29.3%, 17.3%, 16.1%, 12.3%, 9.7%, 8.9%, 8.3% and 7.2%. Thirdly, the interaction mutual enhancement of the driving factors focused on power of determinant (PD,H) is as follows: soil∩altitude (36%) , the distance from river∩altitude (34%) , population density∩altitude (32%) , GDP∩soil (28%) . The interaction mutual weakened of the driving factors according to power of determinant (PD,H) is as follows: slope direction∩slope(22.3%), land-form∩altitude(17.6%), the distance from river∩slope direction(7.0%), GDP∩land-form(5.7%), the interaction between the altitude factor and other factors is strong, which makes the altitude an important factor influencing the wetlands loss.

### Key words:

wetland loss; driving factor; Geographical Detector

## Research on Land Use Change Driven by Farmland In Loess Hilly-gully Region

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### Abstract

Land use/cover change (LUCC) is an important component of global environmental change, at the same time, the production and human life is closely related to the social and economic development, so it has a long-term vitality of the hot research area. With the implementation of the national policy of returning farmland to forest, the land uses have changed greatly In Loess Hilly-gully region. In order to explore the land use changes and driving mechanism, this paper takes Zhifanggou Watershed AnSai County of Shaanxi Province as an example. Taking three periods of 1991, 2000 and 2013 years of TM and ETM images as the data source, combined with the terrain map, attribute data of field mapping, supported by ENVI and ArcGIS software, analyzed the law of land use changes around returning Farmland in Zhifanggou watershed. Using the principle of matrix multiplication, based on Visual C++ 6.0 platform and the pattern of land use in 2013, and applied the transition probability matrix determined by Markov model to carry on the simulation and prediction of the land use change in 2023. Results show that: Grain for Green Project accelerated the flow velocity of the basin, and changed the relations between the transfers of various land use types, but with the deepening of the project, this trend will decrease, eventually the area of forest, grassland, cultivated land will remain stable in dynamic balance.

### Key words:

Grain for Green; Land Use and Land Cover Change; ArcGIS; Markov Model; Zhifanggou River Basin

## Research on the Pre-Processing of Landsat OLI Images of the Cross-border Region of China, North Korea and Russia

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### Abstract

Remote sensing image preprocessing is a better way to extract target information, the processing results directly determine the accuracy of the extraction of the target information. Especially for large coverage area, multi temporal data, image preprocessing directly affects the classification results. In this paper, the cross border area of China, North Korea and Russia as the research object, research methods of remote sensing image preprocessing at home and abroad. The Landsat8 OLI remote sensing image of the region was used for the pretreatment of the terrain correction, mosaic, clipping, removing the thin cloud and removing the shadow. The results indicated that the ratio operation effectively removed shadows on the nightside region, and by removing the cloud processing of images, can well restore the spectrum information of objects in the region.

### Key words:

Landsat 8 OLI; removal thin cloud ; ratio operation

## Scenario simulation and landscape pattern dynamic changes of land use in the Poverty Belt around Beijing and Tianjin, in China

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### Abstract

Scenario simulation of land use change is an important issue in the study of land use/cover change, and plays a key role in land use prediction and policy decision. Based on Landsat TM images in 1989, 2000 and 2010, scenario simulation and landscape pattern analysis of land use change driven by socio-economic development and ecological protection policies were reported in Zhangjiakou city, a representative area of the Poverty Belt around Beijing and Tianjin. The integration of Markov-CLUE-S model and landscape metrics were used to simulate future land use scenarios from 2010 to 2020 and analyze their landscape pattern characteristics in Zhangjiakou. The results indicated good consistency between the simulated results and actual land use situations according to the Kappa statistic. The conversion of farmland to construction land and forest land formed the primary features of land use change in the future. The simulations for land use demands showed that land use experienced different dynamic changes under different scenarios. The key susceptible to land use changes were mainly distributed in the administrative districts and their surrounding regions as well as Bashang Plateau and its neighboring mountainous areas. The landscape patterns of the four scenarios in 2020, compared with those in 2010, were more reasonable. Spatial differences in landscape patterns also existed in Zhangjiakou. The spatial distribution of land use could be explained by the driving factors, and the simulation results tallied with local situations, which provided useful information for decision-makers and planners to take appropriate land management measures in the area.

### Key words:

land use change; Markov model; CLUE-S model; landscape metrics

## Soil Conservation Benefits of Grain for Green Project at the Forest-Steppe Zone of Loess Plateau

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### Abstract

As the ecological transition zone and fragile eco-environment region, Loess Plateau has suffered severe and large-scaled soil erosion, which in turn greatly affected territorial eco-environment. Therefore, it is of great practical significance to assess soil conservation benefits of the Grain for Green Project for regional ecological restoration and economic development. In our study, on the basis of 2000, 2005 and 2010 meteorological data and land-use types, soil conservation benefits under various slope gradients, vegetation coverages and land-use types were separately assessed with the method of Revised Universal Soil Loss Equation (RUSLE) at the forest-steppe zone of Loess Plateau. By analyzing, the main findings were as follows: (1) Since the Grain for Green Project widely implemented from 1999, vegetation coverage has gradually improved, and the area of woodland and grassland have also significantly increased, with each increment of 2219.41 km<sup>2</sup> and 2205.27 km<sup>2</sup>, respectively. (2) In 2000-2010, soil conservation quantity increased by 241 million ton, and that per unit area increased from 3033.15 t/(km<sup>2</sup>·a) to 5114.86 t/(km<sup>2</sup>·a), which in total significantly improved regional soil conservation benefits. (3) Soil conservation benefits were positively correlated to vegetation coverage. In different land use types, both of woodland, grassland and cultivated land had much higher soil conservation benefits than the rest land-use types, with each soil conservation quantity per unit area of 5405.57, 3598.41 and 3078.81 t/(km<sup>2</sup>·a). However, serious problems, like vegetation deterioration, ground collapse and soil erosion caused by the exploitation of mineral resources in northeastern part, should be solved in no time.

### Key Words:

Loess Plateau; Grain for Green Project; Soil conservation benefits; RUSLE

## Spatial Disparity of Major Cities along Land Silk Road in China from 1970s to 2010

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### Abstract

As Chinese President Xi Jinping has initiated the strategic plan of constructing the "Silk Road Economic Belt" since 2013, cities along the Silk Road will access to a rapid development. In this study, information on the urban expansion process of the main Silk Road cities was retrieved from 1970s to 2010. For comparing and analyzing the influence of the "Silk Road Economic Belt", the expansion of the parallel geographical regions was adopted in this study. Through the analysis of stage characteristics, spatial expansion modes, influences on land use, centroid shifts, and spatial morphological evolution, the spatial differences of Silk Road urban expansion were revealed. Results indicate that 1) the expansion stages of Silk Road cities are more complex than those of similar geographical region cities, and the expansion ranges and speeds of the former are far higher than those of the latter; 2) significant spatial differences in the occupations of different land sources exist between the Silk Road cities and parallel geographical regions; 3) the spatial morphology of Silk Road cities tends to be compact, whereas that of parallel geographical cities tends to be loose. The "Silk Road Belt" has a powerful significance in terms of guiding urban expansion and its spatial differences in Silk Road cities. Urban expansion in Silk Road cities will encounter new opportunities and challenges under the guidance of new types of urbanization strategies.

### Key words:

Urban build up areas; spatio-temporal patterns; Silk Road Economic Belt; cross-city comparison

## Temporal and Spatial Change of ecological services on Loess Plateau of Shaanxi

### Province

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### Abstract

There are a series of factors driving ecosystem services, one of which is the change of land use pattern, and it is drawing more and more attention of ecologists. A series of ecological conservation projects launched since the 2000s altered the land use pattern greatly, and exerted a profound influence on the ecosystem services. Based on the Integrated Valuation of Ecosystem Services and Tradeoffs (InVEST), we assessed the historical fluctuation of sediment control, water yield, carbon sequestration, and habitat quality in the Loess Plateau. We set up a two-grade classify system of land use and interpreted the remote sensing images of 2000, 2005 and 2010 respectively, and then apply InVEST model, which is a space explicit model and based on land use, to map the ecosystem services, and analyze the influence of Land Use to ecosystem services during study period.

The result indicates, between 2000~2010, the forest, shrub, grass and constructional areas had expanded by 122.7km<sup>2</sup>, 285.3km<sup>2</sup>, 3204km<sup>2</sup> and 450.4km<sup>2</sup> respectively. However, agricultural field had shrunk by 3984.5km<sup>2</sup>. The basins soil conservation and carbon sequestration were main increased, Soil conservation increased between 0 ~ 200 t/hm<sup>2</sup> for the most area, parts in more than 200 t/hm<sup>2</sup>, and Carbon sequestration growth in 0 ~ 20 t/hm<sup>2</sup> for the most area, parts in more than 20 t/hm<sup>2</sup>; However, Water yield was main falling, damping between 0 ~ 50 mm for the most area and parts surpass 50 mm; Habitat quality became more better with habitat quality index increase between 0 ~ 0.2, part area in 0.2 above. Changes in the area of ecological services agree with land use / cover change regional, So, Land use / cover change has significantly affecting on the Loess Plateau ecological services.

### Key words:

Ecosystem services; land use/cover change; InVEST model; Loess Plateau of Shaanxi

## The analysis of spatiotemporal varying relationships between urban expansion and related factors using geographically weighted logistic regression

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### Abstract

Urbanization not only improve the level of our lives, but also bring some problems threatening our human health and sustainable development. Revealing the spatiotemporal varying relationships between urban expansion and underlying driving forces which is far from thoroughly understood, especially in terms of the ubiquitous and fast growing small city, is a crucial prerequisite to solve this problems and realize sustainable development. In this research, Kunshan was used as a case study to make some supplements. Eleven variables from four aspects covering physical, socioeconomic, accessibility, and neighborhood were selected, and both logistic regression and geographically weighted logistic regression model were employed to explore the spatiotemporal varying relationships during 1991-2014. Results reveal that urban expansion is enhanced in Kunshan with the annual expansion rate in 2000-2014 is four times higher than that of 1991-2000. Besides, GWLR model performs better than LR model with the same explanatory variables indicated by lower Moran's I of residuals and smaller AIC. GWLR model has greatly improved LR model by revealing the spatial nonstationarity and local variations. The combinations and their relative importance of drivers varies with time and space. More importantly, despite all the local coefficients in GWLR models show distinctive spatiotemporal variations which is different from that in LR models, they show a consistent positive or negative effect with the corresponding variables in global models. Based on these findings, a regional diversity policy to manage urban expansion scientifically is recommended in this research.

### Key words:

Urban expansion; Spatiotemporal variation; Spatial heterogeneity; Geographically weighted logistic regression; China

## The Ecological Footprint in Northeast Asia from 1990 to 2010

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### Abstract

With the population proliferation and science progress, human has change the environment at great scale and speed, and ecological environment has been effected and damaged unprecedented. The ecological environment problem was not just points source problem, but has developed into regional, and national and global problem. Northeast Asia is very rich of natural resources. However, with the rapid economic development in Northeast Asia, the region environmental issues have become even more serious. Northeast Asia is an important ecological protective screen in the eastern of Eurasia, its eco-environment quality directly impacts the national and regional ecological environment safety. This thesis in full control of the land-use data, on the basis of satellite remote sensing data for many years, with the method of ecological footprint(EF) in the Northeast Asia from 1990 to 2010, calculated the ecological footprint. After 1990 the EF of per capita is showed the approach motive trends in the different countries of Northeast Asia. Special into 21 century the EF value is growing in the R.Korea and Northeast of China, over the same period it's dropping in the Far-east of Russia., Japan and Mongolia. The EF value is lower still which was near 4 hm<sup>2</sup>/per capita until 2010, but with the rapid economical development the EF value will continue increase. Meanwhile, the huge population cause the total EF is quite larger even though the EF of per capita is lower level situation, so that how to save the natural resources and protecting eco-environment become more and more important duty for the government and the public.

### Key words:

Ecological footprint; Northeast Asia; 1990;2010

## The Simulation of Crop Productivity in the Guanzhong-Tianshui Economic Region Basing on the Remote Sensing Crop Model

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### Abstract

Food is the basis of our life and production and the Guanzhong-Tianshui economic region is one of the main grain producing areas in China. Therefore, exactly estimating the grain productivity is of great importance for government to work out proper grain policy. The winter wheat and summer maize are the main crops in the region. In this article we use the remote-sensing-photosynthesis-yield estimation for crops (RS-P-YEC) model to simulate the wheat and corn productivity in the research area from 2010 to 2015. For this purpose, a national-wide database (including land cover, leaf area index, meteorology data, and soil data) at a 1km resolution and a validation database were established. The model assumes a horizontally homogeneous, vertically laminar structure on a leaf and produces a multilayer-two-big-leaf model. The core of the model is to calculate the net primary productivity using and then to calculate yield by multiplying the net primary productivity (NPP) by the harvest index (HI). There are eight cities used to validate statistical productivity with the estimating results. As the result shows, Shang Luo City has the most productivity and Yang Ling City the least. And estimating yields shows satisfactory agreement with statistical ones (correlation coefficient 0.817, RMSE 671kg/hm<sup>2</sup>, relative error 9.3 percent), which suggests that the RS-P-YEC model is suitable for crop estimation in the Guanzhong-Tianshui economic region.

### Key words:

Winter wheat; Summer maize; Guanzhong-Tianshui economic region; RS-P-YEC model; NPP

## Transition of Rural Settlements Productive Function: Analysis of Livelihood Strategies And Land Use Of Rural Settlements in Eastern China

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### Abstract

Rural settlements are a multifunctional complex in China with a productive function of great importance. This paper explores the spatial-temporal transition of three rural settlements productive function (He Taoyuan, Da Wengshan and Gaoqiao) in Eastern China. The three rural settlements were all involved in agricultural production (first vegetable planting and then livestock breeding) after the founding of the People's Republic of China in 1949, and changed slowly over the years so that by the 21<sup>st</sup> century they evolved in different ways. Agricultural production (grain insolated and storage) was still dominant in He Taoyuan. Da Wengshan became an industrial-oriented settlement and Gaoqiao a commercial-oriented settlement. This is reflected in the transition of livelihood strategies of rural households and land use of rural settlements. Choice of rural households livelihood strategies affected by both livelihood assets and system, and policies for pure maximized benefits, are the causes that drove the spatial-temporal transition of the three rural settlements productive function. It is hoped that the research conclusions in this paper can provide references for governments across China to implement adjusted rural residential consolidation policies that will improve future production and quality of rural life.

**Key words:** Rural settlement; Productive function; Spatial-temporal transition; Livelihood strategies; Land use

## C12.26 Land Use and Land Cover Change

### Evaluation Of Dominant Trends of Human Impact On Land Use/Land Cover (LU/LC) Changes as in Multi-Levels (/State as Regional and Local Levels)



Home

#### Oral

1. [An Estimation of the Extent of Cropland Abandonment in Mountainous Regions of China](#)  
Shengfa Li, Xiubin Li, Laixiang Sun (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Guiying Cao
2. [Beyond the Jakarta Megacity's Urban Expansion: The formation of Jakarta-Bandung Megaurban Region](#)  
Ernan Rustiadi, Andrea Emma Pravitasari (Bogor Agricultural University, Indonesia), Yudi Setiawan, Setyardi P. Mulya (Bogor Agricultural University, Indonesia)
3. [China's Wetland Losses Occupied by Urban Expansion](#)  
Dehua Mao, Zongming Wang (Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
4. [City lights. The urbanisation process in Spain as shown by night-time images of the Earth \(1992-2012\)](#)  
Oriol Nello, Joan López, Jordi Martin (Universitat Autònoma de Barcelona, Spain)
5. [Cultivated Land use Transition During urban-rural Interaction in the Pearl River Delta, 1980s—2010 Song](#)  
Xiaoqing Xiaoqing Song, Zhifeng Wu, Jürgen Scheffran (University of Hamburg, China)
6. [Dynamic Changes of Land Cover Based on Markov Model in Turpan](#)  
baozhong he, jianli ding (Xinjiang University, China)
7. [European Land Monitoring – recent Trends and 25-year Data Analysis](#)  
Andrus Meiner (European Environment Agency, Denmark)
8. [Expansion of Anthropogenic Land Covers during 1990-2014 in coastal zones of Liaoning Province of China](#)  
Huiying Li, Xiaoyan Li (Jilin University, China)
9. [Exploring Land Use/Land Cover Change as A Driving Force of Forest Fragmentation and Degradation for Song watershed, India](#)  
Haroon Sajjad, Meheebub Sahana, Raihan Ahmad (Department of Geography, Jamia Millia Islamia)
10. [Land Cover and Landscape Diversity changes in two Model Vineyard Areas in the Male Karpaty](#)

## Mountains (western Slovakia)

Jan Hanusin, Dagmar Stefunkova (Institute of Landscape Ecology Slovak Academy of Sciences, Bratislava, Slovakia)

11. Land use change, Agricultural Transformation and Soliga Communities: A case study from Southern India

Divya Rajeswari Swaminathan (Center for Development Research, University of Bonn, Germany, Germany)

12. Landscape Transition after the Collapse of Communism: Case Study Czechia

Lucie Kupkova, Ivan Bičík (Charles University in Prague, Faculty of Science, Czech Republic)

13. Spatial Distribution of Anthropogenic Land Covers in China: a ChinaCover-based analysis

Zongming Wang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China), Bingfang Wu, Yuan Zeng (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China)

14. Spatio-temporal Change in Urban-Rural Land Use Transformation at Village scale—a case of Xuanhua district, north China

Jilai Liu, Yansui Liu (Beijing Normal University, China)

15. Study on Conflict Mechanism and Optimization Strategy of Land Use System in the Desertification Area

Li Qiao, Wu XiuQin, Wang ManMan (Beijing Forestry University, China), Wan Li, Wu Rui, Li YanSen (Beijing Forestry University, China)

16. Study on Land Use Pattern and Vulnerability of Agro-Forestry Ecotone of Northeast China

Tingxiang Liu, Shuwen Zhang, Lingxue YU (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences)

17. Time and Space Differences of Shandong Urban Land Economic Density Analysis

huixia zou (Shandong normal university, China)

## Poster

1. An Integrated Logistic Regression, Markov Chain and Cellular Automata Approach to Modelling Land Use Dynamics in Poyang Lake District, China

Yaobin Liu (China, School of Economics & Management, Nanchang University); Huanhuan Xiong (China, Management School, Nanchang University); Yichun Xie (United States, Department of Geography and Geology, Eastern Michigan University)

2. [Analysis of Cold-hot Pattern of Urban Spatial Expansion Based on Minimum Cumulative Resistance Model ---- A Case Study of Suzhou-Wuxi-Changzhou area](#)  
Shan YANG (China, Nanjing Normal University)
3. [Analysis of the Downstream Salinization Soil Spectral Characteristics of the Characteristics of Time and Space Distribution in Arid Area Plain Reservoirs](#)  
Heigang Xiong; Rong-rong li; Peng-cheng Duan (China, College of Resources& Environment Science, Xinjiang University)
4. [Analysis on the Evolution of Urban Space Form under the Influence of the Rapid Construction of the Development Zone : A Case Study of Suzhou city](#)  
FUHUA GONG (China, Nanjing normal university.)
5. [Assessing the Evolution of Oases in Arid Regions through Reconstructing Historic Spatio-temporal Distribution: a case of Heihe River basin, China](#)  
Yaowen Xie; Guisheng Wang (China, College of Surveying and Mapping, Anhui University of Science and Technology; No.168, Middle Shungeng Road, Huainan, 232001, P. R. China); Xueqiang Wang (China, The Key Laboratory of Western China's Environmental Systems, Ministry of Education (MOE), College of Earth and Environmental Sciences, Lanzhou University)
6. [Change Patterns of Agricultural Productivity Influenced by Land Consolidation: Evaluation and Prediction](#)  
Yeting Fan; Xiaobin Jin; Xiaomin Xiang (China,Nanjing University)
7. [Changes in the Extent of Surface Mining in the Northeast Qinghai-Tibet Plateau by Using a 1975-2015 Landsat Time series](#)  
Dawen Qian; Changzhen Yan); Lina Xiu (China,Key Laboratory of Desert and Desertification, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)
8. [Determining and estimating impacts of farmland consolidation projects on the regional carbon effects](#)  
Wei SHAN; Xiaobin JIN; Shu ZHANG (China, Nanjing University)
9. [Ecological Risk Assessment of the Coastal Area of Yancheng, China](#)  
huachun He; Rujia Zhou; Yongzhan Zhang (China, Nanjing University)
10. [Ecological Risk Pattern of Poyang Lake Basin Based on Land Use](#)  
Yu Xu; Xinhua Feng; Yexi Zhong (China,School of Geography and Environment, Jiangxi Normal University)
11. [Evaluation Method: Carrying Capacity of Land Ecological Environment Based on “Two-oriented](#)

## Society” in Central China

Changchun Feng; Changchun Liu (China, Peking University)

12. [Explore and Analyse the Problems on High-standard Farmland Construction in Hilly Area: A Case Study in Chongqing](#)

Gen Li; Qingyuan Yang (China, Southwest University)

13. [Impacts of Greenhouse Tillage on Soil Properties in Tibetan Plateau - a Case study in Lhasa area](#)

Zhaofeng wang (China, Institute of Geographic Sciences and Natural Resources Research, CAS);

Alfred HARTEMINK (United States, University of Wisconsin-Madison, Department of Soil Science,

FD Hole Soils Lab); Yili Zhang (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

14. [Influence of Urban Land Intensive Utilization on Livability](#)

Geng Bing; Fu Meichen (China, China University of Geosciences(Beijing))

15. [Land Use Prediction Based on CLUE-S Model under Different non-spatial Simulation Methods: A Case Study of Qinhuai River Watershed](#)

Zihao Bian; Xiaoxue Ma; Lachun Wang (China, School of Geography and Oceanography Sciences, Nanjing University)

16. [Landscape Pattern Change and its Effects on Soil Organic Carbon Pool in Qinghai Lake Watershed](#)

Baoliang Lu; Kelong Chen; Jianping Wang (China, Qinghai Institute of Salt Lake, Chinese Academy of Sciences)

17. [Study on Hydrological Regime Changes during the past 50 years in Kuye River](#)

Xiaohui Jiang (China, College of Urban and Environmental Sciences, Northwest University); Xiaowei Gu (China, Institute of hydraulic research, YRCC)

18. [The Analysis of Scale Management and Intensive Cultivated Land Use: Spatial-temporal Disparity and Their Relationship](#)

Shan Gao (China, Jiangsu Academy of Social Sciences)

19. [The Identification of Importance Ecological Land Uses and Ecological Protection in The Area of Yan-Long-Tu](#)

Li Mingyu; Tian Fenghao (China, Geography Department, Sciences College of Yanbian University)

20. [The Process and Characteristics of Changes in the Build-up Region of Typical Historical and Cultural Cities in China in the Past Two Hundred Years](#)

Lijun Qin; Xiaobin Jin; Xuhong Yang (China, Nanjing University)



21. [Vegetation Cover Variation after Ecological Restoration in the Loess Plateau in 2000-2014](#)

Kun Zhang (China, Research Center for Eco-Environment Science, Chinese Academy of Science)

## An Estimation of the Extent of Cropland Abandonment in Mountainous Regions of China

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### Abstract

With the wages for migrant workers increasing dramatically in China since 2003, the size of agricultural labor forces has been shrinking quickly. The substitution of intensively use of agricultural machinery for the shrinking farm labor force is hardly possible for croplands in the mountainous regions of China where mechanization is difficult to achieve due to small field size and the rough terrain in these areas, which eventually has led to the abandonment of croplands in these regions. Considering the high pressure of food security in China with 1.3 billion populations, cropland abandonment in mountainous regions of China should not be ignored. This study aims at estimating the amount of recently abandoned croplands (period 2000-2010) and what changes can be expected in the future in China's mountainous areas by employing a novel method other than remote sensing technique. The results show that total extent of abandoned croplands in Chinese mountainous counties during the period 2000 to 2010 is estimated at 12.4 million hectare, which means that in total about 35% of croplands in mountainous counties was abandoned, including the croplands converted in the Grain for Green Programme. With three scenario assumptions, a sizeable extent of 10.9 to 11.9 million hectare of croplands may be abandoned during 2010 to 2030 with the rapidly decrease and aging of the projected farm labor forces. This could exacerbate the future challenges of maintaining China's food security. Substantial increase of investments in agricultural projects of land consolidation and agricultural productive fixed assets, especially micro-tillage machines could help to mitigate the risk of cropland abandonment. Additionally, the land-use and environmental policymaking should consider the fast expanding cropland abandonment in mountainous regions.

### Key words:

Cropland Abandonment; Labor Productivity; Land Use Policy; Population Projection; Chinese Mountainous Regions

## Beyond the Jakarta Megacity's (Jabodetabek) Urban Expansion: The formation of Jakarta-Bandung Megaurban Region

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### Abstract

The rapid urbanization in Asian developing countries over the past half century seems to have been followed by excessive of the urban population concentration in very large urban agglomerations which so called as megacities. The growth of megacities in Asia has led to various global problems and requires attention from global communities. Jakarta megacity has grown to become the second largest megacity in the world after Tokyo Megacity (RIHN, 2014), experiencing continuous growth and facing various problems that have not been obtained by other major cities in the world. One form of the urban expansion of Jakarta Megacity is the ongoing expansion along the main transport route linking Jakarta to the metropolitan Bandung within 120 km from Jakarta. The objectives of this study were to analyze (1) the tendency of urban physical expansion, as indicated by the land use/cover changes along 1978-2015, (2) the tendency of changes in the number and density of population along the Jakarta-Bandung corridor, and (3) describe some impacts of the Jakarta-Bandung conurbations to agriculture and environment. Spatial analysis was conducted by employing GIS and using Landsat imagery data. The conurbation has been accelerated after Cipularang highway road linking both cities and the establishment of new towns and industrial estates built by the private sectors along the corridors. The population densities along the corridor has grown much faster than population growth of its surrounding. Furthermore, it was followed by continuing paddy field conversion, declining of biodiversity and due to the declining of forest and agroforestry areas.

### Key words:

megacity; conurbation; Jakarta-Bandung mega-urban region

## China's Wetland Losses Occupied By Urban Expansion

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### Abstract

Human benefits from multiple ecosystem services of wetland ecosystems, but massive wetlands disappeared due to human consumption. China is one of the hotspot regions of urbanization, and also a typical region of urban sprawl at cost of wetland losses. This study aimed to characterize the spatial-temporal pattern of urbanization-occupied wetland losses from 1990 to 2010 at national scale, using remote sensing datasets. Results indicate that there was 2883 km<sup>2</sup> of wetlands disappeared due to urbanization. The rate of wetland loss occupied by urbanization has been high between 2000 and 2010 (213.1 km<sup>2</sup>/yr), which was 2.8 times loss during 1990-2000 (75.2 km<sup>2</sup>/yr). Most of vanished wetlands caused by urbanization can be attributed to the expansion of urban built-up lands. Lakes and marsh are the primary wetland types lost to urban area. Around 2394 km<sup>2</sup> of wetlands disappeared due to urban sprawl were identified in the eastern regions. Considerable urbanization-triggered wetland losses were observed primarily in five identified hotspot areas, including the Liao River delta, Beijing-tianjin metropolitan region, Yangtze River delta, Jiangnan Plain, and Pearl River delta. In terms of increasing urbanization and industrialization trend, the expansion of urban built-up lands for middle-sized and small cities, the construction of industrial landscape in middle-sized and small cities, and denser traffic networks will strongly contribute to the wetland spoilage. Although great efforts were developed to protect wetland ecosystems, there would be new challenges for wetlands management, especially in preventing more wetlands occupation by urban expansion under new situation of rapid economic development.

### Key words:

Wetland loss; Urbanization; Remote sensing; China

## City Lights. the Urbanisation Process in Spain as Shown by Night-Time Images of the Earth (1992-2012)

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### Abstract

The Spanish urban system has experienced significant transformations over the last two decades, affecting both the system's articulation and hierarchy, and the morphology of urban areas. The sources of information on land use, although increasingly precise and exhaustive, present some limitations when it comes to identifying and quantifying this development, most particularly because their sporadic character. In this context, the advances in the availability, precision, territorial coverage and recurrence of night-time satellite images offer new opportunities to assess the transformation of land uses. Under the assumption that there is a direct relationship between light emissions and the level of urbanisation, the present study identifies the development of the Spanish urban system between 1992 and 2012. In this respect, the level of brightness suggests that the transformation of land for urban uses has been much wider than the one assessed by using other sources, such as aerial photography or planning regulations. The contrast with these sources makes evident that, even if the suitability of night-time images is subjected to relevant limitations, they can be used with advantage in order to explain new patterns of land use. This is especially true when studying low density urban developments, such as those that have proliferated in Spain in recent decades.

### Key words

Urbanisation; Spanish urban system; Energy; Night satellite images

## Cultivated Land Use Transition during Rural-Urban Interaction in The Pearl River Delta, 1980s–2010

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### Abstract

Land use transition referring to shift of land use morphology between two qualitatively different states, focused on forest transition and rural housing land transition from the perspective of pattern analysis in the last two decades. Cultivated land use transition especially from the perspective of functional analysis, however, is currently a rather rudimentary and subjective issue. Forced by export-oriented economy model, urbanization has undergone a rapid period of development and has resulted in substantial rural changes in the Pearl River Delta. During the rural-urban interaction, cultivated land has experienced remarkable changes involving pattern and functional dimensions. The spatiotemporal changes of cultivated land use in this area were analyzed from the perspectives of pattern and functional analysis based on the research framework presented in this study using remote sensing images in 1980s, 1990, 2000, 2005 and 2010. Results of spatial metrics showed that cultivated land use pattern transition interpreted as shift of quantity change from accelerating to slowing down decline and shift from rapid fragmentation to concentrated scaled parcels occurred around 2005 at the delta level. Meanwhile, cultivated land use function developed from mono-functional state focusing on grain production to multifunctional state integrating food production with cultivated landscape supply and ecological regulating functions. Mutual feedback evolvement was found between cultivated land use pattern and function transitions resulting from rural out-migration, immigration and industrial upgrading during rural-urban interaction. Differences of cultivated land use transition modes and degrees, however, varied greatly amongst the nine cities of the delta. Cultivated land use transition analysis in this study provided implications for China to implement regional differentiated policies of multifunctional land management to overcome the dilemma of integrating food safety, urban expansion with ecological protection. We also proposed that land use function transition and its feedbacks on land use pattern transition should be emphasized in the future.

### Keywords

land use change; land use transition; cultivated land; urban-rural interaction; the Pearl River Delta; P. R. China

## Dynamic Changes of Land Cover Based on Markov Model in Turpan

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### Abstract

The land-cover data obtained from the TM remote sensing images of 1990 as well as land-use map of 2005, 2011 were used in Turpan to set up a Markov model for predicting changes of land-cover. Given the accuracy of prediction in Markov model is closely relate to its simulated step, therefore, firstly, take 1990 as initial year to predict variant areas of land-cover on different classes in 2005, and found out the optimal simulated step by comparing the minimum difference between the simulate and actual areas of land-cover. Secondly, the changes of land-cover in 2011 was predicted by taking the optimal simulated step in Markov model, then analyzed the land use degree and land use space change dynamic analysis based on this. Results can be summarized as: (1) The areas of transform between unutilized land and grassland are enormous; (2) The cultivated land decrease quickly since 2005, which indicates that the contradiction between supplement and demand are being increased, and also means that the balance of the cultivated occupation and supplement has not implemented; (3) Nearly 6000 hectares of water was disappeared in 21 years which is largely probably associated with global warming; (4) Mainly due to the change of construction land and garden plot makes the land use degree increase year by year, it exhibits that the development of economy is an important factor which result in the changes of land cover; (5) Anthropoc factor is a major reason which leads to the changes of land-cover, people are taking more and more powerful means to affecting the land cover change. Therefore, some appropriate proposals are also offered according to the above results.

### Key words:

land cover; Markov model; land use degree; dynamic space change

## European Land Monitoring – Recent Trends and 25-Year Data Analysis

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### Abstract

The Copernicus - The European Earth Observation Programme - comprises satellite-borne earth observation, in-situ data and a services component. Copernicus land monitoring service contains Global, pan-European, Local and In-situ components.

The pan-European component produces 5 high resolution (20 m pixel) data sets describing the main land cover characteristics as well as updates for the Corine land cover and change dataset (100 m raster, 44 land cover/land use classes, areal coverage ca 6 million km<sup>2</sup> of 39 countries in Europe).

Land cover change in Europe, based on Earth observation data has been already reported for the period 1990-2000 and 2000-2006 (EEA, 2005, 2010). A new reporting for 2006-2012 has become available in 2016. Re-analysis of 25 years data shows the slowing of annual general land turnover and reducing urban sprawl (area). However, share of arable land and permanent crops is still the predominant source for urban land uptake and its relative contribution has been steadily increasing (48% in period 2006-2012).

Integrated assessment of land resources puts the land take process in a number of contexts. One is soil protection, seeking to reduce detrimental impacts of soil sealing and loss of productive land. Another is degradation of terrestrial ecosystems and their ability to supply ecosystem services where land monitoring allows for better understanding of habitat change – one of the main drivers of biodiversity loss.

Next reference year for a pan-European component update is scheduled for 2018.

### Key words:

Land monitoring; land cover change; urban land take; habitat change; Europe;

## Expansion of Anthropogenic Land Covers during 1990-2014 in coastal zones of Liaoning Province of China

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### Abstract

Anthropogenic land cover (ALC) expansion is one of major drivers of regional environmental change in coastal zones. With increasing scientific and political interests in developed areas with fragile environments, there is strong impetus to better understand patterns, causes and environmental consequences of ALC expansion in the coastal zone of Liaoning province, China, one of areas with fast economic growth and high population density in the country. Satellite remote sensing images (Landsat TM, ETM+ and OLI) obtained from 1990 to 2014 were employed to detect anthropogenic land cover changes in the coastal zone of Liaoning Province. Based on multi-period land cover data, we analyzed the process of ALC expansion and investigated main drivers and regional implications of these changes. Our analyses documented 1317.2 km<sup>2</sup> growth of anthropogenic land covers, with industrial land having the largest scale expansion by 608.8 km<sup>2</sup>. Dramatic aquaculture pond expansion (+565.4 km<sup>2</sup>), built-up land sprawl (+322.9 km<sup>2</sup>) and arable land decline (-270.1 km<sup>2</sup>) also characterized the changes of anthropogenic land covers of the study region. ALC changes differed markedly in 1990–2000 and 2000–2014: industrial land, aquaculture pond and built-up land expanded slowly during the first period, but grew rapidly in the second period. Arable land saw a small decline (-46 km<sup>2</sup>) during 1990–2000 but a considerable reduction (-224 km<sup>2</sup>) during the 2000–2014. Socioeconomic factors such as increasing population, booming economy, changing policies and globalization of market were the most significant factors driving ALC expansion in the coastal zone of Liaoning Province.

### Key words:

anthropogenic land cover expansion; coastal zone; remote sensing; human impact

## Exploring Land Use/Land Cover Change as a Driving Force of Forest Fragmentation And Degradation For Song Watershed, India

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### Abstract

This study attempts to assess forest fragmentation and degradation in response to land use/land cover changes in Song watershed, India during 1998-2014. Landsat TM and Landsat 8 OLI satellite data across two dates (1998 & 2014) were used to analyze land use/land cover change and its impact on forest cover. The extent of forest degradation was analyzed using fragmentation model. Four categories of disturbance viz. core, perforated, edge and patch were obtained using 200 meters edge width. The result shows overall decrease of 7% in area under forest over 16 year. Area under open forest, mixed land use/land cover I (agriculture, forest & built up) and mixed land use/land cover III (agriculture & built up) has significantly increased while area under dense forest has decreased during the study period. Fragmentation model revealed lots of disturbance in forest located in mixed land use/land cover areas. Perforated and patch classes of forest have experienced a significant increase in their respective areas while core area has decreased at the expense of other fragmentation classes. Degradation of forest occurred at large scale at Hrishikesh and Thanu forest ranges of Dehradun district and Gadol range in Tehri Garhwal district lying in the watershed. Rishikesh city in Dehradun district located in southern part of watershed recorded increase in patches due to developmental activities. Remote sensing and fragmentation model showed its effectiveness in analyzing forest degradation and monitoring the health of the forest in the watershed.

### Key Words:

Land use/land cover; forest fragmentation; forest degradation; remote sensing; Song watershed

## Land Cover and Landscape Diversity changes in two Model Vineyard Areas in the Male Karpaty Mountains (western Slovakia)

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### Abstract

Land cover (LC) and landscape diversity (LD) changes have been assessed in two model areas of the prevailing viticultural landscape in a part of the Svaty Jur and Modra cadastres (Male Karpaty Mts., western Slovakia) for the years 1896, 1949 and 2015. In both areas we analysed LC changes in large scale. The main trends of LC changes were identified by an overlay of LC maps from each analysed year. The model areas (sized 66 and 88 ha respectively) were divided into a grid (25x25 m) and LD values were evaluated for all cells for all years. The Shannon landscape diversity index was applied as the LD metric. Both LC and LD changes were more pronounced during the 1949 – 2015 period comparing to the 1896 – 1949 period in both areas. In LC pattern distinct decrease of vineyards was observed between 1949 and 2015. During the collectivisation process in the 1950s and 1960s traditional, prevailing non-terraced vineyards were mostly transformed into modern terraced vineyards in both areas. Increase of forest, grasslands and built up areas were also typical LC changes during the 1949 – 2015 period. LD rose during the 1949 – 2015 period in both model areas. The main driving force of this process was the dissection of homogenous smooth vineyard slopes into terraces which led to the increase of patches and the edge length and resulted in a higher LD. Presented methods enable the assessment trends in LC changes, a fine-scale LD evaluation and may contribute to the efficient landscape management.

### Key words:

Slovakia; land cover changes; landscape diversity; Shannon diversity index; vineyards

## Land Use Change, Agricultural Transformation and Soliga Communities: A case study from Southern India

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### Abstract

Many forests areas in India are inhabited by indigenous communities. The government has introduced policies and programs to improve their situation, however, with limited success. Indigenous communities living in forest use forest as a source for resources for their sustenance and livelihood. Indigenous communities apply a combination of multiple land-use systems such as agriculture, agro-forestry, forestry, and pasture. However, many indigenous communities are at the lower end of the social and economic order in India and do not have political decision-making power nor control over the land they use, particularly the forested areas. Most forests are under control of local governments and the lack of secure and proper land tenure rights makes it difficult for indigenous communities to adapt sustainable land management and livelihood systems. The research focuses on “how agricultural transformation and designation of Protected Areas impact on the land uses and livelihoods of the Soliga communities living in and around the Male Mahadeshwara and Sathyamangalam Wild Life Sanctuaries in Southern India?”. Qualitative participatory appraisals have been used to derive narratives of the past and existing situations using semi-structured interviews, oral histories and participant observations apart from a literature review and GIS mapping of landuse resources in the study area. The main outcome of the research has been to understand the agricultural transformation processes and the drivers of land use changes of the indigenous Soliga communities and to recommend for more sustainable land use policies and implementation that better reflects the needs and concerns of the Soliga communities.

### Key words:

Land use; protected areas; indigenous communities, natural resources; land rights

## Landscape Transition after the Collapse of Communism: Case Study Czechia

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### Abstract

The paper deals with landscape transition after the collapse of Communism in Czechia on national and local levels. The main trends of landscape transition on the national level (by cadastral units) in the period 1990–2010 are introduced. The indicators like Processes of landscape change (afforestation, grassing over, intensification, and urbanization), Index of change (the proportion of area where any kind of land use change occurred) and others are used. Two main processes were examined also on the local level, i.e. by parcels. These are trends of Extensification (shift to less intensive use of land, increase of forests and grasslands) and Suburbanization. The case study of Jirny showed strong suburbanization - fertile agricultural land has been turned into residential and commercial areas, roads; soil sealing was taking place. On the contrary, grassing over and afforestation was detected in Hošťka where arable land almost disappeared – it was either abandoned or replaced mainly by pastures between 1990 and 2010.

### Key words:

Land use change; Landscape Transition; Czechia

## Spatial Distribution of Anthropogenic Land Covers in China: a Chinacover-Based Analysis

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### Abstract

Human activities affected around 100 M km<sup>2</sup> of the ice-free land surface leaving. Of this, 18–29% of the land surface has been deliberately converted for agriculture, infrastructure and urban use. There is a strong impetus to better understand spatial pattern of China's anthropogenic land cover (ALC) because china has the largest population and the fastest-growing major economy in the world. In this study we performed a satellite supported survey based on the China Land Cover Database (ChinaCover). We regrouped six land cover types (tree/shrub orchard, human-made wetland, arable land, urban land, rural settlement and mining field) into anthropogenic land cover, according to the Habitats Classification Scheme developed by the International Union for Conservation of Nature and Natural Resources (IUCN). Results indicated that, in 2010, ALC covered 21.7% of the nation's total area and ALC made up more than 80% in coastal provinces. The Hu Line marking a striking difference in the distribution of China's population also divided China into two parts: eastern part with higher ALC percentage and western part with lower ALC ratio. At the provincial level, area ratio of ALC significantly increased with population density and GDP density ( $p < 0.05$ ).

### Key words:

China; Anthropogenic land cover; Spatial pattern; China Land Cover Database

## Spatio-Temporal Change of Urban-Rural Land Use Transformation at Village Scale: a Case of Xuanhua district, north China

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### Abstract

This paper analyzed the dynamic spatial pattern, process and mechanism of urban-rural land use transition using land use updating investigation data of 59 villages in Xuanhua district, Hebei province between 1996 and 2012. The results showed that industrialization and urbanization were the basic driving power of urban-rural land use transformation (URLUT). All villages and the Downtown showed significant spatial heterogeneity and positive spatial autocorrelation. Urban rural land use transformation index (URLUTI) linearly decreased when increasing distance to the centroid of the Downtown (DCD). During 4 periods in 1996, 2000, 2005 and 2012, URLUTI increased in central areas and decreased in edge regions, and the gap between core areas and edge areas was accelerating. Moreover, spatial autocorrelation of URLUTI presented accelerating trend and spatial clustering showed periodical change that truing from decentralization to centralization then to decentralization.

### Key words:

land use transformation; urban-rural harmonious development; land use; urban-rural integration; Xuanhua district, north china

## Study on Conflict Mechanism and Optimization Strategy of Land Use System in the Desertification Area

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### Abstract

With the urbanization gradually shifting to the middle and the west of China, and the implementation of ecological restoration projects in recent years, land use conflict types and stakeholders are experiencing changes. Some regions have undergone conflict intensification. But, this problem has not been paid much attention. To ease land use conflict and realize the efficient use of land in the desertification area, taking Yanchi County of Ningxia Province as typical region of desertification, with the idea of “Identification-Mechanism-Evaluation-Strategy” , following researches are carried out: (1) Combining multi-temporal land use data with stakeholders investigation data to identify land use conflict type, content and subject and to reveal the generation mechanism and the evolution of conflict; (2) Constructing an evaluation index system based on land competitiveness to detect the potential land use conflict; (3) coordinating and resolving conflicts among stakeholders based on the CLUE-S model, with the aim of optimizing the layout of land system which the overall benefit of production, ecology and development is maximized. This research is not only a breakthrough in methods on related issues, but also has practical significance in maintaining ecological safety and sustainable development of the society and economy in desertification area.

### Key words:

Land use and land cover ; Driving Mechanism ; Human-environment System ; Scenario simulation ; Desertification

## Study on Land Use Pattern and Vulnerability of Agro-Forestry Ecotone of Northeast China

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### Abstract

Northeast China is the most important agricultural base and forestry base in China. The agro-forestry ecotone was formed due to the expansion of agricultural land and clear cutting of forest, which distributed between the agricultural region and forestry region. The spatial distribution of agro-forestry ecotone was resulted from geographical environment and agricultural development driven. At present, the agro-forestry ecotone in Northeast China has been basically stable, but the vulnerability of agricultural land in agro-forestry ecotone was becoming significant gradually, which was the loss of soil and water caused by the increase of slope mainly. Taking the Northeast China as an example, this paper extracted the spatial distribution of agro-forestry ecotone based on the land use data and moving window analysis method. The agro-forestry ecotone was classified into two types, edge and inner ecotone. Based on the different spatial scale of these two types, appropriate threshold was selected to extract the corresponding spatial distribution. The spatial and temporal change of agro-forestry ecotone in the past 40 years was analyzed based on land use data of 1975 and 2015. For the vulnerability of agricultural land of agro-forestry ecotone, Revised Universal Soil Loss Equation (RUSLE) and Agro-ecological Zone (AEZ) model were used to study the key limiting effect of slope gradient on the development of agricultural land. The results showed that, although with less area and shorter farming time, the soil erosion was more serious and the output was less in agricultural land of agro-forestry ecotone, indicating significant vulnerability.

### Key words:

agro-forestry ecotone; land use change; vulnerability; Northeast China

## Time and Space Differences of Shandong Urban Land Economic Density Analysis

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### Abstract

Land economic density is the measure of land use efficiency, an important index of city's economic development. Through the analysis of the land economic density characteristics of time and space, can in order to speed up the regional development, improve the level of regional economy. This article, based on the land of 17 cities in Shandong province economic density data, using the coefficient of variation and the relative development rate analysis method, to 2004-2013 in Shandong province the regional differences of land economic density characteristics and dynamic evolution pattern has carried on the preliminary exploration. The results show that: (1) from city to city in Shandong province's land economic density are present for the rising trend. (2) economic density had higher city land, the land in relative economic development speed is faster, the urban land economic density with different relative growth rate. (3) the growth pole of Jinan and Qingdao effect significantly, drive around the city's economic benefit. (4) the main factors influencing urban land economic density, including city size, urban economy development level, urban land investment, investment in science and technology city, urban traffic, urban industrial structure and so on seven aspects.

### Key words:

The urban land economic density; Spatial pattern; The time evolution Influencing factors

## **An Integrated Logistic Regression, Markov Chain and Cellular Automata Approach to Modelling Land Use Dynamics in Poyang Lake District, China**

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### **Abstract**

Land use changes are complex processes affected by both natural and human-induced driving factors. This study demonstrates a combined logistic regression (LR)-Markov chain (MC)-cellular automaton (CA) model when coupled with spatial pattern analysis, is well suitable to analyze temporal change and spatial distribution of land use stressed by environmental and socio-economic factors in Poyang Lake District, China. Firstly, area change and spatial distribution of land use are calculated using GIS technology, and then the logistic evaluation procedure with the specific environmental and socio-economic data is used to identify the driving force and to generate the transition potential maps. Meanwhile, the transition among different land use types is analyzed to obtain the transformation matrices during a period of 2005–2010. Secondly, using the transition potential maps and transition matrices, a cellular automata model is established to simulate spatial distribution of land use in 2010. Finally, the future land use changes during the period of 2015 are forecasted and evaluated by integrating the cellular automata model and the spatial pattern metrics. As a result, in the three zones of Poyang Lake District, the transformation tendency of land use types from 2010 to 2015 appeared an unbalanced tendency of unidirectional-transformation. The study is anticipated to provide an improved understanding of spatial and temporal variations of land use changes and an option to demonstrate land management scenarios for better balancing land use and water environmental conservation.

### **Key words:**

land use change; logistic regression; Markov chain; cellular automata; spatial pattern analysis; Poyang Lake District

## Analysis of Cold-Hot Pattern of Urban Spatial Expansion Based on Minimum Cumulative Resistance Model: A Case Study of Suzhou-Wuxi-Changzhou Area

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### Abstract

Urban expansion is a procedure that different cities compete to control the space, competing and controlling usually achieved by overcoming resistance. In this paper, We introduce least resistance model (MCR ') which can reflect the multi-center character of a region to simulate the urban expansion in SXC area, combined with Spatial Correlation Index (Getis-Ord  $G_i^*$ ). The evolution pattern of urban expansion has been quantitatively revealed. The results show that: Integrated resistance surface can reflect comprehensively the resistance for the urban expansion and indicates spatial trends in the urban expansion, and it has some instructive significance in forecasting the land layout of urban construction. In spite of cold-hot pattern, Simulation results of "hot-spots" showing a significant spatial evolution and transition characteristics. Under the thrust-resistance strength, "hot-spots" cluster structure form change from the Circle to the Group-spread. After that, Four different axis line were selected, Shanghai-Nanjing line/along the Yangtze River/along the Shanghai, and the axis alone Taihu Lake. Cold-hot analysis shows that every axis of the four districts have completely different spatial differentiation: Nanjing Shanghai axis has evident stretching expansion trend; Yangtze River axis act as low-density lateral spread; Shanghai alongside area has concentrated and long-lasting urban expansion area; Taihu Lake's limited room suffer greater e pressure. Therefore, different spatial strategy should be proposed, Such as strengthening the opening area between cities, leading the building area transfer to senior subordinated axis, which can build the network of urban space to achieve an orderly and vertical polymerization regional spatial organization.

### Keywords:

Urban growth simulation; MCR model; cold-hot pattern; Suzhou-Wuxi-Changzhou area

## Analysis of the Downstream Salinization Soil Spectral Characteristics of the Characteristics of Time and Space Distribution in Arid Area Plain Reservoirs

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### Abstract

In 2002, 2007 Landsat 5 images and 2013 Landsat 8 images as data sources, By ENVI and ArcGIS basic for remote sensing image processing and extract the sample point soil reflectance salt index, Analysis of 12 years of Liuchengzi reservoir downstream soil salinization spatial-temporal variation characteristics, results show that: ①From 2002 to 2013, the average soil reflectance increases year by year 2013 (0.206) > 2007 (0.164) (0.183) > 2002; ②Within 0 ~ 1200 m soil  $SI_1$  showed 2013 > 2007 > 2002, but in 1200 ~ 2400 m range is small, in each of the salinization tends to be stable; ③2002, 2007, 2013,  $SI_1$  has strong spatial correlation and spatial autocorrelation change scale increases year by year, suggests that regional factors (groundwater) impact on the spatial variation of soil salinization growing and expanding downstream; ④During the study period, due to the increase in reservoirs (capacity of  $4 \times 10^6 \text{ m}^3$  by 2002, 2007 after expansion is  $6 \times 10^6 \text{ m}^3$ ), reservoir's impact on downstream soil salinization, leads to the salinization degree aggravate gradually. The soil area of mild and moderate salinization was reduced by 69.44% and 37.57% respectively, while the heavier and severe salinization was increased by  $722589.71 \text{ m}^2$  and  $1941395.51 \text{ m}^2$  respectively. The situation of soil salinization of Reservoir downstream tends to deteriorate, and the situation is not optimistic.

### Key words:

geostatistics; soil salinization; salt index; plain reservoir

## **Analysis on The Evolution of Urban Space form Under the Influence of the Rapid Construction of the Development Zone: A Case Study of Suzhou City**

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### **Abstract**

Development zone is an important part of the urban construction after our country's reform and opening up, which has a significant impact on urban development and form change. In Suzhou City, Based on the remote sensing image data of 7 phases of 1984-2013, Firstly, extracting the urban construction land with ARCGIS tool, combing the history of the fast development of development zone, then using morphological index to analyze the characteristics and evolution of the urban space, Furthermore, demonstrating the unique role of development zone in the urban space form in different time periods. The results show that: 1) Among thirty years, the construction of the development zone of Suzhou city has a great contribution to the urban space expansion., which greatly influences the area expansion and intensity of the urban area, resulting in significant difference expansion of urban space; 2)The construction of the development zone makes the Suzhou city from the initial single center expansion of space form to the formation of the large urban core shaft complete space structure;3)The impact of development zone in Suzhou city morphological is divided into three stages: low level fluctuation, mutation conversion and high level stable, Each phase of the urban form of the compact and fractal dimension not only reflects the impact of the Development Zone Construction on the urban form, but also shows the development of the Development Zone land use status.. According to the impact of the Development Zone on the shape of the process, the urban planning should be scientific and reasonable layout of the development zone and control development zone size and timely order, to improve the stability of urban form and compact and make urban land intensive.

### **Key words:**

Development Zone; urban space form; morphological index; Suzhou

## Assessing the Evolution of Oases in Arid Regions Through Reconstructing Historic Spatio-Temporal Distribution: A Case of Heihe River Basin, China

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### Abstract

Oasis evolution affects various aspects of arid zone, such as hydrological process, ecological condition, and micro-climate. In this paper, the spatio-temporal evolution of the cultivated oases over the past 2000 years of the Heihe River basin, a typical arid region in China, was assessed using historical documents, ancient sites, maps and remote sensed images. It showed that the large-scale of oasis development was launched in Western Han Dynasty, and then it reduced gradually from Six Dynasties and reached the minimum in Song-Yuan. An abrupt revival occurred from Ming and continued in Qing Dynasty, and to the Republic of China, it reached the peak of the whole historical period. The areas of seven major historical periods, i.e., Han, Six Dynasties, Sui-Tang, Song-Yuan, Ming, Qing, and Republic of China are about 170,274 hm<sup>2</sup>, 111,462 hm<sup>2</sup>, 62,910 hm<sup>2</sup>, 61,432 hm<sup>2</sup>, 96,355 hm<sup>2</sup>, 120,489 hm<sup>2</sup> and 191,717 hm<sup>2</sup> respectively. The spatial distribution displayed a trend that the oases moved gradually from downstream to middle even upper stream, in addition to continuous sprawl process. The oases along the main river developed stably in most of the period, while those close to the terminal reaches are susceptible to frequent variation, even being abandoned after initial explorations. Various socio-economic factors are the main factors of oasis evolution and among them the regime stability and military necessity are the fundamental determinants.

### Key words:

Heihe River basin; cultivated oasis; spatio-temporal process; arid region; driving factors; landscape change

## Change Patterns of Agricultural Productivity Influenced by Land Consolidation : Evaluation and Prediction

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### Abstract

Since 2006, the focuses of land consolidation (LC) in China have been shifted from requisition-compensation balance on farmland to stabilizing and improving the quantity and the quality of national farmland. It is critical to make a comprehensive evaluation on change patterns of agricultural productivity influenced by LC. Based on MODIS NDVI data from 2001 to 2013 and taking 4442 LC projects from 2006 to 2010 as training set, we extracted four parameters as indexes i.e., the level of productivity (PL), the variation of productivity (PV), the potential of productivity (PP) and multiple cropping index(MI). A Support Vector Machine (SVM) model was established to predict change patterns of agricultural productivity in 3603 LC projects implemented between 2011 and 2013. The results are as follows: (1) SVM model is capable of predicting the change of indexes, especially for binary value in this study. The prediction accuracy of PL, PV, PP and MI were 74.32%, 77.33%, 55.68% and 70.21% respectively. (2) During 2011-2013, LC played a positive role in improving agricultural productivity i.e., the positivity proportion effect on PL, PV, PP and MI were 88.18%, 66.41%, 81.55% and 3.59% respectively. (3) The change patterns have significant spatial variation. The regions with significant effectiveness of productivity improving are concentrated on the middle reaches of the Yangtze River plain, hilly region of south Yangtze River, Chiang-nan Hilly Region and Nanlin Hilly Region.

### Key words:

land consolidation; NDVI; SVM; agricultural productivity; change patterns

## Changes in the extent of surface mining in the Northeast Qinghai-Tibet Plateau by using a 1975-2015 Landsat time series

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### Abstract

Qinghai-Tibet Plateau has been an ideal place for global research: it is very sensitive and vulnerable to the global change. Land use and land cover change are one of the key topics in the global change research. In recent years, Qinghai-Tibet Plateau has experienced profound land use changes due to the increasing human activities, such as artificial surface sprawl, especially in the north-eastern part. Some studies have been conducted on this theme in this region. However, few are focused on the mine development in different period. In this study, we used Landsat imagery from 1975-2015 to monitor the extent changes of surface mining in the Northeast Qinghai-Tibet Plateau, and employed spatial activity degree and disturbance degree to analyse the activity level and the disturbance level of mining areas. Besides, the cumulative damage degree of each mining regions were mapped. The results showed that, the area of all mining regions showed a growth trend after 2000, in which the mining region A and mining region B were significantly larger than the others. Spatial activity degree experienced a process of "increased then decreased" in most mining regions, especially after 2010 while disturbance degree increased in mining region A, B and F and decreased in mining region C, D and F. In addition to mining region A, spatial distribution of cumulative damage degree was shown a "ring" distribution characteristic, namely the severity of damage increased from outside to inside.

### Key words:

surface mining; land use change; remote sensing; landscape pattern

## Determining and Estimating Impacts of Farmland Consolidation Projects on the

### Regional Carbon Effects

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#### Abstract

As a practice relying on engineering measures, farmland consolidation has an important influence on land use such as altering its structures and patterns. Farmland consolidation projects also exert significant effects on regional carbon balances. Here, we analyzed the carbon effect from three aspects: the carbon effect of engineering construction, land structure and land use patterns. We calculated comprehensive carbon effects in the case of farmland consolidation projects in Yixing City, Jiangsu, China. We found that farmland consolidation increased regional carbon sinks, carbon storage increased by 3 718t, but it also remarkably increased carbon emissions. Carbon emissions increased by 6 830t because of engineering construction, and the annual carbon sink increased by 5459t. Farmland carbon stocks increased by 11071t, among which the increase in farmland was a main factor. The increment of soil carbon storage accounted for 87.21% of the total carbon storage increment. Irrigation and drainage engineering were the main reasons affecting carbon emissions, accounting for 70.96% of total carbon emissions during engineering construction. The consumption of construction materials such as cement, steel and diesel were major sources of carbon emissions. The construction of shelterbelts had significant effects on the result. The annual carbon sink increased by 23.64% because of the increased acreage of arable land and improvements in agricultural irrigation.

#### Key words:

land consolidation; farmland consolidation; carbon effects; carbon accounting

## Ecological Risk Assessment of the Coastal Area of Yancheng, China

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### Abstract

Changes in land use and land cover were pervasive in the coastal area over past decades in China that affect key aspects of Earth System functioning. Tracking the land use change in the coastal area of Yancheng during 2000 to 2010, based on remote sensing imageries and land use dataset with the support of GIS and RS technologies, we quantify the land use changes and landscape structure using Geostatistical Analyst and Spatial Autocorrelation Analysis. An ecological risk assessment model has been set up to evaluate the local ecological risk in spatial distribution and temporal evolution. The average ecological risk value of the whole region was 0.35 in 2000, and increased to 0.36 in 2005, then continuously rose up to 0.39 in 2010. In this study area, the region with a moderate ecological risk level is dominant. The area with extremely low risk or low ecological risk mainly located on the west side of the coastal zone with no apparent change. The regions of high risk and extremely high risk increased significantly from the proportion of 0 in 2000 to 14.89% in 2010, which mainly distributed in coastal zone of Sheyang, Dongtai and Dafeng. The spatial pattern of ecological risk showed a tile structure clearly and the degree of ecological risk increased from West to East. With the economic booming, especially the harbor industry and urbanization in the coastal area, the great changes of land use will promote the ecological risk continuously.

### Key words:

Landscape structure; land use changes; ecological risk assessment; coastal area; Yancheng city

## Ecological Risk Pattern of Poyang Lake Basin Based On Land Use

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### Abstract

In order to explore the impact of land use change on ecological risk, the characteristics of land use changes in Poyang Lake basin were analyzed quantitatively based on land use data during 2005-2013. The spatial-temporal variation of the ecological risk in study area were explored by means of spatial autocorrelation, geostatistics and standard deviation ellipse. The results were as follows: the land use changes showed a remarkable trend of non-agricultural transformation. The average ecological risk index (ERI) increased from 0.237 in 2005 to 0.246 in 2013. The spatial distribution ERI showed a positive autocorrelation and significant local spatial clustering pattern, and the spatial disparity of ERI was obvious, with the north higher than the south. According to the result of spatial interpolation of ERI, the study area can be further divided into five types of area: lowest ERI area ( $ERI < 0.15$ ), lower ERI area ( $0.15 \leq ERI < 0.25$ ), medium ERI area ( $0.25 \leq ERI < 0.35$ ), higher ERI area ( $0.35 \leq ERI < 0.45$ ), highest ERI area ( $ERI \geq 0.45$ ). The spatial distribution of ERI grade was significantly related to topographic features, with the ERI grade increase, the distribution area of ERI showed an obvious topographic directivity.

### Key words:

ecological risk; land use; Poyang Lake basin

## Evaluation Method: Carrying Capacity of Land Ecological Environment Based on “Two-oriented Society” in Central China

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### Abstract

Keywords: landuse planning, carrying capacity of land ecological environment, two-oriented society, Central China, Xiangjiang New Area, evaluation indicators.

“Two-oriented society” refers to a resource-conserving and environment-friendly society, especially the social formation featured by harmony between man and nature, and sustainable economic and social development. In Central China where the economy is developed and there is a large population yet less land, land resources are very scarce and thus resources compete with the environment, resulting in declining ecological environment. The carrying capacity of ecological environment evaluation system, which is built based on the concept of “two-oriented society”, can be divided into four layers, namely the support, pressure, state and response, or S-P-S-R, with the natural resource endowments of the region as the support indicator, human and natural impact on ecological environment as the pressure indicator, environmental quality of the region as the state indicator, and ecological protection and control as the response indicator. Xiangjiang New Area, the study area of this paper, is located in Changsha of Hunan Province, being the first state-level new area set up in Central China, a new urbanization demonstration area that integrates industry and city development and urban-rural development, and a typical area for studying the land use in Central China. According to the characteristics of the study area, this paper selects indicators that evaluate the ecological carrying capacity of land, forms the data acquisition method, and collects satellite remote sensing imagery and geographic information, before evaluating the ecological carrying capacity of land using the indicator system established. The results show the overall carrying capacity of land ecological environment in Xiangjiang New Area declined gradually between 2000 and 2014, with the rate of decline becoming slower; as for spatial distribution of carrying capacity in Xiangjiang New Area, land in the eastern region has a lower carrying capacity, followed by that in the western region, while that in the central region, which is the conservation area of the entire ecological environment and should be the protected and rationally utilized due to annular distribution of ecological environment along the landscape, has relatively higher the carrying



capacity. This conclusion provides a scientific basis for further spatial planning of land use and planning of rational use of land resources. Thus it can be seen that the “two-oriented society”-based evaluation of land’s ecological environment carrying capacity can provide a useful reference for landuse planning in Central China under the context of constructing a “two-oriented society”.

**Key words:**

landuse planning; carrying capacity of land ecological environment; two-oriented society; Central China; Xiangjiang New Area; evaluation indicators

## Explore and Analyse the Problems on High-standard Farmland Construction in Hilly Area: A Case Study in Chongqing

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### Abstract

High-standard basic farmland project is one of the most important projects for the construction of modernized agriculture in our country, which is also of a great strategic significance for national food security. Therefore, a good quality of the project is accordingly of grave importance. This paper took Chongqing as an example to research the quality problems in high-standard basic farmland projects, which consists of land leveling engineering, Irrigation and drainage engineering, field road projects as well as their appurtenances. There are several methodologies included in this thesis, such as field investigation and case analysis. Through the research, the author found that the factors that result in a dissatisfying engineering quality are chiefly as follows: impractical planning, lack of construction standards, backward construction technology, poor supervision and administration, lack of maintenance, sick public participation mechanism. By taking Chongqing as a typical representative, the quality problems existing in the construction of high-standard basic farmland project are analyzed on the basis of reliable cases, as a result, this paper is expected to provide reference to improve construction quality in the construction of basic farmland in hilly areas.

### Key Words:

High-standard basic farmland; construction; construction quality; hilly area

## **Impacts of Greenhouse Tillage on Soil Properties in Tibetan Plateau -A Case Study in Lhasa Area**

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### **Abstract**

This study investigated the soil environments in some agricultural greenhouses in Lhasa area on the Tibetan Plateau, and compared them to the farmland soils outside of these greenhouses. In total 92 topsoil (0-10 cm depth) samples including 54 samples in greenhouses and 38 samples in farmland were taken, and soil pH, total salt, electrical conductivity (EC), soil organic matter (SOM), total nitrogen (N), available phosphorus (P) and available potassium (K) were measured. The results indicated: agricultural greenhouses operation has caused the soil acidification, salinization, nutrient imbalance in Lhasa area. Compared to the normal farmland near greenhouses, the average pH decreased by 1.0 unit in greenhouses soil, average total salt increased 82%, and available P increased 1.6 times. Soil organic matter and total nitrogen increased too, and the available K changed slightly. In addition, these soil indexes changed with operational time and vegetable types. The pH kept decreasing with the operational time increasing, and other soil properties indexes reached their maximum value at 9 operational years. The impacts of leaf vegetables planting were relatively slight, and the impacts of fruit vegetables planting were more serious. Compared to other areas in China, the effects of greenhouses in the study area was relative slighter; even so, these effects should be paid more attention for the environment is very sensitive in plateau. These effects mainly due to the chemical fertilizer and irrigation water overuse; the precision agriculture might be an optimum pattern in Lhasa area.

### **Key words:**

facility agriculture, soil fertility, acidification, salinization, soil degradation

## Influence of Urban Land Intensive Utilization on Livability

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### Abstract

With the increasing expansion of construction land use, Beijing is under various influences during the social development. In order to study the intricate relations between intensive urban land use pattern and urban livability, in this paper we build a livable and intensive land use dynamic model to seek a new way of urban land use which not only efficiency but sustainability and livability. The model adopts the dynamic system method to analyze the quantitative relationships between the population, economy, ecological environment, residential environment and urban land use. Simulate the intensity of urban land use changes from 1996 to 2014 and predict the tendency from 2015 to 2100 combining with the currency livability. The results illustrate that the intensity of urban land use positive correlates with livability during the early urban development, but will appear the negative correlations after reach a certain level. The maximum value of Beijing constructive land use intensity will appear from around 2020 to 2600 under the current social environment, but the livability level appears low during that period. The research suggests that the livability should be taken into account as a very important influence factor to the land use intensity. And population and constructive land use area should be controlled for ensuring the intensity and livability of Beijing.

### Key words:

Intensive urban land use; livability; dynamic system; optimization; Beijing

## Land use prediction based on CLUE-S model under different non-spatial simulation methods: A case study of Qinhuai river watershed

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### Abstract

As the land use plays a more and more important role in the future regional planning and city development, it is very important to choose the suitable method to simulate the land use. Under the background of rapid urbanization in Qinhuai river watershed, we choose CLUE -S model to simulate the land use situation of it in 2020. We used linear regression model, Markov model and the gray GM (1, 1) model respectively to predict the demand for land use which is needed by the non-spatial module of CLUE-S model, then we compared the three forecast results. Two Prediction scenarios were established, one is "natural development" scenario where land use will change according to historical trend and the other is "optimization" scenario which considered the effects of planning policy. We simulated Qinhuai river watershed land use pattern in 2020 under different scenarios, and analyze the landscape pattern of it. The results showed that the rapid urbanization is the important reason of the land use change in Qinhuai river watershed; There exist difference between the predict results of three kinds of land use demand forecasting model, but they all meet the requirement of model accuracy; under the "optimization" scenario, the land use condition can meet the requirement of protection of basic farmland and ecological land, increasing infiltration capacity of rainwater, and alleviating the urban heat island effect, which provide the reference for land use planning in the future.

### Key words:

Land use simulation; CLUE-S model; Non-space module; Scenarios simulation; Qinhuai river watershed

## Landscape Pattern Change and its Effects on Soil Organic Carbon Pool in Qinghai Lake Watershed

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### Abstract

The variation of soil carbon content caused by the Landscape pattern changes is one of the most important factors affecting carbon cycle of terrestrial ecosystem, which is also second significant human activity behind the burning of fossil fuels in increasing concentrations of greenhouse gases in the atmosphere. The soil in Qinghai lake watershed has a great potential in greenhouse gases emissions because of the unique geographical environment it immerse. However, there is huge research gap in terms of the change of the underlying surface in this region and its effects on soil organic carbon. In this paper, based on the 3 sets of (1987, 2000, 2010) TM image in Qinghai lake watershed, we divided landscape into 16 types through artificial interpretation. Based on the census data and 163 soil profile data collecting in 2010, we determined the content of soil organic carbon density and its distribution features in 9 kinds of landscape. The results illustrate that the amount of soil organic carbon pool of Qinghai lake basin is about 0.296Pg in 2010. The landscape pattern from 1987 to 2010 has significantly changed in Qinghai lake watershed, the area of 7 types of landscape has increased, and the area of 9 types of landscape has reduced. From 1987 to 2010 the index of landscape fragmentation mainly showed an increasing trend with the results of enhancement of landscape heterogeneity. According to the research, the landscape changes in Qinghai lake basin has led to  $8.63 \times 10^5$  t carbons loss during the research period.

### Key words:

soil organic carbon; landscape pattern change ; RS and GIS

## Study on Hydrological Regime Changes during the past 50 years in Kuye River

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### Abstract

Base on the data about hydrology, meteorology, water and soil conservation and exploitation of mineral resources in Kuye River, analyze the trend changes of runoff, rainfall and the relationship of rainstorm and flood in Kuye River, and established SIMHYD Model to quantitative simulate the effect of climate change and human activities. The results show that: since the 1980s, the trend of runoff has reduced significantly, especially since the beginning of this century, runoff dropped shaply; the impact of human activities on the Hydrological regime is becoming more significant, increased from 52.5% to 89.9% from 1980~1990 to 1997~2006. Soil and water conservation is the main reason from 1980 to 1996, however, coal mining is the dominant factor to reduce runoff.

### Key words:

Hydrological regime; SIMHYD Model; Climate change; human activities

## The analysis of Scale Management and Intensive Cultivated Land Use: Spatial-temporal Disparity and Their Relationship

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### Abstract

With the progressive development of land institution reform and rural management system, China's scale management enters into a new stage, and its relation with the agricultural land use becomes closer and closer. It is one of the scientific problems to explore the key factors and effect of the intensive arable land use change from the perspective of scale management. This paper takes the precise recognition of the influencing mechanism of scale management on intensive cultivated land use as a basis, and employs the dynamic principal components analysis to discuss the spatial-temporal disparity of scale management and intensive cultivated land use during the period from 2011 to 2015. Moreover, spatial panel econometrics model is used to reveal the relationship between these two variables by employing the panel data on 24 provinces of China during the period 2011-2015. Major conclusions can be drawn as follows: (1) Scale management brings remarkable and positive influence on intensive cultivated land use. (2) The performances of relationship between scale management and intensive cultivated land use are various in eastern, central, western China. The spatial-temporal evolution trend reveals that these two variables show a more apparent similarity and synchronization of cluster evolution trend. Therefore, it is necessary to perfect the process of scale management, which is helpful to optimize rural land use structure as well as to enhance the rural household's income.

### Key words:

scale management; intensive cultivated land use; panel data; spatial-temporal change; China

## The Identification of Importance Ecological Land Uses And Ecological Protection in the Area of Yan-Long-Tu

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### Abstract

In this paper, the evaluation index system of ecological land was constructed of four aspects which were service function, water resources security, landscape spatial pattern, ecological sensitivity. Using AHP to determine the weight factor, applying the sum of weighted index combine with GIS spatial analysis to evaluate the importance of ecological land in the area of Yan-Long-Tu in order to know the importance of ecological land types explicitly and then establish the corresponding protection schemes. The results show that the most important ecological land accounting for 25.88% of the total area, the respectively area is 69.64Km<sup>2</sup>, 934.18Km<sup>2</sup> and 244.05Km<sup>2</sup>. The cultivated land in the important ecological land is in a trend that is adjacent or mosaic to the forest land, so we should strictly control the development. The total area of the generally important ecological land is 1719.46Km<sup>2</sup> which is reserved as the urban development land. The main land types are water area, cultivated land and woodland. Finally, according to the evaluation results, we put forward the specific protection plan which can be the significant reference to the sustainable development of the integrated sustainable development and ecological civilization construction for Yan-Long-Tu integration. ( Project supported by the National Natural Science Foundation of China ( 41461036 ) )

### Key words:

Ecological Land; The Importance Evaluation; Protection Scheme; Yan-Long-Tu

## The Process And Characteristics of Changes in the Build-Up Region of Typical Historical and Cultural Cities In China in the Past Two Hundred Years

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### Abstract

The historical land use and land cover change is one of an important content on LUCC and global change studies. The LUCC in urban areas is very severe and has the most significant impact on global environment change. Based on the data extracted from historical documents, ancient maps and remote sensing, the built-up area changes in the past 200 years in 43 cities in the Chinese historical and cultural cities (including 4 municipalities, 13 capital cities, 20 prefecture-level cities and 6 county-level cities) were studied. We took the year of 1820, 1930, 1970, 1980, 1995, 2000 and 2010 as time sections, and took 5 parameters i.e., expansion rate, expansion intensity, the migration of city's gravity center, shape index and fractal dimension as evaluation indexes to explore the quantitative and spatial dynamic changes in these cities. We obtained the following results: (1) quantitatively, the area of built-up increased significantly in past 200 years, and the average increment is 43.35 times as 1820's; (2) there can be divided into three stages from the process of the quantity changes i.e., the stable phase from 1820 to 1930, the slow-growth phase from 1930 to 1970 and rapid-development phase from 1970 to 2010; (3) with the increasing of the area, the urban morphology becomes more complex, the index of shape compactness have decreased while the fractal dimension have increased; (4) as the migration of city center, it influenced by the terrain and traffic conditions greatly. Most cities in the plain area adopted concentric type expansion.

### Key words:

LUCC; built-up region; historical and cultural city; process and characteristics; China

## **Vegetation Cover Variation after Ecological Restoration in the Loess Plateau in**

**2000-2014**

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### **Abstract**

Since the Grain to Green Program launched in the Loess Plateau, the process and pattern of ecological transition has become an attractive topic. Using the fractional vegetation cover (FVC) as index, this study examine the spatial and temporal change of vegetation cover in the Loess Plateau over the past 15 years. Furthermore, we analyze the distribution and change trend of climate effect on vegetation cover. The vegetation cover tend to increase from northwest to southeast in this region. Along with the restoration age extension, the vegetation cover exhibit an overall increase trend. The percentages of significant restoration vegetation are 2.08%, 20.99% and 51.97% in 2000-2005, 2000-2010 and 2000-2014, respectively. The restoration rate in north part is higher than south, while the difference between rate of north and south tending to reduce. The vegetation cover variation is the outcome of human activity and climate. Human activity, especially the ecological restoration program, act as the dominant driving factor of vegetation cover increase. As to the effect of climate variables, from southeast to northwest, the effect of precipitation keeps positive and enhancing on vegetation, while the effect of temperature transforming from positive to negative.

### **Key words:**

vegetation cover; spatiotemporal change; human activity; climate; Loess Plateau

## C12.26 Land Use and Land Cover Change

### Policies and Economic Conditions Impact on Urban, Agricultural and Forestry Landscapes Change



Home

#### Oral

1. [180 Years of the Cultural Landscape Development in Czechia \(The Czech Republic\)](#)  
Ivan Bičík, Lucie Kupková (Charles University in Prague, Faculty of Science, Czech Republic)
2. [A Analysis on the urban sprawl and urban landscape pattern between 1985 and 2000 in the Pearl River Delta, China](#)  
Yahui Wang (Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Erfu Dai
3. [A multi-scale Remote Sensing Analysis of Land Cover Change under the forest policy in Yunnan, Southwest of China](#)  
Zhiming Zhang, Shuangliang Li, John Zinda (Institute of Ecology and Geobotany, Yunnan University, China)
4. [Colonizing Forest and Filling Patches – A Mechanism and Process from a Case of Western Ghats, Karnataka, India](#)  
Kimoto Koichi (Kwansei Gakuin University, Japan)
5. [Decision Support Information Product for Crop Inventory and Crop Assessment using Multi-Sensor Data](#)  
Swati Katiyar (Banasthali University, India), Pavan Kumar (Kumaun University, India), C.S. Murthy (NRSC, India)
6. [Determining Potential Best Management Regimes on Plantations at Stand-level: A Case Study of Moshao Forest Farm in Southern China](#)  
Erfu DAI, Jianjia ZHU (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
7. [Does China's Dual Land Ownership Affect Manufacturing Location Choice? Case From --Beijing](#)  
Daquan Huang, Piingping Ma (School of Geography, Beijing Normal University, China), Xingshuo Zhao (Urban Rural Planning Management Center, Ministry of Housing and Urban Rural Development of China, China)
8. [Evaluating Conservation Effectiveness of Mangroves: a Remote Sensing Based Comparison for Two Adjacent Protected Areas in Shenzhen and Hong Kong, China](#)

Mingming Jia, Zongming Wang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)

9. [Growth of Urban Encroachments and Non-Agricultural Uses on Agricultural Land in Punjab \(India\): A Case Study from the Jalandhar District](#)

Sucha Singh (Assistant Prof. in Geography, University School of Open Learning, Panjab University, Chandigarh 160014, India, India)

10. [Hierarchical Determinants of Winter Wheat Abandonment in the North China Plain\\_A case study of Cangxian County in Hebei Province](#)

Xue Wang, Xiubin Li (Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China),

11. [Inheritance of Imperial Forestry: Japan's Tropical Forest Development in Southeast Asia](#)

Koji Nakashima (Kanazawa University, Japan)

12. [Land Cover Versus Ecosystems – Two Different Approaches for Mapping Ecosystem Services and Landscape Changes. Consequences for Interpreting Land Cover changes](#)

Jerzy Solon, Marek Degórski (Institute of Geography and Spatial Organization Polish Academy of Sciences, Poland)

13. [Land Use Changes and Influence on Grain Production from the Perspective of Farmers --A Case Study of Jiangnan Plain China](#)

Chengwu Liu (South Central University for Nationalities, China)

14. [Land Use changes of Paddy Cultivation Sector in a Rapidly Changing Suburban Regions: A case study of Gampaha District in the Colombo Metropolitan Region of Sri Lanka](#)

Chandrasena Urugoda (University of Kelaniya, Sri Lanka)

15. [Modelling the Impact of Macro-Scale Determinants of Urban Land-Use on Individual Residential Behaviour](#)

Andreas Koch (University of Salzburg, Dep. of Geography and Geology, Austria)

16. [Monitoring and Mapping of Forest Cover Changes Due To Proposed Satellite Town of Purbachal, Bangladesh](#)

Sharmin Shishir (Hokkaido University, Japan), Tanjinul Hoque Mollah (Hokkaido University), Shiro Tsuyuzaki (Hokkaido University)

17. [Property Right Difference, Transaction Mode Options and Land Use Efficiency of Industrial Enterprise: the Case of Wuxi city, China](#)

Lifang Ye, Xianjin Huang, Zhigang Chen, Taiyang Zhong, Zelin Xe (Nanjing University, China)

18. [Spatial Variation of Forest Resources and the Contribution of Natural and Economic Factors Across China during the early 21st century](#)

Jiayue Wang (1.Institute of Geographical Sciences and Natural Resources Research, CAS. 2. University of Chinese Academy of Sciences, China), Liangjie Xin (Institute of Geographical Sciences and Natural Resources Research, CAS, China)

19. [Urban Construction Land Intensive Use and Urbanization Process in China: A Case Study for Wuhan Urban Agglomeratio](#)

Jun Yang, Xianjin Huang, Guoliang Xu (Nanjing University, China)

## Poster

1. [A Preliminary Carbon Analysis of Wood Product Substitution](#)

Yang Hong; Ryan Bright; Rasmus Astrup (Norway, NIBIO)

2. [Assessment of Ecosystem Food Production and its Spatiotemporal Heterogeneity in the Bailong River Watershed, Gansu, China](#)

Yuchu Xie (China, Guangxi Teachers Education University)

3. [Discussing the System Platform Background of the Rotation-Fallow System in China: Based on the Current Main Cultivated Land Protection System](#)

Xiaorong Tong; Qingyuan Yang (China, School of Geographical Sciences, Southwest University)

4. [Dynamic of Land Use Performance in Xiangjiang River Basin](#)

Hongwei Mo (China, Hunan University of Science and Technology)

5. [Trade-offs between Carbon, Water, Soil and food in Guanzhong- Tianshui economic region](#)

Jing Li (China, Shanxi Normal University)

## 180 Years of the Cultural Landscape Development in Czechia (The Czech Republic)

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### Abstract

Land use database of Czechia works with land use data in six time horizons (1845-1896-1948-1990-2000-2010), which represent years of key political and socio-economic changes not only in Czechia but throughout Central Europe. Each of many key events influenced Czech landscape. A generalization of this complex development has led to a substantially different system - from simple local into more hierarchical one where larger regions of similar land use structure and their development are present. The overall development of the changes in the land use in Czechia is documented by a series of cartograms and tables describing over eight thousand units covering the whole territory of Czechia.

The regional structure of land use was fundamentally transformed. At higher elevations and in less fertile areas, there has been a decline and demise of arable land and the overall restructuring of agriculture. The opposite type of agriculture is located in lower altitude (up to 400 - 450 m) where crops production and mixed intensive agriculture dominate. There are not only two above mentioned opposite types of landscape and their evolution in the present Czechia. Different types of landscapes corresponding to the new and advanced features/functions, previously almost unknown are also present. As an example we can mention environmental, water management, recreation, mining, etc. functions/landscapes. Each of these functions formed the characteristic structure of landscape use on larger territories characterized by cadastres with similar structure of land use and its development in the last 50-70 years.

### Key words:

Spatiotemporal analysis of land use structure; Czechia, driving forces

## **A Analysis on the Urban Sprawl and Urban Landscape Pattern Between 1985 and 2000 in the Pearl River Delta, China**

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### **Abstract**

Urbanization is an irreversible trend worldwide, especially in rapidly developing China. Accelerated urbanization has resulted in rapid urban sprawl and urban landscape pattern changes. Quantifying the spatiotemporal dynamic of urban land use and landscape pattern changes can not only reveal the characteristic of social transfer and economic development but can also provide insights into driving forces of land use changes. In this study, we coupled remote sensing (RS), a geographic information system (GIS), gradient analysis and landscape metrics to quantitatively compare the spatiotemporal dynamics on land use, urban sprawl and landscape pattern for nine cities in the Pearl River Delta from 1985 to 2000. The results show an increase in buildup land and shrinking cropland in the Pearl River Delta. For the whole region, the phenomenon of urbanization was obvious, and for the nine selected cities, there existed a great difference between the sprawling process and the magnitude, both at spatial and temporal dimensions. Guangzhou and Shenzhen are shown as the two most intense examples of urban sprawl. The urban landscape changes could help understand the different stages of urban development and reflect specialty urbanization. The results also provide important implications for future urban planning and land management strategies in China.

### **Key words**

Urbanization;urban sprawl; landscape pattern; gradient analysis; Pearl River Delta; China

## **A Multi-Scale Remote Sensing Analysis of Land Cover Change under the forest policy in Yunnan, Southwest of China**

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### **Abstract**

China's Natural Forest Protection Program (NFPP) and Returning Farmland to Forest Program (RFFP, or called Sloping Land Conversion Program), are two of the world's largest forest conservation programs in terms of both expenditure and spatial extent. Studies of land cover change at national and regional scales find forest cover gains in jurisdictions in which each program was implemented. However, land cover change patterns at smaller scales vary sharply, raising questions about whether these policies or other factors best explain observed patterns. In this study, we attempt to untangle the impacts of these programs and other factors simultaneously impacting land use and land cover at different scales in a county in southwest China. Multi-temporal and multi-source satellite imagery data were used to detect the land cover change at county, township, and community levels, and data from a household survey and focus group discussions informed the analyses. Results indicate overall forest cover gain both in 2000-2010 and in 2010-2014 at all three levels. At the community level, there is no significant difference in forest land cover change in communities with and without RFFP participation. Transition matrix results show that forest gain resulted primarily from shrub succession and avoided deforestation, with cropland retirement playing a secondary role. These findings suggest that over the past three years land cover change processes in this region have been dominated by forest conservation under the NFPP as well as social changes driving retirement of marginal cropland regardless of RFFP participation.

### **Key words:**

Natural Forest Protection Program; Returning Farmland to Forest Program; land cover change; multi-scale analysis; spatial heterogeneity

## Colonizing Forest and Filling Patches – A Mechanism and Process from a Case of Western Ghats, Karnataka, India

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### Abstract

In the last two decades, India has been attracting attention from all over the world as one of the region where while overcoming the deforestation issues. Regarding the rate of forest cover in India, it has been restored from 10% (1980) to 21.23% (2013). Forest Survey of India (FSI) mentioned that "the positive change can be attributed to conservation measures or management interventions such as afforestation activities, participation of locals for better protection measures in plantation areas as well as in traditional forest areas etc." (FSI 2013:18). But, in the aspect of land use cover and change (LUCC), we cannot recognize the any improvement from our field experience apparently. We have done continuous projects, Forest Management as Regional Governance (FMaRG) and Regional Government of Forest and its Fringe (ReGFF), for investigating the mechanism and process of de-forestation, and the effect to the livelihood of region where made by deforestation process. We explore the relationship between distribution pattern (patches) of population increase and de-forestation process by using census data and several maps. In concluding, we will show not the direct effect of population increase, but the structural mechanism of effect of it in regional context.

### Key words:

deforestation; effect of population increase; India;

## Decision Support Information Product for Crop Inventory and Crop Assessment using Multi-Sensor Data

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### Abstract

India is an agricultural dependent country and one of the principal wheat producing and consuming countries in the world. Almost two third of the employed class in India are surviving upon agriculture as their means. Agriculture, one of the oldest economic practices, plays an vital role in the context of Indian society. Remote sensing data can also be used for the estimation of crop area. Remote sensing techniques have demonstrated their potential in providing information on the character and distribution of various natural resources. Possible application areas related to agriculture are management of land and water resources, crop acreage and production forecasting, crop condition. The current study is focus on the crop inventory and crop assessment of agricultural field of Madhya Pradesh state, with Taluk as a spatial unit using decision support information product because it gives precise information about condition of crop in any area in terms of healthy or stress condition, biodiversity analysis, helps in monitoring of the crop management activity such as rehabilitation, and abiotic factors like temperature, and rainfall. The aim of this research is to improve methods for quantifying and verifying inventory based carbon pool estimates for the tropical dry deciduous forests. In future, the other method and techniques will be found out to perform the analysis. The current study uses the satellite remote sensing data of LANDSAT-8 and RESOURCESAT-2 to generate the objective and study about Rabi season (November-December to April- May) in the year 2013-14, 2014-15, and 2015-16. The study deals with crop yield estimation, spatial distribution, crop assessment, crop inventory and developing decision support information product in the districts of Madhya Pradesh i.e. Hoshangabad, Crop yield estimation and crop assessment of these districts is studied at village as well as taluk level. The major Rabi season crop took under study is wheat, jowar and mustard. Spectral response based model for identify different crop condition identification of sensitive area.

### Key words:

Decision support information; Remote sensing; Water resources; Satellite data

## Determining Potential Best Management Regimes on Plantations at Stand-level: A Case Study of Moshao Forest Farm in Southern China

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### Abstract

A number of problems concerning even-aged forest structure and dwindling ecosystem services existed for plantations in southern China under the traditional forest management. The objective of this study is to determine best management regimes (BMR) aiming at sustainable forest management, with a case study at Moshao forest farm. We propose a framework of BMR modeling, which is characterized by high scheduled timber production (STP), low fluctuations in periodic scheduled timber harvest levels (FPS), and age class structure (ACS) at the end of planning horizon, and a simply paired analysis is conducted among the three indicators to identify a suitable management planning for long-term timber production. Our results suggest that STP, FPS and ACS are correlated to each other, it is possible to control these forest performance indicators in a planning horizon by setting various harvesting intensities. Management regimes with cutting area percentages of 20%-40%, cutting period of 10 years combined with small area clear cutting ( $\leq 5$  ha) may be BMRs for Moshao forest farm in Southern China, and management regime with cutting area percentage of 35% is probably the best one. These findings suggest that applicable management regime could be designed by identifying the best harvesting intensity. The local current harvesting intensity can be increased properly under a balance between timber production and ecological impacts on the plantations.

### Key words:

plantation; harvesting intensity; timber production; management regime; sustainable forest management

## Does China's Dual Land Ownership Affect Manufacturing Location Choice? Case from Beijing

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### Abstract

China has a unique dual land ownership system, in which there are two kinds of land ownership, state-owned land and collective-owned land. Corresponding to these two land ownership, land is used in different ways, performance in acquisition approach, security of land use system and land transaction. Eventually leads to the difference in enterprises cost, including land cost, transport cost, operating cost and financial cost. So whether there are influences of land ownership on enterprises location choice and to what extent will it influence to different enterprises has received extensive attention of scholars. This paper chose Beijing as an example to examine the influence of land ownership on manufacturing enterprises location choice during 1990 to 2001. We used zero inflated negative binomial regression models and highly detailed data set of Beijing to explain whether there were influences of land ownership on manufacturing enterprises location choice. And then four categories manufacturing enterprises data was used to explain whether there were different influences on different types of manufacturing enterprises. The results indicated that although land property had no effect on integral manufacturing enterprises, after classification, collective-owned land had higher attraction to low technology and medium-low technology enterprises, while medium-high technology and high technology enterprises were more tended to be located on state-owned land with more secure land use policies and environment.

### Key words:

collective ownership; manufacturing location choice; influence; Beijing; China

## Evaluating Conservation Effectiveness of Mangroves: a Remote Sensing Based Comparison for Two Adjacent Protected Areas in Shenzhen and Hong Kong, China

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### Abstract

Among various mangrove conservation projects, the Ramsar Convention is the internationally adopted one, and the China's National Nature Reserve Systems (CNNRS) are on the list of priority financial and political supports in China. This study aimed to evaluate and compare mangrove conservation effectiveness of two adjacent protected areas which were under the management policies of Ramsar Convention and CNNRS. To achieve the goal, Landsat images obtained in the year of 1973, 1979, 1988, 1993, 1996, 1999, 2003, 2006, 2009, 2013, and 2015 were chosen and classified, and then three remote sensing based measurements, including areal extent, area-weighted centroids, and landscape metrics were developed. Results showed that, from 1973 to 2015, the area extent of mangrove in both reserves increased, but the net change and increasing rate of the MPMNR (281.43 hm<sup>2</sup> and 6.70 hm<sup>2</sup>) were much higher than that of the FMNRR (101.97 hm<sup>2</sup> and 2.43 hm<sup>2</sup>). Area-weighted centroids of mangroves in FMNRR moved seaward for about 120 meters, while in MPMNR the centroids moved seaward more farther (410 meters). Although both reserves saw increased integrity and connectivity of mangrove patches. We concluded that mangroves in the MPMNR under the policy of Ramsar Convention were protected with higher effectiveness than the FMNRR under CNNRS. This study may help to formulate generally accepted criteria in evaluating conservation effectiveness and advice on proper mangrove protection and management decisions.

### Key words:

Remote sensing; Mangroves; Ramsar Convention; National Nature Reserve; conservation effectiveness

## **Growth of Urban Encroachments and Non-Agricultural Uses on Agricultural Land in Punjab (India): A Case Study from the Jalandhar District**

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### **Abstract**

The countryside in Punjab state of India has been noticing land use conversions in response to the rapidly growing urbanization, industrialization and network of transportation. Among these, expansion of transportation network has played an important role in the growth of urban encroachments on fertile agricultural land along major roads near urban centers of Punjab. Similar changes have been observed along a bypass road of Jalandhar district of the state.

Thus the proposed research focuses on the spatio-temporal analysis of encroachments of fertile agricultural land in the study area during 2001-2015.

The study is based on both secondary and primary sources of data. Secondary data has been obtained from the concerned Govt. offices. Primary data has been collected by conducting a field survey. Maps showing spatio-temporal changes in the encroachments have been prepared using ArcGis 9.2 software.

The study revealed that agricultural land has predominantly been encroached for housing development projects followed by commercial and industrial projects. Expansion of road network and the less profitable farming activities of small and marginal farmers in comparison to short term high returns from the sale of their holdings are the determining factors for such encroachments. The unplanned and haphazard growth of urban encroachments on agricultural land is a matter of serious concern for the state of Punjab and thus requires attention of policy makers.

### **Key words:**

Conversion; Encroachment; Fertile Land; Housing Projects; Commercial Projects; Industrial Projects

## **Hierarchical Determinants of Winter Wheat Abandonment in the North China Plain: A Case Study of Cangxian County in Hebei Province**

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### **Abstract**

Since the late 1990s, the North China Plain (NCP) has undergone large-scale shrinkage of area sown to winter wheat, accompanying with traditional double cropping system being replaced by spring corns. However, studies on the underlying determinants are rarely found. The goal of this study is to detect the determinants across land parcel, household and village levels on farmers' cropping system decisions. A case study was carried out in Cangxian County of Hebei Province, and multi-level statistic models were constructed using household survey data. Our study reveals that of the variance in farmers' land use decisions, 50% and 30% could be explained at the land parcel level and village levels, respectively, while the remaining 20% could be explained at the household level. We found that the price of labor, the education level of the agricultural policy makers and the price of irrigation electricity were positively correlated with farmers' tendency to choose the spring maize single cropping system or to abandon winter wheat. We also found that soil quality, irrigation conditions and agricultural labor availability were negatively correlated with farmers' tendency to choose the spring maize single cropping system or to abandon winter wheat. The relationship between the labor age and farmers' land use decisions was non-linear, and the influence of farming distance was not significant. In addition, the plot area, agricultural equipment and land fragmentation all significantly influenced farmers' land use decisions. Households with agricultural equipment and lower land fragmentation were less likely to abandonment winter wheat, especially on larger areas of parcels. Overall, our study provides empirical identification on hierarchical determinants of agricultural land use change in the NCP, and encourages policies aiming at adjustment of cropping systems, integration management of both surface and groundwater, and promotion of land transfer, in order to achieve the twin goals of ecological conservation and food security in water-scarce areas.

### **Key words:**

Agricultural land use change; Multi-level modelling; Land quality; Irrigation water source; North China Plain



## Inheritance of Imperial Forestry: Japan's Tropical Forest Development in Southeast

### Asia

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#### Abstract

In 1980s and 1990s, Japan was severely criticized by environmentalists as a destroyer of the tropical rain forest in Southeast Asia and South Pacific areas. Kuroda and Nectaux (1989), Shimizu (1994) and Dauvergne (1997) argued that great bulk of the tropical timber import during 1960s-1980s by Japanese general trading companies and forestry capitals to Japan has resulted in a large scale of deforestation in these areas. British anthropologist John Knight criticized Japan's antithetical forestry policy as that Japan has imported great bulk of tropical timber and triggered deforestation in Southeast Asia and South Pacific Islands to provide resources for its own demand while it has practiced a nationalistic forest conservation policy of National Land Afforestation Campaign at its own country (Knight 1997). Although these two sides of Japan's forestry policy were not directly connected with each other, they have consequently resulted in the conservation of Japanese domestic forest and the deforestation of tropical rainforest in Southeast Asia and South Pacific areas. This paper attempts to demonstrate that this antithetical forestry policy of postwar Japan originates in imperial forestry policy of wartime Japan that was based on geopolitical strategy of Japanese empire through examining discourses of Japanese forestry experts during the wartime. Furthermore, focusing on the role of the wartime forestry experts in the postwar forest development projects in Southeast Asia conducted by Japanese forestry capitals, this paper illuminates a continuity of forest resource use between wartime and postwar Japanese forestry policies. Postwar tropical forest development in Southeast Asia by Japanese capitals was realized along geopolitical ambitions of wartime imperial forestry. As recent works of environmental history (e.g. Barton 2004; Anker 2001; Mizuno 2006) argue, the concept of environmentalism is deeply embedded in the history of empire. In the history of forest resource use and conservation of modern Japan, we can see specific relationships of forest conservation and deforestation, domestic forest and overseas forest, and environmentalism and imperialism.

#### Key words:

tropical forest; imperial forestry; Southeast Asia; Japanese empire

## Land Cover versus Ecosystems – Two Different Approaches for Mapping Ecosystem Services and Landscape Changes. Consequences for Interpreting Land Cover Changes

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### Abstract

In Poland, at the local scale, at least three groups of policy makers play the decisive role in the process of shaping the space: (a) local government - responsible for spatial planning, (b) nature protection authorities (e.g. a director of a national park) – defining limitations of land cover changes, and (c) forestry managers – deciding of forest spatial and age structure, as well as its utilization.

According to national regulations the planned LC spatial structure and function should take into account preservation and/or enhancement of amount and availability of ecosystem services according to the rules of sustainable development.

We explore the spatial heterogeneity of ecosystem services in three communes in NE Poland (800 km<sup>2</sup>). We defined ecosystem services in two different ways: as a property of a land cover type and as a feature of ecosystem type. The results show that the adoption of different types of basic units gives different estimations of the scope, amount and availability of services, what, in turn, influence the unlike interpretation of the LC changes during the last 20 years.

We observe three main processes of land cover change, namely: (a) the growth of the built-up areas as well as the growth of areas dedicated to be built-up in the future; (b) the systematic decline of arable lands; (c) the slow, regular growth of newly afforested areas. These changes are interpreted differently by the policy makers, but in our opinion, they may result in deterioration of landscape quality, especially in terms of ecosystem services.

### Key words:

Ecosystem services; Land Cover change; landscape heterogeneity; Poland; policy makers

## Land Use Changes of Paddy Cultivation Sector in a Rapidly Changing Suburban Regions: a Case Study of Gampaha District in the Colombo Metropolitan Region of Sri Lanka

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### Abstract

Land use changes in a region, takes place due to multiplicity of natural and human factors, leading to land use conversion and land fragmentation and tenure changes basically. Sri Lanka, as an island state of about 65,610 sq.Km and with about 20 million population is one of the high population density country in Asia. In Sri Lanka, the agricultural sector contribute about 11% of the GDP, of which 1.2% is provided by paddy cultivation sector. However that sector alone provides mainstay of about 1.8 million people. Although there are about 60 % of paddy lands exists in the dry zone districts in the country, Gampaha , a major wet zone district yet consists of about 1.1% of land allocated for paddy cultivation in the country. The paddy cultivation in Sri Lanka continued under subsidies of government in terms of fertilizer subsidy, and remains at low land and labour productivity level for decades. Being a rapidly urbanizing area, the demand for land for housing, recreation, infrastructure and services increases in a gigantic way, while structural changes take place in most of the highland areas.

However, due to legal, institutional and tenure factors, the paddy land in the area in the district is not being converted to other uses. Instead, the abandoning paddy lands, inappropriate land use conversions and unprofitable paddy cultivation are evident in some areas as symptoms in responses ongoing economic changes. Besides some of the paddy lands remain barren for years due to shortage of family labour, fragmentation of ownership and poor maintenance of irrigation networks etc.

This paper argues that the sustainability of paddy cultivation sector in the area depends only under careful land use planning strategies, that demarcate the most suitable and profitable paddy lands, while converting part of the land into other uses and based on spatial and environmental concerns. The information and data of this study were collected from secondary sources and interviews with selected key informants of the case study areas. The findings of the study revealed that paddy cultivation in the district is preferred to be converted to high value crops, if the suitable strategies were introduced. The experts' views and policy makers'



suggestions for land use changes were disclosed at the survey in order to design an appropriate land use strategy for paddy cultivation sector in the area.

**Key words:** paddy cultivation; subsidies; sustainability; land use planning;

## Land Use Changes and Influence on Grain Production from the Perspective of Farmers--A Case Study of Jiangnan Plain, China

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### Abstract

Recognizing farmers' land use changes and their influence on food production are of great significance to estimate China's food production correctly and formulate relevant policies to ensure food security. Characteristics of farmers' land use changes and their influence on food production since 1981 are analyzed in this thesis based on the data collected from a total of 620 peasant households from 12 village groups in 4 counties-Shishou, Jianli, Honghu and Xiantao-located at Jiangnan Plain which is a traditional commodity grain production base in central China. The following conclusions can be drawn from this thesis. (1)In the past 30 years, traditional land use behaviors of farmer households living in Jiangnan Plain have been substituted remarkably: "labor efficiency" practice gradually replaces traditional ways of farming; (2)Sown area for food crop production decreases continuously, and farmland multi crop index declines dramatically. However, the pesticide and fertilizer use per unit land area increases sharply; (3) Farmers' land use changes have exerted an important influence on regional food production and food security. Due to the decline of sown area since 2001, the average household food production has decreased more than 1,300 kilograms every year, and per capita share of grain has decreased by 23% from 345 kilograms in 1981 to 265 kilograms in 2011. (4)It is of great significance to master change laws of grass-root farmer land use behaviors and grasp the real situation of China's food production for correct estimation of China's food security.

### Key words:

Farmer; Jiangnan Plain; Land Use Changes; Food Production

## Modelling the Impact of Macro-Scale Determinants of Urban Land-Use on Individual Residential Behaviour

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### Abstract

Models of urban residential mobility usually take a bottom-up perspective by emphasising individual (household) decisions on locational preferences. This approach is commonly justified by the investigation of social emergence, i.e., the assumption that social macro phenomena (collective phenomena) derived from micro phenomena cannot be linked causally but have their own independent characteristics. Empirically, individual decisions are evidently framed by social, economic, and political forces such as markets, legal rules, and norms. The contribution therefore presents a preliminary attempt to incorporate macro-scale determinants of land-use, such as housing market mechanisms and urban planning decisions, into an agent-based model (ABM) in order to simulate patterns of residential mobility more comprehensively. The model is developed with NetLogo and focuses on the influence of large housing complexes – as one type of representing urban planning – in two urban districts of the city of Salzburg, Austria.

### Key words:

human agency; social forces; land utilisation; urban segregation; agent-based modelling

## Monitoring and Mapping of Forest Cover Changes Due To Proposed Satellite Town of Purbachal, Bangladesh

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### Abstract

The rapid growing population of Bangladesh (about 1000 persons/km<sup>2</sup>) creating immense pressure on Dhaka city. At this stage establishing a new satellite town may minimize this massive problem and Purbachal is such a kind of satellite town. However, the urbanization process in Purbachal new town creates enormous impact on its landmass particularly on the basic environmental factors i.e. forest cover, wetland etc. and the topography as well as the natural land surface i.e. lowland, highland, depression, valley etc. has been reduced. The key focus of this research is to monitor and map the disturbances on forest areas and detect the changes due to township development plan of Purbachal by using State of the art technologies like GIS and remote sensing using satellite imageries from 2002 to 2014. This work is based on both primary and secondary data sources where primary data sources are field observation, photograph taking etc. and secondary data sources are time series satellite imagery, feasibility report of Purbachal, journal, etc. Digitizing the disturbed areas of forest and wetland from Google-Earth imagery and then mapping to detect the changes from 2002 to 2014 by using Arc GIS software is the specific methods to conduct this research. Due to the urbanizing activities of PNTD hundreds acres of forested area has been turned into non-vegetated area. In Purbachal, total forest area has been decreased into 742 acres from 2378. 25 acres from the year 2002 to 2014.

### Key Words:

Urbanization; Forest cover; Change detection; GIS; Satellite Imagery.

## Property Right Difference, Transaction Mode Options and Land Use Efficiency of Industrial Enterprise: the case of Wuxi city, China

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### Abstract

China is experiencing the new normal economic development, contradiction with land demand over supply. The problems of land use efficiency of industrial enterprise raised the government and the public's attention. The Chinese urban-rural land market is dual. The property rights of state-owned land and collective land are not equal. There is significant difference between different property rights. Urban and rural industrial land can be achieved through several transaction modes. This article aims to evaluate the impact of different land property rights and different transaction modes on land use efficiency of industrial enterprise using an econometric model. Based on a preliminary theoretical study and literature review, 297 industrial enterprise questionnaire survey samples from the three towns of Wuxi City, Hudai Town, Qianqiao Town, Xibei Town are used in corresponding empirical study. The results show that different land property rights have significant effect on land use efficiency of industrial enterprise. The state-owned land use efficiency is higher than collective land, while different transaction modes have no significant effect on land use efficiency of industrial enterprise.

### Key words:

Property right; transaction mode; land use efficiency; urban-rural land market; questionnaire survey

## Spatial Variation of Forest Resources and the Contribution of Natural and Economic Factors Across China during the early 21st century

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### Abstract

China has entered a new stage of ecological environment construction during the early 21st century, it's necessary to grasp variable characteristics and influences of forest change. In this paper, we combine statistical regression modelling into spatial analysis to ascertain the spatial variation of the forest resources based on GlobalLand 30 dataset between 2000 and 2010, and to determine the contribution of natural and economic factors of forest change based on statistical data on county level. The results indicate that forest primarily distributed in where the average annual precipitation is above 300mm, the altitude is around 400m and the slope gradient is around 15°. The forest coverage rate showed a slight increase of 1.06% during 2000 to 2010, and the changes mainly concentrated in the southwest of China. Grassland, cultivated land and shrubland are the main sources and directions of the forest change. Natural, policy, economic and society factors significantly influenced forest change in different forestry division, especially viewed from economic factor, along with the increase of per capita GDP, forest change presented an "U" trend, the inflection point was 49731.51yuan/person, and 93.63% counties located in the left of the "U" curve among all samples in 2010.

### Key words:

forest resources; spatial variation; natural factors; economic factors; China; GlobalLand30 dataset

## Urban Construction Land Intensive Use and Urbanization Process in China: A Case Study for Wuhan Urban Agglomeration

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### Abstract

The purpose of this study was to analyze the phase evolution of urban construction land intensive use and relevant policies in every stage based on urbanization in China, and to explore factors that may influence urban construction land intensive use. The study evaluated the intensiveness of urban construction land use in Wuhan urban agglomeration, measured the coupling-coordination degree between urban construction land intensive use and urbanization level, and identified the main factors that influence urban construction land intensive use from county and prefecture city two levels. The FAHP-Composite Evaluation Model and Hierarchical Linear Model were used to conduct this research. The results found that urban construction land utilization presented various characteristics in different urbanization stage. Although the central government made many policies to promote the intensiveness of urban construction land use, there expressed unsatisfactory effects. In Wuhan urban agglomeration, only 11% of counties showed well coordination between urban construction land intensive use and urbanization level, and in over 62% of counties, the intensiveness of urban construction land use lag behind its urbanization level. The intensiveness of urban construction land use at county level was driven not only by financial revenue and population density at county level, but also by the proportion of the second and third industry at prefecture city level. The former contributed 86.7% and the latter contributed 13.3%. Increasing land use costs, promoting population gathering, and optimizing industrial structure are the best ways to effectively improve urban construction land intensive use in developing new urbanization.

### Key words:

urban construction land intensive use; urbanization; land use policies; Driving forces; HLM; China

## A Preliminary Carbon Analysis of Wood Product Substitution

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### Abstract

Forests play a very important role of global carbon cycle, while forest management may change species and carbon stock. The recent study found the reduce of forest carbon stock due to the conversion from deciduous to coniferous forest in Europe. However, it is traditionally ignored that wood products are an integral part of the forest sector carbon cycle and contribute through the substitution of energy-intensive products, for example steel and concrete, and fossil fuel to climate warming mitigation. The Conference of the Parties to the Kyoto Protocol in Copenhagen, 2009, for the first time, recognized the importance of including harvested wood products as carbon sinks in national greenhouse-gas reporting. The displacement factors, the efficiency of using forest biomass to reduce net greenhouse gas emission, are mostly between 1.0 and 3.0, with the average of 2.1. The investigation in central Sweden indicated the average accumulated substitution effect of wood products was  $0.6 \text{ t C ha}^{-1} \text{ year}^{-1}$ . In spite of spatial and temporal variations, it is important to integrate the wood product substitution effect into carbon budget for a more comprehensive understanding of carbon cycle of forest sectors.

### Key words:

Forest; Wood Products; Substitution; Carbon

## Assessment of Ecosystem Food Production and its Spatiotemporal Heterogeneity in the Bailong River Watershed, Gansu, China

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### Abstract

Terrestrial ecosystems function to supply food (*e.g.* grains, vegetables, fiber), maintain diversity, and prevent environmental contamination. Thus, the idea that ecosystems are vital assets and are important to human well-being has spread like fire. Food production is vital for the sustainable development of human populations, and its dynamic spatiotemporal factors are closely related to spatial geographical heterogeneity and social development. However, there are only a few studies on the universal dynamic evaluation method for ecosystem function used at the regional scale, especially in the fragile mountains of China. Bailong River Watershed (BRW) is located in the transitional ecotone along the Tibet Plateau, Loess Plateau and Qinba Mountains, and it was selected to analyze the spatiotemporal heterogeneity of ecosystem food production. Based on a field survey employing land use data, model simulations, and GIS spatial analysis, the ecological conditions and socio-economic factors were used to revise the previously held dogma which put forward by Costanza in 1997. Specifically, sources of hazards reflected the differences in ecological conditions. The resource scarcity theory and the willingness to pay were used to revise and calculate the economic developmental coefficient. A dynamic evaluation model was constructed with the above corrections method and applied for ecosystem food production services assessment in the Bailong river watershed during 1990–2010. In addition, spatiotemporal heterogeneity and food production were analyzed by ArcGIS 9.3. The results indicated that the supply of cropland distributed in the river valley and bank area of BRW, hill slopes, low mountain regions and decreased. The area of instable cropland and the index of social progress increased. In the period of 1990–2010, ecosystem food production value increased. The mean value of food production was 1.8674 million Yuan in 2010. In addition, the spatial distribution pattern change of food production value was not obvious. Land accounting for high yield of food production value was 42.4% of the total area, which was mainly distributed in the valleys of BRW between Zhouqu and Hanwang town, the northwestern part of Tanchang County. The low-yield areas of food production distributed in the national nature reserve and forest. Our data change how the value of China's terrestrial ecosystem was previously defined on a national to regional scale. Compared with a previous evaluation model, the change in food production was smaller using our



method, and its spatial pattern was a better fit to the natural system of the Bailong river watershed. These data indicate that natural hazards (such as landslides and debris) and human activities affected food production and its value.

**Key words:**

Ecosystem service; Food production; Economic value; Spatiotemporal change; Bailong River Watershed of Gansu

## **Discussing the System Platform Background of the Rotation-Fallow System in China: Based on the Current Main Cultivated Land Protection System**

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### **Abstract**

This dissertation aims to study the relationship between the current main cultivated land protection system and the rotation-fallow system as well as the former's influence to the latter. There are three methods in this study, namely literature method, content analysis method, and synthesis and analysis of the specific combination of research method. The main conclusions of the essay are as follows: (1) mutual compensation relationship: The current cultivated land protection system is mainly focus on the farmland quantity while the rotation-fallow system is aimed at the quality and ecological environment protection of arable land, they mutually make the cultivated land protection system be an integrated system; (2) positive effects: The protection of the farmland quantity is the premise for the protection of the farmland quality, so that the content of the current cultivated land protection system itself has positive effects on the rotation-fallow system; (3) negative effects: The enforcement of the current cultivated land protection system is not very satisfying, which will certainly increase the burden of the rotation-fallow system, and put obstacle for the fallow and rotation system's implementation around the country; (4) experience and revelation: By studying the successful experiences and reflecting on the problems of the current cultivated land protection system, valuable experience and profound lesson for developing the content of the rotation-fallow system can be learned.

### **Key words:**

fallow-rotation system; cultivated land protection system; system platform background; revelation

## Dynamic of Land Use Performance in XIANGJIANG River Basin

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### Abstract

Based on the interpretation of land use data, used grid as the basic research unit, and from the two aspects of economy and ecology of land use in XIANGJIANG river basin to comprehensive consideration of land use performance of space-time distribution and variation characteristics. The results are as follows: 1) From 2000 to 2010, the cultivated land and unused land area of XIANGJIANG river basin is reduced while right to use construction land; forest land and water area is increasing. Total amount of land use type change is 4757.61 km<sup>2</sup>, accounted for 5.61% of the total area. Land use type change are mainly between cultivated land, grass land and construction land, and one of the biggest changes is cultivated land transformed into construction land, accounted for 27.64% of the total changing area. 2) During the period of 2000 to 2010, the number of output in XIANGJIANG river basin increased by 836.136 billion Yuan; the relative change rate of output is three hundred and ninety-eight percent; the annual increase nearly eighteen percent. The high density of economic output of XIANGJIANG river basin mainly concentrated in the area of CHANGSHA-ZHUZHOU-XIANGTAN urban agglomeration, LOUDI City and LIUYANG City, LILING City and NINGXIANG County area. 3) In the 10 years from 2000 to 2010, ecosystem service value of XIANGJIANG river basin reduces 1.436 billion Yuan; ecological service value decreased by zero point four six percent and the rate is negative zero point zero nine percent in a decade. During these ten years, the biggest declines of ecological service value are CHANGSHA, XIANGTAN, WANGCHENG, XINGSHA and the XIANGXIANG, and ecological value reduction mainly caused by the rapid expansion of city scale. 4) From 2000 to 2010, the performance of land use in XIANGJIANG river basin increased by 8347.33 billion Yuan; the performance of land use change is one hundred and sixty-one point two percent and the annual rate is ten point zero eight percent. In 2000-2005 the annual rate is 161.28%.

### Key words:

land-use performance; value of ecosystem services; XIANGJIANG River Basin; land-use change

## Trade-offs Between Carbon, Water, Soil and Food in GuanzhongTianshui Economic Region

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### Abstract

It is important to ensure the efficient supply of multiple ecosystem services from land systems by government and policy when competition for land is increasing. This paper modeled the spatially explicit supply of ecosystem services (carbon sequestration, agricultural production, water interception, and soil conservation) under two scenarios from 2000 – 2050 and explored the tradeoffs among these ecosystem services in Guanzhong-tianshui region's land. Then it assessed the productive efficiency of ecosystem services under the past situations and each two scenarios and compared these to production possibility frontiers (PPFs). We also analysis the optimum allocation through scenario simulation, in order to provide scientific evidence to the development of eco-system. The nature of these trade-offs highlight the potential to sequester carbon in the landscape with very little loss of agricultural production, but much more water is used. Efficient land use arrangements could be identified that meet society's preferences for ecosystem service provision from land by adjusting the metric used to combine multiple services.

### Keyword:

carbon sequestration; food security; water interception; trade-offs

## C12.26 Land Use and Land Cover Change

### Land Use/Land Cover (LU/LC) Change Mapping in Multi-Scales: Data and Methodology



Home

#### Oral

1. [A study of Urban land use information extraction by using object oriented processing techniques from multi-sensor data in arid area](#)

Jing Qian (Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China), Xi Chen (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China), Qiming Zhou (Department of Geography, Hong Kong Baptist University, China)

2. [Accuracy Assessment of Approaches to Spatially Explicit Reconstruction of Cropland in the Late Qing Dynasty](#)

Lan qi Jiang, Li juan Zhang (Harbin Normal University, China), Shu ying Zang (Harbin Normal University, China), Xue zhen Zhang (Institute of Geographic Sciences and Natural Resources Research, China)

3. [Analysis on Land Use and Land Cover Change in Coal Mine Area](#)

Jing Li (China University of Mining and Technology, Beijing, China), Carl Zipper, Patricia Donovan, Randolph Wynne, Adam Oliphant (Virginia Tech, United States),

4. [Changes of Entropy and Neighborhood of Land Use in Metropolitan Areas of Poland](#)

Piotr Werner (Faculty of Geography and Regional Studies, University of Warsaw, Poland)

5. [Comparisons of Green Space Classification of Town and Village between Time Series HJ-CCD and Landsat-8 OLI data](#)

Panpan Xu, Zhenguo Niu, Jie Wang (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China)

6. [Estimating Various Soil Properties Using Visible –Near Infrared Reflectance Spectroscopy in the Sanjiang Yuan Regions of China](#)

Xiaohong Gao, Lingyu Yang, Wei Zhang, Yang Yang (Qinghai Normal University, China)

7. [Forest Study In Mongolia Using Advanced Rs Technologies](#)

Munkh-Erdene Altangerel (Institute of Geography and Geoecology, Mongolia)

8. [Land Cover Changes Investigation Using Sentinel 1 and 2: the Project Commons](#)

Alessandro C. Mondini (CNR IRPI, Italy)

9. [Land Use/Land Cover Change Assessment of Chunati Wildlife Sanctuary Using Satellite Imagery](#)

Kamrul Islam, Mohammed Jashimuddin (Institute of Forestry and Environmental Sciences, University of Chittagong, Bangladesh)

10. [Spatial Scale Effect on Mapping Accuracy of Plastic-Mulched Farmland Using Remotely-sensed Imagery in Northwest China](#)

Hasi Tuya, Zhongxin Chen (Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, China ), Limin WANG

11. [Spatio-Temporal Land Use/Land Cover Changes Analysis Using Decision Tree and DEM in the Upper Beas Basin, Western Himalayas](#)

Seema Rani, Sreekesh S. (Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi 110067, India)

12. [Spatio-Temporal Mapping and Modeling of Flood Inundation Using Optical Remote Sensing](#)

Chang Huang (College of Urban and Environmental Sciences, Northwest University, China), Yun Chen (CSIRO Land & Water, Australia), Shiqiang Zhang (College of Urban and Environmental Sciences, Northwest University, China), Jianping Wu

## Poster

1. [Study on the Spatial Pattern of Citrus Orchard in South of Jiangxi with Remote Sensing and GIS](#)

Hanzeyu Xu (China, Jiangxi Normal University); Shuhua Qi (China, Jiangxi Normal University)

2. [Analysis of the Landscape Pattern of Land Use Change Based on TM Images](#)

Hongbing Hu; Yulan Zhan; Xingguang Cao (China, Huanggang Normal University)

3. [Analyzing Multi-temporal Land Cover Change Pattern](#)

Jinmu Choi; Minjun Kim (China, Kyung Hee University)

4. [Automatic Interpretation of High Resolution Remote Sensing Image Based on eCognition](#)

Bei Xue (China, Xi'an University of Science and Technology)

5. [Cropland Reconstruction for Eastern China and its Spatial-temporal Characteristics Analysis over the 10th~13th Century](#)

Fanneng He; Meijiao Li (China, Institute of Geographical Sciences and Natural Resources Research, CAS)

6. [Distribution Characteristics of Soil Particle Size and Some Soil Properties in Alpine Ecosystems on the Northern Tibetan Plateau](#)

Xiaojia Li (China, Inner Mongolia Normal University)

7. [Extraction of Urban Impervious Surface Information Based on Remote Sensing Image Segmentation](#)

MIAO LI; Shuying Zang; Changshan Wu (China, Harbin Normal University)

Munkh-Erdene Altangerel (Mongolia, Institute of Geography and Geoecology)

8. [Forested Wetlands Mapping of the Great Zhan River Basin Using Optical, Radar, and Topographical Data](#)

Xiaodong Na; Shuying Zang (China, Harbin Normal University)

9. [Monitoring Urban Growth And Land Use Change Detection With GIS And Remote Sensing Techniques In Istanbul, Turkey](#)

Mehmet Fatih Döker (Turkey, Sakarya University)

10. [Research on Remote Sensing Images Domain Adaptation Learning for Land Use/Land Cover Change detection](#)

Yang Li; Hua Shao; Nan Jiang (China, Nanjing Normal University)

11. [Semantic Classification Based on Bag of Visual Words and High-order Conditional Random Fields using High-resolution Imagery](#)

Bin Zhang (China, China University of Geoscience)

12. [Spatiotemporal Changes of Urban Land Cover and Land Use based on Grid Cell Approach: A Case Study of Urumqi City](#)

Maitiniyazi maimaitijiang; Alimujiang kasimu (China, Xinjiang Normal University)

13. [The Change of Landscape Pattern in Jilin City and Its Effects on the Climate During 1980 to 2010](#)

Zhang Li; Zhao Dandan; Liu Jiping (China, Jilin Normal University)

14. [The Effects of Gentrification Phenomenon on the Neighboring Areas-Focused on the Hongik University Area-](#)

Hye-Won Do; Se-Eun Oh; Byung-Seol Byun (South Korea, Inha university)

15. [The Relationship Between Forest Cover and Water Balance in the Upper Basin of Jiu River, Romania](#)

Gabriela Adina Morosanu (Romania, Faculty of Geography, University of Bucharest)

16. [The Use of Land- Surface Parameters extracted from the Digital Elevation Models of Republic of Turkmenistan](#)

Nurgeldi Arbatov; Akif Karatepe (Turkey, Sakarya University)

## A Study of Urban Land Use Information Extraction by Using Object Oriented Processing Techniques from Multi-Sensor Data in Arid Area

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### Abstract

Extraction of urban land-use information is the fundamental step of urban change detection. However, there are challenges in automatic delineation of urban areas and differentiation of land cover types within the city. Thanks to the heterogeneity nature of urban areas, where coexists of continuous and discrete elements, therefore the accuracy of extraction for built-up area is unsatisfactory. Another reason is the mixed pixel problem or the low resolution, which is particularly serious in an urban environment. The built-up areas in arid areas may confuse with nearby bare soil and stony desert, which present similar spectral characteristics as construction materials like concrete, while they are often surrounded by farmland. This study focuses in improving urban land use and land cover classification approach in typical arid city area of Western China by using multi-sensor data. Pixel-based classification of Maximum Likelihood Classification (MLC) and object-oriented image classification were adopted in this study. The classification dataset from Landsat ETM, CBERS, ZY-3 and GF1 of 2015 and Beijing-1 of 2007 are selected. High-resolution images, aerial photograph and field investigation are the types of data adopts for the accuracy assessment. The aim of this study will compare Object-oriented processing techniques with traditional pixel-based image analysis.

### Key words:

remote sensing; arid area; classification; object-oriented processing; multi-sensor

## Accuracy Assessment of Approaches to Spatially Explicit Reconstruction of Cropland in the Late Qing Dynasty

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### Abstract

Based on the historically documented cropland area at county level, we reconstructed the spatially explicit cropland distribution at pixel size of 1 km for the Songnen Plain (SNP) in late Qing Dynasty (1908 AD). The reconstructions were carried out using two methods. One method (hereafter, referred to as method I) allocated the cropland to cells ordered from a high agricultural suitability index (ASI) to a low ASI, but they were all within the domain of potential cropland area. The potential cropland area was created by excluding natural woodland, swamp, water bodies, and mountains from the study area. The other method (hereafter, method II) allocated the cropland to cells in the order from high ASI to low ASI within the domain of cropland area in 1959. This method was based on the hypothesis that the cropland area domain in 1959 resulted from enlargement of the cropland area domain in 1908. We compared these two reconstructions and found that the distributions of cropland by the two methods exhibit a similar spatial distribution pattern. Both reconstructions show that the cropland was mostly found in the southern and eastern parts of the SNP. By spatially comparing the unmatched cropland cells of the two reconstructions with the settlements for each county, we found that unmatched cropland cells from method I are closer to settlements than those from method II. This finding suggests that reconstruction using method I may have less bias than reconstruction with method II.

### Key words:

comparison of reconstruction methods; cropland cover; late Qing Dynasty; Songnen Plain

## Analysis on Land Use and Land Cover Change in Coal Mine Area

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### Abstract

Coal mining disturbances have attracted attention globally due to serious influence on topography, soil, land use, ecosystems, and human health in both surface mining area and under-ground mining region. On the basis of traditional field surveying work, post-classification method of remote sensing was extensively used in land use and cover change detection. By our observation, post-classification method with only several images in long time period is ineffective in some cases. So we develop several methods to delineate mining disturbance on land use and land cover in three coal mine-areas. Firstly, a method to detect the mining disturbance date and spatial distribution was developed and applied as a three step sequence by Landsat time-series images: vegetation index selection, persistent vegetation identification, and mined-land delineation by year of disturbance. Secondly, surface mining and reclamation trajectory was defined and clustered. Thirdly, we developed coal waste pile delineation method which based on both spectral and geometric shape' character. Our study showed analysis of pixel-scale vegetation index trajectory can reconstruct history and pattern of land use and land cover change by mining and reclamation activities. Method of coal waste distribution mapping was also verified effective. Information generated from the study can be applied to gain further insight concerning mining influences on terrestrial ecosystems, water quality, and other essential environmental features, and provide a scientific basis for land reclamation management and policy decisions. Our future research is to improve the method developed and propose new method for land cover detection in subsided area by underground mining.

### Key words:

LUCC; change detection; trajectory analysis; time series Landsat images; analysis on pixel scale; Appalachian coal field; Shendong coal mine area; land reclamation

## Changes of Entropy and Neighborhood of Land Use in Metropolitan Areas Of Poland

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### Abstract

The aim of the study was identification of detailed land use changes and anthropopression in the metropolitan areas of Poland since 1990. The metropolitan areas selected for the purpose of the analysis, were mainly the ones that are related to cities identified as metropolitan centres according to Poland's Spatial Development Concept till 2030 (KPZK, 2011) – the policy document elaborated at the Ministry of Regional Development. With regard to spatial extent of metropolitan areas, delineation used for the purpose of Urban Audit project (Eurostat, 2012). In these studies an attempt was made to compare the dynamics of land use using GIS (Geographic Information Systems) – especially map algebra (MA) and cellular automata (CA) and using the entropy coefficients as the main measure of spatial (dis)order. Processes of land use changes are complex, and can only partly be interpreted by resorting to the neoclassical theory of urban land rent. The very detailed studies concerned values of entropy of land use changes using neighborhood coefficients within the geometrical grids. The concept of neighborhood coefficient (NBC) is based on the combination of map algebra with two-dimensional cellular automata. NBCs are calculated on the basis of a mathematical formula.

Maps of neighborhoods of land use of studied metropolitan areas are starting points of further spatial and temporal analyses which, in turn, made possible revealing typical, detailed, repeated schemes of neighborhoods of land use classes and their possible spatial transformations, what is not clearly possible with ordinary maps of land use.

### Key words:

land use dynamics; metropolitan areas; entropy; neighborhood coefficients

## Comparisons of Green Space Classification of Town and Village Between Time Series

### HJ-CCD And Landsat-8 OLI Data

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#### Abstract

Ecological land plays a key role in maintaining ecological environment of towns and villages. However, monitoring based on single-date remote sensing data cannot fulfill the demand of land use mapping with seasonally dynamic land cover types, such as paddy fields, wetlands, forests and dry farmlands. Classification of town/village ecological land using different time-series remote sensing data sources was evaluated. Various data combinations of HJ-CCD images and Landsat-8/OLI images were employed to classify ecological land covers in Changshu city, Yangtze River Delta and evaluated based on the following aspects: (1) comparison between the two medium resolution sensors (HJ-CCD and Landsat-8/OLI); (2) comparison between single date, multi-temporal and time series data; (3) comparison of classification between band reflectance and remote sensing indices (NDVI). The results indicated that while mapping ecological land in villages, image quality of the two sensors had no significant influence on the classification accuracy (overall accuracy of single-date image Landsat-8 OLI / HJ CCD: 67.55% / 66.53%), and time series remote sensing data could improve the accuracy obviously (overall accuracy of synthetic image of 26 HJ CCD images / single-date image of HJ CCD: 75.86% / 66.53%). Furthermore, the classification accuracy of time series image of HJ-NDVI was almost equal to that of time series band reflectance data (overall accuracy of synthetic image of 26 HJ CCD images / time series image of HJ-NDVI: 75.86% / 75.66%). The performance of classification of HJ data is better than that of Landsat 8/OLI in monitoring ecological land, partly due to the limitation of long visit cycle of Landsat 8/OLI, especially under unfavorable cloudy conditions.

#### Keywords:

Remote sensing monitoring of ecological land; HJ-1/CCD; Landsat-8 OLI; time-series satellite imagery; Changshu city

## Estimating Various Soil Properties Using Visible –Near Infrared Reflectance Spectroscopy in the Sanjiang Yuan Regions of China

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### Abstract

In this study, the potential ability of visible–near infrared reflectance spectroscopy (VNIRS) was evaluated for simultaneously estimating several soil properties in the Sanjiang Yuan Regions of Qinghai, China. Soil surface (0-30cm) samples were collected from 175 locations of five different soil types in 2012. After soil samples being air dried and sieved, soil reflectance spectrums were scanned with ASD FieldSpec 4 spectrometer under laboratory conditions. The concentrations of 17 physical and chemical properties were analyzed in the laboratory. The partial least squares(PLS)regression model with cross validation was used to establish calibration model between the reflectance spectra data and the measured values for the above of soil properties, and validate using an independent set of samples. The results showed that good predictions were obtained for soil organic matter(OM), total nitrogen(TN) and total carbon(TC) from visible-near infrared reflectance spectroscopy (  $0.83 < R^2 < 0.90$  and  $2.17 < RPD < 3.12$ ). Several other properties such as pH, carbon to nitrogen ratio(C:N), ferrum(Fe )and Al(aluminium) were moderately well predicted(  $0.68 < R^2 < 0.77$  and  $1.75 < RPD < 2$ ). The concentrations of common and heavy metal elements including magnesium(Mg), zinc(Zn), plumbum(Pb), chromium(Cr) and cadmium(Cd) were poorly predicted with low accuracies ( $R^2=0.54-0.58$ ,  $RPD=1.47-1.68$ ); whereas silicon(Si), manganese (Mn), arsenic(As), copper(Cu) and hydrargyrum(Hg) could not be predicted using VNIRS and PLSR( $R^2 < 0.5$  and  $RPD < 1.4$ ). The results demonstrated that VNIRS could be used as a rapid, timely and inexpensive technology to simultaneously predict some soil properties in a wide range of area.

### Key words:

soil organic matter; visible-near infrared reflectance spectroscopy; partial least squares regression; the Sanjiang Yuan Regions

## Forest Study in Mongolia Using Advanced Rs Technologies

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### Abstract

The aim of this study is to conduct a forest resources study using optical and synthetic aperture radar (SAR) satellite images. For this purpose, a Bogd Khan mountain located in central Mongolia is selected. As remote sensing (RS) data sources, panchromatic and multispectral Landsat images as well as ALOS PALSAR L-band HH and HV polarizations data are used. To produce a reliable land cover map from the multisensor images, a novel refined maximum likelihood classification based on the spectral and spatial thresholds are applied and for the accuracy assessment an overall accuracy is used. Overall, the research demonstrates that advanced spatial technologies based on optical and microwave RS are reliable tools for different forest studies.

### Key words:

remote sensing; radar; GIS; forest

## Land Cover Changes Investigation Using Sentinel 1 And 2: the Project Commons

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### Abstract

The two ESA Sentinel 1 and Sentinel 2 Satellite constellations offer the opportunity of frequent and regular acquisitions all around the world in different spectral ranges. The measure of the interaction between the incoming active or passive radiation at the earth surface in different wave domains intercepts and investigates different physical land processes offering the unprecedented possibility to detect and monitor land cover changes. In the framework of the ESA SEOM program, the COMMONS project proposes to investigate new approaches for land cover changes mapping, combining the complementary capacities of optical and SAR data. Methods will be tuned to track abrupt changes due to natural hazards such as landslides and floods, and changes in land cover that influence natural hazard occurrence, like snow cover changes and forest changes, and changes in agriculture. The framework consists of: (i) a multi-sensor training library of change signatures trapped by the Sentinels in a set-up phase and caused by landslides, floods, snow cover, deforestation and agricultural operations, and (ii) classifiers that use the elements of the library to recognize, identify, and map new changes. The library represents a knowledge system which takes advantages from the combination of S1 & S2 data and that can be extended to other classes of changes. Here the main goal of the project, the conceptual idea, the selected approach, and key applications preliminary results will be presented.

### Key words:

Change detection; Sentinels; spectral library

## Land Use/Land Cover Change Assessment of Chunati Wildlife Sanctuary Using Satellite Imagery

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### Abstract

Due to inappropriate management and planning, land use change of developing country like Bangladesh is a common phenomenon. Land use change phenomenon will have its tremendous effect on natural habitat area. The prime objectives of this study were to find out land use and land cover change (LULCC) of Chunati Wildlife Sanctuary (CWS) using satellite imagery considering the time period of 2005-2015. LULCC of Chunati Wildlife Sanctuary were assessed using Landsat TM (Thematic Mapper) and Landsat 8 OLI/TIRS (Operational Land Imager/Thermal Infrared Sensor). ArcGIS v10.1 and ERDAS Imagine v14 were used to process satellite imageries. Land cover change of the area was identified using Normalized Difference Vegetation Index (NDVI) technique. Highest NDVI value was found in 2005 (0.71) which denotes presence of moderate-high vegetation cover. After 2005, highest NDVI value was found following a decreasing trend (0.56 in 2010 and 0.4 in 2015) which clearly represents the rapid vegetation cover change. Using supervised land use classification, it is found that almost 256 hectares of degraded forest area increased within 10 years of study period with 25.56 % annual rate of change. About 159 hectares of naturally forested land have been changed to other land uses with an (-) 15.88 % annual rate of change demonstrating an alarming situation for this important habitat area. The overall supervised classification accuracy was found 92.16 % for 2015, 86.15 % for 2010, and 83.96 % for 2005 with Kappa value of 0.8901, 0.8168, and 0.8057 for 2015, 2010, and 2005 respectively which is satisfactory.

### Key words:

Land Use/Land Cover Change, Remote Sensing, Geographic Information System, Chunati Wildlife Sanctuary, Protected Area

## Spatial Scale Effect on Mapping Accuracy of Plastic-Mulched Farmland Using Remotely-sensed Imagery in Northwest China

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### Abstract

In recent decades, plastic-mulched farmland has expanded rapidly over the world because it can increase crop production significantly by improving the hydrothermal condition of soil. However, the plastic mulching practice has showed negative impacts on the balance of water, air and soil cycle of the eco-environmental system, as well as on visual quality of rural area and has so far been inadequately investigated. Monitoring and mapping plastic-mulched farmland is crucial for agricultural production, environmental protection and proper management strategies. This article evaluates the spatial scale requirements for timely and accurate mapping of plastic-mulched farmland using GF-1 remotely-sensed imagery, seven different spatial resolution scales: 2 m, 4 m, 8 m, 16 m, 32 m, 64 m and 128 m were designed respectively for mapping the plastic-mulched farmland using Support Vector Machine and Maximum Likelihood Classification in Guyuan, Ningxia Hui Autonomous Region, China. Results show that better accuracies in classification were obtained when high resolution images were used. The optimum spatial scale is 8m for Support Vector Machine, and 4m for Maximum Likelihood Classification. And the overall accuracy (83.20%) from Support Vector Machine using 8 m spatial resolution image is higher than the result (81.11%) from Maximum Likelihood Classification using 4 m spatial resolution images. High resolution satellite images are the essential data sources for mapping the plastic-mulched farmland, but the processing time for classification and data availability should be considered, especially over large area, when using the very high spatial resolution images. Successful mapping plastic-mulched farmland depends largely on the selection of the suitable spatial resolution of remotely-sensed imagery.

### Key words:

Plastic-Mulched Farmland; Mapping; Spatial Scale Effect; Machine Learning Algorithm; Remote Sensing

## Spatio-Temporal Land Use/Land Cover Changes Analysis Using Decision Tree and DEM in the Upper Beas Basin, Western Himalayas

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### Abstract

It is essential to understand the dynamics of land use/land cover changes to make any strategy for management of an area. Remote Sensing and GIS provides a significant scope for analyzing the spatial extent and temporal changes of land use/land cover in regional planning. The paper aims to understand the nature, extent and spatial pattern of the land use/land cover of the upper Beas basin in the Western Himalayas during 1972-2015. Pre and post monsoon season Landsat images of 1972, 1980, 1990, 2001, 2010 and 2015 were used. SRTM 30 m data were also acquired for obtaining the topographical details of the area to develop a decision tree. A decision tree classification method was developed for land use/land cover analysis of the area. Band Ratios most suitable for identification of different land use/cover types were identified in conjunction with the field knowledge. Results show that dynamic land use/land cover changes have occurred in the basin. The study found a substantial rise in built up area and cultivated land and a marginal reduction in forest cover and snow cover during the period of study. The land cover transitions are mainly from vegetative to built-up, forest to vegetative. It is also to be noted that vegetated areas are marginally engrossed to higher altitudes. Significant land use/land cover changes have occurred in and around the main Kullu valley of River Beas and lower reaches of other valleys. These may have serious implications on the ecological system of the basin.

### Key words:

Land use/land cover; Decision tree; Band ratio; ecological system

## Spatio-Temporal Mapping and Modeling of Flood Inundation Using Optical Remote Sensing

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### Abstract

Optical remote sensors, such as Landsat TM/ETM+/OLI, MODIS and Suomi NPP-VIIRS, have been widely applied in detecting flood inundation, due to their high availability and efficiency. However, there are still several issues that need to be noticed, such as the limitation of time scale of remote sensing data, and the trade-off between their spatial and temporal resolutions. Long time-series of observed hydrological data were integrated with time-series MODIS data to model the spatio-temporal dynamic of flood inundation over a large river basin. Inundation frequencies and probabilities were calculated, estimated and mapped. It was also noticed from this study that sensors like MODIS cannot map inundation accurately due to their coarse spatial resolution. However, higher resolution sensors such as Landsat have a relatively lower temporal resolution which limits their application in continuous and intensive monitoring of flood inundation. We have been working on two approaches to alleviate this dilemma. The first one is to combine the spectral unmixing model and super-resolution mapping method to refine the detection resolution of coarse sensors. The other one is to blend two categories of sensors based on a spatial and temporal adaptive fusion model. Through case studies in different areas, both approaches have been proven to be effective. Higher spatial resolution of inundation detection can be achieved while keeping the temporal resolution.

### Key words:

Flood inundation monitoring; sub-pixel mapping; image fusion; spectral unmixing model; super-resolution mapping; hydrological data

## Study on the Spatial Pattern of Citrus Orchard in South of Jiangxi with Remote Sensing and GIS

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### Abstract

South of Jiangxi Province, abbreviated as Gannan, takes possession of hilly land resource and climate condition which would profitably benefit to cultivate citrus on a large scale. Since the citrus was planted in 1970s, the local government has put forward a series of policies to support the development of citrus planting industry. And nowadays, citrus planting has been a leading agricultural sector in Gannan.

The distribution of citrus in Gannan was mapping with artificial visual interpretation on Google Earth platform. And the spatial pattern such as clustering characteristics, autocorrelation with road network or resident distribution of citrus orchard were analysed with ArcGIS software as well as DEM, road network, and residents distribution. The results showed that : (1) The total area of citrus orchards was increased to nearly 2.249 million mu, and the top three county in citrus area in Gannan were Xunwu, Xinfeng and Anyuan sequentially; (2) Citrus orchard in Gannan was mainly distributed over the mountains and hills with an altitude ranged from 100m to 500m and slope smaller than 20°. But it presented the high altitude and steep slope planting phenomenon. And the planting area in south and southeast is relatively larger than other directions. (3) Citrus orchard was mainly close to roads with distance less than 3km, and to the residential areas with distance no more than 2km; (4) Moran's I index of citrus planting density was increasing when downscaling. And the density of citrus orchard showed autocorrelation spatially.

### Keywords:

Spatial pattern; spatial autocorrelation; Gannan; citrus

## Analysis of the Landscape Pattern Of Land Use Change Based On TM Images

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### Abstract

By use of 1990, 2000, 2000 TM remote sensing images and on the basis of analysis for the parameters such as Normalized Difference Vegetation Index (NDVI), Normalized Difference Water Index & Modified Normalized Difference Water Index (NDWI & MNDW), Normalized construction Index (NDBI) and Digital Elevation Model (DEM), the rules of classify for several land use types including Water, arable land, forest land, construction land and unused land were established. The quantitative and spatial distribution character of land use types during the three periods of Qichun County, Huanggang City, Hubei Province, China were obtained by using of decision tree classification method. And 7 landscape index were select to calculate the landscape pattern and its change from three levels of landscape fragmentation, landscape dominance index and landscape diversity. The results show that: (1) during the period of 1990 to 2010, the area of water and construction land increased by 44.89 km<sup>2</sup> and 37.63 km<sup>2</sup> respectively, and that of cultivated land, woodland and unused land decreased by 53.83 km<sup>2</sup>, 33.80 km<sup>2</sup>, and 5.11 km<sup>2</sup> respectively;(2) land use landscape fragmentation, diversity and evenness index increased, which reflected the influence of human activities on the land use type change increased; Dominance maximum conversed between cultivated land and forest land, which reflected the change of land use type mainly occurred between the cultivated land and forest land;(3) driving force factors of land use landscape pattern and its change were analyzed from the point of natural and man-made reasons.

### Key words:

TM image; Land use; Decision tree; Landscape pattern change; Qichun county

## Analyzing Multi-temporal Land Cover Change Pattern

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### Abstract

In General, land cover changes have been conducted through direct comparison between two layers from different time, so-called the binary-land cover change detection. Therefore, investigating multi-temporal land cover data are not easy. In this study, we devised a novel change detection method for multi-temporal data. This method requires four step process. First, multi-temporal data will be merged into one file, in which each data element stores a change pattern. Second, change pattern similarity is measured by a sequence alignment method. Third, similar patterns are grouped. Finally, individual groups are interpreted. This novel change detection method not only allows the interpretation of multi-temporal changes, but also provides a method to find where such changes have been occurring. This approach can be applied any type of spatiotemporal change detections.

### Key words:

Land cover; change detection; sequence alignment; spatial query

## Automatic Interpretation of High Resolution Remote Sensing Image Based on eCognition

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### Abstract

With a multi-scale segmentation technology, the eCognition software's automatic interpretation of high resolution remote sensing image is unique. This paper discussed the multi-scale segmentation and nearest neighbor classification in the remote sensing image auto-classify process, set different parameters, compared and analyzed the segmented results, we can determined the most appropriate parameters and then applied it to the image's interpretation of the typical Karst region, finally get the region's current land using information.

### Key Words:

eCognition; remote sensing image; multi-scale segmentation; land use and land cover

## Cropland Reconstruction for Eastern China and Its Spatial-Temporal Characteristics Analysis over the 10th~13th Century

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### Abstract

As a traditional cultivated region, eastern China experienced the rapid population increase and the improvement of cultivation technology in the North-South Song dynasty (AD960~AD1279). As a result, the land use intensified gradually and the land cover changed dramatically here. In this study, first of all, by collecting and compiling traditional historical documents, we analyzed the history of administrative settings, population change, land use policies and taxes-related policies in eastern China for AD960~AD1279. Then a method of estimating cropland area based on taxes-cropland data and population data was created. Subsequently, the datasets of cropland area for AD990, 1078, 1102, 1162 and 1215 were reconstructed at *Lu* or *Dao* (*Lu* and *Dao* are province-level political units in the North-South Song dynasty) levels. Finally, the spatial-temporal characteristics of cropland change were analyzed. Major findings of this study are summarized below: (1) During the 10th~13th century, the areas of cropland in eastern China have shown an increasing trend overall. Cropland area increased from  $34.33 \times 10^4 \text{ km}^2$  in AD990 to  $70.28 \times 10^4 \text{ km}^2$  in AD1215, and the corresponding land reclamation ratio increased from 7.73% in AD990 to 16.89% in AD1215. However, as the population here increased rapidly, per capita cropland decreased from  $8.24 \times 10^{-3} \text{ km}^2$  to  $4.73 \times 10^{-3} \text{ km}^2$ . (2) In terms of the spatial patterns, cropland mainly distributed in the mid-lower regions of the Yellow River, the Yangtze River, and the Chengdu plains. And the land reclamation ratio of these places had been increased obviously. Besides, the land reclamation of northeast and southwest of China had also been expanded.

### Key words:

Cropland; reconstruction quantitatively; spatial-temporal characteristics; eastern China; 10th~13th century

## Distribution Characteristics of Soil Particle Size and Some Soil Properties In Alpine Ecosystems On The Northern Tibetan Plateau

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### Abstract

The distribution of soil particle size is an important property both in horizontal and vertical that may affect many other soil properties. However, little is known either about the grain size profile distribution in alpine ecosystems on the northern Tibetan Plateau, or about other soil properties. Little data is available for the study areas due to the high elevation. Here we report the results of an investigation of soil profiles at 37 sampling sites on the northern Tibetan Plateau. We provide a description of variation in soil properties with soil depth including grain size distribution,  $\text{CaCO}_3$ , soil organic matter (SOM), total nitrogen (TN), total phosphorus (TP), and total Potassium (TK). Base on all of the analytical data we concluded that gravel content ( $>2\text{mm}$ ) in 0-5 cm, 5-10 cm, 10-20 cm, 20-30 cm and 30-50 cm were significant negative correlation with the content of sand (0.1-0.25) and clay ( $<0.1$ ) in the same layer respectively at 0.01 level in both sides. It had not significant correlation with the gravel content in the depth of 50-70 cm and 70-100 cm. In addition, the content of TN was significant positive correlation with SOM in all depths above 50cm in both sides ( $P<0.01$ ). Finally, the content of TN was significant negative correlation with  $\text{CaCO}_3$  content in both sides at all depths above 50cm. The results suggested that soil properties altered with space. These properties could be considered in ecological models.

### Key words:

soil particle size; alpine ecosystem; northern Tibetan Plateau; soil properties

## Extraction of Urban Impervious Surface Information Based on Remote Sensing

### Image Segmentation

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#### Abstract

For traditional linear spectral mixture analysis (LSMA), selecting endmember has some problem. To address this problem, segment-based linear spectral mixture analysis (S-LSMA) was proposed. Vegetation, high albedo, low albedo, soil were selected as endmember. Both of S-LSMA and LSMA were applied to a Landsat TM image acquired in Harbin. According to a contrast and analysis, results indicate that the performance of the developed S-LSMA outperforms traditional LSMA techniques, with a mean average error (MAE) of 14.76 %. In particular, with LSMA, the MAE of %ISA has a value of 19.84%, showing a relatively large estimation error. This model can provide a new way for the extraction of urban impervious surface.

#### Key words:

urban impervious surface; Harbin main urban area; endmember selected; image segmentation;

V-H-L-S; spectral mixture analysis

## Forested Wetlands Mapping of the Great Zhan River Basin Using Optical, Radar, and topographical data

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### Abstract

Knowledge of the spatial extent of forested wetlands is essential to many studies including wetland functioning assessment, greenhouse gas flux estimation, and wildlife suitable habitat identification. For discriminating forested wetlands from their adjacent land cover types, researchers have resorted to image analysis techniques applied to numerous remotely sensed data. While with some success, there is still no consensus on the optimal approaches for mapping forested wetlands. To address this problem, we examined two machine learning approaches, random forest (RF) and K-nearest neighbor (KNN) algorithms, and applied these two approaches to the framework of pixelbased and objectbased classifications. The RF and KNN algorithms were constructed using predictors derived from Landsat 8 imagery, Radarsat-2 advanced synthetic aperture radar (SAR), and topographical indices. The results show that the object-based classifications performed better than per-pixel classifications using the same algorithm (RF) in terms of overall accuracy and the difference of their kappa coefficients are statistically significant ( $p < 0.01$ ). There were noticeably omissions for forested and herbaceous wetlands based on the per-pixel classifications using the RF algorithm. As for the object-based image analysis, there were also statistically significant differences ( $p < 0.01$ ) of Kappa coefficient between results performed based on RF and KNN algorithms. The object-based classification using RF provided a more visually adequate distribution of interested land cover types, while the object classifications based on the KNN algorithm showed noticeably commissions for forested wetlands and omissions for agriculture land. This research proves that the object-based classification with RF using optical, radar, and topographical data improved the mapping accuracy of land covers and provided a feasible approach to discriminate the forested wetlands from the other land cover types in forestry area.

### Key words:

Random forest; Object-based ; Forested wetlands; SAR imagery

## Monitoring Urban Growth And Land Use Change Detection With GIS And Remote Sensing Techniques In Istanbul, Turkey

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### Abstract

Geography that examines the relations between human and natural environment has gained a new dimension due to changes in the science and technology in the 21st century. In particular, developments occurring in geographic information systems and satellite technology have provided rapid and accurate analysis of required data. Today, these technologies are extensively used in the studies of urban geography as well as in many studies. Some of these studies are production of retrospective land cover/use map and definition of urban development by classification of satellite images. The rapidly increasing urbanization process from day to day is becoming a serious problem that affects people's lives. 54% of the world population approximately lives in cities and this ratio is expected to be 66% in 2050. This process of urbanization also brings about spatial changes in the cities. The spatial changes occurring in the cities to ensure sustainable urban development should be well understood and managed. Determination of urban growth of Istanbul is very important for smart growth urban sprawl. Urban development and land use changes cause many problems such as environmental pollution, depletion of agricultural and forest lands, disordered urbanization and industrialization when they are happened unplanned. Determining the temporal and spatial changes to prevent unplanned development and the direction of these changes are crucial to the sustainable management of the complex urban areas. In this study, the spatial growth of Istanbul in the last 40 years has been detected by using Landsat satellite data and this growth has been demonstrated by figures.

### Key words:

Urban Growth; Land Use; Change Detection; Istanbul

## Research on Remote Sensing Images Domain Adaptation Learning for Land

### Use/Land Cover Change detection

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#### Abstract

Accurate Land Use/Land Cover Change (LUCC) type is crucial for ecosystem monitoring and environmental change studies, automatic interpretation requires adequate training samples, which makes it hard to automatically update the LUCC data in a large scale. Learning from the process of recognizing change information in remote sensing image by human, this research takes full advantage of the existing remote sensing images and LUCC data, combining the theory and methods in domain adaptive learning. Unlike the other traditional methodologies for detection of changes in Land Use/Land Cover, we get the feature changes among multi-temporal remote sensing images by using the object-based approach. Based on feature mapping, the feature changes and the corresponding semantic changes are modeled by using Latent Dirichlet Allocation model (LDA). Here, the spatial-temporal regulation of the change patterns are analysed, which helps to construct spatial-temporal domain and change information transfer knowledge base. Then the transferring mechanism of change information under cooperative constraint of multiple sources and other priori knowledge is analysed to propose the change information transfer model on multiple sources to multiple targets. The results obtained with LUCC data set and multi-temporal Landsat TM data set from 1980s to 2010 at Jiangsu Province, China, confirm the effectiveness and reliability of the proposed method. Our research can provide feasible technology for automatically LUCC data updating and spatial-temporal data mining techniques may have more potential in change detection.

#### Key words:

Domain Adaptation Learning; Remote Sensing; Land Use/Land Cover; change detection

## Semantic Classification Based on Bag of Visual Words and High-order Conditional Random Fields using High-resolution Imagery

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### Abstract

In this paper, a super-pixel-level semantic classification method based on Bag Of Visual Words (BOVW) and High-order Conditional Random Fields (HCRF) is proposed. After the implementation of the image dense SIFT feature extraction, low-level feature descriptors are achieved. Using the BOVW model for low-level feature descriptor decomposition, and then mid-level dictionary feature descriptors are calculated. Max-pooling method is used for smoothing the mid-level feature descriptors after image segmentation. The HCRF model is constructed by the bottom-up costs and top-down costs. The mid-level feature descriptors are used for constructing unary potential belongs to the bottom-up costs, and the distances between adjacent super-pixels are used for constructing pair-wise potential also belongs to the bottom-up costs. The relationship between the visual dictionary and the object category is established for top-down costs after statistical analysis of histogram of the super-pixels. The parameters of HCRF model is estimated by Max-Margin method using training images, and then testing images is automatic classified. Experimental results show that compared with the BOVW-SVM model, this method can achieve higher classification accuracy, and has better effect on shape and edge exaction.

### Key words:

Remote sensing; image classification; Bag Of Visual Words (BOVW), Conditional Random Fields(CRF)

## Spatiotemporal Changes of Urban Land Cover and Land Use based on Grid Cell

### Approach: A Case Study of Urumqi City

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#### Abstract

By using Landsat images from 1990, 2000 and 2011, land cover and land use (LCLU) information of Urumqi city were extracted, then these land classification data were converted to 250m×250m vector square grid cells, and establish land cover and land use vector maps of Urumqi city; Based on these vector maps, the proportion of each land cover category within a grid cell area were calculated. Finally, we analysed the spatiotemporal changing characteristics of land cover and land use of Urumqi city from 1990 to 2011 and its driving factors using the proportional land cover maps. The transforming and replacing relationship between different land cover categories were analysed based on correlation and regression methods. The result shows that: ① from 1990 to 2011, Urumqi city experienced rapid expansion, a large amount of bare land and green space were changed to build up area and it increased continuously, meanwhile due to the reasons such as “Greening Barren Hills” project etc., bare land declined continuously and green space gradually increased; ② Land cover and land use shows different changing trends in different area and direction within the study region due to the impacts of topography, policy, urban planning, and road system etc.; ③ Based on the grid cell approach, we can not only analyse the overall changing characteristics of land use, but precisely quantify the spatiotemporal changing characteristics of different areas and directions within the study region and its driving forces.

#### Key words:

land cover and land use; grid cell; spatiotemporal change; Urumqi city

## The Change of Landscape Pattern in Jilin City and Its Effects on the Climate During 1980 to 2010

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### Abstract

Using ArcGIS, ENVI, Excel and FRAGSTATS, the authors make use of the number of patches, patch density, largest patch index, perimeter-area fractal dimension, aggregation index and the Shannon diversity index to analyze the landscape pattern of Jilin City in 1980, 1995 and 2010 respectively. The analysis shows that during 1980 to 2010, the number of patches, patch density, perimeter-area fractal dimension, and Shannon diversity index increased first and then decreased, aggregation index decreased first and then increased, largest patch index has increased in Jilin City. The areas of forest and grassland landscape have been reducing all the time, the area of wetland had increased first but reduced afterwards, and the area of dry landscape had expanded. Under the background of climate change in northeast China, the change of landscape pattern has a certain effect on the climate of the Jilin City. In this area, the temperature increased and rainfall decreased. This study provides a scientific basis for the regional landscape ecological evaluation and landscape planning and management. There has the good relationship between the change of landscape pattern and the spatial distribution patterns of the temperature and rainfall of the Jilin City.

### Key words:

landscape pattern; landscape index; climatic effects; Jilin City

## The Effects of Gentrification Phenomenon on the Neighboring Areas-Focused on the Hongik University Area-

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### Abstract

Gentrification is a phenomenon in which people in the middle class living in the suburbs return to the deteriorated downtown areas causing the increase in the land price as they are revitalized by the government policies and artists' activities, and as a result, native residents who cannot afford the rising capital leave the revitalized downtown areas while the functions of downtown areas performed by outside capital are commercialized. For example, gentrification appears in the Hongik University area in Korea which has a highly artistic and cultural spatiality. In other words, an expansion of the excessive commercialization of the area boosts the price of rent and land, which in turn forces artists who can ill afford to pay the rent to leave the area.

Thus, this study aims to analyze the changes in the price of land of 16 donges located in Mapo-gu, Seoul with focus on the Hongik University area where gentrification appears. Through this, this study seeks to determine how much influence the changes of the hike of the land price caused by gentrification have on the increase of land price in the neighboring areas and how extensively such changes are transferred to them. This analysis may present some policy implications for Seoul's urban regeneration projects.

### Key words:

gentrification; commercialization; changes in land price; Hongik University

## The Relationship between Forest Cover and Water Balance in the Upper Basin of Jiu River, Romania

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### Abstract

In the context of natural and man-influenced forest and water changes in the environment, recent research advances in watershed hydrology highlight the strong connections between forest cover dynamics and water balance. In this paper, we intend to examine the influence of the forest management and forest cover extent on the hydrological and hydro-morphological dynamics in the upper part of Jiu River Basin, situated in south-western Romania. The upper basin of Jiu River is located between the Meridional Carpathians and Getic Sub-Carpathians, including Petroşani tectonic depression, a vast coalfield whose planning in the last century meant a series of interventions in terms of pine and beech forests found here, as well as soils and hydrology. On the background of the direct and indirect man-influence, the study focuses on one side, on the institutional aspects in control landscape conservation in the upper part of Jiu Watershed, and on the other side, on the stream – flow processes as a response to the forest practices and management of water resources and extreme phenomena. This interdisciplinary research is sustained by a field study and a cartographic analysis. To achieve this, satellite images and Corine Land Cover database were employed. Overall the study has shown the existence of a relationship between forest cover changes and water balance and humidity content. In most cases where we zoomed in our analysis, we could highlight, therefore, the interplay forest cover dynamics and hydrological processes in the upper basin of Jiu River.

### Key words:

Forest changes; catchment hydrologic response; Jiu River

## The Use of Land- Surface Parameters extracted from the Digital Elevation Models of Republic of Turkmenistan

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### Abstract

Geographic Information System (GIS) has an important instrument visualization and analysis of spatially oriented data. Using GIS, we can easily show terrain features of any study areas. Applications of GIS in Physical Geography studies have been rapidly increasing since the 1990s with spreading of the “Desktop GIS” in worldwide. Providing of Digital Elevation Models (DEM) at various resolutions has facilitated this trend. GIS and DEM have enhanced the cartographic representation of any kinds of landforms.

Digital Elevation Models are data files that contain the elevation of the terrain over a specified area, usually at a fixed grid interval over the surface of the earth. Common uses of DEMs include; extracting terrain parameters, modeling water flow, creation of relief maps, rendering of 3D visualizations, surface analysis (slope, aspect etc) and many more.

The aim of this study, to provide the terrain features of the Turkmenistan. In this context, ArcGIS 10.2 software, its 3D and Spatial Analyst extensions have been used to create database and analysis them.

### Key words:

DEM; GIS (Geographic Information Systems); Land Surface Parameters; Republic of Turkmenistan District.

## C12.26 Land Use and Land Cover Change

### Land Cover/Land Use Databases and Data Sharing



Home

#### Poster

1. [Land-cover Types Classification and Mapping for Irkutsk City in Siberia Region](#)  
Anastasiia Martynova (Russian Fed, Irkutsk State University); Solodyankina Svetlana (Russian Fed, The V.B. Sochava Institute of Geography SB RAS)
2. [Land Use Change Detection and Prediction in Alexandria, Egypt Using Satellite Images and SLEUTH Model](#)  
Lotfy Azaz (Egypt, Geography Department, Faculty of Arts, Menofya University)

## Land-Cover Types Classification and Mapping for Irkutsk City in Siberia Region

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### Abstract

Traditional landscape approach is an important part of land-cover mapping in Russia. Since different regions have different landscape's hierarchy, it is impossible to use one classification for all the regions. We tried to analyze the correlation of such concepts as: land cover, landscape, geosystem, habitat. Habitat is terrestrial or aquatic areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural. Geosystem is a natural system, which accommodates urban elements and affects on their structure. It is a holistic terrestrial unit, integrated by flows of substance, energy and information. Landscape is a part of the Earth's surface, which is shaped by natural conditions and formed by human influences. Since the terms have close meanings, it is necessary to specify which term needs to be taken for certain aim. So, we defined land-cover as the complex of biotic, abiotic and cultural components on the Earth's surface. The aim of this study is to compile the classification of terrestrial units for Irkutsk city urban area which can be used for complex and narrow purposes, for example, for research of soil or vegetation and their changes, as well, for spatial planning. Irkutsk (large regional center) is located on the South of Eastern Siberia near Lake Baikal. Accepted in European Union CORINE Land Cover and EUNIS habitat classification don't have data for the studied area. In our research, we elaborate a synthetic approach with using CORINE and EUNIS database and conception of geosystem to classify the Irkutsk's city terrestrial units.

### Key words:

land-cover mapping; urban areas classification; landscape approach; EUNIS; CORINE

## Land use change detection and prediction in Alexandria, Egypt using satellite images and SLEUTH Model

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### Abstract

In 1905, Alexandria's 370 thousand inhabitants lived in an area of about 4 km<sup>2</sup>. Since that time, the city has expanded rapidly, eastwards and westwards. It presently occupies a built-up area of about 300 km<sup>2</sup> and has a ten-fold increase in population at 4 million in 1996, and become 4.7 million in 2014. This increase in population leads to significant Land use change. Land use change were detected using Landsat (TM) images of 1984 and 1993. The images were classified using a customised classification scheme with accuracy of 93.82% and 95.27% for 1984 and 1993 images respectively. This high accuracy enabled detecting land use/cover changes with high confidence using a post-classification comparison method. One of the most important findings here is the loss of cultivated land in favour of urban expansion. Prediction of future land use change was implemented using SLEUTH urban growth model. The application of this model in Alexandria of Egypt with its different environmental characteristics is the first attempt outside USA and Europe. If the current loss rates continued, 75% of green lands would be lost by year 2191. The results revealed that future urban growth would continue in the edges of the current urban extent, which means the cultivated lands in the east and the southeast of the city will continue to lose more day by day from their area. These hazardous rates call for an urban growth management policy that can preserve such valuable resources to achieve sustainable urban development.

### Key words:

Alexandria; land use change; urban expansion; satellite images; change detection; image classification; Landsat (TM) ; future land use change ; SLEUTH model; urban expansion

## C12.27 Latin American Studies



Home

### Oral

1. [Between Discourses, Landscapes and Power Relations: The Invention of Florianópolis as a Tourist City since the 1970s](#)  
Maria Helena Lenzi (State University of Santa Catarina, Brazil)
2. [Challenges of Land Use Planning in Metropolitan Areas in Latin America: Experiences from an Applied Case Study in Guadalajara \(Mexico\).](#)  
Bernd Pfannenstein (University of Passau, Germany)
3. [Gang Territorial Demarcation in Downtown Belo Horizonte, Brazil: the role of graffiti](#)  
Alexandre Diniz, Rodrigo Ferreira, Sergio Alcantara (Pontifical Catholic University of Minas Gerais, Brazil)
4. [Information Geotechnologies in Peru: history, uses and Applications in the Peruvian Education](#)  
Juan Manuel Delgado Estrada (Instituto Francés de Estudios Andinos/ Unión Geográfica Internacional – Perú., Peru), Jacqueline Fernandez Ortiz (Unión Geográfica Internacional – Perú., Peru)
5. [Paths And Routes Of People Matsigenka: from Isolation to Community](#)  
Martha Rodríguez Achung (Pontificia Universidad Católica del Perú, Peru)
6. [Principal nuclei, major flows and Primary areas of the Tourism Economy in Central America: A Geographical Interpretation](#)  
Alvaro Sanchez Crispin (UNAM Mexico, Mexico), Enrique Propin Frejomil (UNAM Mexico, Mexico)
7. [Production of Public Space: Citizenship and Access to the City. A study of the Trajectory of Squares in Florianopolis/Brazil](#)  
Murad Vaz (Universidade Federal da Fronteira Sul, Brazil)
8. [Segregation and Spatial Forms in the Last Planned town of the Twentieth Century: An Analysis of urban Space in Palmas \(Brazil\)](#)  
Aldenilson Costa, Lalita Kraus, Fabiana Oliveira (University Federal of Rio de Janeiro, Brazil), Suzethe Souza (University Federal of Tocantins, Brazil)
9. [Social and Environmental Transformations in indigenous Lake Basins; cases of Pátzcuaro, Mexico and Atitlán, Guatemala from 1990.](#)  
Resendiz Sanchez Tonatiuh (UNAM, Mexico)
10. [Time-Use Survey as Method to Understand the Relation between Time-space and its impact on the](#)

## Harmony of a Society.

Carlos Guilbe, Mayra Velez (University of Puerto Rico, United States)

11. Venezuelan Amazon: A Perspective From Environmental And Social Processes Of Indigenous Peoples.

Melgris Jose Becerra Ruiz, German Pirela (Universidad del Zulia, Venezuela)

12. Women and Agrarian Reform Policies in Brazil

María Franco García (UFPB, Brazil), Ruben Camilo Lois González (USC, Spain)

## **(Geography of Latin American Cities)**

### **Poster**

1. Revanchism in the Northern Mexican Border: the Violent Production of a Violent City

Larissa Santos (United Kingdom, The University of Edinburgh)

2. Same but Different: the Geography of a Large Brazilian Prison

Ludmila Ribeiro (Brazil, Federal University of Minas Gerais Brazil); Alexandre Diniz (Brazil, Pontifical Catholic University of Minas Gerais); Vitor Oliveira (Brazil, Federal University of Minas Gerais - Brazil)

3. The Spatial Impact and Territorial Expansion of Residencial Gated Communities in the Metropolitan Area of Guadalajara (Mexico)

Bernd Pfannenstein (Germany, University of Passau)

## **(Environmental Problems, Climate Change and Disaster Risk Management in Latin America)**

### **Poster**

1. Environmental Problems of Drag and Hydraulic Extraction of Placer Deposits

Sergey Govorushko (Russian Fed, Pacific Geographical Institute)

## **Between Discourses, Landscapes and Power Relations: the Invention of Florianópolis as a Tourist City Since the 1970s**

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### **Abstract**

Initially considered as an activity that would revive economic and urban growth in Florianópolis, the capital of Santa Catarina state, in south Brazil, tourism became a truth inherent to the city. Beyond the exclusively economic sphere, tourism came to guide a set of rules about the forms of seeing and enunciating the city, orienting meanings about its landscape and its urban and economic guidelines and to compose the socio-environmental conflicts that spread through the city. With the objective of investigating the process of inventing Florianópolis as a tourist city, I analyze the relations of power and the discursive construction about tourism in the city since the 1970s. For these analyses, I establish a dialog with theoretical concepts of Michel Foucault and James Duncan. From this perspective, I explore the historic conditions of the emergence and transformation of practices, institutions and discursive strategies and I analyze media narratives found in newspapers, magazines and advertising, as well as urban and tourist legislation. This set of discursive production, interwoven to the power relations, composes the landscape of Florianópolis and participates in the invention of the tourist city. The landscape, in this study, is understood as a discourse, and is therefore mediated by power relations. In this way, the landscape is analyzed considering political choices and arrangements and tensions between the various social groups that dispute power and the use and signification of space.

### **Key words:**

tourism; discourse; landscape; urban space; power relations

## **Challenges of Land Use Planning In Metropolitan Areas in Latin America: Experiences From an Applied Case Study in Guadalajara (Mexico).**

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### **Abstract**

The process of land use planning in Mexico is mainly the local municipality's responsibility. Therefore, it appears to be an isolated task field focused on individual needs and interests. In the case of the metropolitan areas, which consist of more than one municipality in their geographical size, the particular local perspective on land use planning seems to dominate the possible efforts as a community. In these cases, the key challenge is how to achieve an agreement on such a controversial issue like land use planning?

With 4.86 million inhabitants, the Metropolitan Area of Guadalajara is the second biggest city in Mexico and includes nine municipalities. It has served as an experimental area on how to accomplish the unification and standardization of the legal instruments of land use planning on a metropolitan scale. The paper will describe the process, the challenges and the solutions for the creation of the Metropolitan Land Use Plan in Guadalajara. A key step in realizing this goal in collaboration with the local Metropolitan Planning Institute has been the implementation of Geographic Information Systems for the construction of a consultable georeferenced database. A change of paradigm away from isolated local planning towards intermunicipal coordination was needed. The results of this applied case study will serve as a significant experience in the Geography of Latin American Cities and on research in the subject of Metropolitan Land Use Planning.

### **Key words:**

Metropolitan Planning; Land Use Planning; Geographic Information Systems; Guadalajara; Mexico.

## **Gang Territorial Demarcation in Downtown Belo Horizonte, Brazil: the Role of Graffiti**

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### **Abstract**

The city of Belo Horizonte, Brazil is home to an intense and ubiquitous competition for its walls, facades and public monuments, in which numerous agents working individually or in gangs tattoo the urban landscape with graffiti interventions demarcating the extent of their territories. Graffiti raises a number of social conflicts as the practice is not understood, let alone, accepted by the local population, being treated by the Brazilian State as environmental crime. This research cataloged and mapped the phenomenon in downtown Belo Horizonte searching for spatial patterns and territorialities. The study was based on primary information gathering, cataloging and data mapping, working with places, styles, instruments and the nature of graffiti. Results demonstrate the presence of several graffiti gangs operating in downtown Belo Horizonte. Nonetheless, the geographical distribution of this urban phenomenon is highly uneven, as certain areas of the city are more sought out than others due to the greater visibility they offer to graffiti interventions, especially around street corners and squares. The top of tall buildings are also highly praised by graffiti gang members as they are perceived by other gang members as acts of great bravery. Conversely, certain public buildings, bohemian zones and more policed areas display far less graffiti.

### **Key words:**

Territorial dispute; Graffiti; Belo Horizonte; Urban Geography;

## Information Geotechnologies In Peru: History, Uses And Applications In The Peruvian Education

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### Abstract

The use of technological tools for the presentation of territorial realities during the history of humanity is fascinating the man to reduce his understanding in a map, who during the time by the evolution and imagination of the societies changed the interest of presentation and also creation in front of the conclusion of space-statistical basis of the cadastre of presentation about the wealth of states, peoples and territories in different continents.

The power of this system of information come out of the military-scientific-technological search by the massive use of internet, where Geomatic, Geotechnology, Geotics, AppsGeo after, is no more a prohibited resource or out of the reach in daily life, but now directly useful for children, students and young searchers like is our case in Peru to arrange changes in the productive matrix and well use of territories.

### Key words:

Geotechnology; geography; education; internet; research; science

## Paths And Routes of People Matsigenka: from Isolation to Community

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### Abstract

This paper discusses the history of territorial displacement of families Matsigenka

(Etnolingüístico Arawac Group), study paths, trails, rivers and streams that refer to their origins and their family and staff mobility to reach the Lower Urubamba (Cusco) located on the eastern slopes of the Cordillera de los Andes Peru or Amazon. Its high spatial mobility made its territory is broad, covering a space of several watersheds, the Alto Manu east, the Madre de Dios River to the south, west and Apurimac River north Mishagua. Territory characterized as one of the most important biodiversity hotspot in the world where currently the Camisea gas megaproject is developed.

Several studies agree that the Matsigenka village has an ancient history dating back at least five thousand years before our era; that is to say, is an ancient town that was never conquered by the Inca Empire. Today this population lives in population centers and have territorial rights in the form recognized by the Peruvian State Native Communities.

This paper is part of research on access and use of natural resources by indigenous communities, conducted during the last 20 years in Matsigenkas communities.

### Key words:

Indigenous rights; occupation of space; employment land; biodiversity

## Principal Nuclei, Major Flows and Primary Areas of the Tourism Economy in Central America: A Geographical Interpretation

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### Abstract

The aim of this presentation is to reveal the territorial arrangement of tourism in the Central American region, nowadays. In the last decade, we have carried out research on the Geography of tourism in this part of the Americas and have come across interesting territorial structures of this type of economy, in each and every one of these countries. In this presentation, we firstly depict the existing natural basis (beaches, volcanoes, lakes, tropical forests) onto which the promotion of tourism has recently occurred. We then examine some of the policies these countries have collectively undertaken, in order to position tourism as a major foreign exchange earner and employer in their own lands. Official tourism statistics as well as data collected during numerous fieldworks in all Central American countries were used to produce thematic cartography concerning this investigation. The presentation of key research findings includes the disclosure of pivotal tourism centers in the region (Panama City, Guatemala City, San Jose); the identification of dominant tourist flows towards Central America (both from the United States and from within the region itself) and the areas that have been fundamental for the growth of tourism in the last years (Atitlan lake, Bay Islands in Honduras, the Central highlands of Costa Rica). We close up with a reflection on how these countries will convene the challenges emerging from the put in practice of the new forms of the tourist economy and how this will originate new territorial arrangements within their own boundaries.

### Key words:

Central America; tourism; tourist flows; mapping tourism

## **Production of Public Space: Citizenship and Access to the City. A Study of The Trajectory of Squares in Florianopolis/Brazil**

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### **Abstract**

Seeking to comprehend how the understanding of citizenship and public space can be read and interpreted within the city, this is an study about the public space of Florianopolis, Brazil, focusing on its squares. The implantation process of the studied spaces was analyzed through periodization, location, and understanding of the mentioned spaces by legal plans and laws. This analysis provided the study with a solid base to the discussion about the two factors we are interested in when talking about public space in planning process: the physic condition and its importance as an urban agent that connects people as public sphere, a key theme in Latin American discussions. By the “progressive-regressive” method (H.Lefebvre), every finding for each specific space provided a set of information which composed a broader look at the city’s network of public spaces. This approach allowed to look at the intrinsic connection between public spaces intended for collective use and the dynamic of urban occupation. These variables are directly and reciprocally related to the utilization of public spaces by citizens or their obsolescence. The city is a mediation of a set of factors resulted from socioeconomic and cultural processes associated to its location in the urban environment. This confirms the assertive of the public space not being neutral, assuming that its trajectory is influenced by conflicts and resistance. Through the geographic analysis, the concept of square directs us to different paths to be pursued in future studies, which can elucidate the logic of the urban construction.

### **Key words:**

Public Space; Production of Urban Space; Square; Florianopolis; Brazil

## Segregation and Spatial Forms in the Last Planned Town of the Twentieth Century: An Analysis of Urban Space in Palmas (Brazil)

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### Abstract

The question of this paper is to understand how the spatial forms within the town, reproduces segregation ratios, even when it comes to a new town, as Palmas. Palmas is the last planned town of the twentieth century in Brazil, it is capital of the province Tocantins, and is located in the northern region of the country. Although being a "planned" in the original design and have a proposal for social integration, there are spatial forms that reproduce old paradigms of production of urban space, and do not provide the right to the city to the whole population town. As spatial forms that help maintain segregation ratios considers the full production of residential condominiums, which is changing the landscape of the town which is becoming more vertical, and turns into a mechanism of social distinction. However, the verticalization as spatial form produces a symbolic structure by creating a distinction, it produces collective imagination that act as a barrier to the full right to the city. On the contrary, what you can see is a fragmentation of the town that can be read through some elements from the spatial distribution of residential quarters to the location of neighborhoods and today real estate investments that are changing the landscape town. At the same time, the fact that attracts attention is that the verticalization in Palmas is an early process, and answer the interests of capital, and its actors, unrelated to the need for the town and the population.

### Key words:

production space; residential segregation; verticalization; planned city; Palmas; Brazil

## **Social And Environmental Transformations in Indigenous Lake Basins; Cases of PÁTzcuaro, Mexico and Atitlán, Guatemala From 1990.**

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### **Abstract**

From the 1990s a series of aggressive changes in public policies focused on agricultural development in Latin America began. The speed of this change has brought a number of social conflicts arising from the application of outside indigenous world; migration, spoilage on the geographical environment and failed public policies are a constant. This had a negative effect on local economies, additionally the environment in both regions was affected gradually, and this is reflected in reduced biodiversity in addition to the worrying proliferation of pollution and excessive logging. The factor of intensive tourism also contributes negatively on lake ecosystems as it enters in conflict over water disposal. Cases of ethnic Purépecha in Michoacán, Mexico and Tzutujiles in Sololá, Guatemala will be analyzed.

### **Key words:**

indigenous peoples; social geographic; environmental changes; Lake Basins; Mesoameric

## The Time-Use Survey as a Method to Assess the “Harmonious Society” within the San Juan Metropolitan Area, Puerto Rico

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### Abstract

Time- Use Surveys (TUS) are becoming an important source of primary data and information about daily activities within a geographical area. TUS provides a more nuance understanding of the population and the existing urban dynamic in the Metropolitan Area of San Juan. This work presents the data obtained by the first TUS done in Puerto Rico. To obtain this data, the subjects were asked to disclose what they have done since they woke up until the time they went to sleep. Each of these activities were coded into different categories which included personal hygiene, shopping, community involvement, and education, etc. Mapping daily activities gave us a broader scope in understanding the urban structure of San Juan and its hinterland. Furthermore, it shows the differences in class, gender, and age in their relationship with time and space, revealing important patterns and its relationship with the physical environment. This paper concludes by discussing methodological and empirical challenges of this work, while also proposing new lines of research and public policy, which could include urban planning, transportation and labor policies, among others. Finally, we propose that a coherent view of the individual in relation with his/her use of time-space can informed better policies towards a greater harmonious society.

### Key words:

Time use; Latin America; Puerto Rico

## Venezuelan Amazon: A Perspective From Environmental And Social Processes Of Indigenous Peoples

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### Abstract

The Venezuelan Amazon is a region that accounts for about 417. 528 square kilometers of the total area of the national territory, the territorial space has a vital importance in terms of biodiversity globally. With respect to its geological formation is due to characteristics that correspond to the call Guyanese Shield, in this sense, it has a particular geographic location in which they have ancestrally made life different indigenous peoples of different linguistic-cultural families whose modes life have maintained a dialectical relationship with nature, allowing them to establish an appropriation-meaning and delimitation of this spatiality for the use and exploitation of its territory. This research methodologically built with documentary resources and specific experiences about the everyday processes of grassroots indigenous organizations from the technical support the existence of a vision of the future of the territory which is marked by the right to a defense and preservation then seeks to identify a way to advance research in the midst of these dynamics.

### Key words:

Venezuelan Amazon; biodiversity; indigenous peoples.

## Women and Agrarian Reform Policies in Brazil

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### Abstract

In Brazil, historically prevented the access to the ownership of land to generations of women farmers and workers.

Until the 2000s the legal obstacle that excluded the peasant women of the agrarian reform policies, was the way the land titles were issued. While these policies consider the family as the beneficiary, the title or land deed was granted on behalf of the 'father' of the family.

Inequality began to be changed from 2003 to Ordinance No. 981 and Normative Instruction No. 38 of the National Institute of Colonization and Agrarian Reform (INCRA), which made it mandatory joint titling of lots in rural settlements.

This mechanism has strengthened in the last fifteen years, the right of women to land, and have allowed access productive credits, participation and development of cooperatives. Our aim in this article is to analyze the implications of changes in recent agrarian laws in the lives of rural women and their communities.

### Key words:

agrarian reform policies; women; Brazil

## Revanchism in the northern Mexican border: the violent production of a violent city

Santos, M. L. S.

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### Abstract

Ciudad Juárez, the birthplace of the Maquiladora Industry in the mid-1960s, won the international newspapers' headlines since the 1990s as a spot of endemic violence in the northern Mexican border. The territorial stigmatization of Juárez became even stronger after the unprecedented upsurge of criminality from 2008 to 2010, when it was considered twice the world's most violent city. This violent context is often considered the result of cartels disputes and hence of the 'narcos' (drug traffickers), responsible for degrading the city. The neoliberal politics of representation of these 'undesirables' is the mainstay both of the zero tolerance policing and the gentrification process that has taken place in Juárez since 2011. These two urban policies are claimed by the official discourse as the main reasons for the recovering of the seemingly unending cycle of violence that Juárez faced until 2010. Nevertheless, the narrative of 'rescuing' of the city image from the domain of narco-violence, vocalized by decision-makers and hegemonic journalism, contradictorily mobilizes different levels of violence in its formulation. What connects these different kinds of violence is a legitimization discourse that melds a global and a local revanchism. This paper analyses it by describing how the interactions between four expressions of violence (structural, political, symbolic, and everyday violence) in the zero tolerance policing and gentrification policies has violently produced a new space in Ciudad Juárez during the last five years.

### Key words:

revanchism; Ciudad Juárez; gentrification; zero tolerance policing.

## Same But Different: the Geography of a Large Brazilian Prison

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### Abstract

The purpose of this paper is to present the geography of one of the largest maximum security prisons in Brazil: Nelson Hungria prison (PNH), in the municipality of Contagem, Minas Gerais, Brazil. The PNH houses between 1900 and 2000 prisoners, while its carrying capacity ranges from 1800 to 1850 prisoners. Structurally, PNH is organized in 12 pavilions where convicted prisoners are housed. It is within these pavilions that the geography of arrests happen. Pavilions 1 and 3 are for prisoners associated with a major criminal organization called First Command of the Capital (PCC). Pavilion 2 is for prisoners considered dangerous; pavilions 7,8 and 9 are for prisoners who work inside the unit; whereas pavilions 4, 5, 6, 10, 11 and 12 house the remaining convicts. In addition to these 12 pavilions, PNH relies on a few structural annexes, which rely on a more sophisticated infrastructure, such as, showers with hot water for inmates. Annex 1 is for prisoners of the Federal Police, that is, individuals who have been convicted of transnational crimes, mostly, drug trafficking. Annex 2 is for convicted public security professionals(civil police, prison guards, guards Municipal, Military). Finally, Annexes 3 and 4, function as relocation sites for pre-trial detainees, where more than eight inmates are found within each cell, whose carrying capacity is only four. Behind the Geography of PNH lies a number of special meanings regarding who the prisoners are; how their social networks are built or deconstructed; and about the sources of differentiation in terms of access to goods and services, mainly expressed through the communication channels with prison officers.

### Key words:

Geography; Prisons; Brazil; Criminal offence

## The Spatial Impact and Territorial Expansion of Residential Gated Communities in the Metropolitan Area of Guadalajara (Mexico)

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### Abstract

With 4.86 million inhabitants, the Metropolitan Area of Guadalajara is the second biggest city in Mexico and includes nine municipalities. The social exclusion and the expansion of residential gated communities has evolved in a dynamic and complex way. There is a new reality: the gated and exclusive city.

More than eleven percent of the metropolitan urban area are occupied by these protected urban residential areas. For the municipality of Zapopan the number is more than 17 percent. More than ever, the walls of segregation impact city planning and the concept of public space. The “success” of gated residential areas is promoted by the local housing market and a deficiency of public policies.

A key goal of the research project has been the implementation of Geographic Information Systems for the construction of a consultable georeferenced database of gated urban areas. The conclusions focus on a classification and an evaluation of the social and territorial impact of the gated communities and its influence on urban planning and the urban society.

There is an urgent need for a paradigm shift to a model of urban development based on the needs of the urban community and not the particular benefit of an elite and semi-elite social class. Walls will not solve social issues, they will make them worse. The results of this applied case study serve as a significant input for public decision makers on the combat of residential segregation, its influence of the urban day to day context.

### Key words:

Gated City; Segregation; Gated Communities; Social Exclusion; Guadalajara; Zapopan; Mexico.

## Environmental Problems of Drag and Hydraulic Extraction of Placer Deposits

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### Abstract

The drag and hydraulic development of placers impacts surface and underground waters, hydrobionts, condemnation of land, atmospheric air, soils, vegetation, and terrestrial animals.

The influences on surface and underground waters are related to the following factors: (1) operations are carried out in the overflow lands and valleys of rivers; (2) technology provided for the displacement of watercourse channels, and their blocking by dams and banks, disturbs the natural hydrological regime; and (3) when rocks are excavated with dredges, water is contaminated, and drainage flows contain heavily precipitable mineral particles.

Impact on hydrobionts related to high concentrations of the suspensions that reduce illumination and the productivity of phytoplankton. Fine suspensions that are deposited in river channels deprive fish of their spawning grounds, and they prevent small aquatic fauna from seeking refuge between stones.

The condemnation of land is great due to creation quarries, dams, dumps of barren rocks and flushing tailings. The atmosphere is polluted mainly during drilling and blasting operations, as well as due to dust from rock dumps. The effects on soils consist of the destruction of the humus layer during construction of structures, blocking with dumps, and contamination of soils with dust.

The effects on vegetation occur when the placer is cleared of trees, and bushes; difficulties in photosynthesis, growth, and development of plants in adjacent territories result from the pollution of plant leaves with dust.

### Key words:

Placers; drag and hydraulic extraction; environmental impacts; natural components

## C12.28 Local and Regional Development

### Local and Regional Development



Home

#### Oral

1. [A Comparative Study of The Regional Comprehensive Economic Strength](#)  
Meng Shasha (Shangdong, China)
2. [A Geo-spatial Analysis of The Ski Resort Development Using GIS and Micro-geodata](#)  
Daisuke Shiozaki (Hokkaido Univ, Graduate Student, Japan), Yuichi Hashimoto (Hokkaido Univ, Japan)
3. [A Multiple Criterion Analysis in the Identification of Criteria and Indicators of Community Based Forest Management in West Bengal - Case Studies](#)  
Malabika Biswas Roy (GCBT college, Habra, India), Debanjana Chatterjee, Pankaj Kumar Roy (Jadavpur University, India)
4. [A New Approach for Planning and Environmental Policies in Regional Development: As a Case Study Southeastern Anatolia Project \(GAP\) in Turkey](#)  
Bulent Acma (Anadolu University, Turkey)
5. [A New Approach to The Identification of Regional Specialisation. Is Space Important?](#)  
Pawel Churski (Adam Mickiewicz University, Poznań,, Poland), Katarzyna Kopczewska, Artur Ochojski, Adam Polko (University of Economics in Katowice, Katowice, Poland)
6. [Adoption of Integrated Farming System and Sustainable Management of Local Resources: An Experience from Indian Sundarban Delta](#)  
Tarun Kumar Mondal (Department of Geography, University of Kalyani, Kalyani 741235, Nadia district, West Bengal, India, India)
7. [Atlas of Rural Areas in Poland as a Research Tool for Regional and Local Development Study](#)  
Jerzy Banski (Institute of Geography and Spatial Organization, Poland)
8. [Changes in Formal Institutions and Responses of Local Trade Associations in a Modern Industrial District: The Case of a Pharmaceutical Industrial District in Tokyo, Japan, 1713-1943](#)  
Takashi Amijima (The Kyoto University Museum, Japan)
9. [China's Regional Economic Resilience under the 2008 Financial Crisis: A Spatial Analysis at Prefectural-level Regions](#)  
Wenxin LIU (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
10. [Development and Structural Change In Rural Delhi](#)

Nidhi Arora (IGNOU, India), BARAIK V.K. (IGNOU, India)

11. [Dimensions and Drivers of the Youth Unemployment Problem in Africa](#)

Benjamin Ofori Amoah (Western Michigan University, United States), Joseph Oppong (University of North Texas, United States), Kefa Otiso (Bowling Green University, United States)

12. [Disparities in the Levels of Socio-Economic Development in India during Pre and Post Liberalization Periods: An Inter-State Analysis](#)

Amarjeet Bhargava, Vijay Kumar Baraik, Mahendra Singh Nathawat (Indira Gandhi National Open University, New Delhi, India)

13. [Emerging Challenges of Regional Disparities in India](#)

Krishna Mohan, Mohan Nishi (Panjab University, India)

14. [EU Deep Periphery: A Case Study of Mountain Borderlands in Bulgaria](#)

Boian Koulov (National Institute of Geophysics, Geodesy, and Geography, )

15. [Evaluating the Development of Strategic Emerging Industry of Henan Province Based on Cloud Theory](#)

yong liu (The Center For Yellow River Civilization And Sustainable Development Research Of Henan Universtiy, China), Gao Jianhua (Institute Of Environment And Planning Of Henan University, China)

16. [Exploring Four Motors of Knowledge Production in East Asia: Comparing Shenzhen, Taipei, Seoul, and Tokyo](#)

Jung Won Sonn (Bartlett School of Planning, University College London, United Kingdom), Shiqi Wang, Zheng Wang (Institute of Policy and Management, Chinese Academy of Science, China),

17. [Historical Factors in the Underdevelopment of Regions – Comparative Study of Himachal Pradesh and Uttarakhand](#)

Anjan Sen, Soma Sengupta (University of Delhi, India)

18. [Innovations as Tools of Development Aid: Case of Finland and Tanzania](#)

Jussi Jauhiainen (University of Turku, Finland)

19. [Local Development in the Fijian Periphery: Stagnation through Adaptation](#)

Michael Sofer (Bar Ilan University, Israel)

20. [Local Development Potential and Its Barriers – The Case of the La Lopé National Park \(Gabon\)](#)

Maciej Jedrusik, Andrzej Lisowski (Faculty of Geography and Regional Studies, University of Warsaw, Warsaw, Poland, Poland), Dieudonne Mouketou Tarazewicz

21. [Micro level Procurement Centers and the Bargaining Power of Mediators: A Comparison of Private](#)

[and Public Agencies for Lac Production in Rural Jharkhand, India](#)

Joseph Ravi (Jawaharlal Nehru University, New Delhi, India)

22. [Mining and energy territories and deindustrialization in the Great Eastern Venezuela](#)

Anne Pene Annette (University of French West Indies (Université des Antilles), Martinique)

23. [Multi-scale Analysis of Evolutionary Mechanisms on Spatial Economic Structure In Henan Province](#)

Jingjing Li (Henan University, China)

24. [Municipal Emblems as a tool for Local Identity Formation, Representation of a Locality: Case of Municipalities in the Liberec Region \(Czechia\)](#)

Miroslav Šifta, Pavel Chromý (Charles University in Prague, Faculty of Science, Czech Republic)

25. [Organizational Model and Mechanism Exploration of Urban Agglomeration Subregional Space—Taking Hubei Urban Agglomeration as the case](#)

Chong Peng, Ting Li, Chen Zhang (College of Architecture and Urban Planning, HUST, China)

26. [Participatory Assessment of Development in Benin: ‘PADev+’ with a counterfactual and a layered approach](#)

A.J. (Ton) Dietz (African Studies Centre Leiden, Netherlands)

27. [Planting Seeds of Endogenous Development in the State-led Industrial Cluster: the Case of Gumi IT Cluster in Korea](#)

Jong Ho Lee (Gyeongsang National University, South Korea), Chul Woo Lee (Kyungpook National University, South Korea)

28. [Privatisation of municipal golf courses in small towns in the Western Cape, South Africa](#)

Manfred Spoeter (Stellenbosch University, South Africa)

29. [Production and Export Potential of the Resource-Based Regions of Canada and Russia in Intracontinental Situation](#)

Anastasia Lomakina (Institute of Geography, Russian Academy of Sciences, Moscow, 119017, Russian Federation), Leonid Bezrukov (Dr., Professor, V.B. Sochava Institute of Geography, Irkutsk, Russian Federation)

30. [Ras Al Khaimah In Transition –international team project](#)

Izabella Lecka, Robert Arthur (Faculty of Arts and Sciences, American University of Ras Al Khaimah, Canada)

31. [Regional Segmentation based on The Spatial Patterns of Rural Development in Jammu \(J&K\)](#)

Rajender Singh, Devinder Manhas, Vivek Mahajan (University of Jammu, India)

32. [Renewable Energy Resources for a Green Development in Belgorod Region \(Russia\)](#)  
Alla Pakina, Anastasia Karnaushenko (Lomonosov Moscow State University, Russian Fed)
33. [Role of Small Sized Towns in the Peripheral Areas, the Case Study of Mazovia Region \(Poland\)](#)  
Konrad Czapiewski (Institute of Geography and Spatial Organization PAS, Poland)
34. [Spatial Analysis for Supporting Strategic Environmental Assessment: Implementattion In Indonesia](#)  
Triarko Nurlambang (University of Indonesia, Indonesia)
35. [Spatial Evolution and Driving Mechanisms of County Urban-Rural Association to the Major Grain-Producing Areas of Central Jilin Province of the Northeast China](#)  
Zhao Hongbo (Key Research Institute of Yellow River Civilization and Sustainable Development& Collaborative Innovation Center on Yellow River Civilization of Henan Province, China)
36. [Spatial Indicators to Compare the Development Conditions of Siberian and Arctic regions of Russia](#)  
Anastasia Myadzelets (V.B. Sochava Institute of Geography SB RAS, Russian Fed)
37. [Spatial Patterns and Determinants of the Manufacturing Industries' Transformation Across Regions of the Russian Federation in the 1990-2010s](#)  
Igor V. Pilipenko (European Bank for Reconstruction and Development, Russian Fed)
38. [Spatiotemporal Development of Natives in the Czech Republic since 1989](#)  
Miloslav Šerý (Palacký University Olomouc, Czech Republic)
39. [Spatio-temporal Difference of the Economic System Coevolution of Chang Zhu Tan "3+5" Urban Agglomeration](#)  
Yu xing Huang (South China Normal University, China)
40. [Spatiotemporal Distribution of Border Ports in China and their Spatial Impacts](#)  
Zhouying Song, Shuyun Che (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
41. [Strategic Planning of Local and Regional Development in Bulgaria](#)  
Kliment Naydenov, Petar Slaveykov (Sofia University "St. Kliment Ohridski", Bulgaria)
42. [Strategies for Regional Development in Higher Education: An Evaluation of Policies for Marginalized Groups in India](#)  
Sahab Deen (Jawaharlal Nehru University, India)
43. [Structural Transformations in Territorial Socio-Economic Systems, and Methods for Their Study](#)  
Baklanov Petr (Pacific Geographical Institute, FEBRAS, Russian Fed)
44. [Sustainable Roots-driven Rural Change through Community Asset Mapping](#)



Melanie Nicolau (University of South Africa, South Africa)

45. [Territorial Development and Regionalisation in Tunisia](#)

Ali Bennasr (University of Sfax/Tunisia, Tunisia)

46. [The Development Patterns and Evolution of Regional Cooperation in the Yangtze River Delta](#)

Lei Wang, Xuejun Duan (Nanjing Institute of Geography & Limnology, The Chinese Academy of Sciences, China)

47. [The Institutions and The Development of Foreign TNCs in Russia: Regional Aspect](#)

Marina Mironova, Agunda Alborova (People Friendship University of Russia, Russian Fed)

48. [The Positive Role of Local Economic Enterprises in Efficient](#)

Reihaneh Soltani Moqadas (Assistant professor Payam noor university, Iran)

49. [The Promotion of Bio-Energy Production as Instrument of Rural Development In Germany – a Critical Analysis](#)

Kim Philip Schumacher (University of Hannover, Institute of Economic and Cultural Geography, Germany)

50. [The Research on Local Industrial Cluster Formation and Development Mechanism based on the Co-Evolution Theory](#)

lv kewen (Henan University, )

51. [The Role of University in Transnational Triple Helix System: Towards a Conceptual Framework](#)

Cui Liu (Zhejiang University, China), Yuzhuo Cai (University of Tampere, Finland)

52. [The Study of Land Scale Operation in the County as a Unit in Gullied Rolling Loess Area: The Case of Liulin County, Shanxi Province](#)

Ge Zhang (Nanjing University, China)

53. [The Study of Space-Time Evolution to District Economic Coordinating Developing of Henan Province in new time](#)

Gao Shang (Shaanxi Normal University, China)

54. [The Variation of the Regional Competitiveness Discrepancy of Guangdong Manufacturing Industry in recent 20 years](#)

Qinglan Qian (Guangzhou University, China)

55. [Traditional Skill and Handicrafts of India: Case Study of Madul-kathi Craft](#)

Suman Sao (University of North Bengal, India), Kajal Sarkar (Narayanpur Jr. High School, India)

## Poster

1856

Shaping Our Harmonious Worlds

构建我们的和谐世界

1. [Achievements of the Kingdom of Saudi Arabia in the Field of Toponymy \(2014-2016\)](#)  
Abdullah Alwelaie (Saudi Arabia, King Abdulaziz Foundation for Research and Archives)
2. [Agricultural Labor Productivity and Rural Residents' Income Gap](#)  
Wang Yahui; Li Xiubin; Xin Liangjie(China, Institute of Geographic Sciences and Natural Resources Research, CAS)
3. [Characteristics of indirect energy consumption and carbon emissions and the influence factors of indirect carbon emissions: A case study of Jilin Province](#)  
Li Guozhu (China, Jilin Normal University)
4. [Competitiveness, Cohesion and Sustainability in the Urban Development. EU vs. Non-EU Romania's Border Areas](#)  
Bianca Mitrica (Romania, Institute of Geography, Romanian Academy); Costin Dumitrascu (Romania, 'Spiru Haret' University, Faculty of Geography); Irena Mocanu (Romania, Institute of Geography, Romanian Academy)
5. [Density, Distance, Division and Rural Poverty in Guizhou Province, China](#)  
Yongming Wang; Dianting WU (China, Beijing Normal University)
6. [Ecological Civilization Construction of Nanliujiang River basin, Southern China](#)  
Linshuang Qin (China, Guangxi Teachers Education University)
7. [European Union's Cohesion Policy in Poland: Chances and Threats for Regional Development](#)  
Pawel Churski (Poland, Adam Mickiewicz University, Poznań)
8. [Evolving Geography of Auto Industry in Hubei Province](#)  
Juncheng Zhu (China, School of Resource Environment Science and Engineering, Hubei University of Science and Technology; Research Center of Urban and Regional Development, Hubei University of Science and Technology)
9. [Hydroclimatic Research of the Baikal Natural Territory as a Part of a Significant Transboundary Catchment](#)  
Olga Gagarinova (Russian Fed, Sochava Institute of Geography SB RAS)
10. [Implementation of Socioeconomic Development Strategy at Local Level. Concept, Principles and Methodology. The case of Bistrița-Năsăud County, Romania](#)  
Vasile Zotic; Diana Elena Alexandru; Viorel Puiu (Romania, Babes-Bolyai University, Centre for Research on Settlements and Urbanism)
11. [Integrate Construction Research of Urban Agglomeration in the Middle Reach of Yangtze river - based](#)

[on Generic ERE and Mr PRED System](#)

Wang Wei (China, Central China Normal University)

12. [Necessities to develop clusters in Mongolia](#)

Erdenebayar Luvsanjantsan (Mongolia, Mongolian State University of Education); Batmunkh Dashkhuu (Mongolia, Institute Of Strategy Studies); Davaanyam Surenjav (Mongolia, Mongolian Young Scientists Association)

13. [People Climate and City-Regional Competitiveness in Finland](#)

Niina Kotavaara (Finland, University of Oulu); Toivo Muilu (Finland, Natural Resources Institute Finland (Luke))

14. [Re-considering Framework and Methodology of Regional Geography for Investigation into Indian Villages - From an Experience of Joint Research Project of Hiroshima University -](#)

Haruhiro Doi (Japan, Oita University); Kazunari Makino (Japan, Sasebo College of Technology); Kimoto Koichi (Japan, Kwansai Gakuin University)

15. [Reflection on Poverty Alleviation in the Eastern Tibet of Kham and Amdo](#)

Yang Xie (Japan, Ochanomizu University)

16. [Regional Dual-nuclei Structure Theory](#)

Yuqi Lu (China, College of Geographical Science, Nanjing Normal University)

17. [Regional Inequality and Evolvement Mechanism of Industry Output with Different System of Ownership base on Institution Aspect—A Case Study of Jiangsu Province](#)

Liu Shuaibin (China, School of Geography Science, Nanjing Normal University)

18. [Regional Spillovers of Transport Investment on Economic Growth in China](#)

Liu Zhengbing (China, Beijing normal university); Dai Teqi (China, Beijing normal university)

19. [Research on New Regional Spatial Division of Labor Based on Cross-regional Industrial Spatial Organization Change - A Case Study of Foshan Ceramics Industry](#)

Lixia Jin; Zhang Hong'ou; Wang Yang (China, Guangzhou Institute of Geography)

20. [Research on Regional Development Status and Coordination Study in Henan Province Based on the Five Development Concepts](#)

Tian Guanghui (China, Henan University)

21. [Research on the Optimization of Regional Land Development in the Yangtze River Economic Zone](#)

Ruiwei Zhang (China, Southwest University); Qingyuan Yang (China, Southwest University)

22. [Spatiotemporal Evolution of New Pattern Industrialization, Urbanization, Informatization,](#)

[Agricultural Modernization, Greenization Coordination Development in Shandong Province](#)

Hou Chunguang; Cheng Yu; Ren Jianlan (China, Shandong Normal University)

23. [Spatiotemporal Characteristics and Dynamic Mechanisms of Agricultural Development in China's Intensively Urbanized areas: The case of Pearl River Delta](#)

Long Rongjun; Li Xun; Zhang Chengguo (China, Sun Yat-sen University)

24. [Study on the Institutional Arrangement for Optimizing Territorial Spatial Development in Yangtze River Economic Zone](#)

Qingyuan Yang (China, Southwest University)

25. [The Innovation from the Airport Economy Development of ZAEA to the Regional Development Mode](#)  
Zhang Zhancang; Chen Ping (China, Henan Academy of Social Sciences); Peng Junjie(China, Academy of Social Sciences)

26. [The Spatial Characteristics of Producer Service Agglomeration in Jinan Metropolitan Region and Its Influencing Factors —Analysis Based on both Industry Level and Regional Level](#)

Mei Ren; Yu Cheng; Jian-Lan ReN (China, Shandong Normal University)"

27. [The Spatial Differentiation and Influencing Factors of the Service Quality of C2C Stores in Central China: a Case Study of Five Types of Taobao Online Stores](#)

Ding Zhiwei; Zhou Kaiyue; Kang Jiangjiang (China, College of Environment and Planning)

28. [The Spatial Pattern and Influence Factors of Specialized Villages and Towns in China](#)

Shao Liuchang (China, Henan University)

29. [The Temporal-Spatial Analysis on Urban Office Space Functional Patterns in Beijing City](#)

Qi Yingqian (China, College of Resource, Environment and Tourism, Capital Normal University, Beijing 100048, China);Jingqiu ZHANG(China,College of Arts and Science of Beijing Union University, Beijing 100191, China)

## A Comparative Study of the Regional Comprehensive Economic Strength

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### Abstract

The regional comprehensive economic strength is to measure the important symbol of regional economic development level. This article is mainly from the economies of scale and quality, innovation ability, economic strength and economic influence, which the evaluation index system is constituted by the 13 indicators. The comprehensive economic strength of 17 cities in Shandong province comprehensive was ranked. Firstly, the variation coefficient method and the traditional TOPSIS method was united in this article. Secondary indicators in Every city were evaluated. Secondly, the comprehensive economic strength of every city was ranked by the factor analysis and cluster analysis method with the sociological statistics software SPSS 19.0.. Qingdao, Jinan and Yantai were in the top, and the economy comprehensive strength of Weifang, Zibo, Jining, Linyi, Dongying and Weihai is powerful and pull the main force of economic development in Shandong province. The Taian, Binzhou, Dezhou, Heze, Liaocheng and other regions were weaker, which belongs to the underdeveloped areas. The imbalance of economic development in Shandong province have been obtained. Finally, the balance development countermeasures of more developed, developed, potential and underdeveloped regions by the clustering analysis were put forward, which have great significance on the optimization and upgrading of economic structure of Shandong province.

### Key words:

the comprehensive economic strength; TOPSIS method; factor analysis; cluster analysis

## A Geo-spatial Analysis of The Ski Resort Development Using GIS and Micro-geodata

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### Abstract

This study aimed at clarifying development of ski resort area in Niseko and Kutchan town where ski and snowboard players who come from Australia and Asia put a high value on powder snow. Spatial structure near ski resort is transformed by constructing many buildings. This study analyzed in time series the number and area of the building in the Niseko area since 1995 at first. Analyzed data were following; address of developer, location of buildings, site area, intended purpose, floor number. Second, it analyzed spatial structure transformation using data which were location and site area of buildings. The results are as follows. 1) Although before 2004, development area near station was larger than area near ski resort, ski resort area has developed more than near station since 2004. In 2008, developments near Niseko Grand HIRAFU-Ski Resort were most numerous in Niseko area. 2) Developers promoted land high-level because of limitation on land use. 3) Niseko town completed to equip with network infrastructure as IRU of OPTICAL LINE. Furthermore, it started to equip with wireless network infrastructure as Wi-Fi. This study concluded that Niseko area was seemed to be more evaluated by foreign tourists, and increased developments.

### Key words:

Micro-geodata; Niseko Area; Resort Development; Ski; GIS

## A Multiple Criterion Analysis in the Identification of Criteria and Indicators of Community Based Forest Management in West Bengal - Case Studies

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### Abstract

Community based forest management (CFM) is a widespread and practised management system in India. But this type of forest management is complex and difficult to apply due to the pluralistic view of different stakeholders. CFM also change its' characteristics based on the different types of forest, climate, and landforms. In this paper the community based forest management of two different forests are analysed through multi criterion analysis (MCA). The man-forest dependency is also studied in this regards. Two different forests, in respect of climate, landforms, species combination and nature, are selected for study. The first one is a dry deciduous forest- Bankadhaha Forest and other one is evergreen forest- Neora Valley Forest. MCA offers an analytical environment where multiple goals, objectives, perspectives can be judged and discussed collectively and holistically. The CFM of these two forests is analyzed comparatively on the basis of a set of indicators. Through the study, it is evident that the better forest management is associated with more involvements of local communities in management system. The participation of local people is necessary to manage the natural resources. Involvement in forest management is more viable and effective approach than restriction of forest.

### Key words:

Criteria; Indicators; Community Based Forest Management; Multiple Criterion Analysis; Forest Dependency; Stakeholder Participation.

## **A New Approach for Planning and Environmental Policies in Regional Development: As a Case Study Southeastern Anatolia Project (GAP) in Turkey**

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### **Abstract**

The Republic of Turkey has a special place in the Mediterranean Region from the respects of both its social-economic structure and its geo-politic and geo-strategic importance. It is also a model for the Middle East Countries by combining the traditional and modern life styles. The Southeastern Anatolia Project (GAP), one of the most ambitious regional development project, is open to both planning and environmental developments. It has been carried out as a human resources by developing irrigation and energy project. This project is expected to cause important changes and transformations in the region when it is completed. The Southeastern Anatolia Project (GAP), an important project to develop the remarkable natural resources of the world, is accepted as a change for getting benefit from rich water and agricultural resources of the Southeastern Anatolia Region for Turkey and the region. Major reasons of developing such an integrated regional development project can be expressed as follows: The undeveloped social-economic and cultural structure of the region, rich but unvalued natural resources and geo-political situation of the region. Recently important strategic and political changes came into consideration. Especially, the concept of sustainability of the development has become dominant for this project; Beside physical developments, some concepts such as planning and environmental have started to become main topics. The purpose of this study is to make clear the basic components of the project and developments, and to put forward the circumstances of obtaining sustainability of development. It is also aimed to analyse the processes which are being applied. In the first section of this study, the Southeastern Anatolia Region and Southeastern Anatolia Project (GAP) a brief historical development will be introduced. In the second section the concepts of planning and environmental which are being processed in the GAP Project will be explained and its human related and social dimensions will be analyzed. In the last section the basic frame of the structure with which will be changed and developed is going to be analyzed. In this section proposals and approach necessary for the success of the project will be presented within planning and environment concepts.

**Key words:** Sustainable Development and Environmental Economics; Sustainable Regional Development;

The Southeastern Anatolia Project (GAP)

## A New Approach to the Identification of Regional Specialisation. is Space

### Important?

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### Abstract

In economic and geographical research, regional specialisation is usually identified with a region's unique economic activity affecting its development in a permanent and significant way. Its identification, however, is not systematised, whether in terms of definition or measurement. In the literature three concepts are usually employed here: agglomeration, concentration, and specialisation. They are often used interchangeably, which is unjustified and leads to terminological chaos and loss of clarity concerning the specific nature of those phenomena. This paper seeks to systematise the concepts and measurement methods concerning regional specialisation. The authors propose a systematisation of its definition and measures based on an integrated approach with a complementary use of spatial agglomeration and sectoral concentration notions. Another goal is to systematise measurement methods employed in the literature. A value added is the proposal of a new spatial agglomeration measure, the Spatial Agglomeration Index (SPAG), which allows examining the spatial heterogeneity of firms when measuring regional specialisation, and thus its better identification. Apart from systematising definitions and measures, much attention is also given to interpretation-application challenges involved in the use of the regional specialisation conception in development policy practice (e.g. place-based policy, smart specialisation), emphasising the need for it to accommodate the integrated approach proposed. The paper synthesises final results of the project Statistical models to identify regional specialisation including the spatial heterogeneity component, financed by the Polish National Science Centre as a research project in OPUS 6 call, contract no. UMO-2013/11/B/HS4/01098. Its full results can be found in the monograph *Measuring Regional Specialisation: A New Approach*, published by Palgrave-Macmillan.

### Key words:

regional specialisation; spatial agglomeration; sectoral concentration; definitions; measures; SPAG; place-based policy; smart specialisation; regional policy

## **Adoption of Integrated Farming System and Sustainable Management of Local Resources: An Experience from Indian Sundarban Delta**

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### **Abstract**

Sundarban delta is the largest estuarine delta in the world lying at the confluence of rivers Ganga, Brahmaputra and Meghna. This delta region, identified as one of the worst climate change hotspots, is prone to severe natural calamities i.e. cyclones, tidal surges, floods. Moreover, remote location and economic backwardness have induced extreme poverty and hunger among the inhabitants. However, in spite of adverse agro-ecological conditions, agriculture is the mainstay of rural livelihood in this delta due to limited opportunities for other economic activities. To cope up with these challenges, farmers of this delta have introduced integrated farming system to sustain their livelihood. In this context, an attempt has been made in this paper to analyse the role of integrated farming in the sustainable management of local resources in this delta region. Altogether 200 households practicing integrated farming from eight villages in this delta have been surveyed through structured questionnaire. Eight Focus Group Discussions, one from each village, consisting of eight members have also been conducted. In addition to descriptive statistics, Malmquist Data Envelopment Analyses (Fare et al. 1994) has been adopted to measure technical efficiency change, technological change and total factor productivity change of principal crops under integrated farming system. The study has revealed that integrated farming system is a viable option to utilize local resources in order to maintain sustainability of rural livelihoods in this delta region.

### **Key words:**

estuarine delta; integrated farming; rural livelihood; rural poverty

## Atlas of Rural Areas in Poland as a research tool for regional and local development study

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### Abstract

As a result of transformation in political system and structure of the economy after 1989 as well as Poland's accession to the EU, spatial structure of rural areas has experienced dynamic changes. These include all forms of social and economic activities that require diagnosis and constant observation. Hence, the idea of establishing the *Atlas of Rural Areas in Poland*, whose primary objective is to present the contemporary image of Poland's countryside spatial structure along with its diversity, by implementing possibly most recent statistical data processed into cartographic form. The *Atlas* has been divided into eight parts: *Natural environment, Spatial arrangement, Demography, Society, Land use, Economic functions, Housing and infrastructure, Planning and management*. The *Atlas* was drafted based on a homogenous set of statistical data. With respect to cartographic methods, the premise was to use basic cartographic methodology, depending on the character of the source data and the purpose of the map. However, consideration was given to the wide audience the product could potentially reach, and therefore it was decided that simple and most perceptually intuitive methodological solutions would be most effective. Maps are usually the basis for deeper analysis but also used for synthetic and conceptual approach. The *Atlas* constitutes a basic reference source for studies and expert reports in the regional and local development and planning. Further, it is the starting point for the work of geographers, rural economists, sociologists and representatives of other scientific fields interested in the topic of rural areas.

### Key words:

Atlas; cartography; rural areas; Poland; development

## Changes in Formal Institutions and Responses of Local Trade Associations in A Modern Industrial District: the Case of a Pharmaceutical Industrial District in Tokyo, Japan, 1713-1943

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### Abstract

To clarify what helps an industrial district to thrive for a long time, it is important to pay attention to the local governance structures, such as trade associations, which can foster trust and temper opportunism among traders. However, the lifetime of a trade association, which is fostered by formal institutions such as commercial laws, is usually much shorter than an industrial district's lifetime. This paper exemplifies how traders in an industrial district have responded to changes in formal institutions and modified their trade associations to maintain their district for a long period of time. It uses the example of a pharmaceutical industrial district in Nihonbashi-Honcho, Tokyo, between 1713 and 1943.

In 1713, the first pharmaceutical trade association in Tokyo, *Honcho Yakushudonya Kumiai*, was organized under the strong leadership of the government, although there were already many pharmacies operating in Nihonbashi-Honcho. The association consisted of traders in Nihonbashi-Honcho and they monopolized Tokyo's pharmaceutical trade. Since that time, several trade associations have been dissolved and re-organized, responding to changes in governmental policies and institutions. Among other things, governments have tried to modify and even dissolve pharmaceutical trade associations in Nihonbashi-Honcho to promote the liberalization of the pharmaceutical trade. However, Nihonbashi-Honcho's pharmaceutical traders worked to keep their trade association from changing its style, in order to preserve their exclusive business practices, which were crucial for maintaining the stability of the pharmaceutical trade order. Thanks to the consistency of these business practices, the identity of the industrial district was maintained.

### Key words:

industrial district; industrialization; local governance structure, formal institution; trade association; pharmaceutical industry

## China's Regional Economic Resilience under the 2008 Financial Crisis: A Spatial Analysis at Prefectural-level Regions

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### Abstract

Since the 2008 financial crisis, following with the recession and recovery of the global economy, the resilience research has become a hot topic in the academic field. Initially, resilience was applied to the ecological research, which formed the different concepts as ecological resilience and engineering resilience, etc. and then gradually extended to the research field of economic geography and regional development in recent years. Based on the theory of resilience, this paper establishes the regional economic resilience index with Chinese characteristics, analyses the changes track of China's regional economic gravity centres before and after the financial crisis, describes the spatial pattern of the China's regional economic resilience under the financial crisis by using exploratory spatial data analysis (ESDA) method, and identifies the impact factors for the spatial differences of China's regional economic resilience by using geographically weighted regression (GWR) model. The research results show that due to the impact of the financial crisis, economic growth rate for the southeast coastal cities of China dropped significantly, and the regional economic gravity center slightly moved westward and northward. The GWR Model reveals that the areas who have relatively large proportion of foreign investment in the economy, higher degree of dependence on export, and single economic structure are impacted greater; and the technological innovation and fixed assets investment are important impact factors for higher regional economic resilience.

### Key words:

economic resilience; spatial differentials; impact factors; the 2008 financial crisis; China

## Development And Structural Change In Rural Delhi

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### Abstract

Development being a multi-dimensional concept includes aspects such as economic growth, level of education, quality of housing, availability of health facilities etc. In a large country like India, there are extreme variations in the levels of development between different regions. Delhi is one of the fastest growing urban centres of India. It has been drastically transformed in terms of infrastructure and facility and also in the beautification emerging as a world class city and these benefits are also extended to the rural areas of Delhi. There has been rapid structural change in the rural areas of Delhi as well. However some of the studies suggest that the rural areas are not receiving the fruits of rapid development of Delhi proportionately even located adjacent to the so called Delhi 'World Class City'.

In this paper, attempt has been made to study the extent and sources of variations in the levels of development in rural Delhi using secondary data. Also the paper examines some of the structural changes in the rural areas of Delhi. The status of development of different districts of Delhi has been estimated with the help of composite index based on combination of developmental indicators related with social aspects, economic aspects, health, education, infrastructure and facilities. The paper attempts to identify the lagging districts in terms of the levels of development and quality of life for the plausible interventions and measures to bring about positive changes in them. The structural changes have also been studied with the help of spatio-temporal data related to various aspects of the rural villages of Delhi.

### Key words:

Composite Index; Development Indicators; Structural Change



## Dimensions and Drivers of the Youth Unemployment Problem in Africa

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### Abstract

Africa faces a stubborn youth unemployment problem that has triggered major crisis including recent uprisings in North Africa and terrorist activities in other parts of the continent. Despite several country-based and regional-based studies, a comprehensive examination of the complex dimensions of the problem and its drivers is lacking. This paper seeks to fill this void following a comprehensive literature review. We show that youth unemployment varies across countries, regions and in demographic groups. The drivers behind the problem lie in political, economic, and socio-cultural factors that have deep roots in the government policies and public perceptions of colonial, and post-colonial Africa. The paper discusses implications for policy.

### Key words:

AfricaL youth unemploymentL demographic dimensionsL post-colonial Africa

## Disparities in the Levels of Socio-Economic Development in India during Pre and Post Liberalization Periods: An Inter-State Analysis

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### Abstract

The development programmes have been taken up in India in a planned way through various Five-Years Plans to provide the higher standard of living for the people. The country has followed the mixed-economic structure and adopted the policy of balanced regional development since the Third Five Year Plan to address the regional inequality due to considerable lagging regions during post independence period. Despite balanced development strategies since then, large disparity exists with development in the country. Since the period of liberalization the regional patterns of the levels of development and disparity, however, seems to have some changes than the previous period due to new economic policy and structural changes and also due to the changing political scenario, rapid technological advancements and focus on social sector in various parts of the country. This study is an attempt to make a comparative analysis of the inter-state levels of development in India for the time period ranging from 1991 to 2011. It examines the disparities in the levels of development among the states in the background of overall development of the country. The paper is based on secondary data obtained from various government sources. The development indicators are related to social, economic, infrastructure, health and agriculture sectors. Method followed for the study is simple statistical techniques for the construction of development index and assessing gaps and cartographic techniques for graphic representation.

### Key Words:

Development, Disparities, Mixed-Economy, Liberalization, Development Indicators and Composite Index.

## Emerging Challenges of Regional Disparities in India

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### Abstract

The planning era in India ended on Jan1, 2015 when National Institution for Transforming India (NITI) Aayog replaced Planning Commission. The National Food Security Act, 2013 promises food security to 67 per cent or 820 million people of India. Mahatma Gandhi National Rural Employment Guarantee Act, 2005(MGNREGA) ensures work for 100 days in rural areas to adults willing to do unskilled job.

Contrary to it, a national level Backward Regions Grant Fund (BRGF) scheme started in 2007 was discontinued on April 1, 2015. A large number of similar centrally sponsored schemes have been either discontinued or transferred to states or the ratio of centre-state share has been modified. The fourteenth finance commission raised the share of states in divisible pool from 32 per cent to 42 per cent and recommended to do away with special category states.

The reservation for Other Backward Class (OBC) that was implemented in 1993 invited more trouble than solution. The perception of being backward became rampant consequent to which a socio-economic caste census (SECC), 2011 was ordered. The results are not public yet.

In the light of the above developments, the issue of regional disparity has once again emerged on the forefront. The present research paper attempts to find the spatial impacts of national food security act, MGNREGA, increased share of states in divisible pool, Make in India and Smart City initiatives in addressing the issues of regional disparities.

### Key Words

NITI Aayog; MGNREGA; Backward Regions Grant fund; Special Category States

## EU Deep Periphery: A Case Study of Mountain Borderlands in Bulgaria

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### Abstract

Geographic research and constant monitoring of EU periphery and its dynamics are necessary to identify and outline priority areas for regional development policy. This work proposes that “deep” periphery areas form where peripheries of different geographic nature (physical, economic, political) and scale overlap. The investigation applies GIS-aided mapping and comparative scale analysis to the case study of Bulgaria to identify “deep” periphery areas and affirm they are disproportionately situated in the mountain regions along EU external borders. These study results suggest special regional development policy attention to such areas, among which adoption of a Mountain Sustainable Development Strategy for all mountains within the EU geographic space, and, in particular, a Southeast European Convention on Sustainable Development of Mountain Regions.

### Key words:

regional development policy; regional development policy; regional development policy; mountains; borders

## Evaluating the Development of Strategic Emerging Industry of Henan Province Based on Cloud Theory

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### Abstract

Development of strategic emerging industries is the key work for local government to upgrade the industrial structure, while the selection of them is the basis and premise for scientific developing the strategic emerging industries. Based on the definition of the connotation and characteristics of the strategic emerging industries, this paper from six aspects construct 13 specific indicators, which contain economic benefits, growth potential, key technology, driving effects, sustainable development, and policy support, and employ the cloud theory to evaluate the current situation and trend of strategic emerging industry of henan province. Results show that the development of strategic emerging industries of henan province should be divided into three gradient: biological industry, and new energy automotive industry should be given the priority to the development; new generation of information technology, new material industry, new energy industry, energy conservation and environmental protection industry are the second gradient, which should be developed as the potential industry ; high equipment manufacturing industry is the third gradient for the lack of industry basis and development space.

### Key words:

strategic emerging industry; cloud theory; development strategy

## Exploring Four Motors of Knowledge Production in East Asia: Comparing Shenzhen, Taipei, Seoul, and Tokyo

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### Abstract

A small number of city regions occupy dominant share of knowledge production in global economy. In East Asia, four city regions dominate the landscape of knowledge production. They are Greater Tokyo, Capital Region of South Korea, Taipei/Hsinchu, and Pearl River Delta. Using U.S. patent data, this paper looks at how these four city regions differ. We calculate technological diversity, average size of firms, growth rate, the area's share in the whole nation, and other indices using U.S. patent records from 2000–2013. A number of interesting facts are found. 1) These four city regions are extremely similar in their composition of technological sectors. 2) There is much flow of knowledge among these four. 3) Capital Region of South Korea is highly dependent upon small number of large innovators while Taipei/Hsinchu, and Pearl River Delta are not so. 4) Greater Tokyo is still the biggest knowledge producer although the gap is closing. 5) Pearl River Delta has achieved the fastest growth

### Key words:

Knowledge production; patent; East Asia; city region; Pearl River Delta; Seoul; Tokyo; Taipei; Hsinchu

## Historical Factors in the Underdevelopment of Regions – Comparative Study of Himachal Pradesh and Uttarakhand

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### Abstract

What factors possibly explain the variations in development in two regions that have similar locational parameters; and fairly identical natural and human resources? The present paper attempts to explore the role of a region's evolving history to its state of under-development.

The study is based on a comparative study of two mountainous states situated in northern India – Himachal Pradesh and Uttarakhand. The two states, situated in the Central Himalayas, share political boundary, and have similar physical and social setting, but display a vast disparity in their levels of development. The research attempts to relate the level of region's development to its administrative autonomy. During the colonial period, both Himachal Pradesh and Uttarkhand were administratively parts of larger provinces – Punjab and United Province respectively. Besides, several districts of Himachal Pradesh being Princely States were then autonomous. Because of this factor, Himachal Pradesh enjoyed a separate identity since 1948, and became a self-governing state in 1971. On the contrary, Uttarakhand remained part of the state of Uttar Pradesh, and became self-governing as late as 2000.

The present study precisely evaluates, whether this element of historical and political autonomy, has a role towards higher level of development, being witnessed in Himachal Pradesh, compared to greater incidences of underdevelopment dogging Uttarkhand. However, the analysis of data neither indicates any specific temporal trend nor signifies any precise spatial pattern. Development is a multi-faceted process; and among the various factors of development, it is difficult to isolate the role of any one factor, least of all historical and political, as its impact gets nullified with the passage of time.

### Key words:

Underdevelopment; Historical Factors; Colonialism

## Innovations as Tools of Development Aid: Case of Finland and Tanzania

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### Abstract

Development policy between the Global North and the Global South is changing. Earlier, the emphasis was most often on transferring material aid from well-developed countries to less and least developed countries through projects tackling specified problems in particular areas. Such projects provided immediate help, however, not always having long-term resilience for sustainable development and economic growth.

More recently, in the Global North have emerged development policies, instruments and practices to support the generation of innovations in the Global South. This includes also the transfer of innovation system framework, enhance of ICT and other technology development projects and broader support for innovative entrepreneurship. Furthermore, the aid-providing countries are interested in increasing reciprocity in development policy. This means, for example, enhancing via development projects businesses that support the enterprises of the country the aid is originating from.

The presentation discusses the Finnish development policy that nowadays substantially focuses on supporting innovations. The empirical case regards Africa and more specifically Tanzania that has been for decades a key target for development aid from Finland. In the presentation, specific attention is paid on two broader development policy programs that have used, for example, ICT, technology entrepreneurship, and living labs for promoting innovations in Tanzania in the 21st century. However, the innovation-related development policy, its instruments and their transfer are not without challenges.

### Key words:

development; Africa; Finland; Tanzania; Innovation

## Local Development in the Fijian Periphery: Stagnation through Adaptation

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### Abstract

The outer island of Kadavu is representative for the Fijian periphery, and a major question is how this island has developed and what the resulting changes are in its peripheral status. This paper deals with its physical characteristics, infrastructural conditions, village economic activities and government initiatives with the aim of understanding the changes it has gone from a perspective of three decades. A combination of micro-geographic studies run in two villages in three different periods, and a meso-geographical analysis of the province of Kadavu show that the pattern of development found in Kadavu in the early 1980s has not changed much since. The current pattern of cash crop production and trade has been further entrenched and is almost entirely dependent on the kava beverage crop. Shipping services, provided by core agents, have not improved and local initiatives to tackle this issue are only now beginning. Local infrastructure is underdeveloped, the island suffers from the peripheral penalty phenomenon, and government initiatives aimed at changing the trend are very limited. However, the current form of non-capitalist production and its derived benefit has forced villagers into a strategy of adaptation which might actually be preferable for them under the current conditions of peripheralization.

### Key words:

Fiji; Kadavu island; periphery; development; kava; stagnation; strategy of adaptation

## Local Development Potential and Its Barriers – The Case of The La Lopé National Park (Gabon)

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### Abstract.

The present work aims at evaluating the La Lopé National Park's development prospects and indicating the most significant factors hindering the exploitation of this region. The work presents the situation as at the end of 2014. Most of the current data was collected as a part of a field mission organized by Université Omar Bongo in Libreville and the University of Warsaw. The La Lopé National Park (4,913 km<sup>2</sup>) is located in four provinces (Ogooué-Ivindo, Ogouée-Lolo, Ngounié and Moyen-Ogouée) of central Gabon. Being (since 2002) one of the biggest national parks in Gabon in 2007 it was listed as a UNESCO World Heritage Site. It reveals a significant touristic potential, still insufficiently exploited. The park is one of the oldest protected areas in the country and the most popular among tourists. However, the tourists are few in number, especially if compared to other African national parks. Significant differences regarding the efficiency of management in this area can be noted. Its main focus should be on nature conservation *in situ* and sustainable ecotourism. The La Lopé NP is managed by national authorities which are responsible for ownership supervision, as well as the choice and realization of a development strategy. The activities undertaken in this scope have proven ineffective. Lack of effective nature resource preservation, no investments in infrastructure, non-existent mediation with the locals, and especially lack of their involvement in pro-environmental activities constitute a threat to the existence of the Park and fail to stimulate local development of the area.

### Key words:

La Lopé; Gabon; ecotourism; national park

## **Micro Level Procurement Centers and the Bargaining Power of Mediators: A Comparison of Private and Public Agencies for Lac Production in Rural Jharkhand, India**

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### **Abstract**

The objective of the paper is to highlight the changing role of mediators under private as well as Government trade regimes of 'Lac' collection and its influence on related micro level and household industries. Lac is one of the minor forest products to become a lucrative export good on the virtue of its commercial viability in niche markets abroad. Since the last two decades a stark imbalance in demand and supply of 'Lac' resulted in huge fluctuations in its price resulting in regulatory measures in this sub sector. Our study looks at how the roles of mediator's changes under ex-ante (private) and ex-post (government) regimes and its implication on small manufactures.

The finding of our study reveals that the profit margin of larger manufacturers is higher than the small scale manufacturers resulting in their closure over time. Consequently, the suppliers who used to supply to the small manufacturers shifted their supply to government procurement centers where they had greater bargaining power over the 'lac' farmers than before. This is found that the initiative to protect the farmers through price stabilization has a negative impact on small manufacturing units at one hand and loss of bargaining power of the farmers on the other. We believe, our study, based on primary survey of 200 households and 50 traders cum mediators, will have significant implication for the poverty alleviation programs with communities living in forest-fringe hamlets, agriculture and rural development.

### **Key words:**

Price stabilization; Bargaining power of mediators; Household and Small Scale Manufacturing units.

## Mining and Energy Territories and Deindustrialization in the Great Eastern

### Venezuela

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#### Abstract

The government of Venezuela has envisioned a fundamental change of Venezuelan society, politically and ideologically, but also regarding its organization and territorial dynamics. Especially with the support of the Chinese actors and enterprises, the economical development is focused in mining extraction and heavy industry in the Greater East of Venezuela since ten years. The Greater East is a geographical construction that we propose to enhance the territorial dynamics between *Oriente* (north east Caribbean coast of Venezuela) and the Venezuelan Guayana. The Orinoco Socialist Project (PSO) is the key component of the development plan for the «Orinoco Belt» (FPO), based on the exploitation of heavy petroleum, which occupies the south eastern strip of the Orinoco river basin. In this context, to realize an harmonious development is a strong defite while the deindustrialisation and the difficulties to propose an alternative of “petroleum development” are intensified.

#### Key words:

deindustrialization; mining; energy; Venezuela; Orinoco Beltenergy, mining, deindustrialization, Venezuela, Orinoco Belt

## Multi-Scale Analysis of Evolutionary Mechanisms on Spatial Economic Structure in Henan Province

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### Abstract

Since the 21st century, China's economic development period turns to the transitional economic and legal economic times from the era of globalization. Under the guidance of integration of Zhengzhou Kaifeng and Luoyang, Central Plains Economic Zone, the Silk Road Economic Belt and other strategies, Henan's economic development type and economic spatial structure is evolving and becoming more stable as the economic enters a new normal stage of development. Following the multi-scale evolutionary mechanisms framework, using the quantitative analysis methods like Theil index, multilevel regression models, etc., this article analyzes the spatial-temporal dynamics and mechanisms of regional space structure in Henan since 1999 to 2014, from the county, municipal and economic zone of the three spatial scales. The study found that Henan economic spatial structure of multi-core-periphery nested structure gradually evolves into single core-periphery structure. On the basis of Theil index decomposition on three zoning types which is prefecture-level city, economic zone and urban-rural, we know regional disparity is sensitive to the geographical scales. It is more pronounced at finer spatial scales. Meanwhile, sizes and contributions to the overall difference of intra-regional and inter-regional disparities are more related to the spatial scales. The result of multi-level regression analysis which analyses the dynamic mechanisms of spatial-temporal variance, shows that regional development in Henan Province is more sensitive to space economic structure and time. Decentralization, marketization and regional development strategies are main driving forces leading to regional economic disparities. Furthermore, social endowment and natural endowment with early agricultural conditions and geographical environment factors as the token are essential for regional development in Henan Province. In addition, inequality between urban and rural areas is also an important aspect of disparity in the development of Henan Province.

### Key words:

spatial economic structure; regional economic development; Theil index; multi-level model; endowment

## **Municipal Emblems as a tool for Local Identity Formation, Representation of a Locality: Case of Municipalities in the Liberec Region (Czechia)**

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### **Abstract**

Paper analyzes the role of graphic symbols in the local representation and in process of local identity formation. The extent of graphic symbolism utilization by local development actors in the region, its importance for the image formation of the locality (municipality) from the point of view of local development actors and assessment of the degree of identification with the municipal characteristics among the local population are evaluated, based on the results of the corresponding survey targeted at municipal representatives in the region. Municipal emblems tend to (and also should) have a local representative function. These should emphasize local specificity, uniqueness. Municipal emblems have also a potential to play role of connecting, mediating and activating factors also on higher than local level.

Municipal emblems are still not used enough and in the right way by actors of municipality representations. These are often misunderstood and deemed unimportant for the local development.

### **Key words:**

territorial identity; local development; local symbol; graphical symbol; municipal emblem; the Liberec Region (Czechia)



## Organizational Model and Mechanism Exploration of Urban Agglomeration Subregional Space—Taking Hubei Urban Agglomeration as the case

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### Abstract

Urban agglomeration subregional space is a certain area having some function to be guided in an urban agglomeration area, it is an extension of the core area of economic space, the development of its space system has complex and dynamic dual characteristics. Based on the international experience, this article classified the model of the urban agglomeration subregional space organization into four mature ones: Polycentric urban region, Network city, Corridor city, combined metropolitan area. This study selected the Hubei urban agglomeration as the case. It first analyzed the regional backgrounds and features from the urban scale, spatial structure and evolution way of the three subregions in Hubei urban agglomeration, Wuhan city circle, Yi Jing Jing and Xiang Shi Sui, and researched their long-term trends and development paths. Then, it summarized the spatial organization pattern of the three subregions, and revealed the mechanism of these patterns formed from two perspectives, macro(environmental factors) and micro(the main roles of space effect and their behaviors). Finally, it concluded by summarizing three spatial relationships in town cluster: Urban and regional spatial relation, urban and rural spatial relation, human social economic activities and natural ecosystems spatial relation. (This study is supported by The National Natural Science Funds (No: 51178200); The Fundamental Research Funds for the Central Universities, HUST: 2014TS108; Hubei Science and Technology Support Program (2015BDF040).)

### Key words:

Urban agglomeration subregional space; organizational model; mechanism; Hubei urban agglomeration

## Participatory Assessment of Development in Benin: 'PADev+' with a counterfactual and a layered approach

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### Abstract

During an earlier IGU Congress I presented the results of the PAdDev approach to assess development interventions and social change in local rural environments in Northern Ghana, based on a participatory method ([www.paddev.nl](http://www.paddev.nl)), that was tested in West Africa. In 2015 an international NGO (The Hunger Project) asked the PAdDev team to do an assessment study in Benin, but to do that by not only doing a PAdDev study in one of their intervention villages, but also compare it with a neighboring non-intervention area, and with a study among the 20% poorest people in the intervention village. This resulted in three datasets, with very revealing comparative conclusions, and it challenged the multi-national NGO with regard to their core principles. This further development of the PAdDev method of 'participatory assessment of development' has now reached a level of sophistication, that makes it credible among those who believe in the gold standard of impact evaluation practices.

### Key words:

Impact evaluation; local development; participatory assessment; rural change; Benin

## Planting Seeds of Endogenous Development in the State-led Industrial Cluster: the Case of Gumi IT Cluster in Korea

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### Abstract

It is widely accepted that large industrial complexes, which were established by the central government from 1970's, have played a leading role as a national and regional economic engine in terms of production, exports and employment. However, they show lacks of social infrastructure and superstructure. From the viewpoint of the cluster approach, it is clear that Korea's industrial agglomerations cannot be sustainable in response to an increasing global competition between regions. To resolve these structural problems, the government started to implement so called the cluster policy from 2005. The main focuses of the cluster policy are on building knowledge-based infrastructure and creating the cultural and institutional foundations of spontaneous social interactions between firms, universities and industries. In this paper, the authors attempt to examine the possibilities of endogenous development in the state-led industrial cluster, drawing on the in-depth case study of the Gumi IT cluster, one of the largest industrial complexes in Korea.

### Key words:

Cluster; Industrial Complex; Gumi IT Cluster; mini-cluster; working group; self-organizing; learning communities; endogenous development

## Privatisation of Municipal Golf Courses in Small Towns in the Western Cape, South Africa

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### Abstract

There has been a surge of interest by geographers in contemporary South African small towns. This paper reports on the sale of municipal land in small towns from 1974 to 2014 in selected municipalities of the Western Cape. Attention is focussed on the sale of municipal golf courses as an example of privatised municipal land that has not contributed to undoing apartheid spatial legacies or integrating small-town communities. The rate of municipal land sales increased appreciably after the introduction of the neo-liberal Growth Employment and Redistribution macro-economic strategy in South Africa. Neo-liberal processes have adapted to local conditions and morphed into what is known as the Third Way: essentially a marriage between the neo-liberal agenda and postapartheid egalitarian principles. The divisive nature of privatised, once municipally-owned, spaces is supposed to be offset by investment in social development funds for some small towns. It is intended that these funds be managed by municipalities and spent on projects identified in the Integrated Development Plan. Documentation of environmental impact assessments of privatised golf courses provides insights into the logic of the privatisation of small-town municipal golf courses and the addition of residential components to them. It is concluded that the secure, gated and fortified housing spaces of the golf estates are aimed at the monied classes and have become enclaves of wealth within the broader small-town milieu. The developmental dilemma is that while municipalities may benefit from such land sales and their subsequent revenues, socio-spatial integrative opportunities are being sacrificed for monetary gain.

### Key words:

golf estates; municipal land; neo-liberalism; privatisation; small towns; South Africa; Western Cape

## Production and Export Potential of the Resource-Based Regions of Canada and Russia in Intracontinental Situation

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### Abstract

Russia and Canada share much in common in terms of geographical location. The situation in high latitudes and interocean position are the more important traits that influence transport-geographical and transport-economic location of both countries. However, a quick look at the map do not always allow to identify the real sources of transport-economic properties of the territories. In our study we propose a method, which yields to estimate continental location in transport-geographic terms.

In the research the estimation of transport-geographical location of Russian and Canadian territories, population and mining industries is considered. Their comparison confirm the constant influence of the northness as well as the level of transport infrastructure of the territories. In both countries continental and ultracontinental zones are leading in share of territories, also in producing and exportation of the large-tonnage raw materials – oil, coal, ironstone. As for population, it concentrates predominantly in maritime zone in Canada on the contrary of continental zone in Russia. Canada and Russia have common and specific traits of their transport-economic and transport-geographic continentality as well as their approaches to compensating its negative influence and overcoming transport-economic challenges.

### Key words:

Regional development; landlocked regions; Canada; Russia

## Ras Al Khaimah in Transition –International Team Project

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### Abstract

In the presentation we will present Ras al-Khaimah emirate compared to other emirates of the United Arab Emirates and respond primarily to the question:

What is the reason of the authorities to have taken the emirate's policy of "modernization of economic and social space"?

Is Ras al-Khaimah Free Trade Zone competitive compare to other free trade zones in United Arab Emirates? What are the characteristics of foreigners working in Ras al-Khaimah, where they come from and how long immigrants (expats and workers) are staying in; determine their level of satisfaction with staying in the emirate; frequency of contacts with their homeland.

How children (local families and foreigners) evaluate the global world from the perspective of Ras al-Khaimah?

### Key words:

local development; modernization; Middle East

## Regional Segmentation Based on the Spatial Patterns of Rural Development in Jammu (J&K)

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### Abstract

Rural development is the process of improving the quality of life and economic well being of people living in relatively isolated and sparsely populated areas. The present study is an attempt to study the pattern of development at village level in three Blocks of Jammu District, varied in term of physiographic divisions. In order to study pattern of development pattern a detailed household survey of three villages selecting one village from each Blocks was conducted. As compared to 12% in Block Bishnan and 11% in Block R.S Pura Block only 3% of the total villages in Block Ahnoor show high levels of development. Block Bishnah and R.S Pura are Agriculturally dominated blocks whereas in most of the population in Akhnoor are involved in Secondary activity. Sanitation scenario of the three villages reveals that 40% of households of village Chak Abtara 57 % of household of village Tutrey and more than 65% of villages Barola do not have Toilet facility and still practices open latrine system. As per the economic status is concerned more than 80% of population of villages Chak Abtara and Tutrey lies above Poverty line whereas less than 32% of population of village Barola lies above poverty line.

### Key words:

Rural development; Structure perspective; relational perspective; physiography

## Renewable Energy Resources for a Green Development in Belgorod Region (Russia)

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### Abstract

Green development is a significant direction of the Russian economy's modernization. Opportunities to green development on a regional level we have considered on example of Belgorod region. The region is only 0.2% of the total area of the country, however, it ranks 26th in the list of 85 Russian regions. The main sectors of regional economy are mining industry, developing on the resources of Kursk magnetic anomaly, as well as agriculture, based on extremely rich humus soils – chernozem. Current regional development caused a number of environmental problems, and a shortage of energy is also a challenge for future regional development. Belgorod region has sufficient resources to generate energy through renewable sources. The amount of solar radiation varies from 1140 to 1200 kWh/m<sup>2</sup> per year within its boundaries, which is comparable with the southern regions of Russia, where such stations are widely used. Wind resources are less promising: the wind speed is about 5.2 m/s. However, the biological resources have the greatest potential. Being an agricultural region, Belgorod area has a great potential for use and recycling agricultural production wastes, and especially livestock, for energy purposes. Such facilities are already in operation in some farms of the region. During the research we considered a possibility to produce energy through bio-waste recycling on example of individual farms. Taking into account the region's share in the pork production (now exceeds 28% of the total), it could be a suitable decision to increase energy efficiency and to reduce resource consumption.

### Key words:

green development; Belgorod region; renewable energy; bio-waste recycling



## **Role of Small Sized Towns in the Peripheral Areas, the Case Study of Mazovia Region (Poland)**

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### **Abstract**

The paper shall explore the role of small towns situated in the periphery in Mazovia region (Poland). Using the concept of the exogenous functions performed by these urban cores, we shall investigate their role with regard to the surrounding areas (with dominant agricultural function). The paper will exploit statistical data on commuting to work from 2006 and 2011 and central functions of small towns in 2005, 2010 and 2014.

### **Key words:**

Small towns; periphery; Poland

## **Spatial Analysis for Supporting Strategic Environmental Assessment: Implementattion in Indonesia**

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### **Abstract**

Sustainable development in Indonesia has been enhanced by the application of Strategic Environmental Assessment (SEA). SEA is mandatory for development and spatial planning in Indonesia, whether the plans are at the national or local level. One of the method use for SEA is spatial analysis. Spatial analysis has been proven to be effective at assessing complex problems and cross-cutting issues in certain regions. Amongst the region where spatial analysis has been implanted in SEA is in the district of Tapanuli Utara and the province of North Sumatra, both of which will be discussed further in this paper to examine the strengths and weaknesses of spatial analysis in SEA. This study compares the several roles that spatial analysis plays in SEA, specifically in how spatial analysis utilizes sustainable development principles. Although spatial analysis has proven to be useful in analyzing complex problems in planning and predicting future demand, it has remained underused and difficult due to the lack of high quality spatial data.

### **Key words:**

SEA; sustainable development; spatial analysis

## Spatial Evolution and Driving Mechanisms of County Urban-Rural Association to The Major Grain-Producing Areas of Central Jilin Province of the Northeast China

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### Abstract

Taking the major grain-producing areas of central Jilin Province as a case, in this paper the indicators system of quantitative assessment and evaluation model were established based on the system framework of urban-rural association, then, we explore spatial-temporal evolution of the county urban-rural association degrees and its driving mechanisms in 2004-2010 with the methods of multifactor overall evaluation, GIS spatial analysis and principal component analysis. The results are shown as follows. First, the urban-rural association level of central Jilin Province had been fluctuating up, but, the spatial difference of urban-rural association is obvious, the circle-type spatial pattern of the urban-rural association level that reduces gradually from Changchun and Jilin to outside had been emerged, meanwhile, Chang-Ji area and Songyuan which were better economic development had high urban-rural association level. Second, and the associativity of prefecture-level municipal districts were significantly superior to county-level cities, reflected the urban and rural development was still at the stage of polarization relative. Third, the driving mechanisms were identified as the following aspects: level of economic development, urbanization, adjustment of industrial structure, complete infrastructures and policies on regional development.

### Key words:

urban-rural association; temporal evolution; driving mechanisms; the major grain-producing areas of central Jilin Province

## Spatial Indicators to Compare the Development Conditions of Siberian and Arctic Regions Of Russia

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### Abstract

Regional development is analyzed depending on local specificity using the variety of economic, social and geographical characteristics. The goal of the research is to study associations of socio-economic parameters to compare the territorial development conditions of Siberian and Arctic regions of Russia. Such investigations are the basis for effective regional policy of peripheral territories. Mathematical models and statistic methods are used for the processing of time series of investment and gross regional product of industry and agriculture for 2000-2014 and the comparative analysis.

Indication model of generalized integral parameters is worked out. It is a bilinear function of economic or social factors such as production volume or others and sensitivity characteristics which are accelerators of economic processes. Different socio-economic macrocharacteristics are considered as spatial indicators which fully describe the territorial economy. For example, it is gross production volume, resources, production and finances, investment, employed in the economy, population income, etc. In the research the algorithm is realized for the functional dependence of gross domestic investment from gross production and agriculture volume (million rubles per year) in the studied regions. Calculation of current values of the accelerators, conditional characteristics and indicators is fulfilled with regression methods using factual data. Qualitative methods are used to compare the results of integral index evaluation in the regions.

Typifying of the regions is carried out according to the similarity criterion of the spatial indicators; territories of different investment efficient level are determined; assessment of the regional economic reaction on the crisis of 2008-2009 is given. (Research was done with financial support of the Russian Humanitarian Foundation (16-02-00570(a)))

### Key words:

socio-economic parameters; regional development; spatial indicators; regional efficiency and similarity

## **Spatial Patterns and Determinants of the Manufacturing Industries' Transformation Across Regions of The Russian Federation in the 1990-2010s**

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### **Abstract**

Having lost ca. 6 million jobs during the period of 1991-1998, while a number of science-intensive industries such as manufacture of machinery went into decline, the Russian industrial sector turned one of the biggest winners from the 1998 financial crisis due to the sharp national currency devaluation that improved price competitiveness of manufacturing industries. The mining sector, low and later medium-tech manufacturing were among key driving forces behind the Russia's economic revival during 1999-2007. However, the structural adjustment resulted in an additional loss of more than 3.2 million manufacturing jobs over this period. Contrary to 1998, the 2008-2009 economic crisis hit the manufacturing sector hard triggering a 15% contraction and new massive job cuts exceeding 800 thousand only in 2009. Despite some positive effects from this crisis, which pushed companies for further optimization, the lack of high-tech manufacturing and a huge decline in manufacturing employment posed recently a question about the need for a new industrialization as a pre-requisite for the modernization of the Russian economy. This paper seeks to explore and map spatial patterns in the transformation of manufacturing industries at different levels of the Russian Classification of Economic Activities across regions of Russia from the end of the 1990s to the 2010s. We reveal trends in specialization, (de)concentration, and productivity of manufacturing activities using several geographical and economic analysis techniques. Further, we employ multiple regression analysis to study determinants of these trends and the impact of agglomeration effects on the manufacturing industries' development.

### **Key words:**

Russia; manufacturing; regions; spatial concentration



## Spatiotemporal Development of Natives in the Czech Republic Since 1989

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### Abstract

The main objective of the proposed contribution is to introduce the most significant outcomes of current research on natives in the Czech Republic. The natives are understood as one of the essential aspects of regions. The proportion of natives to entire population can crucially affect such processes as identification of residents with their region, susceptibility to emigration from region or regional development generally. In spite of this importance, it is possible to conclude that knowledge concerning spatiotemporal patterns of natives in the Czech Republic remains insufficient. Thus, we attempt to analyse above mentioned phenomenon. Being aware of its limitation, data collected during censuses (1991, 2001, 2011) was used for this purpose. The analysis has been focused on development during the so called transitional era which commenced in 1989 with the fall of Communist regime. The main findings identified in the conducted analysis are applicable in further research on regional transformation as well as in processes of regional planning.

### Key words:

natives; Czech Republic; regional development; spatiotemporal patterns

## Spatio-temporal Difference of the Economic System Coevolution of Chang Zhu Tan “3+5” Urban Agglomeration

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### Abstract

Based on the differences of economic function, the economic system of the Chang Zhu Tan “3+5” Urban Agglomeration was divided to the production subsystem, the circulation subsystem, the investment subsystem and the consumption subsystem. Then, the study, using the system entropy, the coupling degree and the coupling coordinative degree and constructing the order parameter, depicted the spatio-temporal differentiations of the urban agglomeration’s economic system, and analyzed the rationality of this evolution to provide some theory evidences to improve the economic competitiveness. The results showed: firstly, the development and extension of the consumer market leded the economic system of the Chang Zhu Tan “3+5” Urban Agglomeration to the synergic way. Secondly, those high level transport nets, such as high rails, strengthened the whole region’s negotiability. For each city, the core region’s circulation subsystem tended to rationalize, the north was surplus, and the burden of the south was increased. Thirdly, the development of the urban agglomeration was not balanced. The economic system of Chang Sha was the most synergic, but those neighboring cities, such as Xiang Tan, Zhu Zhou and Yi Yang, were smothered.

### Key words:

economic system; coevolution; Chang Zhu Tan “3+5” urban agglomeration; complex science

## Spatiotemporal Distribution of Border Ports in China and their Spatial Impacts

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### Abstract

Border ports play a substantial role in socioeconomic exchanges that reflect diplomatic relations between neighboring countries and the development of border areas. As a platform for cooperation and opening-up, the Belt and Road Initiative will boost the development of border ports. This article maps and analyzes the evolution process of border ports in China since the 1930s regarding to their spatial distributions, transport modes, and flows of cargo and people. Based on the relative concentration index (RCI), five function types of border ports are summarized according to the functions and development levels of border ports and cities. The results of the spatiotemporal distribution analysis show that there have been three stages and two peak periods for the opening of border ports in China since the beginning of the 1950s. The opening of border ports is closely related to the bilateral relations with neighboring countries, complementarities of natural resources and economic development, as well as foreign policies. Nearly half of the border ports in China have limited urban functions, which means most border ports have quite limited impacts on the development of border areas, as a result of the adverse natural environment and small population size. The findings of this study may help to understand the development of the border port system and their impacts on border areas, which is an important part of the Belt and Road Initiative of China.

### Key words:

border ports; spatio-temporal distribution; Relative Concentration Index (RCI); border areas; China



## Strategic Planning of Local and Regional Development in Bulgaria

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### Abstract

Strategic and integrated approach to planning for economic development of Bulgarian regions and municipalities continue to be on the agenda in modern conditions. In the context of the current objectives, principles, rules and procedures for the conduct of regional policy within the EU and in Bulgaria this approach is crucial. Broader and deeper use of strategic tools in the planning of regional and local development after 2013 has increasing role even more important for the future development of regional policy for sustainable integrated regional development. Strategies and plans as existing strategic documents and currently have fundamental importance for demonstrating the will and readiness of Bulgaria for effective participation in regional policy and the use of EU structural instruments. The new EU strategy "Europe 2020", adopted in 2010, calls for improved coordination and linkage of various policies and national strategies, including policies and strategies for balanced and sustainable regional development within the EU in order to achieve smart, sustainable and inclusive economic growth to meet today's global challenges for countries and regions. New approach and method of planning and programming of regional development with particular emphasis on territorial cohesion is dictated by the development and implementation of macro-regional strategies for integrated development within the EU.

### Key words:

Economic development; regional policy; macro-regional strategies; integrated development

## Strategies for Regional Development in Higher Education: An Evaluation of Policies for Marginalized Groups in India

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### Abstract

In the context of Indian society which is based on hierarchal social order; access to higher educational opportunities endures the multiple dimensions of inequalities characterized by gender, caste, class, religion and region. Gross enrolment ratio (GER) in higher education among the social groups not only varies among the regions but also among the social groups. India has significant increase in GER from 1.5 % in 1960-61 to 10% in 2000 and subsequently increased to 21.1% by 2012-2013(MHRD, 2013) through affirmative action. However, significant inequalities in GER persist across the regions and social groups. Thus, the key objectives of the paper are: a) to evaluate the policies for educational development for marginalized groups and, b) to measure the spatial and social disparity in access to higher education. The present study is a quantitative and qualitative work based on primary data collected from 40 districts of 9 Indian states. Sopher's index has been exercised to capture the disparity in higher education among the regions and social groups. Logistic regression analysis (LRA) has been used for individual level data analysis. The analysis of the study reveals that there are large gap in accessibility and attainment in higher education between privileged section and marginal groups. The scheduled population are still facing caste based discrimination in education system. On the other hand, government policies and programmes have not been properly implemented and functions in the educational institutions. Thus, the failure of policy has negative consequences on balance regional development in higher education of the country.

### Key words:

Gross Enrolment Ratio (GER); Higher Education; Marginalized Groups; Policies; Regional Development; Scheduled population

## Structural Transformations in Territorial Socio-Economic Systems, and Methods for Their Study

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### Abstract

Territorial socio-economic systems (TSES) are combinations of population groups, economic objects and infrastructure facilities within a certain territory together with their various relationships with each other and conjugations with the territory (Baklanov, 2013 *et al.*). The basic structural unit of TSES is a discrete settlement. Any discrete settlement can be considered as a "starting point" of TSES structure (Baklanov, 2007, 2013), followed by defining all the structural units of the 1-st order. These units form all individual settlements directly tied with the central ("starting point") units by transport links.

Structural transformations include the whole combination of changes in the structural units of the 1-st order under certain changes in the central settlement: changes in the population number, in scale and assortment of production of goods and services. The structural units of the 2-nd and higher orders can be defined in TSES to assess their structural changes.

We propose a method of assessment of possible calculated structural transformations in TSES, by inclusion or exclusion of discrete components in the structure of TSES like separate existing or potential enterprises, their combination, and up to settlements as a whole.

Calculations of structural transformations in TSES should be carried out using the proposed matrix models of TSES.

The paper gives the examples of various types of TSES allocated in Pacific Russia, and assessment of their structural transformations through variants of inclusion of new and exclusion of discrete components among the existing ones.

### Key words:

territorial socio-economic systems; structural transformations; matrix models

## Sustainable Roots-driven Rural Change through Community Asset Mapping

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### Abstract

Despite more than two decades of democracy, South Africa still has high levels of poverty and inequality. The paper presents a tool called "Community Asset Mapping Programme (CAMP)" that was developed from experiences within rural communities in South Africa. The tool is designed to achieve sustainable and responsible high impact social change, by enabling community members to map cognitive and physical assets and empower themselves to use these assets sustainably to create a better life for themselves. Unlike similar tools, CAMP advocates that the success of roots-driven change depends on the inclusion of processes that will provide a variety of cognitive changes to ensure sustainable change in communities. The post development methodology can be used by researchers to collect valuable data for any research related to roots-driven sustainable socio-economic change in rural communities. The tool also provides the opportunity for external partners who would be willing to stand aside and allow communities to establish their own priorities to improve their quality of lives, but would still be willing to provide funding; mentorship; skills; and a continuous monitoring process over the medium to long term.

### Key words:

Poverty, roots-driven sustainable change, asset mapping, quality of life, post development methodology

## Territorial Regionalisation In Tunisia

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### Abstract

The Advent of independence in Tunisia in 1956 raised the question of administrative cutting and territorial planning. The country launched a territorial restructuring project work (refinement of the cutting, a new hierarchical territorial mesh). The objective of such restructuring consists in breaking opposing tribal powers and seating the state authority.

However, in addition to the observed dysfunctions, it has become clear and evident for the state that governorates do not have the sufficient professional knowledge to conduct territorial planning effectively.

The necessity of larger territorial units to form governorates was recognized in 1985. But the question of regionalization has always posed the problem of the central power which has always opposed the institution of a regional echelon that provides governorates with the power of decision making. Such echelon would play the role of an intermediary between the central administration and governorates.

After the Tunisian uprising, the topic of regional development has become the central theme of national debate and concern. The issue consists in rethinking the topic of regionalization and reducing imbalances.

### Key words:

Economic region; regional disparities; regionalization; territorial mesh; territorial planning



## The Development Patterns and Evolution of Regional Cooperation in the Yangtze River Delta

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### Abstract

Based on the framework of political-economy analysis, this paper sorts out the changing context and the structure of major administrative bodies at horizontal and vertical levels in the Yangtze Economic Belt, and evaluates the development levels of regional cooperation. The most developed subjects of regional cooperation among the 11 province-level units are located in the flood control, customs clearance policies, and quarantine. However the necessitated regional cooperation in the water resources and environment management, waterfront and port management, infrastructure construction and management, and ecological compensation and relevant platform of information-sharing are still under developed. Comparatively, regional cooperation is at the highest level of development among Shanghai, Jiangsu and Zhejiang in the lower reaches, and multi-level coordination mechanisms have been established to fulfill their agreements on many subjects, such as tourism and transpiration building, etc. The development level of regional cooperation in the upper reaches is higher than that in the middle reaches. In the upper reaches, regional cooperation is concentrated between Chongqing and Sichuan and several regional projects have been co-built because of their rooted similarities in cultural and historical background, as well as the promotion of central government. Last, regional cooperation is hampered among the four provinces in the middle reaches because there is lack of a strong economic center to drive the cooperation as in the lower reaches, and they also have more incentives to compete for attracting industrial transfer from Eastern China than to cooperate for regional affairs.

### Key words:

The Yangtze Economic Belt; regional cooperation; political-economic context; patterns; evolution

## Institutions and Development of Foreign Tncs in Russia: Regional Aspect

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### Abstract

Foreign transnational companies (TNCs) accounted for 30% of 500 large business companies in Russia in 2014. Consumer services and extraction of natural resources were the most important sectors of foreign TNCs functioning in 2000-2014, while their share in banking sector decreased and their share in high added value branches grew. More than 70% among the largest Russian companies in production of electronics, consumer goods, alcohol and tobacco are foreign. The institutional factor played a significant role in foreign TNCs development and in foreign direct investment (FDI) in Russia in 2000-2015. Legislative reforms on simplification of doing business in Russia, adopted in 2005, led to a sharp increase in FDI inflows into its economy and industry in 2006-2013. Privileges in payment of customs duties in the implementation of economic activities, which are foreground for the Russian Federation, by foreign investors influenced rapid development of import substitution in the automotive and food industries, pharmaceuticals, telecommunications, etc. Branch interests of foreign TNCs and the laws of the Russian Federation on the establishment of special industrial economic zones had identified the regional priorities of TNCs development and FDI inflows. The largest companies in a number of economic branches in many Russian regions (Tatarstan, Tula, Kaluga, Lipetsk, Vladimir Oblasts, etc.). Types of Russian regions by the scale of FDI inflows and territorial peculiarities of regional disparities in Russia were identified. Institutional barriers (introduction of sanctions against the Russian Federation in 2014) had sharply reduced the FDI inflow, and a number of foreign TNCs left the country's market.

### Key words:

Foreign transnational companies; institutional factor; foreign direct investment; regional priorities

## The Positive Role of Local Economic Enterprises in Efficient Urban-Rural Linkages

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### Abstract

The interplay of rural and regional networks helps develop the positive role of regional network, in which spatial behaviors of rural people and their decisions have a substantial effect on development of such interactions. In developing countries, villagers have a small share due to market mechanisms and economic powers of urban dealers that determine prices, which diminishes reciprocal and positive role of villagers in the marketplace. The information flow can affect bargaining powers and participation of villagers, enhance efficacy of urban-rural relationships, and boost rural income and investment, which will increase rural-urban interactions due to purchase of new commodities from cities. Generally, there is no purchasing power in villages resulting from simple interactions, and relationships based on local practices do not enhance villagers' role in capital flow and added value. Accordingly, increased information power and participation in social networks, and knowledge of market information will provide the underlying factors for development of positive personal practices in rural social organization and positive urban-rural links, which will have a major impact on diversification of sources of rural income and rational investment and increased market share and added value. These can result in formation of a positive and dynamic local economy through increased interaction and participation in a spatial network.

### Key words:

economic enterprises; Urban-rural linkages; regional network.

## The Promotion of Bio-Energy Production as Instrument of Rural Development in Germany – A Critical Analysis

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### Abstract

Progress in German governments have in the last 15 years decided to transform the energy system from fossil and nuclear energy towards a system based on renewable energy, mainly wind power, solar power and biomass. This development has initiated a new interest in rural areas as locations for energy production. In the case of biomass based energy production an additional opportunity for regional development with new opportunities for regional added value, new business opportunities for farmers and firms as well as the stimulation of new actor and stakeholder cooperation within the regions have been proposed. Several funding schemes, subsidy programs and support programs have been set up to contribute to these goals, especially a ‘bioenergy-regions’ program. Since 2012 severe cuts of the subsidies and programs regarding biomass based energy production due to rising costs were observed.

The aim of this paper is to discuss these developments and their impacts on the regional level of rural regions in Germany. The paper is based on literature and document analysis and particularly on the empirical insights from a case study dealing with one of the bioenergy regions in north-western Germany. Findings show that in some regions at least a small number of stakeholders have benefited from these programs whereas the promotion of bioenergy production has had negative impacts in other regions, e.g. the case study region. Especially the regional agri-business has been affected and many conflicts of objectives regarding sustainability have developed. The paper concludes with lessons learned and recommendations.

### Key words:

Policy analysis; renewable energy; regional development; Germany

## **The Research on Local Industrial Cluster Formation and Development Mechanism Based on the Co-Evolution Theory**

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### **Abstract**

By combing industrial clusters and co-evolution theory literature, the paper analyzed the history and current situation combing Yuzhou Jun Porcelain development of industrial clusters, found the various aspects of local resources, historical traditions, institutional arrangements, market development and technological innovation were the cause of the the Yuzhou Jun porcelain industry cluster formation, and multi-factor co-evolution mechanism led to the further developing of the cluster, such as the basis of history and resource conditions provide initial impetus was the original force of the formation of industrial clusters Jun Porcelain provided initial impetus to the formation of Jun Porcelain industrial clusters, reform and market demand was the important force to the industrial cluster growth, the effective institutional environment and institutional arrangements provided a suitable atmosphere for the growth and macroeconomic environment, technology and process innovation was the core factor of the development Jun Porcelain industrial clusters.

### **Key words:**

Clusters; co-evolution

## The Role of University in Transnational Triple Helix System: Towards A Conceptual Framework

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### Abstract

It has been commonly perceived that the university plays a crucial role in the national/regional innovation system through production, transmission and application of knowledge. However, there are few attempts to understand the role of university in the transnational context. This paper proposes a conceptual framework to examine the role of university in transnational innovation system by combining the factors at the node level, the dyad level and the structural level. At the node level, we inherit the Triple Helix model and consider the government, university and industry as crucial actors in transnational Triple Helix system. At the dyad level, we use spatial proximity and institutional proximity between the actors in various Triple Helix systems to understand the contexts of transnational innovation. At the structural level, we focus on both social networks and knowledge networks to discuss the dynamics of transnational innovation. As transnational industrial (I-I) networks are the most vibrant in the existing transnational Triple Helix system, we approach to the role of university by examining its linkages with the industry. We categorize the I-I networks into four types according to the different combination of spatial and institutional proximity. In each type, we discuss the features of I-I networks and their challenges to transnational Triple Helix system. Then we examine the transnational university (U-U) networks and explore the role of U-U in collaborating with I-I to promote the development of transnational Triple Helix system.

### Key words:

Transnational innovation system; Triple Helix; university engagement; university-industry collaboration; proximity; networks

## The Study of Land Scale Operation in the County as a Unit in Gullied Rolling Loess Area: The Case of Liulin County, Shanxi Province

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### Abstract

The content is based on the case of Liulin County, Shanxi Province whose economy develops rapidly and industry supports agriculture remarkably, due to the study of farmers' willingness of land transfer, through studying the various land scale operating models, to explore the effective models of land scale operation in modern agriculture. The results indicated four major factors which impact the farmers' willingness of land transfer, including gender, per capita income, agriculture proportion of total revenue and status que of land transfer, by the method of Binary Logistic Regression model. Though a variety of large-scale land operation model case study, the conclusions are as follows: 1. Corporatization operating model has solid financial and high mechanization utilization. As long as the company maintaining good economic performance and interests of all parties achieving moral self-discipline, honesty and trustworthiness this model can achieve efficient allocation of resources. 2. Large farming and family farm operation model who transfer land spontaneously can improve the efficiency of resource use and make the interests of all parties to reach a Pareto equilibrium. 3. Land Cooperatives operating model primarily serving the public, local economic development and prosperity based, but because of its inherent flaws make farmers who have fewer arable land and no other skills into a new poverty. 4. Although Agricultural Services Team operating model mechanized land operation of modern agriculture, farmers decentralized management is not conducive to the promotion of production, application and development of modern agricultural technology. And the content proposed land operation models which are suitable for case area to provide a useful supplement for traditional land scale management theory.

### Key words:

Land Transfer; Binary Logistic Regression model

## The Study of Space-Time Evolution to District Economic Coordinating Developing of Henan Province in New Time

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### Abstract

Base on the concepts and intensions which to define the Chinese region economic coordinate developing in new time by this article, to survey the structure of space-time to district economic coordinate developing of Henan province by ArcGIS and SPSS. It is to find that a tendency have appeared in space that much closeness is between districts, district economic coordinate developing is independent on the promoting and pushing by economic developing quantify and efficiency. It is highly coordinating effect between the space of economic improving and people's living level, there are still many problems in district economic coordinate developing of Henan province. The highly increase of financial revenue to prove the source of dynamic and the guarantee of coming developing. To analysis to region economic coordinate developing of space-time structure, it is to find that the district economic coordinate developing of Henan province level is higher than the whole nation, no matter what the aspect of time or space, there is obvious difference in district economic coordinate developing of each city.

### Keywords:

district economic coordinating developing; the relationship between districts; Henan province



## The Variation of the Regional Competitiveness Discrepancy of Guangdong Manufacturing Industry in Recent 20 Years

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### Abstract

Guangdong province, located in Southeast China, is famous for its manufacturing industry both in China and in the world. In recent years, particularly since 1978 based on the open door policy, Guangdong's economy has grown rapidly led to the national's economic growth. The manufacturing industry plays an important role in Guangdong's economic development. However, Comparing with developed countries, Guangdong manufacturing is characterized by inferior infrastructure, low value-added products and lack of overall competitiveness. The rise of the Guangdong as a promising workshop of the "world factory" in China has attributed to the export-oriented industrialization drive by foreign direct investment. Since the world financial crisis in 2008, Guangdong's manufacturing industry faced huge challenge, external demand declining, prices of raw material rising, international markets fluctuating ,which make the traditional development model difficult to sustain. Guangdong's manufacturing is in a critical period of restructuring and transformation of development mode. Does Guangdong's manufacturing industry still have competitiveness? Regional manufacturing industry competitiveness is an important aspect of the study of the theory of regional economic development, as well as it is a new field which need us to make further efforts to explore. This paper on the basis of the overall evaluation of the competitiveness of manufacturing industry in Guangdong Province, revealing its manufacturing competitiveness characteristics of spatial-temporal variation, this research provides the theoretical basis and reference to promote the development of manufacturing industry in Guangdong Province and enhance the manufacturing industry competitiveness.

### Key words:

regional competitiveness; manufacturing industry

## Traditional Skill and Handicrafts of India: Case Study of Madul-kathi Craft

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### Abstract

In Indian traditional society, various skills were acquired by generations of people. Some of these traditional technology expressed in various handicrafts have stood the test of time and remain popular even today. In fact modern means of development in rural areas has led to a gradual decay of the symbiotic functional system of rural society. Subsistence agriculture economy of the rural areas continues to dispel part of its working force due to over dependence on land which leads to out migration of work force to urban areas. Thus development of handicrafts which follow traditional technology in production process and rely on traditional skill which are relatively simple seems a rational solution. Madul-kathi is an important handicraft of Harirampur block of South Dinajpur District of West Bengal. Objective of the present study which is based on a sample consisting of 40 units is to identify the role of traditional skill in the production process of Madul-kathi craft and to formulate strategies for the development of the said sector. Presently though the sector attracts skilled artisans and continues the industry's tradition moderately, units suffer from the problems like low productivity, monopoly of middlemen in marketing system, lack of credit facilities, and low diversification in production system. Attempt has been made to estimate the relevant objective variables by regression analysis and to interpret the co-efficient associated with different policy variables associated with madul kathi. Based on optimal values of policy variables strategies for the development of madul-kathi craft has been put forward.

### Key words:

Traditional skill; Handicraft; India

## Achievements of the Kingdom of Saudi Arabia in the Field of Toponymy (2014-2016)

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### Abstract

Due to a growing worldwide interest in, and concern with, place names in general, and in the Kingdom of Saudi Arabia (KSA) in particular, the Royal Decree no. 36072 dated 28-91434H was issued for the purpose of establishing the National Committee on Geographical Names (NCGN) to incorporate all governmental agencies with related interests, with its headquarter at King Abdulaziz Foundation for Research and Archives (KAFRA). The general aim of the NCGN is to promote interest in, and verification of, place names in the Kingdom, and it also aims mainly at unifying all efforts pertaining to place names in the KSA in terms of their writing, orthography, spelling and all that is compatible with relevant national standards and data bases; as well as performing all works that will assist in representing the Kingdom in international conferences and symposiums. All of which will eventually make the NCGN the only competent authority for such an activity. The NCGN enjoys the membership of fifteen governmental authorities. We will highlight the achievements of some of them during the last two years as in this paper.

### Key words:

Saudi Arabia; Toponymy; Geographical Names; National Committee on Geographical Names

## Agricultural Labor Productivity and Rural Residents' Income Gap

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### Abstract

Using the panel threshold model proposed by Hansen, this paper empirically studies the nonlinear relationship between agricultural labor productivity and the rural residents' income gap based on panel data of 29 provincial units from 2000 to 2012. The results show that, there is the distinctive characteristic of the threshold between agricultural labor productivity and rural residents' income gap, rather than a simple linear relationship. Among different regimes divided by the threshold value, the influence of agricultural labor productivity on rural residents' income gap is different. When the agricultural labor productivity is less than 8.383, the improvement of agricultural labor productivity can effectively alleviate the rural residents' income gap; when the agricultural labor productivity across the first threshold value of 8.383, its effects of alleviating the rural residents' income gap is weakened; while it leaped over the second threshold value of 8.703 (i.e. the inflection point), it would exacerbate the rural residents' income gap. In addition, the current agricultural labor productivity has crossed the second threshold value, the expansion of rural residents' income gap should be concerned by all parties.

### Key words:

Agricultural labor productivity; Rural residents' income gap; Panel threshold model

## Characteristics of indirect energy consumption and carbon emissions and the influence factors of indirect carbon emissions: A case study of Jilin Province

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### Abstract

With the improvement of residents' living standards and the upgrade of consumption structure, energy consumption and carbon emissions caused by residents' living consumption increase day by day. This paper accounted the energy consumption and carbon emissions due to Jilin Province residents' expenditure during the period 2004-2013, and analyzed their variation features, which proved that living, education and entertainment, and food were the main aspects contribute to energy consumption and the carbon emission. Based on the STIRPAT model, a multivariate linear model fitted by a ridge regression to examine the relationship between carbon emissions and a list of human activity indices including carbon emission intensity, population of Jilin Province, per capita consumption expenditure, urbanization rate, was built. It was found that for 1% increase in carbon emission intensity, population and urbanization rate, there was 0.831%, 0.184% and 0.055% increase in carbon emission caused by residents' living consumption in Jilin Province. Carbon emission intensity was the most aspect contribute to the carbon emission. However, every 1% increase in the per capita consumption expenditure led to 0.309% carbon emission reduction.

### Key words:

Indirect energy Consumption; Carbon emissions; Residents' living expenditure; Jilin Province

## Competitiveness, Cohesion and Sustainability in the Urban Development. EU Vs. Non-EU Romania's Border Areas

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### Abstract

The Romanian border areas include 898 Local Administrative Units 2 (LAU2), of which 88 urban. Romania has border line with the following countries: Bulgaria, Republic of Moldova, Serbia, Ukraine and Hungary, of which 63.5% is Non-European Union boundary. According to the population structure, 51.6% of the total population is urban. Identifying territorial disparities in terms of competitiveness, territorial cohesion and sustainability in the urban space of Romania's border areas implies several research stages: selecting relevant statistical indicators, analyzing their territorial disparities, standardizing the absolute values of the selected 15 indicators; grouping the elementary indicators by three secondary indexes (competitiveness, cohesion and sustainable development), stressing out the main socio-economic development aspects: 1 – *competitiveness* (general employment rate, unemployment rate, number of higher education graduates/total population over 20 years old, variation rate in the number of employed population between 2002 – 2012, physiological density); 2 – *territorial cohesion* (population migration rate, average rate of population growth, total population, dynamic of finished dwellings (1990 - 2014), living floor m<sup>2</sup>/inhabitant; the demographic dependency index, the physicians/1,000 inhabitants); 3 – *sustainable development* (% of dwellings with access to sewerage system, forest-covered area, green space area/inhabitant, the consumption of natural gas for domestic use). The final index of territorial development is assessed using the relative distances ranking method, adapted to the objective of the current study, in order to measure simultaneously the territorial disparities between the towns of the Romania's border areas and the urban space of each border areas (EU and Non-EU) on the one hand, and between the mentioned towns and the national urban space on the other hand.

### Key words:

competitiveness; cohesion; sustainability; urban development; EU and Non-EU Romania's border areas

## Density, Distance, Division and Rural Poverty in Guizhou Province, China

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### Abstract

This paper introduces and evaluates the relevance of a 3D framework from the 2009 World Development Report, which is designed to analyze the determinants of spatial disparities in rural poverty in Guizhou Province, China. The results show that this framework is effective for understanding varieties of rural poverty. Density was seen to have a negative effect on poverty level, while the distance to a local city center and the socio-cultural divisions had positive effects. The distance effect was significant for distance to a local city center, but was not significant for distance to a provincial capital. These results have important policy implications for poverty- alleviation, both on a provincial and national scale.

### Key words:

China; Guizhou; rural poverty; new economic geography

## Ecological Civilization Construction of Nanlijiang River Basin, Southern China

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### Abstract

In little more than a decade, the idea that ecological civilization IS vital assets has spread like fire. especially, under the background of green development in the planning of China's 13<sup>th</sup> Five-Year, the construction of regional ecological civilization is the inevitable choice to promote China's beautiful construction. Nanlijiang River basin belongs to the densely populated areas in Guangxi, and its ecological civilization construction is the key to solve the contradictory of regional economic development, environment and population. According to the south stream resource environmental bearing capacity of river basin and the principle of land layout optimization, this paper selected per capita annual consumption per capita, land for construction, such as the proportion of the tertiary industry, industrial effluent 10 index as the index evaluation system of ecological civilization construction of Nanlijiang River basin based on production, living and ecological analysis. and then, their spatial layout were quantitatively analysis. the result showed that: contradiction between ecological civilization construction of Nanlijiang River basin is irrational economic structure, low resource utilization, industrial distribution, poor production, living contradiction results. and then, proposed development path and ecological industrialization model were put forward based on combining with the development of the thirteenth Five-Year Plan requirements and the sustainable development in the Nanlijiang River basin.

### Key words:

Nanlijiang River basin; ecological civilization construction; index evaluation system; basin ecological industrialization model

## European Union's Cohesion Policy in Poland: Chances and Threats for Regional Development

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### Abstract

Poland is the largest new member of the European Union very much relying on assistance because of its level of socio-economic development being lower than in the 'old' Community states. The most important assistance instrument, both in terms of the scope and value of the support given, is the cohesion policy. The 10th anniversary of Poland's EU membership celebrated in 2014 and the end in 2015 of the second financial perspective in which it participated as a member state are a good occasion for summing up and assessing the effects of this momentous event and changes it has brought about. They have affected various spheres of life (institutional, economic, social) and various levels of authority and territorial administration (national, regional, local). The goal of this poster is to present the most significant consequences of the EU cohesion policy in Poland, especially changes it has produced in the level of regional development and differences in it at a regional and a subregional level. Apart from presenting objectively positive effects of the support received, a critical assessment is also made of programming assumptions, barriers to and limitations of the absorption process as well as of adverse consequences of assistance not always used properly. The results provide a basis for recommendations concerning further development-oriented measures. Their significance grows especially in the light of the ever stronger position of Poland and its regions on the changing European map of differences in development. This means ever greater challenges in the programming and implementation of a future development policy in Poland after 2020.

### Key words:

cohesion policy; European Union; Poland; region; regional development; convergence vs. divergence; supply and demand effects

## Hydroclimatic Research of the Baikal Natural Territory as a Part of a Significant Transboundary Catchment

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### Abstract

The Baikal Natural Territory (BNT) is the natural environment of Lake Baikal on the Russian territory. Global climate changes, the increasing human impact on the environment modify natural landscapes and have a significant influence on the formation of water resources. Conservation and management of natural waters is one of the strategic objectives of sustainable development of the BNT and the whole region. We made multi-method investigations of long-term hydroclimatic and landscape- hydrological patterns of the BNT. We estimated the intensity of changes in the basic hydrological characteristics against the background of climate change. We noted annual distribution of the river flow of the BNT on a background of multidirectional vibrations of the totals. A significant influence of air temperature variations on the dynamics of river flow in the months of temperature transition through the 0° C (April and October), and on the flow increase in the cold period (October to March) is revealed. In other periods of the year we tracked the influenced by the rainfall dynamics. As a result of model calculations and landscape-hydrological analysis, we determined the magnitude of water loss of the landscapes of the BNT in specific hydrological seasons, as well as substantiated and revealed the areas with different contribution to the formation of water-resource and hydro-ecological potentials of the territory, showed the areas with different degrees of sensitivity to human impacts and natural changes, and finally, assessed the environmental situation and extreme hydrological conditions of the catchments.

### Key words:

climatic processes, water resources, landscape, heat and moisture supply, river flow

## Evolving Geography of Auto Industry in Hubei Province

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### Abstract

Instead of drawing upon China's abundant labor resources, auto manufacturing represents a newly emerging industry that requires high capital investment and intensive technology. The growth and expansion of auto industry is considered to be imperative to China's manufacturing upgrading, economic restructuring, urban production network development and city network. The growth and spatial configuration of China's auto industry in the past experienced both dispersion and concentration in geographic space but has recently evolved into noticeable clustering patterns centered in several major metropolitan regions. During the process of spatial evolution of auto industry, machinery manufacturing, industrial upgrading & development policies and institutions, FDI, and technological innovation are argued to have played significant roles. However, knowledge is still limited on how these factors interact with each other and with geographic contexts in the path-dependent evolutionary process of auto manufacturing. This study adopts a theoretical framework grounded in evolutionary global production network to understand spatial and temporal trajectory of auto industry in Hubei Province. Using published statistics, government documents, and firm interviews, this study attempts to identify evolving mechanisms that shape the spatial process of changes in auto industry and explain its regional development paths. It also tries to explain its production networks structure and to analyze the auto industry development path on density, extensity, accessibility and spillover. And it also tries to analyze changing urban landscape based on production networks.

### Key Words:

auto industry; evolving; evolutionary economic geography; production network; Hubei Province

## **Implementation of Socioeconomic Development Strategy at Local Level. Concept, Principles and Methodology. The case of Bistrița-Năsăud County, Romania**

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### **Abstract**

Current territorial development needs do no longer fit the traditional development patterns. The new development challenges triggered by energy crisis, environmental pollution, resource depletion, depopulation, or globalization make territories that were once in a certain balance, now devolve to disequilibrium. This is associated with an increasing territorial disorder although resources are continuously invested to stabilize the development process. Romania fits this context, demonstrated by many development indicators. Apart from objective factors that impede the correct and suitable territorial development (corruption, lack of professionalism of the decision-making factors, lack of coherent development plans) we add subjective factors, namely the quality of elaboration and implementation of development strategies. Most of them only reflect territorial dysfunctions without providing solutions and development patterns to be followed by the local communities. This paper presents an approach of local development strategies from the results perspective, which is not only a list of proposed programs, measures and projects on local development, but also a proposal of how to interrelate and integrate them into strategic projects. Thus, we changed the conceptual approach, we introduced the concepts of informational pyramid and logical scheme on information management, and threshold values to help answering appropriately to the ways proposed to solve dysfunctions after and during the implementation of strategy. The result is the implementation of the development strategy at county level, in which the novelty was to identify a series of representative strategic projects, to further represent the backbone of development in the analyzed territory for the period of 2016-2020.

### **Key words:**

integrated management of territory; development strategy; strategic planning; smart development; informational ranking; threshold values; development patterns.

## **Integrate Construction Research of Urban Agglomeration in the Middle Reach of Yangtze river - based on Generic ERE and Mr PRED System**

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### **Abstract**

Site is our ancestors created material and spiritual heritages and recorded the history of the vicissitudes of life, depict the picture in the development of the Chinese nation. But, with the rapid development of our country's economy, the spread of city scale, the urban environment deteriorating, for site protection work has brought the huge challenge. In the process of rapid urbanization, large sites with more attention paid to the protection and utilization, park planning and design arises at the historic moment, become great site protection and utilization of the reality of the carrier. Based on the analysis of site protection and utilization at home and abroad, based on the research of international and domestic city ruins protection by use of different methods. Jing Zhou Chu chariots and horses array of national archaeological site park planning and design case study, the combination of theory and practice for extraction of individuality and commonness, summed up the ruins park planning and design principles, considering the influence factors of the content and level. Research results including the present situation analysis in the process of planning and design, scope definition, value evaluation, planning theory, and the protection and display multiple aspects, such as work content, the stages and put forward the planning content and solution, so as to the future park planning and design at home and abroad to provide reference for reference.

### **Key words:**

Planning and design; ruins; Ruins Park; protection; display

## Necessities to Develop Clusters in Mongolia

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### Abstract

Clusters are considered globally a key tool for strengthening competitiveness, implementing innovation policies and enhancing national export capacities and promoting economic development. In addition, clusters are regarded as a powerful mechanism for regional development.

Cluster approach based regional development models are now believed to be the optimal way of economic integration. Regional clusters are fast becoming leaders of economic development in their respective countries. Mongolia's neighbours, Russia and China, are undertaking active measures to develop their own clusters.

Mongolia faces an urgent need to enhance its economic competitiveness, implement innovation policies, modernize the structure of the economy, strengthen public private collaboration, develop appropriate national and regional level production and service industries and reduce unemployment and poverty.

International experience shows that clusters create conditions favorable for developing small and medium production and service enterprises, generating employment and reducing poverty. Cluster development will be an important part of Mongolian economic development policy in near future.

### Key words:

Cluster development; economic development policy; competitiveness; innovation policies

## People Climate and City-Regional Competitiveness in Finland

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### Abstract

This study approaches city-regional policymaking and fostering of international competitiveness of city-regions in Finland in the context of people climate –concept and attractiveness of city-regions to talented people. In the predominant knowledge-based economy cities' competitiveness relies on their ability to attract talented employees. In 2002 Richard Florida proposed that regional economic growth is driven by the location choices of creative people who are attracted to places that are diverse, tolerant and open to new ideas. Florida considers that having an effective people climate is even more essential than having a solid business climate. Florida's ideas and policy recommendations have gained interest around the world and they have been widely applied in regional development policies. At the same time his ideas have provoked a critical scientific discussion concerning whether they can be applied to different regional context from USA where they were originally developed. Finland has succeeded excellently in international comparison of global competitiveness indexes (e.g. World Economic Forum). However, competition for talented people has become tighter and structural change of economy has cut investments in education and research. To keep up with international competition, Finnish city regions, together with state administration, have launched several political acts which aim at strengthening their international competitiveness. This study is interested in the political objectives that Finnish city-regions have set in the political documents to attract talented people: To what extent they are based on Florida's ideas, and on other hand, to what extent they are based on specific regional contexts?

### Key words:

regional competitiveness; people climate; city-regions; Finland

## Re-considering Framework and Methodology of Regional Geography for Investigation into Indian Villages - From an Experience of Joint Research Project of Hiroshima University -

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### Abstract

Area Studies have two genealogies, namely one is with origins in the colonial survey and another is with the field survey in geography traditionally. Historically both were often overlapped each other, and it was sometimes called into question the academic significance. However, for the geography to profess itself "knowledge of the relationship between human being and nature", regional field survey which bury in inquiring "relationship" in region, has been the academic *raison d'être*. In Japan, area studies to target many areas around the world, especially Asia, have been thriving not only during World War II but also throughout the post-war. In Hiroshima University, since 1967, geography studies of Indian villages have carried out continuously. The research approach was unique in that based on collection of all common data of village from whole aspect, which can do comparative studies between target villages in deferent regional conditions. Studies were divided into 2 phases, the North India Project (1967-73) and the South India Project (1978-82), during each phase, intensive field survey (2 weeks to 3 month) has been carried out. In addition, following up survey have done in 1991-93 about these study areas. In result, a detailed and continuous research data is accumulated. Recently, area studies in a broad sense, by innovation of research methods and technique, and development of data, have been divided into two poles of, the macro-level analysis of data and micro-level case study. In this study, we will try, 1) to verify the results of the Hiroshima University project, 2) to present a new field work framework and methodology, which is based on the "regional" concept.

### Key words:

Regional Geography; Indian villages; region; methodology

## Reflection on poverty alleviation in the eastern Tibet of Kham and Amdo

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### Abstract

In western china, ecologically fragile areas and poverty areas are geographically overlapped, and the poverty alleviation projects were designed to ecological protection and income increase. However, almost of these projects were proved to be not effective. Most researches attributed the reason to religious influence in Tibet but ignored the locality. This research based on a literature review on previous studies on poverty alleviation in Tibet and Inner Mongolia area, summarizes the recent progress in the research, analyzes the biases in present researches, and illustrates different characters and results according to different regions. According to the post-2015 millennium development goal, this research indicates how to adjust our research direction and discusses the new positionality of researchers. Especially with respect to the eastern Tibet of Kham and Amdo, this research is expected to inspire new reflection into poverty alleviation.

### Key words:

Poverty alleviation; pastoral areas; Tibet

## Regional Dual-Nuclei Structure Theory

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### Abstract

The dual-nuclei structure is a special, highly efficient spatial structure that contains a regional central city, a gateway city and their relations, thus having both the centered nature of a regional city and the fringe nature of a gateway city. Dr. Lu Yuqi first observed this phenomenon in 1996 and, shortly thereafter, finished the whole process of pattern detection, mechanism analysis, reason deduction and mathematical derivation.

There are three types of regions: natural regions, which mainly include river valleys; economic regions, which mainly indicate urban economic regions; and administrative regions. In China, the dual-nuclei structure appears to be that of the administrative unit at different spatial scales. Generally, the national-, metropolitan-, provincial-, municipal- and county-level spatial scales are 1000, 500, 200, 100 and 50 kilometers, respectively.

There are two types of gateway cities: port cities and inland gateway cities. The spatial efficiency and development potential of the former are much greater than those of the latter, so the apparent dual-nuclei structure mainly refers to one that comprises a central city and a port city. Further, port cities include harbor cities and river port cities. Therefore, basins are the ideal region for nurturing the dual-nuclei structure, especially for rivers such as the Yangtze River in China, the Mississippi River in the United States, and the Nile in Africa.

The dual-nuclei structure phenomenon is widespread in the world. This is true in Chinese coastal and river areas but also in Chinese border regions. Worldwide, this phenomenon is also quite common.

### Key words:

regional dual-nuclei structure; regional central city; gateway city

## Regional Inequality and Evolvement Mechanism of Industry Output with Different System of Ownership base on Institution Aspect: A Case Study of Jiangsu Province

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### Abstract

The industrial development is closely related to economic institution in a country or region. Base on the aspect of economic institution, the paper divide the industry output into state-owned, private-owned and foreign-owned, examine regional inequality of industrial output with different system of ownership in Jiangsu province from 1995 to 2013 by the method of Theil index and spatial analysis, and analyses the influence mechanism of economic institution. The result shows: (1) the regional inequality of state-owned and foreign-owned industry output increased from 1995 to 2001, decreased from 2001 to 2013. While, the regional inequality of private-owned industry output decreased all the time. (2) The standard deviation ellipses of different ownership's industry output present northwest-southeast pattern, but the evolution trend is different. The range of state-owned industry output's standard deviation ellipse was stable. The range of private-owned industry output's standard deviation ellipse was expanding all the time. The range of foreign-owned industry output's standard deviation ellipse varied obviously after 2005. (3) The different effects of institution variables on state-owned, private-owned and foreign-owned industry output in time and space, reflect the short-acting of decentralization's effluence and the progressive of marketization, indicate that the enterprise of private-owned and foreign-owned would be the main agent of decreasing regional Inequality for Jiangsu province.

### Key words:

economic institution; industry output; regional inequality; influence mechanism; Jiangsu province

## Regional Spillovers of Transport Investment on Economic Growth In China

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### Abstract

The paper main studies the spillovers of transport investment on economy from all the provinces in China, transport infrastructure investment has indirect and direct effect on economy, and transport endowment on regional economy receive local effect and other regions' investment effect, which had been assumed and proved by many preview literatures. Moreover, infrastructure investment on economy has time lag character, but it lacks relevant studies on spillovers, so this study uses panel data analyze lag spillovers on economy base on production function from 1988 to 2013. The result shows that it has significant spillovers on economy, 1 lag time has more positive on spillovers of transport investment, it has significant time effect and release with longer lag year. Consider to East regions, West regions and Central regions divided by China, which have different spillovers on their own economy, and they also have significant lag effect, mobility of factors play an important role on sub-regions effect of transport investment.

### Key words:

Transport investment; economy growth; spillovers; Lag time.

## Research on New Regional Spatial Division of Labor Based on Cross-regional Industrial Spatial Organization Change - A Case Study of Foshan Ceramics Industry

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### Abstract

After 30 years of growth, China is facing an important transition. Regional economic activities are showing a complex trend of agglomeration and diffusion. In this process, the cross-regional industrial spatial organization change and its dynamic mechanism have been produced and concerned widespread. But regional relations evolution has been neglected. Based on the theoretical basis of Spatial Division of Labor, from the micro perspective of industrial spatial organization, this paper studies new models, new mechanisms and new effects of the regional spatial division of labor under the background of the new round of industrial spatial restructuring in Guangdong Province. This article takes inter-regional production space organization of ceramic enterprises between Foshan and Qingyuan as a case. The study shows that ceramic industry of Foshan has undergone two rounds of space restructuring, and the production space organization of ceramic enterprises has changed significantly, multi plants and multi locations production space structure and cross regional production network are being formed. With the separation and concentration of space of different functional departments in the process of labor, regional spatial divisions of labor evolves to regional functional division of the 'core-periphery' pattern. In this process, in addition to the market-driven mechanism, institutional mechanisms become an important driving force of the current regional spatial division of labor. Especially, the forced mechanism of environmental regulation and the promotion mechanism of industrial transfer system arrangement have become the most important driving mechanisms under the new round of industrial restructuring. This new model of spatial division of labor presents a balanced networking trend, promotes the development of regional industrial integration, and greatly improves the form of spatial inequality. But essentially new forms of inequality are being reproduced which have further strengthened the 'core-periphery' trend.

### Key words:

Industrial Spatial Organization; Spatial Divisions of Labor; the 'Core-Periphery' Pattern; Regional Functional Division; Ceramic Industry; Foshan and Qingyuan

## Research on Regional Development Status and Coordination Study in Henan Province Based on the Five Development Concepts

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### Abstract

The five development concepts provide us a new road, direction and important breakthrough point about Chinese regional development in the period of 13th Five-Year Plan. Meanwhile, it's a further supplement to the Objectivity of social and economic development. Based on the connotation and connection of five development concepts, we set up an evaluation index system of regional development status from five aspects including innovation, coordination, green development, opening up, and sharing respectively, take Henan province as the example for quantitative analysis. Then, Measure the regional development status and the coordination level of the subsystems of 18 cities in Henan province by use Fuzzy Discriminating Model and Model of Coordinating Degree. The results show that the comprehensive development of Henan City is in the low state of development, and the city level differences are obvious, present the core-edge space structure. Four major economic zones have different levels of development; Central Henan Urban Agglomeration has obvious advantage. Green index is higher than other indexes, innovation and opening up have become an important obstacle of regional development. City development status has a significant positive correlation with the level of economic development, the higher the economic development of the city, the higher the regional development status. Coordinated development of the system is in the stage of weak coordination, the overall level of the system needs to be improved. Meanwhile, there is no correlation between the level of coordination and the level of economic development. Finally, the status of the development of Henan is divided into five types according to the cluster analysis, and relevant suggestions are put forward.

### Key words:

five development concepts; coordinated degree; fuzzy Comprehensive Evaluation Model ; henan province



## Research on the Optimization of Regional Land Development in the Yangtze River Economic Zone

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### Abstract

The Yangtze River economic belt is an important part of the strategic layout of the "T" spatial structure, which is also an important part of the strategic layout of the country's urbanization. By the moving population and industrial chain changes, this paper constructs land expansion theoretical analysis framework of regional spatial development based on the relations among the population, industry and construction, thus constructing the regional scale economy of the Yangtze River with urban network contact model. Moreover, it also investigates the coordinated relationship between the coupling of various provinces and cities and demonstrates the area value of spatial variability so as to put forward optimized regional value chain, form a reasonable division of region and upgrade the Yangtze River economic belt land and space development.

### Key words:

spatial development; Coupling and coordination; the Yangtze River economic belt

## **Spatialtemporal Evolution of New Pattern Industrialization, Urbanization, Informatization, Agricultural Modernization, Greenization Coordination Development in Shandong Province**

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### **Abstract**

The new industrialization, urbanization, informatization, agricultural modernization and greenization (hereinafter referred to as the “new five modernization”) has received extensive attention of the society from all walks of life and value and it is the basic path to achieve regional sustainable development. Taking the new industrialization, urbanization, informatization, agricultural modernization and greenization as the measuring indicator, this paper analyses the spatialtemporal evolution of the “new five modernization” coordination development in Shandong Province from 2000 to 2013 by using the mathematical model, quantitative analysis and spatial analysis method. The results show as following. ①The “new five modernization” comprehensive development level rise faster. New industrialization, urbanization and informatization development momentum growing rapidly. The level of agricultural modernization and greenization development is low. ②The degree of coupling of “new five modernization” each subsystem between 0.703 to 0.986, but it is a low level of highly coupled. The coordinated development level of the “new five modernization” between 0.301 to 0.823, most of the year “new five modernization” coordinated development level is not high in Shandong Province. ③The coupling degree and coordination degree of the “new five modernization” are higher in Jinan, Zibo, Qingdao, Weihai and other Ludong area in Shandong Province, the coupling degree and coordination degree are low in Heze, Liaocheng, Linyi, Rizhao and other Lunan region in Shandong Province from the perspective of the spatial pattern of the “new five modernization” coordinated development. According to the above study, put forward: Promote the simultaneous development of the “new five modernization”.

### **Key words:**

“new five modernization”; coupling degree; coordination degree; Spatialtemporal evolution

## **Spatiotemporal Characteristics and Dynamic Mechanisms of Agricultural Development in China's Intensively Urbanized Areas: The Case of Pearl River Delta**

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### **Abstract**

The spatial patterns and contributing factors of agricultural development have long been a core concern for geographical research conducted on the regional scale in China. Until recently, however, few attempts have been made to investigate the evolution of agricultural development in intensively urbanized areas. Using the weighted regression model (GTWR), this research explores the spatiotemporal characteristics and dynamic mechanisms of agricultural development in the Pearl River Delta in southern China over the past twenty-five years. Based on county-level data, significant spatiotemporal heterogeneity in the pattern of agricultural production was revealed by the findings. The results of analysis indicate that in the study area: firstly, the gravitational centre of agricultural production has moved both from south to north, as well as from east to west; secondly, while effects of the amount of cultivated land and the quantity of agricultural labor on agricultural GDP have been less significant across time, an increasingly strong correlation has been found between the figure of agricultural GDP and (1) the amount of machinery and (2) a composite index on the fragmentation of cultivated land, respectively. With the development in agricultural technology and its scale management, this research offers fresh understanding of the important role played by agricultural modernization in an intensively urbanized area such as the Pearl River Delta, and lends support to more scientifically-informed policy-making for the development of agriculture in this region.

### **Key words:**

Agricultural development; Pearl River Delta; spatiotemporal characteristics; mechanisms; geographical weighted regression

## Study on the Institutional Arrangement for Optimizing Territorial Spatial Development In Yangtze River Economic Zone

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### Abstract

The Yangtze River Economic Zone is an important part of the "Three longitudinal and Two- horizontal" distribution of country's urbanization. How to optimize the functional composition of the Yangtze River Economic Zone and make it work synergistically are two main problems needed to be solved. This article explores the Institution arrangements and the operating mechanism of the optimization of the territorial spatial in Yangtze River Economic Zone. Concrete institutional arrangements include: (1) A mechanism of population and land resources connection should be built in terms of in-flow areas and out-flow areas. As land and labor linked by price mechanism, the key elements of production could be allocated effectively. (2) A market-based mechanism should be built in order to configure the national construction land indexes. Setting up a trade market of land development right could optimize the allocation of critical resources, such as land resources. (3) A strategic resources compensation mechanism should be built, plus a land resources tax reform at the Yangtze River economic belt. There are alternative approaches: combining the farmland occupation tax, economic development and urban sprawl, or taking progressive "ad valorem" path. (4) A balanced development mechanism should be built, which can prevent the industry homogenization and establish collaborative mechanism between industrial transferring and financial transferring payment. (5) A mechanism of Multiple-planning coordination and integration should be built, land use planning, and the territorial planning of Yangtze River Economic Belt. Moreover, the Institutional friction caused by the differences of use control mechanism design should be avoided.

### Key words:

territorial spatial development; system; mechanism; the Yangtze Economic Zone; Chongqing

## The Innovation from the Airport Economy Development of ZAEA to the Regional Development Mode

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### Abstract

As the growth pole of regional economic development, the pathway that airport economy leads the development of regional economy includes: changing the regional elements endowment in micro scale, coupling with the industries in the hinterland in the medium scale, accelerating the tax revenue increase and employment growth in the macro scale. As a representative of Chinese airport economy, Zhengzhou Airport Economic Comprehensive Experimentation Area (ZAEA) plays a significant leading and demonstrating role in the following fields: deepening the reforms in an all-round way, promoting the “synchronization of five modernizations”, building “one carrier and four systems”, constructing “four Henan”, supply-side structural reform and integrating the resources of Henan airport. The article concludes: supply-side structural reform in China needs to accelerate the airport economy development and to integrate into the international frontiers under the Economic New Normal. Airport economy will play a crucial part in the “One belt and one road” strategy. The innovation of ZAEA development promotes the regional development pattern, which shows the tendency of future regional new “four modernizations”. The airport economy may change the traditional development pattern that the regional development center locates in the coastal areas usually since the Industrial Revolution, and open up a new era that the regional development center will return to the inland regions.

### Key words:

Airport Economy; Supply-side Structural Reform; Zhengzhou Airport Economic Comprehensive Experimentation Area; Regional Development Model; Inland Era

## The Spatial Characteristics of Producer Service Agglomeration in Jinan Metropolitan Region and Its Influencing Factors: Analysis Based on both Industry Level and Regional Level

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### Abstract

The word industrial structure presents a general trend that the industry economy is transforming to service economy, promote the coordinated development of producer service agglomeration in Jinan metropolitan region can optimize the industrial structure of Jinan metropolitan region. It has been an important way to improve the overall strength of the region. Mainly based on number of employees of Jinan metropolitan from 2003-2014, using the Gini-coefficient, the Concentration Ratio to measure the overall situation, industry characteristics, cities average concentration ratio of Jinan metropolitan and then find its influencing factors. The results showed that: ① The degree of spatial characteristics of producer service agglomeration in Jinan metropolitan region is low and the fluctuation characteristics is obvious. The curve is inverted "U" type.; ② From the industry level, the producer services agglomeration degree is higher than the manufacturing industry, the agglomeration of capital-intensive industries or technology-intensive industries is higher than other industries. From the regional level, different cities have different concentration of producer services, the center-periphery model is very obvious; ③ Demand structure, human capital and the level of opening can promote the agglomeration of the Jinan metropolitan producer services, but the government policy can inhibit the agglomeration of the Jinan metropolitan producer services.

### Key words:

producer service; spatial agglomeration; industry; region; Jinan metropolitan region

## The Spatial Differentiation and Influencing Factors of the Service Quality Of C2C Stores In Central China: A Case Study of Five Types of Taobao online stores

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### Abstract

The C2C e-commerce, such as clothing, hand bags, foods, cosmetics, personal electronics and household appliances, has played a major role in consumer market. Five types of stores on Taobao, one of the biggest online C2C shopping websites in China, are selected in this study. The location, type and service quality for each store in 88 city regions are collected from the website. The comprehensive service quality at provincial and prefectural levels is evaluated. The results show that the spatial differentiation of service quality is evident at provincial scale. The comprehensive service quality in the capital cities, the core cities of urban agglomeration and the economically developed cities is higher, while it is lower in peripheral area. At prefectural level, it shows a weak negative spatial autocorrelation, for example, Wuhan city and Chang-Zhu-Tan Urban Agglomeration is in the HL region with strong polarization effects. As for the characteristics of complex network, the provincial capital cities and the economically developed cities have high degree of centrality and form a “core - periphery” spatial layout structure with the core cities and a few strong comprehensive strength cities. At the same time, the centrality degree and agglomeration coefficient does not match and even shows an inversion phenomenon, which suggests that the agglomeration of service quality of C2C stores in central China is not strong and the trickle-down effect is not obvious.

### Key words:

C2C E-commerce; online stores; Taobao website; spatial difference; Central China.

## The Spatial Pattern and Influence Factors of Specialized Villages and Towns in China

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### Abstract

Based on these data of 1605 specialized villages and towns named One Village One Product (OVOP) in China, this paper makes analyses of spatial point pattern with methods of kernel density estimation and K function and analyses of spatial surface pattern with methods of spatial autocorrelation analysis and hot spot analysis and gets the following results: (1) The distribution of specialized villages and towns has an obvious spatial inequality. Especially, there were different kinds of specialized villages and towns, and most of them belonged to the planting-oriented, and so the proportion of nonagricultural-oriented was usually lower than others. (2) These regions with higher density are distributed around the Beijing-Tianjin region and these regions of Jiangsu, Zhejiang and Shanghai. The spatial structure showed a gradually decreasing trend from the center to its periphery. The result of quantitative measure with Ripley's K function shows the significant agglomeration of specialized villages and towns in spatial distribution. (3) The spatial autocorrelation analysis showed that the administrative region distribution of specialized villages and towns has an obvious characteristic of spatial cluster, and the distribution from the city-level administration is further analyzed. The result of GWR for the influence factors (the terrain, road, economic development) of agglomeration showed that the regression coefficient of each factor had significant spatial variation. The relevant government departments should improve the development environment for the specialized villages and towns in the existing resource endowments, and continue to make efforts to promote the OVOP specialized villages and towns.

### Keywords:

One Village One Product; specialized villages and towns; point pattern analysis; surface pattern analysis; agglomeration

## The Temporal-Spatial Analysis on Urban Office Space Functional Patterns in Beijing City

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### Abstract

This paper based on the 2009 and 2014 Beijing's office buildings point data and enterprises data that from Data Information Company as the study samples. Using statistical analysis and spatial autocorrelation analysis methods, discusses the present situation of the office space patterns and temporal-spatial evolution characteristics. The research shows that (1) The density distribution of urban office location gradually reduced from the inside to the outside, thus the location selection of the office activities is still in a centripetal force mainly. (2) Analyzing the changing characteristics of the industry in the four major office clusters, find that the four major office clusters play the different roles in the development of the city. (3) Urban office activities overall performance of clustering effect. High-high type is mainly located in the edge of the core area of the capital function; Low-low type is mainly distributed in the edge of development district of the capital function. (4) 2009-2014, Beijing office space is mainly on radiation pattern, continuously extended outward from the gathering area, thereby expanding the scope. (5) From the urban functions, the financial industry, technology services and the social services industry developed rapidly. But construction industry and transportation industry developed relatively slow in these five years.

### Key words:

Office clusters; Urban functional patterns; Spatial analysis; Temporal-spatial evolution; Beijing City

## C12.29 Marginalization, Globalization, and Regional and Local Responses

### Long Forgotten Backward Spaces in the Focus of Global Economy

#### Oral



Home

1. [Abrupt Structural Change Areas in the Finnish Regional Policy](#)  
Toivo Muilu (Natural Resources Institute Finland (Luke), Finland)
2. [Can Landscape Empower Rural Minorities? Eco-ethnicity in Highlands of India, China and Vietnam](#)  
Frédéric Landy (Université de Paris Ouest Nanterre, France), Raghubir Chand (University of Kumaon, India), Béatrice David (Université de Paris 8, France), Steve Déry (Université Laval, Canada), Olivier Ducourtieux (AgroParisTech, France)
3. [Development of Tourism in Mountain Areas and Representations of Landscape: A Comparative Analysis with case studies in India, Nepal and China](#)  
Évelyne Gauché (Université de Tours, France), Pierre Dérioz (Université d'Avignon, France), Frédéric Landy (Université de Paris Ouest Nanterre, France), Steve Déry (Université Laval)
4. [Diversification Économique Des Coopératives De Pêche Dans La Zone Pacifique Nord, Reserve de la Biosphère El Vizcaíno \(Basse-Californie du Sud, Mexique\)](#)  
José Manuel Crespo Guerrero (Instituto de Geografía (UNAM), Mexico)
5. [Economic Impacts on the Survival of Alpine Marginal Villages – A Comparative Case Study of Vrin and Vals in Switzerland](#)  
Shiyu Wei (School of Architecture, Tsinghua University, China)
6. [Farmers and Skills – Statistical Analysis of Spatial and Temporal Changes](#)  
Konrad Czapiewski (Institute of Geography and Spatial Organization PAS, Poland)
7. [Intermediate Space is Marginal](#)  
Hugo Capella Miterique (Universitat Illes Balears, Spain)
8. [Job Creation through Environmental Management in South Africa's Marginal Areas: a Critical Evaluation of the 'Working for Water' programme](#)  
Tony Binns (University of Otago, New Zealand), Etienne Nel (University of Otago, New Zealand), David Bek (University of Coventry, United Kingdom)
9. [Les Technologies De l'Information Et De La Communication Au Service De L'Insertion Efficace De l'Afrique Dans La Globalisation](#)  
Alain François Loukou (Université de Bouaké, Cote D Ivoire)
10. [Likahka in La Muskitia: Jellyfish as the Next Miskitu Boom Industry.](#)

Matthew Fahrenbruch (University of Kansas, United States), Peter Herlihy (University of Kansas, United States)

11. [Marginal Areas in Romania: a Study on the Accessibility to High School Educational Infrastructure](#)  
Raularian Rusu ("Babeş Bolyai" University of Cluj Napoca, Faculty of Geography, Romania), Iulia Hărănguș, Titus Man ("Babeş Bolyai" University of Cluj Napoca, Faculty of Geography), Ci
12. [Politics of Marginality Among the Kurdish Youth in Turkey](#)  
Ilhan Kaya (Yildiz Technical University, Turkey)
13. [Rich country – 'poor' regions: fighting regional disparities in Switzerland](#)  
Walter Leimgruber (University of Fribourg, Department of Geosciences, Geography, Switzerland)

## Poster

1. [Minerals out, E-waste in: the Role of Ghana in the Contemporary International Labor Division](#)  
Kaue Lopes dos Santos (Brazil, University of Sao Paulo)
2. [The Geopolitics of the European Union for Overseas Territories: Assimilation, Fragmentation and the Role of French Guiana in the Regional Context](#)  
Gutemberg Silva (Brazil, Professor to Political Geography in Federal University of Amapa)

## Abrupt Structural Change Areas in the Finnish Regional Policy

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### Abstract

The paper deals with problems caused by abrupt structural change to local labor markets and policy measures aiming to ease these problems in Finland. The areas in question have met region-specific employment shocks due to major job reductions or closure of a company. Major cause for these shocks has been problems in forest industry. In 2005–2013 nearly 20 paper mills and pulp factories were closed in Finland. This resulted one third cut down in production capacity and dismissal of about 8000 employees. Major part of these areas are small or medium-sized rural sub-regions or provincial centres in Eastern and Northern parts of the country. A common feature is dependence on one or a few large companies and public sector jobs. The Finnish government may classify such an area as an abrupt structural change area. Prior to naming the area(s) consequences and effects of problems are evaluated in terms of employment, production and economic structure. A plan to solve the crisis is jointly drawn up by the area's municipalities, the business community, the employment authorities and the regional council. In 2007-2014 more than 30 sub-regions or cities were named as areas of abrupt structural change. In the context of local labor markets regional differences were found in spatial mobility, where migration appeared more common than commuting between regions. In general, spatial mobility seemed to be more important in smaller labor markets. Results of the government policy on abrupt structural change are varying and region-specific, as are the effects of shocks.

### Key words:

abrupt structural change; local labor markets; regional policy; Finland

## Can landscape empower rural minorities? Eco-ethnicity in highlands of India, China and Vietnam

Frédéric LANDY<sup>1</sup>, Raghubir CHAND<sup>2</sup>, Béatrice DAVID<sup>3</sup>, Steve DERY<sup>4</sup>, Olivier DUCOURTIEUX<sup>5</sup>, Nadège GARAMBOIS<sup>5</sup>, Marion LEBIHAN<sup>5</sup>, Marion MOUNAYAR<sup>5</sup>

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### Abstract

Can rural landscape empower rural mountain dwellers? This paper provides an answer by asking two other questions. Why is rural tourism growing in some « marginal » Asian highlands and not in all of them? And why, in the regions with growing rural tourism, are « local people » impacted variously, from harsh detriments to diverse levels of benefits in terms of income and socio-political empowerment? Based on qualitative fieldwork research within the framework of the AQAPA international project *To Whom Landscape Belongs in Asia?*, this paper addresses these issues through the comparison of three case studies in India (Kumaon), China (Guizhou) and Vietnam (Lam Duong) mountains. Among others, it tests the following hypothesis: what we call eco-ethnicity - the double visibility of ethnic and environmental identity of a group - explains to a large extent the various levels of involvement in tourism growth and the empowerment of local groups. Their identity may be recognized or not by dominant actors such as governments at various administrative levels or private companies, instrumentalized or not in tourism policies and corporate strategies. Identity can also be used by some local people themselves in order to get benefits from tourism by promoting some specific landscape, possibly at the expense of other local stakeholders, activities, or landscapes.

### Key words:

landscape; eco-ethnicity; India; China; Vietnam

## Development of Tourism in Mountain Areas and Representations of Landscape: A Comparative Analysis with case studies in India, Nepal and China

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### Abstract

This paper is focused on the contemporary evolution brought by tourism in the cultural representations of landscapes (common landscape vs landscapes of exception) within the local people, through a compared analysis between three Asian mountain areas which have in common to be involved in a tourism growth process, and to be inhabited by ethnic minorities, Shuis (Guizhou, south-west China), Bhotiyas (Kumaon, Uttarakhand, India), Gurungs, Tamangs and Magars (Annapurna massif, Nepal). Based on interviews and direct observation of landscapes, this comparative study first aims to characterize these different tourist systems (key stakeholders, strategies, importance of tourism within the local economy...). A special attention is also paid to the type of landscapes which are used as resources by the tourist activities, and to the current transformations of these landscapes, some brought by tourism, and some due to other factors (urbanization, new roads, agricultural or pastoral decline...). All these territorial dynamics – including tourism – are studied for themselves but also for what they reveal of the traditional representations of the landscape (what is valuable in the landscape, and for what reason? Which part of the territory deserves to be shown to the tourists, and which are not worth it – or have to be kept only for local use?). As tourism is here considered as a “social transaction” between local “hosts”, operators (local vs outsider) and “guests” (clients), our work also tries to understand what part tourism business and tourism cultural exchanges take in the change in these representations, among other possible factors.

### Key words:

Landscape representations; tourism development ; territorial dynamics ; Asian mountain areas

## **Diversification Économique Des CoopÉRatives De PÊche Dans La Zone Pacifique Nord, Reserve De La BiosphÈre El VizcaíNo (Basse-Californie Du Sud, Mexique)**

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### **Résumé**

La Réserve mondiale de la Biosphère « El Vizcaíno » dans la commune de Mulegé, État de Basse-Californie du Sud est l'espace naturel protégé le plus étendu du Mexique. La Réserve a été créée en 1988 par Décret présidentiel. En 2000, l'Institut National de l'Écologie publia le Programme de Gestion pour contrôler les usages des ressources naturelles pour obtenir le développement durable. Parmi les ressources à gérer, le secteur de la pêche compte sur plusieurs coopératives localisées dans ce secteur, nommé « Pacifique nord ». Les huit coopératives en activité dans la zone sont groupées dans une fédération, ce qui leur permet d'agir comme une unité coordonnée, dynamique, compétitive et professionnalisée. Un des principes de la fédération est donner réponse aux besoins élémentaires de leurs travailleurs au moyen de la couverture sociale, sanitaire et, en plus, cultural et sportive. Les transformations instituées par le Programme de gestion ont permis la certification des coopératives par une « éco-étiquette bleue » qui reconnaît la « pêche durable certifiée », sur la base de la responsabilité sociale et l'engagement environnemental des coopératives. En plus de la pêche artisanale de base communautaire, ces dernières années, les coopératives ont commencé à prospecter dans d'autres secteurs économiques : industrie de conserve de poissons, aquaculture et tourisme. Par une approche multiscale, cette communication vise à contribuer à montrer comment l'implication d'acteurs variés (public, privés, coopératifs, locaux, nationaux, internationaux) a permis une diversification économique locale, permettant aux pêcheurs de conserver un grand pouvoir de décision.

### **Mots-clés :**

Coopératives des pêcheurs; tourisme; aquaculture; pêche; Basse Californie Sud; Mexique



## Economic Impacts on the Survival of Alpine Marginal Villages – A Comparative Case Study of Vrin and Vals in Switzerland

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### Abstract

From 1950, Swiss economics has been irreversibly centralizing - regional centres keep growing while marginal villages are in continuous degradation. Vrin and Vals, located in the deep alpine valley and close to each other, are categorized as the smallest and weakest villages in “social-economic map” of Graubünden. In the past, due to the lack of tourism and other profitable industries, they only depended on traditional agriculture and few subsidies from the federal government and local organizations. The economic troubles then caused a mass exodus of local residents, which exacerbated the degradation in turn.

The first part of this paper explains the economic activities involved respectively in Vrin and Vals when they were faced with social and economic difficulties. In 1979, “Stiftung Pro Vrin” was founded and developed a specific economic model to improve agricultural efficiency. Meanwhile, Vals brought in new industries through construction and export activities. Detailed history research combined with site investigation is made to clearly understand the process. Based on statistic analysis, the second part of this paper tries to describe and predict the trends of population, employment and spatial quality in Vrin and Vals from 1845 to 2045, revealing the distinct differences of economic impacts in the transformation of these two villages - Vrin is dying while Vals starts to thrive. The last part of this paper explores the reasons. It proposes the key roles of new economic activities and industries in periphery’s revitalization, and inspires on a new survival pattern for marginal regions in urbanization.

### Key words:

alpine marginal villages in Switzerland; Vrin; Vals; economic impacts; statistic analysis; population and employment trends; spatial quality

## Farmers and Skills – Statistical Analysis of Spatial and Temporal Changes

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### Abstract

Human resources, and in a particular manner their quality, play the key role in regional development. Depending on the quantity and quality of these resources, they can constitute either an essential barrier to or a stimulator of development. It is held that one of the most important factors, allowing for the achievement of success by the territorial units and sectors of economy (i.e. agriculture), particularly within the multifunctional rural development concept.

Taking into account the above mentioned the main objective of the presentation is: analysis of structural changes in the level of farmers' education in Poland in spatial terms during the period 1986-2010. For this purpose, the spatial econometric models will be used, i.e. one form of spatial regression model: SLM (Spatial Lag Model) - models with spatially offset variable (variable spatial autocorrelation) or SEM (Spatial Error Model) - models with spatial autocorrelation of the random component. The results will be presented with using a cartographic method.

### Key words:

educational level; farmers; statistical methods; cartographic methods; Poland

## Intermediate space is Marginal

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### Abstract

The concept of intermediate space has been hidden by the discussion of dependence. The interdependence from center and periphery makes invisible all the intermediate process. From this perspective, the concept of intermediate it is revealed to be the true element of marginality. Its omission ends to a lack of entity unlike even worse than the sense of negation from center in periphery.

What is intermediate? What does mean? What role has played and plays today? Those ones are some of the questions we will try to answer, from a plural perspective, but focused on mainly geographical and spatial perspective. Behind this unknown and anonymous space will see a land of freedom and diversity ready to be discovered and understood, as the real connector, or center.

### Key words:

Intermediate; margin; connector; diversity.



## **Job Creation through Environmental Management in South Africa's Marginal Areas: A Critical Evaluation of the 'Working for Water' Programme**

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### **Abstract**

Following the demise of apartheid in 1994, South Africa in 1995 embarked on an ambitious alien vegetation clearance and job creation strategy called the 'Working for Water' programme. The programme sought to marry the desperate need to create employment for unskilled and unemployed people in post-apartheid South Africa, with the parallel need to remove alien vegetation from catchment areas suffering from water-poverty, in an effort to increase available stream flow which had reduced over decades as a result of infestation by alien plants. The programme met with mixed success in terms of achieving its original objectives, but has persisted for 21 years, and has been recognised internationally as one of the most significant state interventions of its kind in the world. Significantly, the programme has evolved in recent years to draw on the inputs of NGOs and the commercial farming sector. This paper will examine the evolution of the programme and critically evaluates the impacts and possible outcomes of the new programme interventions, with particular reference to South Africa's Western Cape province.

### **Key words:**

Water; Poverty alleviation; Invasive vegetation

## Les Technologies De l'Information Et De La Communication Au Service De L'Insertion Efficace De l'Afrique Dans La Globalisation

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### Résumé

En dépit des ressources naturelles abondantes dont dispose l'Afrique, sa part dans les échanges économiques mondiaux est extrêmement faible, se situant autour de 3% (Organisation Mondiale du Commerce, 2014), alors qu'elle regroupe environ 15,5% de la population mondiale (Institut national d'études démographiques, 2013). Ce constat souligne que l'Afrique est assez mal intégrée au système des échanges internationaux. Certes, la faiblesse de production de biens et services à valeur ajoutée est l'une des raisons fondamentales de cette marginalisation. Cependant, il importe aussi de questionner la façon dont ce continent a jusqu'ici essayé de s'atteler à la globalisation. Il ne suffit pas de disposer de ressources naturelles abondantes pour occuper une place importante dans les échanges mondiaux. La disponibilité de moyens divers de communication pour se connecter au reste du monde est aussi une condition primordiale. Dans le contexte d'économie de l'information qui gouverne en partie la globalisation, les Technologies de l'Information et de la Communication (TIC) se révèlent de plus en plus être un facteur capital de l'insertion des États et des continents dans ce processus. Or comparativement au secteur des moyens classiques de communication où l'Afrique est beaucoup sous équipée, celui des TIC est relativement bien développé sur l'ensemble du continent malgré une fracture numérique évidente par rapport aux autres continents. A partir de ce constat, le postulat est que cet acquis constitue un facteur pour mieux insérer le continent dans la globalisation, considérant que ce processus serait fortement lié aux TIC.

### Mots clés :

Globalisation; Technologies de l'Information et de la Communication; Afrique; marginalisation; insertion

## Likahka In La Moskitia: Jellyfish as the Next Miskitu Boom Industry

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### Abstract

The indigenous Miskitu of Honduras and Nicaragua have existed on the periphery of the region's dominant Spanish hegemony since colonial times, yet at the center of a series of boom and bust commodity markets that have periodically connected them to the global economy via western markets. Since colonial times, the Miskitu have worked as wage-laborers and traders in various export economies including bananas, lumber, minerals, sea turtles, and lobster. While traditional subsistence activities still pervade their culture, cash income and commercial goods have come to define the Miskitu way of life. Life is good while the resources are flowing, but when the market busts the companies move out, leaving socioeconomic depression. In recent years, the traditional western orientation of the Miskitu has shifted towards East-Asia as markets have developed for edible jellyfish and other specialty seafood products. Jellyfish has been exploited in East-Asia for at least 1700 years as food and traditional medicine, however, high demand and fishery degradation has resulted in a commodity shortage and the entrance of non-traditional producers. We report here on the emerging industry among the Miskitu. Like many non-traditional producers, the Miskitu are not consumers of jellyfish and it does not figure prominently into their moral economy, however, it may be the next chapter in the boom and bust history of the local region, and a microcosm of a larger trend of East-Asian commodity chain development in peripheral regions of the world.

### Key words:

Global Foods Chains; Indigenous Peoples; East-Asia; Latin America; Seafood

## Marginal Areas In Romania: A Study on the Accessibility to High School Educational Infrastructure

Rusu R., Hărănguș I., Man T., Moldovan C., Ionescu-Heroiu M., Dezi Șt., Rusu D., Matei L.

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### Abstract

Access to free education is a fundamental right all over the world. In Romania, education is compulsory for the first 11 years of school, for children aged approximately 6 to 16 years old. This means that children have to go to the primary school (the first 5 years, from 6 to 10 years old), the gymnasium (the next four years, from 11 to 14 years old) and the first two years of high school. While primary and gymnasium education is usually provided within the same elementary schools, which are rather evenly distributed throughout the country, high schools are mainly located in the cities and few of them in large villages. It comes out that many teenagers living in the rural areas must commute to the nearest high school in order to continue their (compulsory) studies. This paper assesses the accessibility issues faced by high school pupils, taking into account the Romanian network of high schools and the existing road and railway infrastructure. The analysis is focused on the marginal areas, located at distance from any high school, where public transportation is also poor. While education is theoretically free, the authorities must also take measures to make it accessible to everyone.

### Key words

Marginal areas; Romania; education; high schools; accessibility; infrastructure

## Politics of Marginality Among the Kurdish Youth in Turkey

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### Abstract

In this paper, I look at the marginalization of the Kurdish youth in Turkey and their resistance to the politics of the state. I argue that people involved in violent terrorist activities are often portrayed irrational beings without any sense of integrity for human life. This mindset dehumanizes people involving in the terrorist events and often views them something to be exterminated to secure the life of ordinary people. This view shadows the real reasons behind long term disagreements resulting in violent conflicts among different groups and ignores the deep sense of alienation, discrimination and otherness, and the frustrations that those with lack of power face. Based on the interviews conducted, I argue that when one looks at the involvement of the Kurdish youth, she or he will see that they are not irrational beings designed for killing and terrorizing other people. They are real people with real feelings suffering from long-term institutional discriminations, injustices and alienation and feeling desperate to change the existing order.

### Key words:

Ethnic conflicts; marginalization; institutional discrimination; Kurdish youth

## Rich Country – ‘Poor’ Regions: Fighting Regional Disparities In Switzerland

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### Abstract

Regional disparities are common situations across the world, in countries rich and poor, and occur at all scales. It is the goal of regional policy to reduce them to an acceptable level (whatever this means). Switzerland, one of the richest countries in the world, has developed various instruments to reduce regional inequality. The political system, however, faces severe challenges given the difficulties of the public budgets (threatening deficits, rising debts) and the influence of the neoliberal market economy philosophy. The state is reviewing its position in this field, trying to reduce its engagement and reorganize redistribution without negatively influencing the aim of disparity reduction.

The paper looks at the current situation of regional policy in Switzerland, the domestic factors of inequality, and the role global economic uncertainties (economic stagnation, floating currencies, political instabilities) play with respect to a small (and yet big) country, both nationally and regionally. It focuses on the fiscal equalization scheme, a regional policy instrument to reduce the financial disparities between the Swiss cantons that appeals to the solidarity between regions.

### Key words:

regional disparities; regional policy



## Minerals out, E-Waste in: the Role of Ghana in the Contemporary International Labor

### Division

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#### Abstract

The Ghanaian territory has a rich variety of mineral resources – such as gold, manganese, bauxite and diamonds – which have been exploited since the late twentieth century by large foreign corporations, when the country executed neoliberal reforms. Export of minerals is a key component of the country's international, bringing substantial foreign exchange to the state. At the same time, due to the lack of industrialization in its economy, Ghana has also become highly dependent on secondhand manufactured goods e.g. electronic goods (but also vehicles and clothes) imported from Europe and North America. Often these goods cannot be reused for their original function and become electronic waste (e-waste) accumulated in Accra neighborhood of Agbogbloshie. Thus, this presentation seeks to analyze the role of contemporary Ghana in the International Labor Division.

#### Key words:

Ghana; Mining; E-waste; international Labour Division; Capitalism

## **The Geopolitics of the European Union for overseas territories: Assimilation, fragmentation and the role of French Guiana in the regional context**

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### **Abstract**

Located in the north of South America, French Guiana in its outermost condition, is part of an important geographical position for the European Union (EU). From the analysis of documents about the outermost regions (OR's), reports concerning the results of recent European fundings for the regional integration of French Guiana; as well as analysis of the importance of Kourou spaceport for the EU, it is possible to indicate the following guiding question of this article: What are the reticular-territorial joint strategies adopted by the European Union in the specific case of French Guiana? In the first section, we discuss the construction of priorities and investments for the OR's in general, however, we established more detailed analysis of French Guiana. In the second section we analyze two subjects: a) the European strategies and the impact on the Guiana when using the Kourou spaceport; b) some of the results of the first edition of POAmazonia (2007-2013), attempting to assess accurately and updated the regional geopolitics in which French Guiana is inserted through the European guidelines.

### **Key Words:**

Geopolitics; Outermost Regions; POAmazonia; French Guiana.

## C12.30 Mediterranean Basin

### The Mediterranean Within Global Contexts



Home

#### Oral

1. [Renewing the “Marco Polo’s” Way: The Increasing Role of the North Adriatic Ports Within Tthe Eurasian Transportation System](#)  
Milan Bufon (University of Primorska, Slovenia), Miha Koderman (University of Primorska, Slovenia)
2. [Sustainability as an institution. With Emphasis on the Mediterranean countries](#)  
olivier lefebvre (Olivier Lefebvre Consultant, France)
3. [The Mediterranean: Bridging, Bordering and Cross-bordering in a Global Mobile Reality](#)  
Maria Paradiso (University of Sannio, Italy)
4. [The Practice of LGBT Sports in Mediterranean Countries: from Closed Networks to Political Statement](#)  
Antoine Le Blanc (Université du Littoral TVES, France)

#### Poster

1. [University Development and Urban Change in the Town of Sousse Erriadh District in Tunisia](#)  
Imen Zâag (Tunisia, Research laboratory Syfacte, Sfax)

## Renewing the “Marco Polo’s” way: The increasing role of the North Adriatic ports within the Eurasian transportation system

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### Abstract

The paper will discuss the increasing role of the North Adriatic ports within the Eurasian transportation system. The North Adriatic thus not only represent the shortest maritime gateway in traffic communication between the EU heartland and the most dynamic economic areas of Eastern and South-Eastern Asia, but it also re-acquiring its historical role in strengthening the Eurasian macroregional economic system. The paper will provide the development stages and the different development perspectives given by the renewal of the “Marco Polo’s” way, but will also discuss some hindrances present in the North Adriatic region, represented by its quite complex political geographical structure and therefore a more fragmented and not sufficiently integrated port and logistic system. These development obstacles also derive from the difficult implementation of an integrated cross-border vision within the North Adriatic EU members. The paper will show how the discussed case-study opens the need for a more appropriate governance of different horizontal (spatial and sectorial) as well as vertical (hierarchical) policies in planning cross-border cooperation or social and spatial (re)integration of borderlands and population, especially if we try to create a more sustainable and “long-lasting” development plan for our increasingly globalized and co-dependent future European “common home”.

### Key words:

Eurasian maritime connections; North Adriatic; Port of Koper; Slovenia; Geopolitics; Geography of transportation

## Sustainability as an Institution..With Emphasis on the Mediterranean Countries

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### Abstract

Even in case of dire emergency (like wars) a society achieves tasks through institutions. Hence the interest of studying sustainability as an institution (according to the French sociologist Mauss a word can be an institution). Paramount is the working of a “neutral terrain” (according to the French anthropologist Van Genep) or a communication terrain where experts and the Opinion use the same words even if their meaning is very different for each party. For instance the famous “black swan” is a high normalized kurtosis for experts and ... a rare animal for Opinion. Other examples are (1) the precautionary principle (2) the “Christmas Turkey” (metaphor of carelessness) (3) the ecocide (in this case the dialogue is in its infancy (4) etc. Experts bank on scientific knowledge and the Opinion is sensitive to images (the Blue Planet seen from satellites, black oil on beaches ...) and metaphors (“we sleep when our beds are burning”). The “neutral terrain” of Van Genep is awkward and should be full of rites. It is occupied by “passeurs” (a French word uneasily translated into “mediators”). They have to have tact.

In the Mediterranean countries the need for this dialogue is exaggerated. These countries need efficient States and a middle class “aware” of the environmental stakes. At least, when researchers study the topic, it strengthens the hopes.

### Key words:

Sustainability; Mediterranean countries

## The Mediterranean: Bridging, Bordering and Cross-bordering in a Global Mobile Reality

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### Abstract

If we look at the Mediterranean only as a space, a dissonant geography is obvious. Its diversity is mistakenly reduced in a process of 'diorthosis', a cognitive and operational approach that starts from assuming the nature of things and functionality modes rather than arriving at a proper image via actual analysis. The study of flows, of networks – i.e. the circulation of ideas, people, finances, and so on – challenges the continuous representation of the Mediterranean between homogeneity and otherness, and re-positions it as both a post-colonial imbricate site of encounters and currents and as a site of new hegemonic and counter-power discourse(s) and alliances. This presentations explores the 'mobility' paradigm as an initial approach to contemporary geographies of the Mediterranean. The latter are being created not only by the media, powers and ideologies, but also by everyday people's inter-ethnic, inter-cultural, and emotional interactions in places and digital communication channels. Such interactions are often characterized by blockages of inter-ethnic or inter-cultural exchanges, as well as by inequalities. It seems to me that the internet and people's spatial mobility underline a deep process of change for the Mediterranean. A dialectic of diaspora politics, circuits of funds, weapons, empowerments, and emotions, challenge the boundaries of political communities in transformation. The Mediterranean thus appears as a global space of confrontation, emulation, opposition, dialectics, and change. Places, flows, wires and digital TV are the loci for all this. There is no assumption of 'Mediterranean as a bridge of cultures'; instead, we all are actors in networking communities.

### Key words:

Mediterranean; global space; mobility

## The Practice of LGBT Sports in Mediterranean Countries: from Closed Networks to Political Statement

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### Abstract

In most Mediterranean countries, lesbian and gay sports clubs are rare, and their spatial practices indicate a high risk perception and management, in response to hostile contexts for LGBT (lesbian, gay, bi, transgender) communities. Their analysis is very revealing about social, cultural and spatial standards and norms in these countries. The creation of alternative sports places, designed or chosen by specific groups in order to challenge the dominantly heterosexual and masculine norm, highlights the violence and the gendered nature of ordinary social and spatial patterns, by setting up different standards, at various scales: creation of secured and temporarily isolated territories, strong local and international networks, high mobility and flexibility, setting up symbolic territorial markers... This paper uses the risk management approach to understand these patterns, since this perspective can bring light on the motivations of individuals choosing to refer to specific communities: the paradoxical process of marginalization chosen by a group of people in an attempt to reach more safety, but combined with a non-consensual objective of de-marginalization, can be analyzed more broadly as a social, cultural and political marker, and the evolution of LGBT sports clubs and tournaments in Mediterranean countries is quite revealing as to the more general trends and changes in this particular region. These adaptations to certain political and social contexts may even entail original forms of collaborations; for instance the LAT41 LGBT sports tournament is a joint Spanish and Italian organization.

### Key words:

Sports, associations, gender, LGBT, risks, Mediterranean

## University Development and Urban Change in the Town of Sousse Erriadh District in Tunisia

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### Abstract

The redistribution of consecutive Tunisian academic institutions to the rapid growth in student numbers has allowed medium-sized cities such as Sousse to gradually give this new feature gradually university cities. Also, the infrastructures of higher education seem to have a powerful authority involved in the dynamics of the territories where they are located and help to increase the resilience of regions.

locating a " Campus" university that extends from the east side and south of Erriadh city, which is a new suburb of the city of Sousse, is part of the new urban development policies that looking to create some socio-economic and urban dynamics through geographical redistribution of academic institutions in the Tunisian cities. This corresponds in principle to a major societal challenge that despite this university location has not been set in the PAU urban development plan of the district. This location will undoubtedly bring new joints in local activities and entertainment to the urban life of the city, but on the other hand and as this localization was not programmed, it gave negative effects such as overload housing following the increased demand due to the presence of large number of students.

Through this work we will present the changes in the city following the implementation of this unplanned equipment in the planning of the area documents.

### Key words:

University; urban planning/development; city; transformation.

## C12.31 Modeling Geographical Systems

### Geocomputation and Modelling of Geographical Systems



Home

#### Oral

1. [A Bayesian-based Markov Chain Monte Carlo Method for the prediction of air pollution in the Urban Environment](#)

Yee Leung (The Chinese University of Hong Kong, China), Wei Fu Ding (BeiFang University for Minority, China), Jiang She Zhang (Xi'an JiaoTong University, China )

2. [A GIS Based-Index Model for Predicting High Risk Tuberculosis Occurrences in Malaysia: A Case Study in Selangor](#)

Abdul Rauf Abdul Rasam, Noresah Mohd Shariff (Geography Programme, School of Distance Education, Universiti Sains, Malaysia), Jiloris F Dony (Ministry of Health Malaysia, Malaysia)

3. [A GIS-Multicriteria Approach for Urban Rain Gauge Siting Selection](#)

Changfeng Jing, Yanli Fu (School of Geomatics and Urban Spatial Information of Beijing University of Civil Engineering and Architecture, Beijing, China, China)

4. [An Agent-Based Procedure with an Embedded Agent Learning Model for Residential Land Growth Simulation: the Case Study of Nanjing, China](#)

Feixue Li (Nanjing University, China), Keith Clarke (University of California, Santa Barbara, United States), Zhengkai Xie, Manchun Li, Zhenjie Chen (Nanjing University, China), Jian Liang

5. [An Application of Spatial Sampling in Search Engine Query Data](#)

Dacang Huang, Jinfeng Wang (State Key Laboratory of Resources and Environmental Information Systems, Institute of Geographic Science and Natural Resource Research, Chinese Academy of Sciences, China)

6. [Bayesian Networks Deploying Factors from Crop, Climate and Farming Management to Predict Winter Wheat Powdery Mildew Injury in Hebei Province, China](#)

Xiping Wang (Hebei Normal University, China)

7. [Data Enrichment Approach for Automatic Generalization Implementation of Rupa Bumi Indonesia \(RBI\) Maps](#)

M. Warizmi Wafiq, Noorhadi Rahardjo (Geographical Information Science, Faculty Geography, Universitas Gadjah Mada, Indonesia)

8. [Defining Korean Mountainous Areas on the Basis of Agent-based Modelling](#)

Hyesop Shin, Woojin Shim, SooJin Park (Seoul National University, South Korea), Hakgi Sohn (Korea

Rural Economic Institute, South Korea)

9. [Developing and testing the new nitrogen index in Chao River basin, North China](#)  
Pang Shujiang, Wang Xiaoyan (Capital Normal University, China)
10. [Evaluating Service Coverage of Evacuation Facilities based on Mobile Phone Data](#)  
Kamyong Kim (Kyungpook National University, South Korea), Gunhak Lee (Seoul National University, South Korea)
11. [Evolution of Regional Differentiation in Mainland China](#)  
Zheng Wang (Institute of Policy and Management, Chinese Academy of Sciences, China ), Haibin Xia (Key Laboratory of Geo Information Science, East China Normal University, China )
12. [GIS in Developing a Grid-based Distributed Hydrologic Model for Urban Storm-inundation Simulation](#)  
Abhisek Chakrabarty (Vidyasagar University Midnapore, India)
13. [HSAR: An R Package for Integrated Spatial Econometric and Multilevel Modelling](#)  
Guanpeng Dong, Richard Harris (University of Bristol, United Kingdom), Angelos Mimis (Panteion University of Social and Political Sciences, Athens, Greece)
14. [Indication of Archaeological Site Locations in the Region of Ukok Plateau \(Altai Mountains\) based on GIS-analysis](#)  
Anastasia Glebova, Igor Sergeev (St. Petersburg State University, Institute of Earth Sciences, Russian Fed)
15. [Minimum Spanning Tree in Landscape Mosaic](#)  
Wojciech Pomianowski, Jerzy Solon (Institute of Geography and Spatial Organization, Polish Academy of Sciences, Poland)
16. [Simulation of Agricultural Land Transitions at City Fringes](#)  
Suranga Wadduwage (School of Environment, Flinders University, Sturt Road, Bedford Park, SA 5042, Australia., Australia)
17. [Spatial-temporal Evolution Analysis Of Per Capita GDP in Jiangsu Province Based On ESDA-GWR](#)  
Cheng Xin, Zhang Yunpeng (Nanjing Tech University, China)
18. [The changes and the Structure Decomposition Analysis of the carbon emissions embodied in trade of China from 2002 to 2010](#)  
Leying Wu, Zhangqi Zhong, Guanqun Ding (East China Normal University, China), Zheng Wang (Institute of policy and management, Chianese Acadamy of Sciences; East China Normal University,

China)

19. [The Spatial Distribution and Change of Chinese Population Constrained by the Natural Endowments in Agent-based GIS](#)  
xia haibin (East China Normal University, China), zheng wang (Institute of Policy and Management, Chinese Academy of Sciences, China)
20. [Theoretical and Methodological Perspectives of CA-Based Urban Expansion Model in the Era of Big Data](#)  
Chang Xia, Haijun Wang (wuhan university, China)
21. [Urban Expansion Simulation Based on the Combination of Dynamic Association Rules and Cellular Automata](#)  
Peng Xie (School of Resource and Environment Science, Wuhan University, China)
22. [Using Rule-Based Model to Predict the Spatial Distribution of Soil Cd Concentrations of Guangdong Province](#)  
Sun Hui (Shanxi Agriculture University, China), Guo Zhixing (Guangdong Institute of Eco Environment and Soil Sciences, China), Bi Rutian (Shanxi Agriculture University, China), Yuan Yuzhi (Guangdong Institute of Eco Environment and Soil Sciences, China),
23. [Water Balance of Selected Fluvial Lakes in the Upper Benue Valley Adamawa State, Nigeria](#)  
Abdullahi L. Tukur, Ezekiel Yonnana (Department of Geography, Adamawa State University Mubi, Adamawa State, Nigeria, Nigeria), Aishatu Mubi

## Poster

1. [A Geospatial Query Mode Based on Geographical Entity Natural-Language](#)  
Chen Wan Peng; Yang Fei (China, Information Engineering University); LI Bing (China, Henan Polytechnic University)
2. [A New Method for Extraction of Alluvial Fans from Digital Elevation Model \(DEM\)](#)  
Abolghasem Goorabi (Iran, University of Tehran)
3. [A Review of Employment Location Models for Metropolitan Areas Abroad](#)  
Shuo Yang (China, Institute of Architectural and Urban Studies, Tsinghua University)
4. [Crime Mapping and Hotspot Analysis for Predictive Modelling: A Case Study of Shimla City](#)  
Ritvik Chauhan; Vijay Baraik (India, Indira Gandhi National Open University, New Delhi)
5. [Distinction of 2D and 3D Digital Geomorphometry in Earth Sciences Researches](#)  
Abolghasem Goorabi; Ataollah Abdollahi kakroodi (Iran, University of Tehran)

6. [Improvement and Evaluation of k-Nearest Neighbor Supervised Classification Method for High Resolution Remote Sensing Image Based on Geostatistical Models](#)  
Yingxia Pu; Xinyi Zhao; Zhibin Jin (China, School of Geographic and Oceanographic Sciences, Nanjing University)
7. [Measuring Spatial Segregation with R](#)  
Seong-Yun Hong (South Korea, Kyung Hee University)
8. [Minimal Runoff and Hydrological Droughts in Basins Transcarpathian Rivers in the Condition of Climate Change](#)  
Valeriya Ovcharuk; Inna Semenova; Tonkoshkura Victoriya(Ukraine, Odessa State Environmental University)
9. [Modeling of the Forming Spring Flood Runoff on Plain Rivers of Ukraine](#)  
Valeriya Ovcharuk; BEugene Gopchenko (Ukraine, BOdessa State Environmental University)
10. [Soil Mapping Classification in Urban Areas in Presidente Prudente - São Paulo-Brazil](#)  
Janaina Natali Antonio (Australia, UNSW)
11. [Spatial Agent-base Simulation for Dengue Fever—A Case Study of Guangdong Province, China](#)  
ShengYin Wang; ZeDong Chen; Yu Liu(China, Peking University)
12. [Spatial and Temporal Variability of Macronutrients at Two Conventionally Paddy Cultivation](#)  
Hasliana Kamaruddin; Nor Aizam Adnan (Malaysia, university technology mara); Muhamad Radzali Mispan (Malaysia, MARDI)
13. [The Current Situation and Potential Evaluation of Sino German Bilateral Trade Based on Gravity Mode](#)  
Junling Zhang; Yuze Zhang; Xiaoqing Zhang (China, Shandong Normal University)
14. [Tropical Forest Change Detection in last 25 years in Xishuangbanna, China, Based on CLASlite Model](#)  
Rafael Chaparro; Jinliang Wang; Jia Li (China, College of Tourism & Geographic Sciences, Yunnan Normal University)

## A Bayesian-based Markov Chain Monte Carlo Method for the Prediction of Air Pollution in the Urban Environment

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### Abstract

Air pollution in cities has become an environmental hazard with serious health implications. It is particularly an important issue under climate change. Obtaining an accurate spatial and temporal profile of air pollutant distribution is crucial to the mitigation of air pollution in the urban environment. Spatial temporal interpolation techniques analyze the correlation of the data in the spatio-temporal space, and then estimate and predict the air pollution concentration of the un-sampled locations. Because of the relatively undesirable performance of the conventional interpolation methods, we propose a flexible Bayesian framework for the prediction of air pollution concentration that integrates the prior information obtained from mobile human and other sensors through spatio-temporal kriging, and derive the posterior distribution of the air pollution profile. In order to overcome the non-existence of an analytic formulation of the posterior distribution, we draw the samples from the posterior distribution with the Markov Chain Monte Carlo (MCMC) method, and approximate the population characteristics with the sample characteristics. The estimation problem of the target distribution is thus effectively solved. We evaluate the proposed method by applying it to the air pollution data in Hong Kong. The experiment shows that our algorithm outperforms the state-of-the-art algorithms in terms of efficiency, accuracy and robustness.

### Key words

Spatio-temporal kriging; air pollution; Bayesian inference; Markov Chain Monte Carlo

## A GIS Based-Index Model for Predicting High Risk Tuberculosis Occurrences in Malaysia: A Case Study in Selangor

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### Abstract

The state of Selangor in Malaysia was reported to have more than 4000 cases in 2015, where 31 percent of the cases occurred in the district of Petaling, thus it needs an intervention method to boost the existing TB detection and performance. A geographical information system (GIS) based index model is an alternative method developed for estimating potential high risk areas of local TB. It is a multi-criteria decision making (MCDM) method utilized for ranking common environmental risk factors of the global TB using a five score scale and selection criteria. The score values are then combined with an expert weight value to determine the total score for each of the factors and their overall index values. A ranked map of predictive risk areas are produced and validated using historical TB cases in 2015 for the model accuracy. It is revealed that the potential high risk areas in Section 17 and Section U19 are 34.85% and 71.43% respectively, covering from medium to very high class. Section U19 shows higher risk spots than Section 17 and this predicted result is also consistent with the findings gained from visual comparison with the cases in 2015. However, the model accuracy for Section 17 (80%) is more accurate than Section U19 (76%) because the majority of the cases in Section 17 are located in the potential risk areas. The tuberculosis infection would be easily transmitted in urban and crowded environments in Petaling. A GIS-based index model has capabilities to be applied in TB screening and vulnerability monitoring of high risk groups in Selangor.

### Key words:

Tuberculosis; risk analysis; GIS; index model; MCDM; Selangor

## A GIS-Multicriteria Approach for Urban Rain Gauge Siting Selection

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### Abstract

In light of conventional sitting selection methods do not take into consideration of geographic surroundings and spatial-temporal scale for the urban rain gauge site selection, this paper primarily focus on finding the appropriate sitting selection rules and methods for rain gauge in urban areas, taking Beijing for study case. In urban small area, the rainfall precise estimation is influenced by distribution and density of rain gauges. Therefore, an approach for rain gauge siting based on GIS and multicriteria is proposed to optimize location. The detailed step is depicted as below: using spatial kernel density could take into account the aforementioned problem on the aspect of rain gauge site selection; GIS buffer analysis is used to optimize the location with the rain gauge signal transmission character. Additionally, the reasonability of the results is validated by cross-validate method with the three-time rainfall real data. Experiment results show that the rules and the proposed method are proper for the rain site selection in urban areas, which is significant for the sitting selection of urban hydrological facilities and infrastructure, such as water gauge.

### Key words:

rain gauge; site selection; multicriteria; kernel density

## An Agent-Based Procedure with an Embedded Agent Learning Model for Residential Land Growth Simulation: The Case study of Nanjing, China

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### Abstract

The bottom-up approach in geo-simulation, especially agent-based modelling (ABM), is commonly used to simulate urban land growth. A key challenge of ABM for the simulation of urban land-use dynamics in support of sustainable urban management is to understand and model how human individuals make and improve their location decisions that then shape urban land-use patterns. To investigate this issue, we focus on modelling the agent learning behavior in residential location decision-making process, to represent individuals' experience and learning from one another during their decision-making. We have constructed an extended reinforcement learning model to represent the human agents' learning characteristics when they make location decisions. Consequently, we propose and have developed a new agent-based procedure for residential land growth simulation that incorporates an agent learning model, an agent decision-making model, a land use transformation model, and the impacts of urban land zoning. The proposed procedure was first tested by using hypothetical data. Then the model was used for a simulation of the urban residential land growth in the city of Nanjing, China. By validating the model against empirical data, the results showed that the procedure we proposed is an improvement to the existing ABMs for urban growth simulation. In addition, adding agent learning made the simulation more realistic and contributed to the representation of the agent's adaptive locational behavior.

### Key words:

agent-based procedure; agent learning; reinforcement learning model; residential land growth; agent decision-making model; Nanjing city

## An Application of Spatial Sampling in Search Engine Query Data

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### Abstract

Search engine query data, such as Google trend and Baidu index, have been used to track the diseases happening around the world. The most typical example is the Google flu trend, which is also a typical application of Big Data in public health. Due to different socio economic status, different regions may have different quality of search engine data. In this article, we will address a novel spatial sampling technique named Biased Sentinel Hospital-based Area Disease Estimation (B-SHADE) to find the bias of search engine data in space and minimize them. By combining the revised search engine data and the historical cases obtained from the China CDC, we were able to improve the predicting accuracy of the Hand, Foot and Mouth diseases in Guangdong province, China.

### Key words:

search engine query data; bias; spatial sampling; B-SHADE; HFMD

## **Bayesian Networks Deploying Factors from Crop, Climate and Farming Management to Predict Winter Wheat Powdery Mildew Injury in Hebei Province, China**

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### **Abstract**

Winter wheat powdery mildew (WWPM) is currently a major crop disease for winter wheat in North China. Its mushroom growth in recent years is commonly recognized as climate warming and enhanced field crop productions. Many studies have illustrated that it is closely correlated with wet and warm weather or field condition. There were also researches in which WWPM being well predicted by Northern Pacific Sea Surface Temperature (SST) and Atmospheric Circulation Characteristics (ACCs). But all existed researches could not reach a good-enough prediction for farming management. We speculate one of the most important reason for that is because the ordinary prediction models can not take into account of the disease management, like effectiveness of pesticide application. Furthermore, all the existing models cannot deal with all the related factors influencing WWPM, as there are both continuous and uncontinuous variables influencing WWPM. In this research, we utilized the Bayesian Networks to scope all these potential factors based on probability relationships. This is expected to reach a complete consideration of the weather condition, remote climate index (like SST and ACCs), as well as field management strategy, to improve the WWPM prediction in North China.

### **Key Words:**

Winter wheat powdery mildew; Bayesian Networks; Prediction; Climate

## Data Enrichment Approach for Automatic Generalization Implementation of *Rupa Bumi Indonesia (RBI) Maps*

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### Abstract

Automatic generalization method has experienced significant growth in recent years. To generalize automatically, the addition of spatial data in order to process geographic data abstraction of a larger scale digital cartographic model into a smaller digital cartographic model scale is required so it can be carried out in accordance with cartographic context. This study propose the model of data enrichment of digital landscape model according to specifications of some generalization algorithms. Data enrichment is done in order to generalize points, networks, and area features automatically with satisfactory results. This study was conducted on a *Rupa Bumi Indonesia Maps* (topographical map of Indonesia) data created by Indonesia's national mapping agencies. The enrichment data model can be used to describe the relationship of geographical object like AGENT approach and the data constraints accordance to the specifications Indonesia's topographic map.

### Key words:

automated generalization; data enrichment; cartography

## Defining Korean Mountainous Areas on the Basis of Agent-Based Modelling

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### Abstract

The Korean Peninsula is covered with a high percentage of mountainous regions of diverse heights and with complex tectonics. However, it is difficult to define their boundaries with precise figures. Regarding this aspect, sufficient criteria that reflect their diversity and complexity are required. Furthermore, applying people's decisions about mountain defining is imperative for delineating mountainous areas, because people normally define mountains by their physical barriers including slope, altitude, convexness and concaveness. Toward this end, this study attempts to export the extent of mountainous areas in Korea by applying individuals' perspectives on the basis of agent-based modelling (ABM). Two regional basins are used in this study: Seomgang basin, observed as steep and rocky; and Namhangang basin in which there are mostly plains. After 50 iterations of mountain export for each basin, 64.8% mountainous areas were identified in Seomgang basin, and 56.4% in Namhangang basin. Comparative work based on GIS showed 70% mountainous areas for Seomgang, about 5% higher than the ABM result, and 43.5% for Namhangang, which was 13% lower. To the best of our knowledge, the ABM results seem to be more appropriate than GIS, due to including individual decision making. In adopting this approach to define mountainous areas, this study can give insight to measuring regional-scale regions as well as places that contain complex topography.

### Key words:

Mountainous area; Regional-scale regions; Agent-Based Model

## Developing and Testing the New Nitrogen Index in Chao River basin, North China

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### Abstract

Nitrogen loss from land to receiving water has been identified as the important trigger factor of eutrophication worldwide. The identification of critical source areas (CSAs) is crucial to prioritization of various agricultural conservation practices for controlling nitrogen loss. In this study, a revised nitrogen index was proposed by introducing the runoff generation index and landscape interception index in the Chao river basin, North China. The runoff generation index was established using the topography index, precipitation, and soil attributes including soil profile thickness and hydraulic conductivity. And the landscape interception index was constructed by considering the slope, width and manning coefficient of different landscape units. The results showed that this nitrogen index can predict the nitrogen loss potential and distribution in more precise after the validation of field water quality data. The CSAs have mainly located at the midstream of Chao river as a result of the intensive human activities and excessive fertilization on arable land accounting for about 5% of the total watershed area. Moreover, the population distribution, livestock scale, and agricultural activities were the predominant reasons for nitrogen loss in this watershed.

### Key words

nitrogen index; loss potential; critical source areas; CSAs

## Evaluating Service Coverage of Evacuation Facilities based on Mobile Phone Data

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### Abstract

Many civil defence evacuation facilities have been designated for disaster preparedness in Korea. They are served as an evacuation place to people who are in the geographical area when catastrophes have occurred. Population count data from censuses infrequently surveyed has some severe limits to provide timely information in disaster situations. This means that demand of the facilities should be measured in terms of de facto population rather than de jure population. Mobile phone data is a promising new source of real-time measure of population. In addition, civil defence evacuation facilities can accommodate restricted people due to their capacity constraint and the service coverage of each facility is spatially limited. In this research, service coverage of civil defence evacuation facilities is evaluated using a coverage-based optimization model considering distance and capacity constraints. Spatio-temporal demand for the facilities is represented by using mobile phone data. The developed model is applied to the civil defence evacuation facilities in Daegu Metropolitan Area. The capacity of the facilities fully covers *dejure* population. The computational results clearly show that when considering service distance and capacity, some demand could not be covered by near civil defence evacuation facilities. This means that it is necessary to increase the capacity of the existing facilities or additionally to designate new facilities where much demand is uncovered.

### Key words:

Evacuation facilities; Coverage; Spatial optimization; mobile phone data

## Evolution of Regional Differentiation in Mainland China

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### Abstract

In this paper, Chinese spatial heterogeneity is discussed on the basis of three geographical natures with ideal of two nature of Krugman's theory; furthermore, an analysis about the role of the three Natures on the regional development and evolution is discussed in the view of evolutionary economic geography. First Nature plays the leading role in agriculture society and causes Chinese agriculture spatial lock. In industrial society, factors of Second Nature such as transportation and infrastructure play the key role on the regional economic development. The spatial distribution of the industry shifts from dispersion to agglomeration and Central-Hinterland structure ultimately emerges. Third Nature promotes regional structural change. Hub-Network structure is finally created.

### Key words:

Economic geography, Regional evolution, Krugman's theory, Three Natures

## GIS in Developing a Grid-based Distributed Hydrologic Model for Urban Storm-inundation Simulation

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### Abstract

Natural disaster like flood and water logging is a worldwide phenomenon. In India, during intense monsoon, not only the rural areas but the urban areas are also badly affected by water logging. Midnapore Kharagpur Development Authority (MKDA) planning region of West Bengal is not an exception. This research is a fundamental step to assess flood inundation and water logging vulnerability of MKDA and their real time display on map, which can aid the prioritization process of MKDA authority in their emergency sewerage clearance and mechanical water ejection during heavy downpour. FLO-2D is a rainfall runoff modeling Software widely used for early flood warning. Using FLO-2D a two-dimensional flood routing model has been generated and used to simulate runoff over complex topography. Spatial information on land use land cover, elevation, slope magnitude, slope direction, soil condition, and sewerage condition were incorporated in the model design; finally rainfall duration and amount were used as input to get the inundated areas as output. Most of the maps have been displayed as either grid element plots, line contour maps and shaded contour maps. By importing the DTM ground elevation points into Mapper and subtracting the ground elevation from the FLO-2D predicted maximum grid element water surface elevation, flow depths are computed for every DTM point. Model generated inundated areas of a real storm have been compared with actual inundated area extracted from microwave imagery (RADAR SAT-1) of the same date and with primary field survey map, for validation of the model.

### Key words:

Water Logging; GIS; FLO-2D; Simulation Modeling; Real Time Display

## HSAR: An R Package for Integrated Spatial Econometric and Multilevel Modelling

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### Abstract

With the increasing availability of geographical data and their wide use in social science research, we need an analytical approach that can take into account both the spatial nature of the data and the multiple, often nested scales for which the data are collected – what Dong and Harris (2015) have described as horizontal and vertical effects. In the horizontal dimension, units may be correlated with each other because of their geographical proximity. The vertical dimension refers to hierarchical or multilevel data structures, with the possibility of within-group dependence or a between-group heterogeneity effect based on group membership structures. An innovative hierarchical spatial autoregressive (HSAR) modelling approach has been developed, offering an integration of spatial econometric and multilevel modelling and seeking to capture the two types of dependence effect simultaneously. The model is implemented using the Bayesian Markov Chain Monte Carlo (MCMC) approach. This study presents how this methodology can be implemented in the developed R package HSAR, which is coded using matrix algebra operations from the Armadillo C++ library. We demonstrate the package by modelling the housing market in Beijing, finding that there are statistically significant horizontal and vertical dependence effects in housing prices.

### Key words:

spatial econometrics; multilevel modelling; R; geocomputation; RcppArmadillo; spatial analysis

## Indication of Archaeological Site Locations in the Region of Ukok Plateau (Altai Mountains) based on GIS-analysis

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### Abstract

The Ukok Plateau is located at the junction of state borders of Mongolia, China, Kazakhstan, and Russia, to the south of the Altai Mountains on the heights 2200-2500 meters above sea level. Despite the severe climatic conditions, the territory was mastered by the representatives of many cultures, and traces of them can be found now in the form of numerous archaeological sites. The locations for the most of these sites are well characterized by the archaeologists. However, it can be stated with a high probability that there are still monuments with unknown location in this region. Based on GIS analysis of archaeological data and digital elevation model areas of possible archaeological site locations were identified. For this purpose a comparison of already known 405 site locations (Molodin, 2004) with the parameters obtained via the digital elevation model ([earthexplorer.usgs.gov/](http://earthexplorer.usgs.gov/)). The resolution of Digital Elevation Model is 60 meters. This research was done in the format of ArcGIS 10.1. Taking into account the statistical regularities (Miller, Kan, 1965) the criteria for identification of undiscovered locations in this area were identified. These criteria include: the absolute height 2080-2300 m; the distance from watercourses about 1 km; slopes up to 6°; slope exposure, in order of occurrence: southern, eastern; the amount of solar radiation for mid-spring (April) from 131000 to 158000 W/m<sup>2</sup> per month and for mid-summer (July) of 196000 to 209000 W/m<sup>2</sup> per month. The highest probability of new archaeological sites detection is associated with the central and southern parts of the plateau.

### Key words:

digital elevation model; indication of archaeological site locations; GIS-analysis

## Minimum Spanning Tree in Landscape Mosaic

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### Abstract

We approach a problem of building a landscape connectivity model with very limited assumptions and input data. A landscape is provided as a classified patch mosaic in vector-based format. A mobile agent (an entity moving in a landscape, like a species) is characterized by two parameters only: 1) patch resistance – the cost of passing through the patch and 2) transfer resistance – the cost to negotiate between adjacent patches. The former may be tied to patch suitability, size or shape metrics. The latter can be derived from ecological similarity of patch types. We do not demand data nor make assumptions about agent's flow, spatial distribution, dispersal range or population dynamics. Mobility is defined in a symmetric way, so direction of movement is unspecified. Within this restricted framework, we are still able to build a undirected, weighted graph structure and find least-cost paths between a specified set of key patches (e.g. important habitats, protected areas). Next, we build a Minimum Spanning Tree (MST) on reduced graph composed of key patches and l-c paths. Resulting MST is an optimum transportation network for key patch set and may be used as an ecological corridor system. The system maximizes functional connectivity and minimizes resource consumption (number of patches, area).

Our model is implemented as a standalone software package, capable of building graph topology from ordinary shapefile map. MST is presented on the background of the original map, and in listings and statistics. We give examples for artificial mosaics and actual vegetation coverages for north-eastern Poland.

### Key words:

ecological network; graph theory; optimization; landscape connectivity

## Simulation of Agricultural Land Transitions at City Fringes

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### Abstract

Contemporary urbanization accelerates agricultural land transitions mainly at the urban fringes. Emergent socio-economic and distant land connections adjust the configuration of land qualities and functions differently in these diverse areas. The complex nature of these land systems create significant implications among planners and policy setters for sustainable land governance and development. This study examines land use decision making behaviour of agricultural land-agent profiles in this complex land system, concerning their properties and interactions in a city scale. Questionnaires and interviews were used to collect information on land agents' profiles; their different expectations, strategies and motivations based on the factors affecting their land use decisions, internally and externally. Bottom to top agent-based modelling techniques were integrated with the attributed socio-spatial data sets for simulating the land transition processes while adjusting the model environment for possible scenarios. The results indicate that agent profiles have unique trade-offs for the factors that affect their land use decisions while demonstrating distinct land transitional spatial patterns in land use transition simulations. Furthermore, the Agent-based model environment changes show significantly different spatial pattern variations of land-agent profiles in the studied land system. This explains the causality effect among the land-agent profiles and path dependencies of these non-linear land transitional processes at the city fringes. In conclusion, this socio-spatial integrated method explains the complexities of this land system which otherwise could not be describe by separate social or spatial methods.

### Key words:

Land-use decision; agent profile; Agent-based modelling; complex land system.

## Spatial-temporal Evolution Analysis of Per Capita GDP in Jiangsu Province Based On ESDA-GWR

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### Abstract

Taking Jiangsu Province as the research object, this article explores the spatial and temporal evolution characteristics of Per capita GDP in Jiangsu province from 2003 to 2012, based on the spatial econometric methods of ESDA and GWR. This paper discusses the spatial correlation between fixed-asset investment, total industrial output value, population density and permanent resident population and the per capita GDP of Jiangsu province, in terms of which we analysis the structure characteristics of GDP spatial structure in Jiangsu province. The results show that: ①The Per capita GDP in Jiangsu province demonstrates a strong agglomeration in space, and the heterogeneity and differences of spatial distribution between regions are notable. ②The impact degrees of the four driving factors for the Per capita GDP is permanent resident population>population density>total industrial output value>fixed assets investment, among which, permanent resident population and population density have a bigger influence on the development of the Per capita GDP of Jiangsu province, and the effect intensity increases from northwest regions to southeast regions. Based on the research results, the development policy of Jiangsu province in the future should put an emphasis on strengthening the regional cooperation, actively promoting the industrial transfer of the South and North, and integrating all kinds of regional factors and spatial structure, so as to realize the coordinated development of regional economy.

### Key words:

Geographically weighted regression model; Spatial auto-correlation; Per capita GDP; Jiangsu Province

## The changes and the Structure Decomposition Analysis of the carbon emissions embodied in trade of China from 2002 to 2010

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### Abstract

The carbon emissions embodied in trade have significant effect on the regional responsibility on carbon reduction. Based on the multi-regional Input-Output model, we calculated the carbon emissions embodied in trade for 30 provinces in China in 2002, 2007 and 2010. During this period, China has always been the net international exporter of the carbon emissions embodied in trade. The emissions embodied in export went down a little from 2007 to 2010, while the emissions embodied in import was stable. The ratio between emissions embodied in provincial trade (*EEPT*) and the carbon emissions based on production has been increasing all the time, which was 40.24% in 2010. For its crucial role in carbon emissions, we analyzed the factors attribute to *EEPT* by structure decomposition analysis. The results showed that the final demand and the carbon emission intensity are the two major factors for *EEPT*, and the structure of trade is the major reason for the differences between *EEPT* in the east province and the other provinces. At last, we analyze the feasibility and the cost of the regional collaborate on carbon reduction based on the data in 2010. The results showed that the regional collaborate on carbon reduction can obviously decrease the effect of the trade on the provincial responsibility of carbon reduction, and it's more beneficial than the reduction by single province. To make sure the regional collaborate gets more effective, there need to be some compensation mechanism in collaborators.

### Key words:

missions Embodied in Trade; Multi-regional Input-output Analysis; Structure Decomposition Analysis; China

## The Spatial Distribution and Change of Chinese Population Constrained by the Natural Endowments in Agent-based GIS

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### Abstract

The use of the related terms “agent-based”, “multi-agent” have witnessed significant growth in the Geographic Information Science (GIScience) literature in the past decade. These terms usually refer to both artificial life agents that simulate human and animal behavior and software agents that support human-computer interactions. In this paper, a method of combining GIS and Agent technology is used to simulate the population growth and migration process from the early Qing Dynasty (1676) to modern times (2009). Natural endowment and agricultural potential productivity have decided spatial distribution of population which depicts spatial pattern of ancient Chinese agrarian society. And this spatial distribution is still effective for farming in China until now.

### Key words:

Natural endowment; agricultural potential productivity; agent-based GIS

## Theoretical and Methodological Perspectives of CA-Based Urban Expansion Model in the era of big data

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### Abstract

Researches of urban model in the big data era has two inevitable trends: research unit by rough unit to fine-scale, and the study area by a single city to urban agglomeration, the nation and even the global. But there are still more difficulties in establishing fine-scale urban simulation models for a large geographic area, and taking into account the large geographic scale and basic spatial unit. The current geo-simulation computing power, data quality and the theory and method are facing new requirements. In this background, the recent breakthrough progresses had made were summarized in this paper, and the system theory and key technology for China's large area and fine-scale urbanization model are put forward to meet requirements of urban model in the future on large data volume and high precision. Results of this study show: 1. Geographical parallel cellular automata based on GPU cluster can provide efficient tools for geographical simulation in the era of big data; 2. Integrating the swarm intelligence evolution algorithm and geographical cellular automata model can automatically and quickly extract transformation rules and improve the simulation precision; 3. Study on the sensitivity of urban cellular automata will effectively reduce model's complexity and the data processing workload; 4. Exploring the reliability theory of the massive geographic data and geographic modeling process, makes it possible to identify data's availability, methods' applicability and results' authenticity.

### Key words:

urban model; cellular automata; big data; fine-scale; large area

## Urban Expansion Simulation Based on the Combination of Dynamic Association Rules and Cellular Automata

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### Abstract

Using cellular automata model combined with association rules method, an urban growth simulation model with dynamic update cellular transformation rules was constructed. In the model a set of association rules of cellular automata for transition probability were tapped first. The cells could select corresponding rules to change their types according to their geographical locations and environmental conditions. After a cell's state changes, transition probabilities of the corresponding rules respond to feedback. With dynamic transition rules simulation for real land-use changes were performed. This paper takes Dongxihu district of Wuhan City as study area, simulating the expansion process of the district from 2010 to 2015 and predict the urban scale of the city in 2020. By comparing the simulated landuse data of Wuhan Dongxihu district in 2015 with real data, the result that Kappa coefficient of average values is above 0.75, shows this model have high credibility. We take this model to forecast the landuse state of Dongxihu district in 2020 and the result shows that the expansion of urban land along the Dongxihu Avenue to the West, and the Northwest Hunjiang Lake to Linkonggang Avenue is most evident.

### Key words:

Cellular automata; Association rules; Land use/cover change; Urban expansion

## Using Rule-Based Model to Predict the Spatial Distribution Of Soil Cd

### Concentrations of Guangdong Province

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#### Abstract

The spatial pattern of soil heavy metal is important to control the pollution of soil heavy metal. The methods of traditional interpolation based on the distance of sampling points or spatial statistic are superior while the sampling points are sufficient and research areas are small. But, the process of sampling is time-consuming and laborious while study area is huge, the accuracy of traditional interpolation are not good enough. For instance, the wide of surrounding areas of the point is abnormal, if the soil heavy metal concentration of the point is excessive. Obviously, the methods of traditional interpolation are low accuracy if study area is huge and sampling points is few. This study was based on the Rule-Based model, Cd concentrations of soil in Guangdong Province as the research object, used 36 influencing factors included both natural and anthropogenic affected Cd concentrations, the model of Cd concentrations and factors was built. The spatial distribution of Cd concentration of Guangdong Province was predicted. Simultaneously, several methods of traditional interpolation were introduced to predict the spatial distribution of Cd concentration. The accuracy of all prediction results were tested and verified using the reserved 100 sampling points in different raster resolutions. The result shows that the accuracy of Rule-Based model is higher no matter the raster resolutions. In addition, the landscape pattern indices of spatial distribution were analyzed.

#### Key words:

Rule-Based Model; Spatial distribution; Soil Cd concentration; Guangdong province; Cubist

## Water Balance of Selected Fluvial Lakes in the Upper Benue Valley Adamawa State, Nigeria

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### Abstract

Water Balance Evaluation is an important inventory activity used for continual assessment of water gains and losses in a hydrological basin or water body for the purpose of sustainable uses. In this paper, groundbreaking attempts have been made to present the Water Budget of Lakes Gwakra and Geriyo in the Upper Benue Valley of Adamawa State, Nigeria. The study aimed at determining the gains and losses of the lakes in 2013, 2014 and 2015 Hydrological Years. The studied lakes were selected on the basis of situation on the river banks, size and relevance in terms of usage. The Derived Water Balance Model used in the study incorporated Direct Precipitation, Evaporation, Surface Inflow, Abstraction, Surface Outflow and Groundwater flux as Net Residual Flux (NRF). Values of the components were computed using data obtained by standard methods of measurement and appropriate formulae. The results showed high values of Surface Inflows, Direct Precipitation and Evaporation. Changes in Storages were generally low and successive gradual decline NRFs of the lakes over the years were observed owing to yearly decline in the other surface variables. NRFs for Lake Geriyo were very low in comparison to those of the other lakes owing to excessive abstractions of water from the lake for various uses. The study provides baseline information for further Water budget studies on the lakes.

### Key words:

Fluvial Lakes; Water Balance; Direct Precipitation; Evaporation; Gauged Inflow; Net Residual Flux;

Abstraction; Hydrological Year

## A Geospatial Query Mode Based on Geographical Entity Natural-Language

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### Abstract

Traditional geospatial data query is based on data and rules selected to complete. There are two kinds of query methods in geospatial relation: ① retrieving only those geography entities what meet the TR(topological relation: disjoint, meet etc) between target files and reference documents, eg: which rivers stream across ZhengZhou; ② TR queried between given geography objects, eg: whether ZhengZhou is adjacent with AnYang. Traditional implementation must have to load two different UI query modes, and operators need to invoke different modes depending on different query requirements. Operator is prone to confused who lacks of the basic knowledge of data loading methods and topology regulation in the process of spatial query.

The paper present a geospatial query mode based on geospatial entity natural-language. Researching on the existing natural language segmentation system and data transfer mode of spatial geography query in the current open source operating system QGIS, incorporating the study of Deng Min etc's approach for spatial query based on natural-language spatial relations and topological expressions of different types of geographical entity: point, line and surface. The establishment of spatial entity natural language query function calling pattern based on geographic data has finished in this study, the same time, geographical entities natural language spatial relations of function matching dictionary(FMD) is constructed due to the diversity in characteristics of spatial geographical information, FMD provides a new means of natural language function-matching invocation instead of conventional method. Finally, a basic framework is designed for spatial entity natural language query function calling pattern based on geographical natural-language.

### Key words:

geospatial data query; UI query mode; geospatial entities natural language; operating system QGIS; function matching dictionary(FMD); natural language function-matching invocation

## A New Method for Extraction of Alluvial Fans from Digital Elevation Model (DEM)

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### Abstract

Alluvial fans have received great attention in all aspects. They have played important roles in the human societies, especially in arid regions. Many early civilizations and cities are built on alluvial fans. Alluvial fans are provided ground water and good soils for human activities. They are commonly associated with tectonically active mountain ranges. Therefore, recognition of alluvial fans border is significance to environmental management. Many researchers have used DEM in different fields. They have employed DEM use for obtaining the drainage networks, extraction of lineaments or linear features, and analyzing of longitudinal and transverse characteristics of watersheds. Notwithstanding its many uses, DEM has not been used for extraction of alluvial fans directly and automatically method so far . In the beginning and the early stages, the methods are used for extraction of alluvial fans have been based on topography maps or aerial photography observations and drawing manually them borders. The purpose of the present research is to demonstrate the utility the new technique to extraction of alluvial fans by using DEM (SRTM). In general, the methods used for extraction of alluvial fans can be classified in three general categories: (1) manual methods; (2) semi-automatic method; and (3) the new method or automatically methods. The purpose of this study is providing an efficient method to extract rapidly, accurately, low cost, and using the minimum data requirements to extraction of alluvial fan boundaries from DEM. For this purpose, with using the DEM and the method in which this study is presented for the first time (symmetrical model of DEM), with symmetry of the alluvial fan elevation data, and GIS ability, alluvial fan is introduced as a catchment and then its boundary is extracted. To assess the accuracy of this method, the extracted boundary is overlapped on satellite imageries (ASTER, QuickBird ...), topographic maps and drainage networks of region. The Results show this method gave good results in extracting alluvial fan and requires only DEM as an input data. Furthermore, the characteristics of final alluvial fans show that the "symmetric model DEM» as regards accuracy, simplicity, speed and performance using minimal data takes precedence over to other methods.

### Key words:

Alluvial fans; DEM; symmetrical model DEM



## A Review of Employment Location Models for Metropolitan Areas Abroad

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### Abstract

For long, the choices of the household location and the employment location in mega city-regions have been concentrated in the field of city planning and city economic all the time. In China, under the influence of market economic, globalization, transportation and information technology, to strengthen the scientific study on employment location will bring about improves and even revolution of city planning in China. To this end, this paper introduces current research on employment location models abroad to China, focusing on three approaches to simulate: employment by zones, employment by individuals, and employment by firms. This paper is composed of four parts: the tendency of employment location models, the history of employment location models, the variables and theories in establishing models, the enlightenment on China's urban planning.

### Key words:

Employment Location; Urban Spatial Model; Metropolitan Areas; Land use

## Crime Mapping and Hotspot Analysis for Predictive Modelling: A Case Study of Shimla City

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### Abstract

Crime is a serious threat to a society and handicaps it in its normal functioning. It also hinders development in the society. It is, therefore, required to tackle the crime properly for its control. Associated with human society with its very existence time, it has been evolving with passage of time. Especially during the contemporary time of rapid technological and societal change, crime has got new types and forms with the advent of the processes of globalization since the 1990s. The new technologies have made it global to be committed. However, the spatial studies on crimes are recent ones despite place plays an important role in understanding and tackling crimes. The sophisticated tools like Remote Sensing, Geographical Information System and GPS have provided vast scope to map and study crime in relation to space and other aspects of crime. This study focuses on the crime mapping for the year 2001, 2006, and 2012 covering aspects of crimes like changing pattern and trends and zonation with identification of hot-spots using the latest tools. The data used for this study is obtained from the Police Department (Shimla), National Crime Record Bureau (NCRB), Govt. of India, Census of India, Municipal Corporation of Shimla for tabular/textual information and bhuvan.nrsc.gov.in for spatial data. The study is expected to help in crime modelling for tackling/management of crime and predictive analysis.

### Key words:

Crime mapping; hotspot analysis; crime trend and zonation; predictive modelling

## Distinction of 2D and 3D Digital Geomorphometry in Earth Sciences Researches

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### Abstract

Now with advancement of knowledge in remote sensing, digital geomorphometry plays very important role in earth science researches. Digital Geomorphometry is provided a rapid, accurate and basic for data mining in the natural sciences. Parameters, elements and features of landforms can be extracted from digital elevation models (DEMs) to form of continuously (slope, aspect, etc.) and discontinuous (point, line, and polygon) in 2 groups D2 (planimetric) and D3 (topographic) data. A review of previous articles show that despite high accuracy and low cost of this systematic approach, so far, the distinction were not performed between D2 and D3 surfaces. Despite, dramatic differences between planimetrics and topographic data, by mistake 2d data are used instead of 3d data in the analysis and molding of earth sciences researches. Therefore it would have had incorrect results. This study, by using digital elevation models (DEMs) of five central Alborz basins have established and specified distinctions and differences of D2 and 3d measurements to provide the correct usage of digital geomorphometry. The results show by increasing of slope, a significant quantity difference exist between the parameters of planimetrics and topographic of landforms.

### Key words:

Geomorphometry; 2d and 3d morphometry



## Improvement and Evaluation of K-Nearest Neighbor Supervised Classification

### Method for High Resolution Remote Sensing Image Based on Geostatistical Models

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#### Abstract

This paper attempts to incorporate a conditional probability function and two geostatistical models (exponential model and Gaussian model) into a supervised k-nearest neighbor (k-NN) classifier to improve the accuracy of land cover classification. A subregion of Nanjing city (multispectral Quick Bird satellite image, 2.4m spatial resolution) is taken as an example to illustrate the validation of this geographical weighted k-NN (gk-NN) classifier. Its overall classification accuracy can be up to 98.54% and that of k-NN classifier. In order to further verify the good performance of this gk-NN, we compare it one three widely used classification which was greater than that of ML, NN and SVM classifiers. Furthermore, the gk-NN classifier has significantly outstanding performance compared with the other classifiers through McNemar's test. Besides, the noise produced in gk-NN classifier has been greatly reduced or almost disappeared, which could be best used in land cover classification than the other classifiers. The geographical weighted k-NN (gk-NN) classifier decrease the "salt and pepper" noise and misclassified classes and is compared with traditional maximum likelihood (ML), neural network (NN) and support vector machine.

#### Key words:

k-NN classifier; Geostatistical models; Geographical weighted k-NN classifier (gk-NN); Accuracy evaluation



## Measuring Spatial Segregation with R

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### Abstract

Despite theoretical advantages of recently developed spatial segregation measures, they have not been widely used in the geography and sociology literature. One possible reason for this under-use of potentially more reliable methods is their computational difficulties: the calculation procedure of spatial indices tends to be more sophisticated than the traditional counterparts, and it often involves complex spatial data processing. Although considerable efforts have been made in recent years to implement some of the newly proposed spatial approaches, either it does not incorporate important improvements in the field, or it requires commercial software to run. In this work, I present a software package for measuring spatial segregation. The package, called 'seg' provides greater flexibility and control over the calculation procedure for advanced users, while ensuring that less experienced users can still use the functions without too much difficulty. Further, as it runs in R, open source statistical software, it is accessible to a wide group of people. The use of this package will not only facilitate the application of spatial segregation measures but also shed some light on their strengths and limitations in empirical research.

### Key words:

spatial segregation measures; R

## Minimal Runoff and Hydrological Droughts in Basins Transcarpathian Rivers in the Condition of Climate Change

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### Abstract

The climate changes have an impact on the water regime of rivers as a whole and on its individual components. In particular, in recent years, is increasing frequency of extreme events such as floods and droughts. Formation of minimum river runoff is closely linked with the previous climatic conditions, and the advent different type of drought reduces the supply of ground and surface alimentation rivers.

To analyze the formation conditions of minimum flow in the investigated territory used drought index SPEI on different time scales. Overall SPEI time series on the scale of 12, 18 and 24 months show that in all points observed from 12 to 16 episodes of drought durations more than one year. Another objective of this work was to study the relationship between values SPEI for different time intervals and minimum values of runoff Transcarpathia rivers. Thus, for the winter time, the largest value of the correlation coefficients obtained for March and April, and for summer low flow - for August, September and October.

Besides using the drought index, in the work was estimated change in the average temperature and precipitation from 2011 to 2050 for the weather station Uzhgorod on scenarios RCP 4.5 and RCP 8.5. Forecasted average temperature in both scenarios show a positive trend with significant correlation coefficients, with regard to rainfall, the correlation coefficients here is not significant. So with increases in temperature and no variability of precipitation, the minimum river runoff will decrease and the probability of extreme drought - will increase.

### Key words:

minimal runoff; hydrological drought; climate change; modelling

## Modeling of the Forming Spring Flood Runoff on Plain Rivers of Ukraine

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### Abstract

In this study are considered the results of modeling the spring flood water content changes depending on the forecast values of mean annual air temperature for different scenarios of climate change. The authors proposed method considering possible climate change as part of genetic model of maximum flood flow and flood operator type. The model proposed makes it possible to introduce "climate amendment" directly to the maximum snow supplies and precipitation during the flood, as well as runoff coefficients.

Comparing the results for different scenarios for the model CCSM3, we can mention that for the period 2039 three scenarios (A1B, B1, A2) give more or less similar results - no significant decrease in runoff spring flood in northern areas, and significant - in the southern of Ukraine.

Analyzing the forecasting period from 2069 to 2099, it should be noted that the results differ significantly for different scenarios. So scenarios A1B and A2 on 2099 are predicting practical disappearance spring flood (water content decrease from 100 to 80%) on the rivers zone insufficient moisture, and to areas of sufficient moisture - reducing runoff by more than 50%.

As already noted, the calculations of "climate amendments" were held in two models - CCSM3 and HADCM3. Simulation results for HADCM3 very different from model of CCSM3. Almost in all scenarios are projected sharp increase in water content (2.5-3 times) for the period until 2039, and then the same sharp decrease (especially for scenarios A2 and A1B) water content spring flood.

### Key words:

maximal runoff; spring floods; Ukraine plain rivers; climate amendments

## Soil Mapping Classification in Urban Areas in Presidente Prudente - São Paulo-Brazil

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### Abstract

The purpose of this study is to develop a predictive mapping of soils in the municipality of Presidente Prudente – São Paulo - Brazil, using the classification methodology by Artificial Neural Networks (ANN), to contribute to the integrated landscape analysis, in areas classified as Technosols. Whereas the landscape is made up of physical elements, biological and man-made, that relate dialectically, and the change in one of these elements will lead to consequences in all others. Thus it is considered that the possible physical changes in soil composition can be directly related to their type of use, as especially in the case urban areas, which have a high degree of transformation of landscapes. The municipality of Presidente Prudente is located in western São Paulo, has 562.795 km<sup>2</sup> land area, and does not have detailed soil surveys in the region. The preparation of soil maps is a time-consuming and costly task, so few surveys are conducted at detailed levels. The use of new techniques such as the use of geospatial data and remote sensing products, has shown efficacy in the results of digital soil mapping. The predictive mapping will be carried out with use of artificial neural networks (ANN), which is a technique capable of performing pattern recognition and classification of digital images associated with parametrics data. After the scores obtained with the use of Artificial Neural Networks (ANN) will be held an evaluation of the influence of the variables and architecture that present the best results for this type of study and can therefore be applied in other areas. The realization of predictive mapping of soils in the municipality may be used for purposes of planning and land use planning as well as for other activities and studies.

### Key words:

predictive mapping; soils; artificial neural networks; landscape; remote sensing; Technosols.

## Spatial Agent-base Simulation for Dengue Fever—A Case Study of Guangdong Province, China

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### Abstract

Dengue fever was broken out in Guangdong province of China, 2014, which had brought to an extensive public attention. For the better understanding of the dengue fever spreading rules, computer modeling and simulating have been served as an effective approach. Instead of neglecting spatial elements in the previous modeling processes, the objective of this study is to take two spatial elements into account while creating the dengue fever's propagation model. These include the mobility of people between different villages and towns, and the spatial heterogeneity of the regional infectious rates which was influenced by the local environment, the population density and the epidemic prevention policy. For this reason, an agent-base model can be an appropriate method to represent the process of dengue fever's transmission for the better considering and describing of the randomness of agents' movement and the spatial heterogeneity. Finally, this model is implemented with combination of three datasets to some extent to restore the spatiotemporal prevalence of dengue fever's diffusion in given units in Guangdong Province, 2014. These spatially explicit datasets include the dengue fever Prevalence information, the mobile phone data where users' mobility can be extracted, and the census information. These simulation results which have good coherence to observed data suggest the proposed model depicting the diseases progression well. Through modifying proposed model, the influence of human's movements in dengue fever's diffusion is defined, and it will provide a basis for making prediction and taking steps towards prevention and control of the dengue fever.

### Key words:

dengue fever; agent-base model ; human mobility; spatial heterogeneity

## Spatial and Temporal Variability of Macronutrients at Two Conventionally Paddy Cultivation

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### Abstract

Paddy cultivation requires large space area as compared to the others plantation. In Malaysia the granary area involved large scale irrigation systems of exceeding 4,000 hectares and the area is recognized by the Malaysia government in policy state agriculture as main paddy production area. Therefore, one of the study area used in this study is a granary area located in FELCRA Seberang Perak and managed by the Integrated Agriculture Development Area (IADA). The second study area for paddy cultivation is Sedaka, Yan Kedah, Malaysia which is managed by the individual local based farmers. Therefore, in this study, 2 different conditions and period of soil sampling were acquired for soil nutrient. The first sampling is before paddy cultivation which is land preparation stage by the farmer. Secondly, soil sampling before the harvesting time approximately 100 days of paddy cultivations with soil fertilization has taken place. In this study GIS analysis was used to derive nutrient content of N, P, and K classification. In comparison of soil nutrients in this research will adopt optimum values of soil nutrients for paddy planting as recommended by Malaysian Agriculture Research and Development Institute (MARDI). This study examined the spatial variability of macronutrient soil that N, P, and K contents indicated varies result for both conditions of before and after fertilization as well as two different places using geostatistical analysis in GIS software.

### Key words:

paddy plantation; geostastical analysis; temporal analysis; GIS

## The Current Situation and Potential Evaluation of Sino German Bilateral Trade Based on Gravity Mode

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### Abstract

Germany is the largest trading partner in Europe for China, so researching bilateral trade potential on Sino German has important theoretical value and practical significance to timely adjust foreign trade strategy, and promote the construction of "The Belt and Road". First, The paper use of bilateral trade data and trade integration index analysis of Sino German bilateral trade situation, and then use the 2014 trade data in 37 major countries, from the two country's GDP, per capita GDP, two capital distance, whether to join the WTO and APEC five aspect, using EViews software to establish the trade gravity model to forecast the Sino German trade development potential. The conclusions are as follows: ① bilateral trade is in large scale, rapid growth rate, and the Sino German trade gradually deepening; ② Sino German commodity structure has a greater complementarity; ③ Germany on Chinese trade integration is from weak to strong, but Chinese of German trade is decreasing; ④ Sino German bilateral trade potential value increases in fluctuation and, more than 1.2, which belongs to the "potential to form", thus the trade potential has been brought into full play, rise in narrow space.

### Key words:

trade ; potential ; Gravity Mode ; China ;Germany

## Tropical Forest Change Detection in last 25 years in Xishuangbanna, China, Based on CLASlite Model

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### Abstract

The development of sophisticated and accessible approaches to monitoring deforestation and forest degradation is central to assessing changes in ecological processes such as carbon storage, biodiversity, biomass and many others in tropical regions. CLASlite is an automated satellite mapping model used to identify deforestation and forest degradation, especially in tropical forest regions. In this paper, we used the CLASlite model to analyze deforestation and forest disturbance from 1990 to 2015 in Xishuangbanna, situated in the southern part of Yunnan Province. We found that largest forest change rate was 23% between 1995-2000, followed by 1990-1995 (0.64%) and 2000-2005 (2.81%), in last five years the change was 2.18%. By means of geographic information system processes, the forest changes detected were compared with the land uses and protected areas of the study area. Most of the change to forest area corresponds to crops and plantations, mosaics of vegetation, and natural forest. The deforestation within environmentally protected areas was 285.2 km<sup>2</sup>, 6.53% of total protected area. Xishuangbanna is one of the few regions in China with a significant tropical forest area, but, as the results illustrate, these areas are at serious risk of disappearing. We consider it important to continue the conscientious monitoring of this region, especially in sectors such as the protected areas. The advanced remote sensing approaches occupy an important role in attaining the objective.

### Key words:

CLASlite; Landsat; deforestation; forest disturbance; tropical forest; Xishuangbannan

## C12.32 Mountain Response to Global Change

### Mountain Communities in High Asia: Searching For a Position in a Globalized World



[Home](#)

#### Oral

1. [An experiment in order to develop sustainability of Wakhi people crossed the border](#)  
Kazuo Mizushima (Nihon University, Japan), Yasuhiro Ochiai (Nihon University)
2. [Differences in the Current Status of Lifestyles between Two Inhabited Areas of Wakhi in Pakistan and Tajikistan](#)  
Yasuhiro Ochiai (Nihon University, Japan), Kazuo Mizushima (Nihon University, Japan)
3. [“Nomadic” Pastoralism in Kara-kul, Northern Part of the Pamirs, Central Asia](#)  
Shigeru Shirasaka (Tokyo Gakugei University, Japan), Teiji Watanabe (Hokkaido University, Japan)
4. [Over Sea Migration and Village based Animal Husbandry, Changing Agro-Pastoralism of East Nepal](#)  
Kazuyuki Watanabe (Hannan University, Japan)

## An Experiment in Order to Develop Sustainability of Wakhi People Crossed the Border

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### Abstract

Currently the Wakhi people (as follows the people) live separately on the border areas of Pakistan, Afghanistan, Tajikistan, and China, although the people have been one ethnic group at one time. The people who inhabit around the junction of mountain ranges of Karakorum, Hindukush and Pamir are also called the people who are living on roof of the world.

In the early Twentieth Century, globalization, and the growth of market economies have penetrated even the geographically mountainous frontier regions where the people live. These changes have significantly influenced not only their traditional form of agricultural system and livelihood but also ways of life they had been practicing for centuries. Against such backdrop, not only the history, tradition and culture of the people have been affected but at some degree endangered to be forgotten both nationally and internationally. One could go as far as to say that the once proud and peace loving ethnic identity of the people in facing a crisis of identity and there growing risk of disappearing from the social ethnic map of the world. According to a workable idea, the committee of GMF(Global mountain Forum) had the international symposium as [Wakhi Summit] of 2015—towards the sustainable development of the people. The committee made a plant for a report and discussion about a few of theme for the symposium.

### Key words:

Wakhi; 4 country; sustainability; GMF

## Differences in the Current Status of Lifestyles between Two Inhabited Areas of Wakhi in Pakistan and Tajikistan

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### Abstract

Nowadays, as the Wakhi people separately inhabit four countries around the Pamirs, their original culture and lifestyles depend on peculiar agro-pastoralism has become different in each area. In Gojal district, Gilgit-Baltistan Province of Pakistan, since the opening of the Karakoram Highway (KKH) in the 1980s, the traffic of persons and goods has been increasing and NGO-enabled development has advanced. Cultivation of crops as a commodity has been extended, and transhumant pastoralism has been relatively reduced. Although tourism opportunities have also been increasing, responses that would allow an economy based on commodities to progress are different in each of the villages, which have different conditions. On the other hand, as the Ishkashim region – Gorno-Badakhshan Autonomous Oblast of Tajikistan – is located in a remote area away the trunk road, helps from the government and the NGOs are restricted. Thus, agro-pastoralism has not changed from its old self-sufficient form, and there are few opportunities to be concerned with tourism or other industries. However, since the independence of Tajikistan in 1991, local society has shifted to a market economy and the expenditures of its inhabitants have also been increasing; many young people have to emigrate to the cities in other areas of Tajikistan or Russia to get jobs.

### Key words:

Wakhi; Pakistan; Tajikistan; agro-pastoralism; lifestyle

## “Nomadic” Pastoralism in Kara-kul, Northern Part of the Pamirs, Central Asia

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### Abstract

The northern part of the Pamirs in the central Asia is situated in high altitudes, under particularly severe natural conditions. The local inhabitants can only do livestock farming for their subsistence. Sheep, goat, cow, yak, and donkey are their major domestic animals and also horse in some areas. Kara-kul is a village in the northern part of Republic of Tajikistan at 3,953m above sea level. Until the beginning of 1900's, these local people had kept nomadism. The central Asia was incorporated in the Soviet Union politically in 1920's and these local nomads were incorporated in sovkhos by the Soviet Union, being forced to settle down in Kara-kul. Farming is not suitable in Kara-kul. From the viewpoint of the difference of altitude, most families of Kara-kul run ascending transhumance mainly, but some families do horizontal transhumance. Generally speaking, many families in Kara-kul graze at their mountain pastures (jailoo) higher than 4,500 meters in summer, and put it out to pasture around the village (kyshtoo) in winter. They make a group for pasturage with several families in jailoo and also in kyshtoo. Each group pastures their livestock every day. They call this way as “novad.” However, they also practice two more concepts of transhumance: küzdöö for spring pasture; and bäärlöö for autumn pasture in addition to jailoo and kyshtoo. After all, they continue to keep four concepts from the age of nomadism. This is why we describe their transhumance “nomadic.”

### Key words:

nomadism; pastoralism; subsistence; Kara-kul; Tajikistan; the Pamirs; central Asia

## Over Sea Migration and Village based Animal Husbandry, Changing Agro-Pastoralism of East Nepal

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### Abstract

Himalayan farmers have taken care of their livestock in order to complement mountain agriculture. There are some kinds of pastoralism. Mountain nomadism and transhumance are famous for their long distance of migration, on the other hand, village based animal husbandry, where farmers keep animals on a shed in their house yard and sometimes they take it for daily grazing at forest or grassland around the village, is also popular among Himalayan farmers. However, in recent years, as overseas migration for jobs in Middle East countries increases, mountain agro-pastoralism is also changing. Shortage of labor is the most difficult problem. In the absence of male population, women, children, and elderly persons who remain in their village can't keep agro-pastoralism in the same size as before.

This paper aims to analyze changes of village based animal husbandry from three points: 1) kinds of animal, 2) size of animal, and 3) extent of mobility. The most important factor is collecting of grass. Farmers who are available for more labor input can raise more profitable kinds of animals and increase the size of the animals using intensive methods. On the other hand, however, farmers who are short of labor also seek more easy methods such as lazy grazing, which saves the cost of labor for grazing, or selection of some kind of animals which need less care and less grass in small size. Sustainability for Himalayan agro-pastoralism faces the problem of how to save the cost of labor input.

### Key words:

short of labor; collecting of grass; mobility of grazing; lazy grazing

## C12.32 Mountain Response to Global Change

### Methodological Development Of Monitoring Studies On Mountain Trail Degradation Under Accelerating Recreational Use



Home

#### Oral

1. [Application of structure-from-motion \(SfM\) to monitor recreational trail degradation](#)  
Marek Ewertowski (Adam Mickiewicz University, Poland), Aleksandra Tomczyk (Adam Mickiewicz University, Poland)
2. [Estimating Future Erosion on Hiking Trails in Shei-Pa National Park, Taiwan](#)  
Yen Liang Lee (Hokkaido University, Japan), Teiji Watanabe (Hokkaido University, Japan)
3. [Monitoring Soil Erosion from Recreational Trails Using Repetitive Topographic Surveys](#)  
Aleksandra Tomczyk (Adam Mickiewicz University, Poland), Marek Ewertowski (Adam Mickiewicz University, Poland)
4. [Monitoring Trail Degradation in Daisetsuzan National Park, Japan since 1989: from 2-dimensional Studies to 3-dimensional Studies](#)  
TEIJI WATANABE (Hokkaido University, Japan)
5. [Study of Trail Erosion in Daisetsuzan National Park in Hokkaido, Japan, Based on Construction of Digital Surface Model with Drone](#)  
YUSUKE KOBAYASHI (Hokkaido University, Japan), TEIJI WATANABE (Hokkaido University, Japan)

#### Poster

1. [Integrated Typology of the Municipalities in the Rhodope Mountain Region in Bulgaria with a View to Regional Development and Management](#)  
Nadejda Ilieva; Boris Kazakov; Mariana Soultanova (Bulgaria, National Institute of Geophysics, Geodesy and Geography – Bulgarian Academy of Sciences, Sofia, Bulgaria)

## Application of Structure-from-Motion (Sfm) to Monitor Recreational Trail

### Degradation

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#### Abstract

Protected natural areas (PNAs) such as national parks often constitute highly valuable regions that are rich in bio- and geodiversity with beautiful scenery. Visitor pressure in PNAs is focused mainly on recreational trails, which facilitate activities such as hiking, cycling, horse riding and wildlife observation. Trails prepared for hikers are among the most common types of recreational trails. High visitor pressure can lead to increases in trail width and a concomitant increase in soil erosion. In case of extensive protected areas, the performing of regular geodetic monitoring is expensive and therefore park managers often face a problem in selecting sites for impact monitoring. However, recent advances in technology enables the development of low-cost alternatives for traditional surveys. Consumer-grade cameras can be used to rapid acquire of photographs. The ground-based photographs can be subsequently processed through the structure-from-motion approach to generate detailed mosaics and digital elevation models of trail surfaces. It is possible to apply such models to study, monitor and quantify processes like soil erosion and vegetation trampling. In this study we present methodological framework for monitoring of trail impact with the use of structure-from-motion approach and demonstrate its application based on examples from Gorce National Park, Poland. The proposed methodological framework can enhance the ability of Park managers to prioritise their trail management activities, enhancing trail conditions and visitor safety, while minimising adverse impacts on the conservation value of the ecosystem.

#### Key words:

Recreational trail; structure-from-motion; impact monitoring; recreation ecology

## Estimating Future Erosion on Hiking Trails in Shei-Pa National Park, Taiwan

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### Abstract

This study examined the trail erosion rates at 51 sites on the 10.9 km trail in Shei-Pa National Park, Taiwan from December 2007 to November 2008. Traditional, repeat cross-sectional measurements were conducted for the purpose. Then, this study estimated the depth of soil (unconsolidated materials) from the trail surface to be potentially eroded in the future by a hand-held dynamic cone penetrometer (PANDA 2), originally designed to measure soil compaction. The repeat measurements of the cross sections showed that erosion dominated at 28 sites (in total 28,854 cm<sup>2</sup> of soil was eroded in one year) and deposition dominated at 23 sites (in total 7,897 cm<sup>2</sup> of soil was deposited in one year). The sounding by the dynamic cone penetrometer showed that the depth of the soil ranged from 4 to 271 cm (average: 98 cm). Assuming that the erosion rates in the past will be constant, the soil depth to be eroded provides the future prediction of further soil erosion at the erosion-dominated sites. For example, at the 9.35 km site from the trailhead, the average erosion rate was 13.8 cm/year, and the estimated soil thickness was 72 cm. Therefore, the 72 cm deep soil would be eroded away by 2014. The dynamic cone penetrometer is a non-destructive sounding machine. It would be helpful for national-park managers to utilize the combined methods of soil erosion rates in the past and soil depth to be eroded in the future.

### Key words:

Trail degradation; trail erosion rate; future erosion depth; soil compaction; dynamic cone penetrometer (PANDA 2); Shei-Pa National Park; Taiwan China

## Monitoring Soil Erosion from Recreational Trails Using Repetitive Topographic Surveys

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### Abstract

This study applied a new method for detailed monitoring of soil loss from surface of recreational trails. The main objectives of this study were: (1) to analyze the spatial aspect of surface changes in microscale; (2) to quantify precisely the short-term rate of soil loss and deposition. Measurements were taken in 12 test sites, located in mountains within two protected natural areas in the south of Poland: the Gorce National Park and Poprad Landscape Park. The studied sites were located on trails characterized by different slopes, types of vegetation, and types of use. The use of precise elevation data provided by the electronic total station and laser scanning allowed us to assess the sediment budget of the surface changes. In such a way, the spatial and temporal dynamics of soil loss influencing the trail tread could be studied. During a six-year period (2008–2014), soil loss dominated within 10 test fields, while a predominance of deposition was recorded for the remaining two. The average net volumetric change of the trail surface elevation varied from -3,5 cm +0,5 cm per year. The short-term dynamics was high and several test fields had a positive balance (predominance of deposition) in one period and negative balance (predominance of soil loss) in the next period. Local geomorphic conditions, morphology of the trail tread and soil properties seemed to be the most important factors contributing to the amount of soil loss or deposition.

### Key words:

Soil loss monitoring; Erosion; Recreational trail; Trail impact; mountain areas; Footpath erosion

## Monitoring Trail Degradation in Daisetsuzan National Park, Japan since 1989: from 2-dimensional Studies to 3-dimensional Studies

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### Abstract

This study reviewed the progress in the studies on monitoring trail degradation (erosion and deposition) conducted in Daisetsuzan National Park, northern Japan since 1989. The first monitoring started in 1989 (Yoda 1991; Gotoh 1993). Those studies have used 2-dimensional (cross-sectional) repeat measurements, which have led to the long-term studies in two areas within the park: Kuro-dake Ishimuro area (e.g., Yoda and Watanabe 2000), and Susoai-daira area (e.g., Watanabe et al. 2004). Although the number of continuous monitoring sites nowadays has been decreasing due to the difficulty in the maintenance of the fixed site-identification poles, several sites have been monitored more than 20 years (from 1989/1990 to 2013/2016). In 2004 and 2005, a simple digital camera was used to take photographs to make 3-dimensional mapping in and around the Susoai-daira area (Ota and Watanabe 2005). The study became possible by adapting easy-use 3D software (*Kuraves*), but the method was not widespread because the software is available only in Japanese. This method, however, demonstrated the effectiveness and importance of 3-dimensional studies. The most recent direction of the trail monitoring is to use either a UAV (drone) or a hand-held digital camera and Structure from Motion (SfM). In addition to monitor the past trail erosion, estimates of soil depth to be eroded in the future are attempted by geophysical sounding methods. The combination of the monitoring of the past erosion rate and the detection of the future erosion contributes to better management of trail degradation in national parks.

### Key words:

Trail erosion; cross-sectional measurement; long-term monitoring; 3D mapping; future prediction; national park management

## Study of Trail Erosion in Daisetsuzan National Park in Hokkaido, Japan, Based on Construction of Digital Surface Model with Drone

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### Abstract

Trail erosion has been investigated near Mt. Hokkai-dake in Daisetsuzan National Park, Hokkaido, northern Japan, with a drone (UAV) from 2014 to 2016. Although mountain trail erosion has been studied by surveying cross-sectional changes at certain sites in the national-park area, this traditional method does not provide the eroded/deposited volume in the entire area. Drones have been recently used to make Digital Surface Models (DSMs) to understand geomorphological phenomena. This study has two objectives: (1) to estimate changes of the eroded volume of mountain trails from 2014 to 2016 by making DSMs, and (2) to understand a relationship between the trail erosion and micro-topography. In this study six segments from starting site to ending site of trail erosion were selected. Before flying a drone, GCPs were set and distances between these GCPs were measured by a total station. About 300 to 500 photographs were taken in each of the trail segments. DSMs and Orthophotographs were made with these photographs by Agisoft, which is Structure from Motion (SfM) software.

The eroded volume in the segment with the largest value attained 274.67 m<sup>3</sup>.

### Key words:

Mountain trail; trail erosion; national-park management; Daisetsuzan National Park; Drone; Japan

## **Integrated Typology of the Municipalities in the Rhodope Mountain Region in Bulgaria with a View to Regional Development and Management**

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### **Abstract**

Mountainous areas in Bulgaria are characterized by deteriorated social and economic indicators compared to other parts of the country. These areas require specific policies and development plans, which aim at stabilizing them and retaining the depopulation processes. The Rhodope mountain region stands out with its wide variety of ethnic and religious structure of the population - on one hand, it is home to the majority of the Bulgarian Muslims (the Pomaks), while on the other – areas with a high concentration of Bulgarian Turks are formed here as well, together with relatively compact areas inhabited by Christian Orthodox Bulgarians. The diverse ethno-religious structure of the population determines spatial disparities in the course of the demographic processes in the region and makes it unique among other mountain regions. The Rhodope mountain region could be an example of transnational region with diverse ethnic and cultural identity. Based on the analysis of the trends in the demographic, urban and socio-economic development, as well as the impact of various factors, the current study attempts to typologies the municipalities (LAU 2) in this mountainous, border region of Bulgaria. For this purpose, by applying methods of the multivariate statistical analysis (hierarchical clustering), based on demographic, urban, social, economic, infrastructural etc. indicators, different types of municipalities have been defined. Each of the separate types has their own specific characteristics and problems and therefore requires a differentiated approach to designing regional plans and development strategies.

### **Key words:**

integrated typology; Rhodope region; Bulgaria; regional development; regional management

## C12.33 Political Geography

### Sociocultural Encounters in Geography: Borders, Borderlands, Grassroots Non-State Actors and the Southern African Integration Project



Home

#### Oral

1. [Advances and Challenges of Public Security Policy in Areas of Brazilian Border](#)  
Alex Jorge Neves (National Security Secretariat Publishes, Brazil), Adriana Dorfman (Federal University of Rio Grande do Sul, Brazil)
2. [Borderland: Ritualized Display of Luxury Hotels in Guangzhou](#)  
Xiaomei Cai (South China Normal University, China)
3. [Borders in Development](#)  
Paolo Novak (SOAS, University of London, United Kingdom)
4. [Geopolitics in Guiana Shield](#)  
Gutemberg Silva (Professor to Political Geography in Federal University of Amapa, Brazil)
5. [Grass Roots Non-State Actors, Border Interactions and Regional Integration: The Case of the Southern African Region and SADC](#)  
Dr Inocent Moyo (Geography Department, University of South Africa)
6. [Marginal, Situated and Emergent: Border Studies in Brazil](#)  
Adriana Dorfman, Luna Borba Colen França, Karla Maria Muller, Rafael Port da Rocha (Universidade Federal do Rio Grande do Sul, Brazil)
7. [On the Geographic Thoughts of Edward Said](#)  
Shixiu Weng (School of Geography and Planning, Sun Yat sen University, Guangzhou, China)
8. [Resilience Nodes: Mapping Survival-cum-livelihood Interactions Among Informal Cross-border Actors in the COMESA-EAC-SADC Tripartite Region](#)  
Chris Nshimbi (Centre for the Study of Governance Innovation (GovInn), Department of Political Sciences, University of Pretoria, South Africa)
9. [Smugglers X State: Territoriality, Sovereignty, Illegality](#)  
Adriana Dorfman, Luna Borba Colen França (Universidade Federal do rio Grande do Sul, Brazil), Rafael Francisco França (Brazilian Federal Police, Brazil)
10. [The EU's Bordering Dilemma - Prospects for Neighbourhood](#)  
James Scott, Jussi Laine (University of Eastern Finland, Finland)



11. [Understanding the Trajectory of Bordering through Literary Discourse: A Popular Geopolitical Study of \*Midnight's Children\*](#)

Shubhi Misra (Jawaharlal Nehru University, India)

## Advances and Challenges of Public Security Policy in Areas of Brazilian Border

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### Abstract

Brazil is a country whose borders are of continental dimensions, corresponding to 27% of the territory. This colossal size, reflects the problems and the potential of these regions, and to address one of these issues in the case, the Public Security, the Brazilian government instituted a Strategic Border Plan in 2011, which provides for a series of measures to strengthen integration, coordination, cooperation and the structure for the control and monitoring of this extensive border region, which after 05 years shows progress and challenges.

As advances we can list the considerable increase in investments, beginning of various programs and projects, such as the National Strategy for Public Security Border (ENAFRON), the Surveillance System for Borders (SISFRON), rigging of more than 600 police units in the range border, in-depth diagnosis of the problems in Brazilian borders and mapping initiatives in China, Russia, India, United States, Mexico and the European Union, in addition to the exponential increase in gun and drug seizures (cocaine and marijuana).

While there have been advances, there are still numerous challenges, such as the complex task of improving the mechanisms of cooperation and integration between the Brazilian agencies with neighboring countries as well as maintain this policy as a priority, especially in the current context of financial crisis and policy.

The work in question seeks demonstrate state of the art of this policy as important for Brazil as well as to South America and many other countries, as well as demonstrate the strategic importance of coordination and exchange of knowledge on the subject among the countries of the BRICS

### Key words:

Borders; Public Safety; Advances; Challenges

## Borderland: Ritualized Display of Luxury Hotels in Guangzhou

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### Abstract

The border was not a line that circumscribed or delineated a territory. Instead, the border was multiple; it was found, practiced and enacted in a multitude of sites beyond and within the territory it was intended to secure. Border as Method, it considers the diverse operations of the border in producing landscapes and subjectivities. Hotel as the border of metaphor, consumers around the world need to provide the effective certificate such as a passport to check in. Besides, consumers that does not locate the ability to act politically in the traditional figure of the citizen, but rather, sees the struggles, contestations and negotiations of non-citizens as intrinsic to the enactment of citizenship and political subjectivity. The study selected 10 luxury hotel in Guangzhou as a case, and used the in-situ observation, depth interview, experience and other research methods. It found that: (1) Consumers through check-in, produce and inspection certificates and other forms of ritualization showed an acute manifestation of the “spectacle of the border”, citizen or non-citizen, resulted in the process of the ritualization of similar border checks are fuzzy. (2) The hotel through language, material products, cultural construction and so on produced blurred border landscape, rendering the multinational national contestations and negotiations. (3) In the process of the interaction of hotel producers and consumers, citizenship is a bordering practice that operates through exclusion and claiming. The study enriched the border related theory, also provides a new perspective for the research of the hotel.

### Key words:

Border; citizenship; landscape; subjectivity; luxury hotel

## Borders in Development

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### Abstract

Development is inextricably related to the state-centred cartography of world spaces defined by borders, both in its historical trajectory and contemporary entanglements. Yet the multiplicity of channels and directions characterising their articulation is scarcely explored, and this article is a first attempt to fill this analytical void. More specifically, the paper places borders in development in two ways. First, it places borders in Development Studies. Examining contemporary development's theories, policies and practices through the prism of scale, it identifies borders as a useful analytical vantage point that lay at the intersection between state- and non-state centred geographies of development. Second, it places Border Studies in development. Focusing on the tension between borders, understood as linear markers of territorial jurisdictions, and bordering, understood as fluid, situated and dynamic social process, it interrogates economic growth- and poverty-related policies. Three contributions arising from placing borders in development in this way are highlighted. At its broadest, the discussion dis-entangles the multiplicity of scales and directions in which borders, bordering and the development process intersect. It is precisely at this scalar intersection that the force of development, and the potentials for engaging, opposing, avoiding, or subverting it, lay.

### Key words:

Development Studies; geographies of development; borders and development nexus; border management; scale; economic integration; Good Governance

## Geopolitics in Guiana Shield

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### Abstract

International limits and borders are relevant issues in geopolitical studies, whether past or nowadays. The land and sea borders, as well as the limits that constitute them, are, from a diplomatic perspective, interconnected. This connection has a layer of complexity in the negotiation of international limits, which is relevant in several countries that comprise the Guiana Shield. This article analyzes important aspects of the still unresolved maritime and territorial disputes in the Guiana Shield from the angle of geohistory and geopolitics. The key problematic is: how occurred and still occur geopolitical arrangements of still active border disputes in the Guiana Shield? The methodological basis was document analysis, literature, field work and updating of thematic cartography. The work takes, even in terms of procedures, an integrated and comparative approach, when possible, of the disputes focused, allowing analyze several important components of geopolitics and geohistory Plateau of Shield that eventually would go unnoticed if an integrated approach was not made. The research concludes that all shield countries mentioned, except Brazil, are involved in territorial disputes and the political dimension of three rivers-limits - Oiapoque, Maroni and Corantyne - are put into relevance. The article also points out that economic interests are put in evidence in the settlement of territorial disputes as the disputed areas are rich of minerals such as gold, oil and bauxite, which sharpens the interest and the participation of multinationals in the regional geopolitical arrangement.

### Key words:

Geopolitics; Geohistory; International limits; Maritime-Territorial claims; Guyana Shield

## Grass Roots Non-State Actors, Border Interactions and Regional Integration: The Case of the Southern African Region and SADC

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### Abstract

The volume and traffic of economic activities in time and space across the Ramokgwebana and Beitbridge border posts which 'separates' Botswana and Zimbabwe and South Africa and Zimbabwe respectively, suggests that markets have the potential of exploiting the economic and social inequalities of people, resulting in the movement of people and goods to where there is potential for gain and economic and personal advancement. Therefore, based on a qualitative study of cross border activities between Botswana and Zimbabwe and South Africa and Zimbabwe, this paper argues that such activities undermine the effect of the border. This suggests that, there is a *de facto* connection and integration on the basis of the activities of grass roots non-state actors between Zimbabwean shops and the border towns of Francistown in Botswana and Messina in South Africa. In a region like the SADC, which aim to integrate among others the economic activities, such an interface, is a grassroots activity which can be harnessed to achieve such an aim.

### Key words:

Cross border social and economic activities; regional integration; SADC

## Marginal, Situated and Emergent: Border Studies in Brazil

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### Abstract

This paper resorts to quantitative and qualitative methods to analyze researchers and researches dealing with contemporary (since the 1990's) border studies in Brazil. The information was collected while building the database "Unbral Fronteiras - Open Access Portal of the Brazilian Universities on Borders and Limits". In the process, border researchers were listed and answered a questionnaire. Through these, we drew the spatial distribution of scholars and studies (in Southern in Central borders, mostly) and identified the main topics (integration; cross-border culture; infrastructure and its limits; fronts) and emerging themes (non-state and non-administrative borders). We conclude that there is no consensual methodology or theory. Still, this is a growing field of research, with a defined community and a solid understanding of its object (the international borders). There are paradigmatic concepts (border, limit, twin-city) and regionalization (border strip, 3 arches, dyads). We conclude that, in Brazil, border studies are a marginal field of research, much like its object. In addition, we found a strong link between researches and public policies aimed at borderlands, more frequently as comments than as formulation. Finally, we conclude that border scholars tend to be politically engaged with the object, which is expressed in situated research.

### Key words:

Scientific production; Border Studies; Brazil; Domain analysis

## On the Geographic Thoughts of Edward Said

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### Abstract

By rethinking the contradictions of Edward Said's thoughts, this article argues that the contradictions are Said's strategies of resistance, and they're very important to research Said's geographic thoughts. Thus, this article explores the features of 'imaginative geographies' and develops a new concept 'contrapuntal geographies'. To imaginative geographies, this article argues that, we should analysis the relative 'structures of attitude and reference' and the relative discourse, then read them in worldly cosmopolitanism humanism. To the concept 'contrapuntal geographies', this article explored the basic features of this concept. First, a geographic space is related to different communities, and has discrepant experiences and representations which competing each other. Second, the representations are possible to reconcile. Third, the results of the reconciliation may be a hybrid co-existence. Last, it's hard to get this co-existence, it need the negotiations of different cultures, the escapes of the secessionism nationalism, and pursues of the worldly cosmopolitanism humanism.

### Key words:

Edward Said; imaginative geographies; contrapuntal geographies

## Resilience Nodes: Mapping Survival-Cum-Livelihood Interactions among Informal Cross-Border Actors in the COMESA-EAC-SADC Tripartite Region

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### Abstract

This paper attempts to map informal cross-border interactions at and across contiguous borders of countries participating in the Tripartite free trade area (TFTA) including the Common Market for Eastern and Southern Africa (COMESA), East African Community (EAC), and Southern African Development Community (otherwise, COMESA-EAC-SADC). It sketches the interactions across specific border crossings and their spread in the TFTA by mainly focusing on the activities of informal cross-border traders (ICBTs). The paper thereby fulfils two methodological and theoretical objectives. Firstly, it reviews and discusses livelihood and sustainability issues concerning and, therefore, brings to the fore the resilience of grassroots non-state actors (including ICBTs) across/in the borderlands and communities of selected participating countries in the COMESA-EAC-SADC TFTA. This theoretically locates the paper in the study of borders, boundaries, frontiers and borderlands. Secondly, it integrates empirical information from personal interviews, focus group discussions and participant observations conducted in selected border locations of TFTA participating countries, and discusses the socio-economic dynamics in these borderlands. Informal cross-border trade serves, for the actors in such areas and those from beyond, as the next best alternative and coping strategy given prevailing unemployment and the socioeconomic neglect of the borderlands by respective governments. The socioeconomic challenges and low levels of development experienced in these marginal outlying border communities are compounded by the neoliberal reforms adopted by most TFTA countries in the late 1980s and early 1990s that removed many economically active people from formal employment. Despite this, the motivations behind the socioeconomic activities of non-state actors in the border communities are seldom deeply and properly articulated, except that their cross-border activities are illegal. If well nurtured, TFTA border towns and borderlands could become bustling nodes of socioeconomic and cultural activity spreading TFTA's success and development in participating countries.

### Key words:

livelihood; borders; informal cross-border trade; COMESA-EAC-SADC Tripartite FTA

## Smugglers X State? Territoriality, Sovereignty, Illegality

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### Abstract

This paper discusses the territoriality of cigarette smugglers at the Southern Cone borders of sovereign South American states, as experienced in Southern Brazil. It confronts the discussion of State sovereignty with analyses of (il)legalities in order to better understand existing borders and territories. It examines the distinct policies in the national territories of Brazil and Paraguay and at their borders, and the territoriality of the local population engaging in illegal activities. Cigarette production and consumption, the market and its regulation, actors, routes and networks, smuggling territories and state borders permeability are mapped and analyzed under the tensions that bind legality and legitimacy. We conclude that tobacco production and trade and cigarette smuggling are connected through agents who use the border to build the legal market and, consequently, to increase the trade value of national tobacco. Cigarette smuggling also represents a resource that translates as informal labor inclusion and legal exclusion. Smuggling at borders combines verticalities and horizontalities, networks and places, hierarchy and confidence in such a way as to be totally integrated to the legal economy, international markets and national territories and does not defy state's sovereignty. It is better explained as integrated to national economy through illegalities management

### Key words:

Smuggling; Sovereignty; Illegalities; Borders; Territories; Cigarettes; Southern Cone

## The EU's Bordering Dilemma - Prospects for Neighbourhood

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### Abstract

As part of the wider debate interrogating ethical consequences of managing mobility through borders, questions related to everyday ontological security (i.e. the identity of the self) and disruptions of self-referential ways of seeing the world need to be taken seriously (Mitzen 2006, Rumelili 2015). Identity bordering within the EU is not only fed by social media and populist discourses but is also part of intellectual and philosophical arguments that, for example interpret liberal, humanitarian understandings of migration and idealistic notions of regional neighbourhood (e.g. with Ukraine, Russia and the South Mediterranean) as naïve and misguided. At the same time, despite all proclaimed intentions of re-setting its Neighbourhood agenda the EU appears to insist on 'asymmetric conditionality' and maintenance of the basic policy architecture that so far has failed to promote genuine partnerships. One reason for this is related to the maintenance of an EU identity and the fact that the EU's ontological security is bound up in the continuity and perceived coherence of its policy frameworks (Natorski 2015). In order to transcend the 'coherence trap' and the selective visibility of social issues that it engenders, alternative understandings of Neighbourhood as a context for societal interaction – and not a merely an 'objective' policy – are required. While cross-border migration has become a fact of life in much of the EU, the discursive and practical securitisation of labour migration and other forms of cross-border mobility challenges basic principles of and prospects for regional cooperation. Understanding the EU as an integral part of any neighbourhood idea, joint engagement with socio-economic, cultural and group-specific concerns could help create a new self-narrative of EU actorness and contribute to a more tolerant and humane border policy.

### Key words:

geopolitics; bordering; European Neighbourhood

## Understanding the Trajectory of Bordering through Literary Discourse: A Popular Geopolitical Study of *Midnight's Children*

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### Abstract

Borders are physical/geographical as well as symbolic and representational. They are lived, created, crossed, resisted, hardened or dissolved at various levels and at varied spaces. Borders no longer refer only to physical/geographical lines demarcating set physical spaces called nation-state; rather they have eventually assumed a hybridized form. The drawing and redrawing of maps brought about by the historical processes of nationalism, imperialism and decolonisation made evident that borders are not natural phenomena but man-made demarcations which are integral to the exercise of power in physical and mental forms. They also show how borders are highly dynamic entity. This has thrown up questions related as much to colonial subjection as to class, race, gender, language and epistemology. Within the current contexts of accelerated globalization and the development of communication and information technologies, which aim to create a 'borderless world' but in reality have 'globalised' the very borders they claimed to dissolve, and with simultaneous shifts in thinking in the social sciences and cultural studies, under which the borders between various disciplines have become increasingly permeable, the concept of 'borders' has been opened to new reflections and debates. Seen against the recent backdrop of accelerating migration, not infrequently burgeoning into distressing crises, the rethinking and debates have taken on certain urgency.

The present paper attempts to retrace the changing nature of the India- Pakistan border by analysing Salman Rushdie's classic novel '*Midnight's Children*'. It attempts to establish a link between literary discourse and the ongoing process of bordering.

### Key words:

Popular Geopolitics; Border

## C12.33 Political Geography

### The Eurasian Pacific – Geopolitical Moments and Unfulfilled Promise

#### Oral



1. [Geopolitical Pivots and Blue National Soil – The Difficulties of Free-Flowing Territory](#)  
Edward Kieran Boyle (Kyushu University, Japan)
2. [Northeast Asia Institutional Gap: Geographical Analysis](#)  
Varvara Krechetova (Geographer, China)
3. [Russia`S Cross-Border Cooperation in the Far East: Towards a Distinctive Strategy?](#)  
Sergey Golunov (Kyushu University, Japan)
4. [The Eurasian Pacific: The Unfulfilled Promise of an Energy Pivot?](#)  
Sophie Hou (UMR5600, France)
5. [The Russian Geopolitical Views on Asia Pacific: Changing Role in World Politics](#)  
Valerii KONYSHEV (Saint Petersburg State University, Russian Fed)
6. [Theorizing Russia's Policies towards BRICS](#)  
Alexander Sergunin (St. Petersburg State University, Russian Fed)

#### Poster

1. [TPP and Economic Containment: A Comparison of China and Vietnam](#)  
MA Teng (China, Beijing Normal University)

## Geopolitical Pivots and Blue National Soil –The Difficulties of Free-Flowing Territory

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### Abstract

The much-vaunted “pivot” of the United States self-evidently draws upon the rhetoric of Harald Mackinder, often proclaimed the founding father of geopolitics. Mackinder considered the Eurasian heartland as the “pivot of history”, control of which would guarantee hegemony in the twentieth century. As we enter the twenty-first, America’s “pivot” is being undertaken by what remains the hegemonic power of the era, signaling the journey of this metaphor from noun to verb. This grammatical transition is itself representative of the transformation in geopolitical imagery, as an early twentieth century that fetishized control over blocks of territory has given way in the twenty-first to a focus on the facilitation, administration, and control of flows of men and material.

Yet while this suggests the aptness of the oft-drawn contrast between spaces of places and space of flows, the state effects these flows through the facilitation and management of the latter. Therefore, while there is no contradiction between territories and networks, the former is required in order to enable the latter to be made visible. The rhetoric of territorial control visible in Asia-Pacific disputes centers upon this claim to order the world of flows, in a manner that both recalls and draws upon an era of high imperial competition. Nevertheless, the claims to novelty for this shift in political rhetoric disguises the inherent continuity of the state, where what has altered is the conception of territory over which it seeks to proclaim its authority.

### Key words:

Geopolitics; pivot; state; territory; islands; Asia; maritime disputes

## Northeast Asia Institutional Gap: Geographical Analysis

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### Abstract

Northeast Asia (NEA), region comprising China, Democratic People's Republic of Korea, Japan, Republic of Korea (ROK), Mongolia and Russia, puzzles with lack of institutionalised regional integration. There are multiple local and central governments initiatives seeking promote peace or foster economic development, the most recent is Northeast Asia Peace and Cooperation Initiative. However, despite the close and intense economic and, in particular, trade ties, common security concerns, NEA did not reached level of integration of NAFTA, Mercosur or European Union. The reasons are numerous; the most important are history of the region, deep involvement of non-regional players in political and military affairs, lack of mutual trust. The paper analyses existing institutional gap in several aspects. Firstly, paper shows how the evolution of international cooperation in NEA at bilateral and multilateral level determines the gap. Then, it presents and analyses the economic landscape of the NEA countries by provinces in different dimensions (measured in Gross Regional Product normalised by population, area, per capita by country average), population distribution, and measures how different it is in areas close to NEA state borders. Lastly, the paper outlines efforts of the regions of China, Russia, ROK, Mongolia and Japan facing inner NEA state borders and motivated by economic challenges, to close the gap via the Greater Tumen Initiative, the Association of North East Asia Regional Governments and similar groupings.

### Key words:

Northeast Asia; regional cooperation; China; Japan; Korea; Mongolia; Russia

## Russia`Scross-Bordercooperationinthefareast: Towards a Distinctivestrategy?

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### Abstract

Russia is the largest country in the world. It borders with more than a dozen of recognized and non-recognized states and faces very different security and cooperation agendas in various regions. Among all, Russia deals with neighbour countries offering distinctive cooperation strategies varied from the EU's cross-border regionalism to the Chinese model of empowering selected regions and even to the North Korean approach of solving almost any regional cooperation problem by representatives of the central government. In these circumstances it is not easy for Russia to elaborate an efficient nationwide framework approach towards cross-border cooperation.

Recent Russian conflict with Western countries led to dramatic curtailing of the Russia-EU cross-border cooperation. At the same time Russia proclaimed "turn to the East" that largely means an attempt to substitute its ties to the West by ties with the most economically developed Far Eastern countries. Among all this can imply empower Russia's Far Eastern regions to cooperate with its foreign neighbours.

Are there distinctive signs of Russia's attempts to elaborate a distinctive cross-border cooperation strategy for its Far Eastern regions? What are opportunities and limitations for developing such a strategy? What are particular features of Russian cross-border cooperation with its neighbour countries? These questions to be focused in the presentation.

### Key words:

BorderStudies; cross-bordercooperation; RussianFarEast

## The Eurasian Pacific: The Unfulfilled Promise of an Energy Pivot?

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### Abstract

Discourses about the Asian Pacific pivot have increased for several decades. Russian leaders have also highlighted the strategic role of Russian Eastern territories and of Russian partnership with Asian Pacific countries for developing the whole country and reaffirming its place on the international arena (Fortescue, 2015). In the energy area, projects have been discussed for a long time between Russia and its Asian neighbours (Jaffe, 2001). However, limited progress has been made, although it should be noted that great gas agreements have been concluded between Russia and China in 2014. This paper aims to suggest some explanations to understand the significant gap between Russian political discourses and concrete realisations in the energy field. Many factors come into play here. Russian Eastern regions are economically disadvantaged and low-populated in comparison with other Eurasian Pacific regions. In many of these regions, energy infrastructures are almost non-existent and energy resources are expensive to develop and are not yet exploited. Moreover, disagreements between companies exist. Furthermore, the relations between Russia and the other Asian Pacific countries suffer from many inherited tensions and misunderstandings. Is Eurasian Pacific region becoming an “energy pivot” or does the area remain marginalised? Why is the promise of an energy centre formed by Russia and North Eastern Asia still unfulfilled, and why is this issue still significant in Russian official discourse?

### Key words:

Eastern Russia; energy; oil and gas; Eurasian Pacific

## The Russian Geopolitical Views on Asia Pacific: Changing Role in World Politics

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### Abstract

This paper aims at examining how different Russian geopolitical schools view Asia Pacific's place and role in the globalizing world as well as Moscow's future relations with the regional actors. Various versions of the present-day Russian geopolitics, such as 'classical' geopolitics, neo-Eurasianism, 'resource' geopolitics, 'spiritual' geopolitics, 'special path'/exceptionalist theory, 'civilizational' geopolitics, critical geopolitics are studied.

This study reflects on how the above geopolitical schools theoretically interpret socio-economic, political and strategic processes in Asia Pacific as well as the impact of these processes on the world developments. These schools seek to find out whether the shift of the 'geopolitical pivot' to Asia Pacific is conducive to the global transformation of the international relations system toward the multi-polar structure. They also try to understand how the coming of the 'Asia Pacific age' will affect the nature of power in the present-day world politics, regional and global governance and alliance systems as well as the emerging security architecture in the region. The above schools' views on Russia's bilateral relations with the major Asia Pacific countries and multilateral institutions are analyzed.

### Key words:

Russian geopolitical schools; Asia Pacific region; security; global transformation

## Theorizing Russia's Policies towards BRICS

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### Abstract

Moscow's policy motives regarding BRICS are examined. The Russian policies towards and within BRICS represent a combination of ideational and material motives. On the one hand, BRICS is important for the Kremlin in terms of status seeking: with the BRICS' help Russia tries to return its status of a great power, shape the future world order and to make the West abide by the rules of that order. On the other hand, Moscow values its economic and strategic partnerships with the BRICS states which are important for Russia's well-being and for counter-balancing the West in the global geopolitical and geoeconomic game. In case of BRICS, Russia's foreign policy behavior does not fall into the classical categorization of the power transition theory which distinguished between revisionist and status quo powers. Rather, Russia (similar to other BRICS countries) is a reformist state differing from the two ideal types of international actors by its motivation and methods. It prefers to act on the basis of existing international rules and norms rather than to challenge or keep them intact. Russia aims at reforming these rules to adapt them to new global realities and make them acceptable for all the members of the world community.

### Key words:

Russia; BRICS; theory



## TPP and Economic Containment: A Comparison of China and Vietnam

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### Abstract

The Trans-Pacific Partnership Agreement (TPP) has been actively promoted by the United States since 2010. TPP is likely to establish a new international economic and trade order. In order to dominate regional economic cooperation in the Asia-Pacific region, the United States has led TPP negotiations, China was excluded. On October 5, 2015, twelve members of the TPP reached an agreement on trade. What is the impact of the agreement on China's export trade? Is there a trade diversion effect? Will the agreement have an impact on China's foreign trade and its geo-economic relationships in the Pacific Rim? This paper selects the major beneficiary country of TPP, Vietnam as a comparison to China and examines foreign-trade data for China and Vietnam from 2005 to 2014. First, we analyze the export structure of commodities between these two countries. Using the relative revealed comparative trade advantage (RTA) index, a modified index of revealed comparative advantage (RCA), we analyze the comparative advantages and the changing trends of the main export commodities. Second, the trade diversion effect of the export commodities is examined by establishing a dynamic data model. Finally, we investigate the degree of spatial agglomeration and its trend for China's foreign trade in the Pacific Rim by a spatial analysis. The results show that China and Vietnam have similarities and substitutability in textiles, apparel and footwear in terms of commodity structure. We therefore conclude that the TPP trade agreement has not yet had a significant impact on China's foreign trade between China and that Vietnam and there has been no trade diversion effect between the two countries until now; from a geographic perspective, China's geo-economy and foreign trade in the Pacific Rim present an increasing dispersion trend.

### Key words:

TPP; geo-economic

## C12.33 Political Geography

### Politics of Environment and People



Home

#### Oral

1. [Analysing the Impacts of Climate Change in the Himalayas: A Critique of the IPCC and Politics of Knowledge](#)  
Dr Sonali Narang (Panjab University, India)
2. [Demographic Change and Political Trust in China: A Case Study of Water Supply in Shanghai](#)  
Nahui Zhen, Jon Barnett, Michael Webber (University of Melbourne, Australia)
3. [Farmer's Resistance to Conservation at the \(Trans\)Frontier](#)  
Innocent Sinthumule (University of Venda, School of Environmental Sciences, Department of Ecology and Resource Management, South Africa, South Africa)
4. [How do We Shape our Harmonious World? A Suggested Holistic Approach for our Common Safe Future](#)  
Lotfy Azaz (Geography Department, Faculty of Arts, Menofya University, Menofya, Egypt, Egypt)
5. [Inter-state Water Conflicts: An Indian Scenario](#)  
Imtiyaz Ahmad Malik (University of Kashmir, India)
6. [Natural Disaster and State Polity](#)  
Md Rezwan Siddiqui (King's College London, Bangladesh)
7. [Secure Food for Mountain People: Case Study in Upper Mekong Rive](#)  
Wenling Wang, Yan Feng (Asian International Rivers Center at Yunnan University, Kunming 650091, China)
8. [The Transformation of Anti-Growth Coalition in China's Urban Waterscape -A Case Study of Chengdu](#)  
Lei Gu (Lanzhou University, China), Gina Chen (Northwestern University, United States), Yali Zeng (Chengdu Urban River Association, China), Hugh Battye (The London School of Economics and Political Science, United Kingdom)

#### Poster

1. [The Influence Elements Analysis of the Geostrategic Location Selection](#)  
Gong Maoyu; Liu Jianzhong; Zhang Jing (China, The Information Engineering University)



## **Analysing the Impacts of Climate Change in the Himalayas: A Critique of the IPCC and Politics of Knowledge**

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### **Abstract**

The Himalayas ‘roof of the world’ the major source of precious water resources for Asia, particularly South Asia is going to be at the receiving end due to the most adverse effects of climate change in numerous ways. The IPCC has observed that “Glaciers melt in the Himalayas is projected to increase flooding, and rock avalanches from destabilized slopes, and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede” (IPCC 2007, Working Group II: 13). The problem of fresh water availability due to sharp decrease in the Himalayan river flows, and floods in coastal area are no doubt going to pose enormously complex problems before communities and governments throughout South Asia in the years and decades to follow. It is difficult to deny that with each passing day the growing ‘consensus’ among policy makers, academics, media and even common people appears to be that climate science is more or less ‘certain’ on this complex subject of climate change which would be inevitable. IPCC which is regarded as the dominant actor and most authoritative voice in climate change debate, critics have pointed out a number of shortcomings in its reports and related research process and methodology. This paper will examine at length the impacts of anthropogenic climate change in the Himalaya regions as offered and outlined by various scientific committees/reports, especially the IPCC and its five assessment reports and secondly, to critique various attempts aimed at climate change scenario building by IPCC and their fallouts, intentional or not, for the securitization of climate change in general and climate migration in particular.

### **Key words:**

Climate Change; Himalayas; IPCC; Politics of knowledge



## Public Trust in Institutions in China: A Case Study of Water Supply in Shanghai

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### Abstract

The relationship between demographic factors and political trust has been well documented. However, in the Chinese context, empirical evidence about the factors that affect political trust is limited, so our understanding of potential changes in trust is poor. Using data from statistical bureaus and a mass survey in Shanghai, we find that residential status and educational attainment are the most influential factors in stratifying public trust in institutions. More educated people and urban hukou groups show lower propensities to trust. Other demographic characteristics do not matter much for shaping political trust. Because the population is becoming more educated and urban hukou people are becoming a higher proportion of the population, institutions in the future will feel challenged to maintain or gain public trust. They therefore need to be more cautious of their performance, especially in terms of transparency and fairness.

### Key words:

public trust; demographic factors; hukou; education; water supply

## Farmer's Resistance to Conservation at the (Trans) Frontier

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### Abstract

The need to increase the amount of land under nature conservation at the national and global levels has gained attention over the past three decades. However, some stakeholders are resistant to the idea of nature conservation projects. The purpose of this paper is to identify historical and contemporary reasons for farmer's resistance to conservation and to analyze the consequences arising from that resistance towards the creation of cross-border nature conservation scheme. The paper argues that resistance to conservation is magnified in transfrontier conservation areas where land parcels under different forms of tenure (state, private and communal) are brought together into a common nature conservation project. The study draws on fieldwork material from Greater Mapungubwe Transfrontier Conservation Area spanning Botswana, South Africa and Zimbabwe. The study concludes that the assumption that various pieces of land often under different forms of tenure can be neatly integrated needs rethinking.

### Key words:

Resistance; Transfrontier Conservation Areas; Mapungubwe; Borders; Farmers

## How Do We Shape Our Harmonious World? A Suggested Holistic approach for Our Common Safe Future

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### Abstract

Sustainable development requires meeting the basic needs of all and extending to all the opportunity to fulfil their aspirations for a better life. A world in which poverty is endemic will always be prone to ecological and other catastrophes, Our Common Future ('Brundtland report') (1987). In 2012, 12.7 % (896 million) of the world's population lived at or below \$1.90 a day. Moreover, Sustainable development cannot be achieved in the world that misses security and peace. Nowadays, there are many wars and conflicts. Wars, conflict and persecution have forced more people than at any other time since records began to flee their homes and seek refuge and safety elsewhere, according to UNHCR's annual Global Trends Report: World at War, (2015). The number of people forcibly displaced at the end of 2014 had risen to 59.5 million. It is believed that conflict on various resources is the main cause of most of these wars. Therefore, there is a need to move from "conflict" to "cooperation" and from "enemies" to "neighbours" as we ALL live in ONE earth. To achieve that, ALL must believe that world resources are for all. Each person has to have his/her equal share of it. This paper may illustrate the different aspects of inequalities in the world. A proposed holistic approach for a common management of world's resources to achieve Sustainable development may be presented, and how to distribute it equally on the world's population to eradicate poverty and achieve security and peace in the world.

### Key words:

Sustainable development; poverty eradication; inequalities; resources; common safe future; security; peace; Wars; conflict; Harmonious World

## Inter-State Water Conflicts: An Indian Scenario

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### Abstract

Although India occupies only 3.29 million km<sup>2</sup> geographical area, which forms 2.4% of the world's land area, it supports over 15% of the world's population. With a population of more than 1.21 billion people, India supports about 1/6<sup>th</sup> of world population but has got only 1/25<sup>th</sup> of world's water resources. Besides, India also caters a livestock population of more than 500 million, which is about 20% of world's total. Provided this huge gap between supply and demand of water in India, its sustainable use and management becomes an inevitable task.

India is gifted with a river system comprising more than 20 major rivers with several tributaries. Many of these rivers are rivers flowing through different states (Inter-state Rivers), and this geographical reality has become a bone of contention between different states of India. There are many inter-state rivers in India. The regulation and development of these river valleys continues to be a source of inter-state friction. India is a federal democracy, and most of its rivers cross state boundaries, as such constructing efficient and equitable mechanisms for allocating river flows has long been an important legal and constitutional issue. Since independence, numerous inter-state river water disputes have erupted in India. In this paper, I will try to highlight how regional politics and ineffective administration has led to the mismanagement of this precious natural resource.

### Key words:

Inter-state; Federal democracy; Mismanagement

## Natural Disaster and State Polity

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### Abstract

This research revisits history up to 1970 to explore the synergies between disaster and national politics. This paper studies pressure points created by disasters on state polity, and the way different regimes interact differently with natural disasters. This discussion is not aimed to present any collective theory of relationship between disaster and politics, rather to shed light on an unexplored area based on indicator based analysis. Natural disaster occurs in political space. It can set motion for political changes. It also creates pressure on political system by increasing demand and by empowering new or existing political group. On the contrary, natural disaster can also dampen conflict and strengthen social bond. Preexisting national condition has been found to be one of the defining factors of disaster vulnerability in politics. Disaster can create both opportunity and challenge for political parties and for interested stakeholders. Bhola cyclone of 1970 is considered as one of the triggering factors that set momentum for 1971 liberation war of Bangladesh. Later on, the very first change in government occurred in 1975 with a military coup, when Mujib government lost its popularity due to nationwide famine after two years (1973 - 74) of consequent flood and drought. Inexperience, corruption and oppressive policy to tackle situation appropriately led to this regime change. Devastating floods and cyclones of 1987 and 1988 created pressure on military government to make way for fair election. Since 1991, democratic governments are showing better performance in reducing vulnerability, disaster warning and relief programs. Disasters sometimes work as diversion from burning issues, create pause in active protest against incumbent. Oppositions use this as opportunity by engaging in relief, highlighting governments' weakness and preparing for protest.

### Key words:

Bangladesh; state polity

## Securefood for Mountain people: Case Study in Upper Mekong River

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### Abstract

Food security status has changing dramatic over last 12 in upper Mekong river, particular in Deqin county. In order to understand the process, 36 years data of “rural annual per capita net income” and “rural annual per capita grain” based on the relevant agricultural economic statistics of Deqin county in 1978-2013 along with 53 household interviews were analyzed. The main results are: (1) Until 2002, the food security status turned in to due to the reliable grain and cash incomes, mainly impacted by the grain yield increase, planting structure adjustment, net income increase and with its multiple channels. (2) The relative official policies were important factors to affect the states and the changes of the regional food security, and many kinds of subsidies from governments became key component of farmers’ net income. (3) The innovation in 3 levels is critical for the local people turn into food secure status. On the macro level, the expanded scope of the farmer’s food security situation no longer only emphasizes the temporary food or cash remedy measures, but also the social well-being as a whole; On the meso scale, farmer’s participation is valued as an important factor during policy implementation; On the micro scale, the villagers are much more willing to take risks to try new things.

### Key words:

food security; changes; Mekong

## The Transformation of Anti-Growth Coalition in China's Urban Waterscape -A Case Study of Chengdu

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### Abstract

Since the 1980s, the gradual regime reform has affected the politics and economy in China, making city as a space controlled and intertwined by different powers and capital. In this context, local growth coalition has been formed by both public and private sectors in many fields: not only in urban land resources and urban infrastructures, but also related to urban waterscape, such as river exploration, river reclamation, waterfront regeneration, urban water supply and so on. These projects are often adopted as pro-growth strategies in order to enhance economic development; yet lead to many negative effects and conflicts meanwhile. As a result, anti-growth coalition occurs and often makes a difference recently.

Based on a case study of Chengdu (a city with long tradition of water culture in China), this paper analyses the features, reasons and mechanism of anti-growth coalition in urban waterscape transformation since the 1990s. From limited influence in early river regulation project in the 1990s to considerable impact during a series of river exploration and reclamation projects in the 2000s, the role of anti-growth coalition in Chengdu's waterscape has experienced a dramatic change. After 2005, many urban environmental movements indeed affected the decision-making process, which is from elite-dominated too grassroots-initiated, with wider cooperation among NGOs, local communities, experts, media, even actors from previous growth coalition and trans-scaled powers. However, after 2010, the voice of anti-growth coalition became lower than before, because local growth coalition took a new type of liquid-green governmentality, for instance, with large-scaled lakes and wetland parks reconstructed, on one hand as a method of pro-growth, on the other hand as a strategy to smooth the conflicts with previous anti-growth coalition; yet some of these cases seemed to cause a struggle again, with new dilemma and anti-growth coalition left.

### Key words:

Anti-growth Coalition; urban Waterscape

## The Influence Elements Analysis of the Geostrategic Location Selection

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### Abstract

Geostrategy is the policy to make use of the geographical relations and their interactions to obtain and protect national interest. The location selection is the important problem of the geostrategy formulation. Geostrategic location selection is affected by three elements: the strategic environment, the strategic intention and the strategic interaction.

The strategic environment is the fundamental condition of the geostrategic location selection. It is the internal environment and the external environment including many geopolitical entities in the geographical environment. The strategic environment consists of the international environment, the national environment and the host country internal environment.

The strategic intention is the guiding of the geostrategic location selection. Under the influence of the strategic environment, the nation forms the strategic purpose based on different subjective wishes. The strategic intention includes the natural resources seeking intention based on energy safety, the pivot seeking intention based on transportation safety, the strategic assets seeking intention improving the national competitive superiority.

The nation shall make other strategic decisions besides the location selection under the influence of the strategic environment and the strategic intention. The approaches for cooperation and the mode of access will result in the strategic interaction among the geopolitical entities and is closely connected with the location selection. So, the strategic interaction is the other influence element of geostrategic location selection.

### Key words:

Geostrategic Location Selection; Influence Elements; Strategic environment; Strategic intention; Strategic interaction

## C12.33 Political Geography

### The Transformation of Political Space and Prospects for New Governance in the Contemporary Phase of Globalization

#### Oral



Home

1. [Beyond The Borderline: Rescaling Cross-Border Linkages in a Globalizing Asia](#)  
Edward Boyle (Kyushu University, Japan)
2. [Challenges in Fostering Local Governance in Post-Socialist Countries: Some Territorial Evidences from the Romanian Case](#)  
Corneliu IATU; Mihail EVA; Ciprian ALUPULUI (Alexandru Ioan Cuza University of Iasi, Romania)
3. [Competing Institutionalizations of the Region: Re-Scaling, Structured Coherence and Condensations](#)  
Bernd Belina (Goethe University, Germany)
4. [Emerging Formal Community Governance and Its Country-Wide Networks in Japan](#)  
Yosuke Maeda (Niigata University, Japan)
5. [From Ungoverned Territory to De Facto State: A Quick Guide](#)  
Fedor Popov (Institute of Geography of the Russian Academy of Sciences, Russian Fed)
6. [Geographical and Geopolitical Aspects of the Development of the Great Silk Zone and the Tea Road](#)  
Arnold Tulokhonov (The Baikal Institute of Nature Management SB RAS, Ulan Ude, 670047, Russia, Russian Fed)
7. [How Our City Should Be Dissolved: Osaka Metropolis Plan as a Politics of Rescaling](#)  
Takashi Yamazaki (Osaka City University, Japan)
8. [Identities, Sovereignty and Legitimacy: Examining Support for Break-Away Republics in the Post-Soviet Space](#)  
Vladimir KOLOSOV (Institute of Geography, Russian Academy of Sciences, Russian Fed); John O'Loughlin (University of Colorado at Boulder, United States); Gerard Toal (Virginia Polytechnic, United States)
9. [Live House for Political Subjectivization: The Guerrilla Model in Chinese Cities](#)  
June Wang; Li Chen (City University of Hong Kong, HongKong SAR, China)
10. [On Globalization, Borders and Nation-States: Some Historical Musings](#)  
Randy Widdis (University of Regina, Canada)
11. [Political Spaces as Influence Analysis: Reconstructing Power Relations in Development Priorities in Chile](#)

Alvaro Roman (CEDEUS, Alberto Hurtado University, Chile)

12. [Positioning of Ukraine in the Geospatial Dimensions of Dynamic World System](#)

Borys Iatsenko (Kyiv National Taras Shevchenko University, Ukraine)

13. [Territoriality and Borders: Contemporary Changes and Possible Perspectives](#)

Vladimir KOLOSOV (Institute of Geography, Russian Academy of Sciences, Russian Fed)

14. [Territory, Sovereignty, and Political Geometry in the Pacific Ocean](#)

Katherine G. Sammler (California State University Maritime Academy, United States)

15. [The Construction of National Identity through the Production of Ritual and Spectacle: An Analysis of “9.3 Commemoration” in China](#)

Yanhui LI (Hengyang Normal University, China)

16. [The Making of Olympic City and the Signs of Crisis in the Globalitarian Model](#)

gilmar mascarenhas (Rio de Janeiro State University, Brazil)

17. [The Migrants’ Common Space as a Transnational Threshold: The Cases of Greek Borderscapes in Mytilene and Idomene](#)

Chryssanthi (Christy) Petropoulou (Department of Geography, University of the Aegean, Greece);  
Charalambos (Charis) Tsavdaroglou (Aristotle University of Thessalonica, Greece); Xenia Alexiou  
(Department of Geography, University of the Aegean, Greece)

18. [Water Sharing in Eastern-Nile River Basin: A Geopolitical Perspective of Conflict to Cooperation](#)

Muraree Lal Meena (Banaras Hindu University, Varanasi, UP, INDIA, India)

## Poster

1. [Behaviour and Electoral Patterns of 2011 Assembly election in West Bengal \(India\): A Case Study in Electoral Geography](#)

MD MOTIBUR RAHMAN (India, Aligarh Muslim University, Aligarh (India))

2. [Consumption of Globalization in Tehran \(Case Study: District 1 And 2, Municipality of Tehran\)](#)

Morteza Ghurchi; mahboobe safaei mehr (Iran, Shahid Beheshti University)

3. [Research on Type and Feature of Geoborderunity](#)

Zhang Jing; Liu Janzhong; Han Zhijun (China, The Information Engineering University)

## Beyond The Borderline: Rescaling Cross-Border Linkages in a Globalizing Asia

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### Abstract

Perceptions of borders in Asia have been dramatically reconfigured over the past 20 years. While continuing to be seen by their central governments through the prism of security, national borders throughout the region have come to be simultaneously interpreted as zones of opportunity. This emphasis on the possibilities for transborder growth stems from the obvious benefits accruable to states and their personnel from economic development, most notably through China's vast OBOR initiative. Nowhere is this more apparent than in rhetoric surrounding economic growth in India's northeastern states. Long marginalized and dominated by security concerns, in recent years the region has seen a flurry of projects that place their emphasis on the region's connectivity and potential for crossborder linkages.

Nevertheless, it has proved challenging to get initiatives like BCIM, India's Look East Policy, or Yunnan's Southern Silk Road Project to exist in anything more than rhetorical form. While states' are cognisant of the advantages accruable to them through increasing economic development, their prioritization on securing an ability to control any resultant largesse results in the conceptual prioritization of their borderline. However, the state's continued fixation on its sovereign limits provides a limited tool for scholars seeking to understand these broader border dynamics. This paper argues that greater attention paid to issues of border scale shall not only enable us to gain a better grasp of what is actually occurring in such border regions, but also allow us to contribute positively towards policies better able to promote regional welfare.

### Key words:

State borders; scale; cross-border linkages; OBOR; Indian northeast

## Challenges in Fostering Local Governance in Post-Socialist Countries: Some Territorial Evidences from the Romanian Case

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### Abstract

The rescaling of territories is evolving at a pace faster than ever, accelerated by globalisation and processes of regional integration and/or reconfiguration. While some of the geographical scales gain momentum (such as the global, the regional or the local ones), others seem to go into the background (such as the national one losing the forefront). European Union countries of Central and Eastern Europe are a good place for observing these changes, as they are encouraged - and sometimes forced by circumstances - to burn stages in rescaling territories and foster good governance at the appropriate levels. Taking these into consideration our study presents an overview of the challenges the concerned countries are facing in building good governance at local levels. Special attention is paid to the Romanian case, on issues such as the role of local financial autonomy, new forms of horizontal cooperation at local level and the challenges facing public-private partnership. Furthermore, the role of European financial instruments and that of the national programmes and development plans are being presented and discussed.

### Key words:

Local governance; post-socialist countries; public-private partnership; financial autonomy; local cooperation; European financial instruments

## Competing Institutionalizations of the Region: Re-Scaling, Structured Coherence and Condensations

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### Abstract

Many commentators lack state theory in David Harvey's work on the spatial economy of capitalism. Just as Harvey constantly reminds us, following Marx, that capital is a social relation, Nicos Poulantzas argued that the state, too, is a social relation; or, more precisely: "the *specific material condensation* of a relationship of forces among classes and class fractions" (Poulantzas 1978: 129, original emphasis). Different classes and class fractions as well as other social groups are able to inscribe their – often antagonistic – interests into the state apparatus in varying – and systematically uneven – ways. The talk applies this idea to Harvey's notion of the region as a "structured coherence" and its institutionalization. Using the example of the different institutions in charge of the regional promotion of economic development in the global city Frankfurt am Main, Germany, and its surrounding region, the Rhein-Main region, it suggests that the variety of competing institutional attempts to institutionalize the scale of the region is a result of different condensations of the relationship of forces.

Poulantzas, Nicos (1978): *State, Power, Socialism*. London: Verso.

### Key words:

region; structured coherence; condensation; state theory; Frankfurt

## Emerging Formal Community Governance and Its Country-Wide Networks in Japan

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### Abstract

This study examines the meanings of emerging formal community governance and its networks across Japan, with particular attention to Unnan, a rural city in Shimane Prefecture. During the last few decades, devolution has become an important term in broader government restructuring in many countries. Generally, devolution means the transfer of power from the central government to a local government; however, it has increasingly started including a shift from local governments to communities. Japan has experienced this process. According to a questionnaire by the author, 38.8% of local governments (n = 908) have (semi-)formal institutions concerning community governance, of which 72.1% has been established since 2001. These have been introduced by local governments, with words such as ‘partnerships’ or ‘participation’, to encourage community activities, build a more direct form of democracy, or maintain social and economic functions. Focusing on the case of Unnan, devolved communities have assumed various roles such as welfare services, transport services or management of retail shops. And, most recently, a network based on the experience of communities in Unnan has been established with the leadership of the Unnan city office. This network consists of approximately 200 local governments and voluntary groups across the country, in both urban and rural areas, and has an influence on many places. Finally, this study suggests that while this devolved community can be understood as ‘governing at a distance’—a technique explained by Foucauldian theory—, the network centred on these communities may alter centre–periphery or urban–rural relationships in Japan.

### Key words:

devolution; community governance; rural area; Unnan; Japan

## From Ungoverned Territory to De Facto State: A Quick Guide

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### Abstract

Spatial distribution of governmental power within any state borders is principally unequal. The territory of every sovereign state includes numerous zones of different size where it's replaced by illegal control by some non-state actors (so-called *de facto secession*). Although such zones attract traditional interest from political geographers, their study remains methodologically problematic.

This paper aims to systematize basic notions and terms used for describing different kinds of non-sovereign political-geographic entities (both territories and polities) which emerge as a result of de facto secession. Although being in heavy demand they actually don't form a universal system of definitions: every author uses his/her own set of terms with his/her own defined or implied meanings according to his/her own needs.

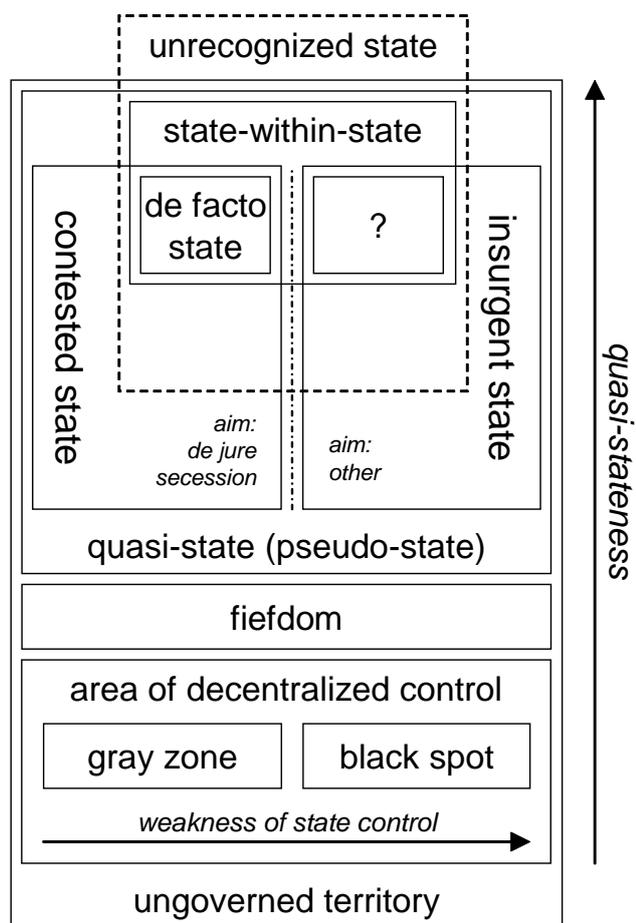
Among such terms there are "ungoverned area", "gray zone", "fiefdom", "quasi-state", "insurgent state", "de facto state" and so on. Each of them has its own semantic features, which in general determine the context of use even within an original concept. Thus it seems essential to work out some broad consensual definitions of all these terms and present them as components of a single conceptual scheme. Basic differentiation attributes include:

- level of quasi-stateness inherent to the entity;
- extent of state control over the area;
- aim the non-state actors pursue.

The working draft of the scheme is shown below:

### Key words:

control over the territory; de facto secession; ungoverned territory; gray zone: quasi-state; insurgent state; de facto state; notions and terms



## Geographical and Geopolitical Aspects of the Development of the Great Silk Zone and the Tea Road

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### Abstract

The report is devoted to the problems of the political geography of the Northern Asian states, including Russia, China, Mongolia and Kazakhstan, within the territory of the merged historical and geographical term “the Great Steppe”. Special attention is given to the theory and practice of the systemic geographical studies of politics, economy and society development of the Asian Russia, in close connection with the social processes taking place on the territory of neighboring countries in the context of globalization. For the first time geographic periodization of the recent economic history of Russia was performed, and it focuses on the territorial state integrity, determined by the ratio to the economic priorities, structural reforms of society, private ownership and rational use of natural resources.

At the economic and geographical zoning of Russia it is proposed to allocate special strategic significant marginal territories adjacent to the borders of the states. As a result of geographic expertise of various social phenomena, the “hot” spots in the development of Russian society are identified, recommendations for improving the political image of Russia and improvement of the program of economic development of Siberia and the Far East are given.

The report is intended for geographers, economists, politicians and historians, interested in the problems of Asian Russia development and its adjacent territories – China, Mongolia and Kazakhstan, and also for the students of geographical and economic departments of universities.

### Key words:

Great Silk zone; Tea Road; political geography

## How *Our* City Should Be Dissolved: Osaka Metropolis Plan as a Politics of Rescaling

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### Abstract

This paper first overviews the literature on “state rescaling” in the field of geography and conceptualize “the politics of rescaling” as a framework to understand the dynamism of “the politics of scale” in an era of globalization. This framework is then employed to explain patterns of the development of rescaling in Japan and demonstrate that state rescaling is basically understood as a neoliberal reform of local government. In order to verify this thesis, examined are the cases of political confrontation between and local election results in the Osaka Prefecture and City governments for the past several years. Through such an examination, this paper points out that discourses for the reform of “local governance” need to be critically scrutinized. Major points of discussion are how the attempt of state rescaling can create political conflict and dissolve and reconstruct the existing local autonomy.

### Key words:

geographical scale; rescaling; governance; Osaka Metropolis Plan

## **Identities, Sovereignty and Legitimacy: Examining Support for Break-Away Republics in the Post-Soviet Space**

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### **Abstract**

The authors examine the identities and the geopolitical imaginations in three non-recognized (or partly recognized) republics in the post-Soviet space – Transdniestria, Abkhazia and South Ossetia. They pay particular attention to the changes in the citizens’ attitude to the legitimacy of ruling regimes, the “parent” states and the role of external stakeholders (Russia, the EU and USA) occurred after the beginning of the geopolitical crisis provoked by the events in Ukraine. They consider the people’s views on national sovereignty and possible conflict resolution. The paper is based on an analysis of the original representative surveys conducted by the authors in 2009-2010 and in December 2014, and on the results of field studies. It is shown that the crisis has not only seriously aggravated economic and international perspectives of non-recognized republics but also contributed to toughening of public opinion regarding their relations with respectively Moldova and Georgia. The crisis can weaken the solidarity of purpose between major ethnic groups in non-recognized republics – the basis of their vitality.

### **Key words:**

Non-recognized republics; sovereignty; legitimacy; identities; post-Soviet space

## Live House for Political Subjectivization: The Guerrilla Model in Chinese Cities

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### Abstract

With its oppositional ideological standing premised on an identity of dissenters, Chinese rock is excluded from mainstream music production while deliberately distinguishing itself from such productions. It is therefore no wonder that Chinese rock has always been underground, symbolically and literally, as a result of a lack of spatial base in the city. The introduction of Live-house to China in the 2000s seems to offer a space for political subjectivization of the excluded or marginalized group. In China, these “cramped, smoky, nondescript concrete boxes” of live houses take up multiple whilst sometimes contradictory functions. Live houses serve as material base for the underground musicians to challenge prevailing social and political norms, escape state-run censorship, foster conjunctions between producer and audience, and perhaps assert alternative order within the established regime of aesthetics.

Widely scattered across the entire country, this guerrilla model of politicization is always in close interactions with state-run urban policing programs through flagship projects, assisted by the allies of state-owned developers and cultural elites. The two antagonistic actions in Chinese cities - one of politicization in a guerrilla pattern and one of de-politicization in a monumental manner - offers a valuable site to reflect on recent scholarly arguments on post-political and post-democratic forms of urban governance in China. Following a contingent reading of aesthetics of art regime, we call for attention to the territorial strategies deployed by both sides in the continuous interplay of politicization and policing.

### Key words:

Ranciere; politics of aesthetics; creative cities; underground music; China



## On Globalization, Borders and Nation-States: some historical musings

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### Abstract

Globalization in varied forms has existed for centuries, albeit in a less intense and pervasive state than that which exists at present. The implementation of laissez-faire trade policies following the repeal of the Corn Laws (1846) resulted in a rapid internationalization of the world economy even in the midst of certain protectionist policies implemented by the United States. Despite two world wars, a global depression and the rise of Keynesian liberalism, international trade and investment continued during the 20th century. The move towards laissez-faire liberalism that took place during the latter part of the century occurred within an international environment transformed by quantum-shifting transportation and communication technologies and increasing global competition. Current globalization, facilitated by space- and time-adjusting technologies and neoliberal ideology, is viewed by many as threatening the particularity of places, borders, and territoriality. But while deterritorializing influences are felt everywhere, so are reterritorializing forces which attempt to cope with the impacts of globalization and its associated spatialities and temporalities. The devolution of some powers to and the support of transnational regions, along with the greater support for cross-border cooperation, is evidence that governments at all levels and business groups recognize that the bordered territorial state is struggling to meet the requirements of a world of flows and networks. While a “spatial fix” recognizing other types of territorial organizations besides nation-states is needed, the nation-state is not dying. The state will continue to direct development, manage networks, and interpret and provide essential context for the new political, economic and cultural realities of globalization.

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### Key words:

globalization; borders; nation-states; history; spatial fix

## Political Spaces as Influence Analysis: Reconstructing Power Relations in

### Development Priorities in Chile

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#### Abstract

Chile has experienced a fast and intense economic growth since the adoption of a neoliberal economic setting after the military coup in 1973. Two of its main productive activities are salmon farming and forestry, both based on raising exotic species in places that traditionally were sterile and unproductive. These sectors have benefited from the deregulation processes from the dictatorship, which didn't allow any criticism. They were continued by democratic governments from 1990 until now. Thus, the configuration of the discourses related to development as based on economic growth is strongly dominated by the acceptance of this neoliberal model. This paper poses an approach whose main component is the understanding of political spaces as relations and structures that shape proximity groups, which contain a variety of actors –limited to one or several scales, with more or less skills and resources, coming from traditional structures such as the State or from transnational corporations, to emergent blocks as local communities– linked by specific interests. The analysis involves characterising the paradigms behind decision-making processes and its translation into discourses regarding development in the provinces where salmon farming and forestry activities are located. This allows us to identify practices, relations and structures that are confronted in order to legitimate some discourses and to delegitimise others. With this in mind, we identify the five development priorities related with Chilean forestry and salmon farming that have gained the consent of the actors involved in these political spaces, and also the discourses that collide or confront them.

#### Key words:

Chile; decision-making process; discourse; forestry; influence; political spaces; power relations; salmon farming

## Positioning of Ukraine in the Geospatial Dimensions of Dynamic World System

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### Abstract

August of 2016 marked the 25<sup>th</sup> anniversary of Ukraine's independence. On its path to statehood, the country had to overcome interior conflicts while withstanding exterior pressure from foreign powers. The young state remains subjected to geopolitical games, which makes positioning of Ukraine in the geospatial dimension of Dynamic World System a matter of priority.

*National Dimension.* Ukrainian nation has ancient history and deep culture, while possessing strong science and technology skillset. The defining years of revolutions (Orange Revolution of 2004 and Revolution of Dignity of 2013-2014) affirmed Ukraine as a geospatially unified nation. Now it has to find its "place under the sun".

*Macroregional Dimension.* Ukraine is located in Central Europe, a territory subjected to clashes of immense geopolitical powers throughout its history. At the turn of last century, this territory experienced pivotal events: defeat in the "Cold War" and collapse of the Soviet Union. During this time, people of independent Ukraine chose the path to democracy and European integration, despite immense pressure from Russia. Russia's efforts to force Ukrainians to "love the Russian Way" backfired and made the Ukraine's path towards European integration irreversible. Ukraine's economy, however, remains a broken piece of the former Soviet "empire" and needs to be rebuilt.

*Global Dimension.* Recent worldwide trends towards globalization and information society create favorable conditions for Ukraine's development. However, in order to benefit from the opportunities presented by the Dynamic World, Ukraine must be open to the new realities of such World.

### Key words:

Positioning of Ukraine; Geospatial Dimensions; Revolution of Dignity

## Territoriality and Borders: Contemporary Changes and Possible Perspectives

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### Abstract

The multiplication of polities, the proliferation of new identities and the salient attempts to redraw border lines on the ground or at sea make contemporary processes of bordering more intense and diverse. They are closely related with globalization deepening social inequality and the gaps along existing state and regional borders, and setting international norms, rules and standards undermining traditional notions of sovereignty and national interests. It intensifies migrations and leads to the creation of transition zones and borderland spaces in the territorial heart of “other” polities, contributes to the fragmentation of political space and increases the importance of internal, local and especially reticular and quasi-political borders. The creation of the Islamic state and the increasing number of failed states is a result of global inequality and a sign of systemic malfunctions of the state system. The post-modern reality is characterized by the interpenetration of legitimate and non-legitimate political units. The boundaries between them are often transparent and the circulation of people, goods and capital is fluid. It blurs the very notion of the state boundary which becomes vague and loose. Some regions look as the archipelagos of “sovereign” domains divided by the boundaries delineating “sovereignty” in different fields. Paradoxically, the ongoing geopolitical changes increase the role of the state which integrates the territory and multiple identities and is the only institute which legitimates political power.

### Key words:

territoriality; borders; sovereignty; state; migrations; globalization; political fragmentation; perspectives

## Territory, Sovereignty, and Political Geometry in the Pacific Ocean

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### Abstract

This paper will examine how the physical factors of the ocean are entangled with legal discourses mutually constituting state performances of expanding offshore territoriality. While emerging spatial theories have been pushing political geography away from limiting territorial thinking to two-dimensional, planar areas, it is becoming increasingly important that we extend theoretical and empirical inquiry, to include the third, vertical spatial dimension, to explicitly identify volume as an important aspect of political, social, and cultural spheres. Thinking through the depths of ocean territories and their impacts on legal designations and practices undertaken at various vertical layers reveals the continual (re)negotiations that are occurring between broad international treaty language and the implementation of jurisdictions and actions in the ocean, on the seabed, and in the airspace above offshore jurisdictions.

Political spatial arrangements that configure state spaces which are not maintained by conventional borders delimiting internally sovereign areas, new geopolitical and geometric imaginaries are created to justify new interpretations and performances of territory and sovereignty. Applying Weizman's rationale that, "departure from a planar division of a territory to the creation of three-dimensional boundaries across sovereign bulks redefines the relationship between sovereignty and space" (2002), this research inquires: How do emerging laws and regulations, investments and pursuits in ocean space serve to destabilize previous land-biased definitions, understandings, and practices of sovereignty and territory? What might submerged oceanic spaces offer to theoretical understandings of vertical sovereignty and territory?

### Key words:

Boundaries; geopolitics; Pacific Ocean; political geography; seabed; sovereignty; United Nations Law of the Sea; territory; volume

## **The Construction of National Identity through the Production of Ritual and Spectacle: An Analysis of “9.3 Commemoration” in China**

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### **Abstract**

In this paper, we adopt the view that ‘nation’ and ‘national identity’ are social constructions, created to serve ideological ends. We discuss this in the specific empirical context of China’s “9.3 Commemoration”. By drawing on officially produced TV programmes and magazines, newspaper reports, and interviews with participants and spectators, we analyse the memorial ceremony on 3, Sep.2015, showing how, as a special ritual and landscape spectacle, the ceremony succeeded to a large extent in creating a sense of national identity. Discussion focuses on four aspects of the ceremony: the site of the ceremony, the sonic landscape of the ceremony, the veterans of the ceremony and the participants of the ceremony. We find that, the Tian'anmen Square, the spectacle and sonic landscape of the parade and the group of the veterans are the central elements in arousing people’s affection of national identity.

### **Key words:**

national identity; ceremony

## The Making of Olympic City and the Signs of Crisis in the Globalitarian Model

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### Abstract

Over the past three or four decades, olympic urbanism have become large-scale expensive projects, with highly visible impacts on social and environmental issues in each host city. However, the last five years have show an increasing global consciousness against high public cost of these events, the violence in large-scale evictions of poor people under gentrification interests and the building of the so-called white elephants. The olympic system has perceived the crisis and decided change its "globalitarian" rules, through Agenda 2020. We aim to examine this new scenery of global transition and verify how Rio de Janeiro 2016 may be the last edition of the worldwide contested urbanism olympic.

### Key words:

Olympic city; legacy; globalitarianism; Rio de Janeiro; global transition

## The Migrants' Common Space as a Transnational Threshold: The Cases of Greek Borderscapes in Mytilene and Idomene

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### Abstract

The ongoing refugee streams that derive from the recent conflict in the Middle East are a central issue to the growing socio-political debate about the different facets of contemporary crises. The human flows that cross boundaries and territories heading to the European North, destabilize both territorial certainties and established governance politics. The moving populations challenge the role of the nation-state and its borderlines and bring into question the notion of free movement and citizenship. While borders, in the era of globalization, constitute porous passages for capital goods and labor market, at the same time they function as new enclosures and racialised spaces of exclusion for migrant and refugee populations. Nevertheless, these human flows contest border regimes and exclusionary policies and create a nexus of emerging common spaces of resistance and co-existence.

Following the recent spatial approaches on commons (Blomley, 2008; Harvey, 2012; Stavrides, 2013) this paper focuses on the production of the migrants' common space as a contested transnational threshold. Specifically we examine the case of Greece, a country that is situated in between Global North and Global South, West and East; hence it is in the epicentre of the current refugee crisis. In particular, we pinpoint in Greek borderscapes in Mytilene and Idomene i.e. the main entrance and exit points. Based on this context, we explore how the newcomers as a new political and social agent in collaboration with NGO and local solidarity movements challenge the existing socio-spatial power relations and produce unique, unpredictable and misfitting common spaces.

### Key words:

Common space; borderscape; transnational migration; Greece

## Water Sharing in Eastern-Nile River Basin: A Geopolitical Perspective of Conflict to Cooperation

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### Abstract

Water is an indispensable natural resource that the countries of the Nile river basin possess. Its efficient and optimal use would not only help countries of the Nile river basin to build a strong economy but also substantially contribute to the growing water requirements of the countries, as water is becoming an increasingly scarce resource in the contemporary period. Distribution of river water is a complicated issue especially when a river passes through a number of countries. This study has investigated the resolving (win-win situation) of water-sharing conflict among the four riparian countries of the Eastern-Nile basin: Ethiopia, South Sudan, Sudan and Egypt.

The study is based on the analytical method, evaluation of the observable trends in river water sharing principles and methods as applicable in the case of the Nile river basin in general and Eastern-Nile in particular. Governmental policy stands of riparian countries on water sharing of Nile river basin will be compared with the countries of upstream and downstream Nile river basin through case study method. For this study, primary and secondary data is collected and processed to give them meaning and extract quality information through the statistical diagrams and cartographic techniques.

This study has been an attempt to probe the problems and prospects of cooperation between these countries over the complex issue of Nile water sharing. Thereby, paper has attempted to analyze the role of geographical determinants that influence the negotiations between the four riparian countries that have impeded implementation of *equitable* water sharing scheme, and the policy issues of the upstream and downstream riparian countries, in this case study, mainly Ethiopia, South Sudan, Sudan and Egypt dictated by their domestic compulsions. This research paper unpacks the comparative advantages of the four riparian countries: it emphasises that Sudan and South Sudan should engage in developments of irrigation, agricultural engagements and biodiversity conservation; Ethiopia in small and medium scale hydro-power generation and water conservation; while Egypt in industry and capacity building know how.

### Key words:

Eastern-Nile Basin; Water sharing; Conflict; Geopolitics; Need and opportunities



## **Behaviour and Electoral Patterns of 2011 Assembly election in West Bengal (India): A Case Study in Electoral Geography**

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### **Abstract**

The present paper explains the voting behavior and electoral patterns of 2011 assembly election in West Bengal (India). Electoral geography is a new and emerging branch of political geography which analysis the methods, behavior, and result of elections in the context of geographical space. The field of electoral geography studies with the identification and explanation of spatial patterns in relation to voting all elections. Voting behavior is a form of political psychology which played a great role in political decision-making process. The main purpose of the present study to identify and analyze the socio-economic factors responsible for voting behavior. In the battle of 2011 Assembly election in West Bengal the two major parties were Left Front and Trinomool Congress. This election witnessed the remarkable successes of Trinomool Congress and decline of 34 years' longest ruler party that is Left Front. Trinomool Congress won a majority of seats that 227 out of 294 but Left Front won only 62 seats out of 294 seats. It also showed highest voter turnout nearly 85%. The present study is based on secondary source of data and data taken from Election Commission of India, New Delhi and Centre for the Study of Developing Societies (CSDS). The most important significance of the study is that it gives an electoral map which clearly identifies those political units where people favour a specific candidates or party.

### **Key words:**

Political Geography; Electoral Geography; Assembly Election; Voting Behaviour; Electoral pattern; voter turnout

## Consumption of Globalization in Tehran (Case Study: District 1 And 2, Municipality of Tehran)

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### Abstract

Larg commercial complexes, Cities brands significant connects with Global production processes and Creates links towns with each other on a global scale. Therefore, formed a new political geography of the local-Global processes in the global production and consumption. Today, Cities are defined by the possibilities they provide for consumers. Mass consumer, On the one hand changed the urban fabric of the mushrooming of shopping complexes, On the other hand, The city has its own consumer design encourages residents to use extreme. In Iran, urbanization has always been subject to changes that occur under the influence of economic and political conditions. One of the key issues in the political geography of Iran, The mechanism of urban development in the context of Global processes in general and particularly of the urban economy and its vectors. During human life, has changed with the emergence of the living environment and thinking always special. In the other word, the human environment is somehow indicative of the prevailing thoughts of the community. There are shopping centers, stores and Modern and large malls, Cities around The economic life story and A symbol of cultural relations and Social relations in the city; so we cannot have a look one-dimensional and simple to the shop, vendor, customer and companies in the city. We believe Tehran has new experience of consumption of Globalization these days.

### Key words:

consumption; Globalization; consumption of Globalization; shopping complexes; Tehran

## Research on Type and Feature of Geoborderunity

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### Abstract

At the end of 20th century and the beginning of 21st century, with the rapid development of information technology and the deep promotion of globalization and economic integration, the research content of the world pattern became much richer. Consequently, geo-economics, geo-culture, geo-resources, geo-technologic etc. related areas appeared accordingly. Research in these areas needs the geoborder theory as a guide. Thus we can define geoborderunity as the basic object of geoborder theory, and also, carry out researches on its types, characteristics, relationships, change rules and others. The geoborderunity types can be analysed from two points of view: spatial scale and attributive character. From spatial scale point of view, continent and ocean are the geoborderunity of global scale; country and regional organization are the geoborderunity of regional scale; administrative, economic and cultural district of a country are the geoborderunity of lower scale. From the perspective of attributive character, it can be divided into political geoborderunity, economical geoborderunity, cultural geoborderunity, and so on. Different geoborderunity has its own characteristics and rules. Spatial feature reflects the feature of the spatial distribution of geoborderunity by analysing its geographical position, appearance, range and other aspects; different geoborderunity has different description indicators on its property, which makes attributive feature as the intension and essence of it; time feature means that the spatial and attributive features could be changed over time.

The definition, types, characteristics and other aspects of the geoborderunity are the basic work of the research and the construction of the geoborder theory.

### Key words:

geoborderunity; geoborder theory; geoborderunity type; geoborderunity feature

## C12.33 Political Geography

### A Reexamination of Militarization and “the Space of Occupation”: A Comparison Perspective



Home

#### Oral

1. [A Preliminary GIS Analysis on the Settlement Geography under the Garrison and Military Cultivation System in Ming and Qing South China Mountain Area](#)  
Shi Xie (Centre for Historical Geography, Sun Yat sen University, China)
2. [Cultural Practices against Militarization: The Resilience of Okinawan Culture](#)  
Takashi Yamazaki (Osaka City University, Japan)
3. [Evaluating the Occupation of Xinjiang by the People’s Republic of China in the Early 1950s](#)  
Qian Guo (San Francisco State University, United States)
4. [Gaza Strip and the West Bank - from military areas to independent state](#)  
Gideon Biger (Tel Aviv University, Israel)
5. [“Lines of Contact” Between Parent States and Secessionist Entities: Linking Past, Present and Future in the War Zones](#)  
Eiki Berg (University of Tartu, Estonia)
6. [Occupation using a Sophisticated Matrix of Control; Israeli occupation of Palestinian territory](#)  
Rassem Khamaisi (Department of Geography and Environmental Studies, University of Haifa, Israel, Israel)
7. [Unbounded territoriality: Territorial control in the occupied West Bank](#)  
Sara Hughes (UCLA Geography Department, United States)

## **A Preliminary GIS Analysis on the Settlement Geography under the Garrison and Military Cultivation System in Ming and Qing South China Mountain Area**

Xie Shi

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### **Abstract**

Over the past 1000 years, the relations between the ethnic groups in Nanling (South China mountains) mountainous areas and each dynasty in imperial China has been in a state of constant change. The Nanling Mountain also serves as an important passage in the communication between inland China and the coastal areas as well as the surrounding areas of the South China Sea. Along with the expanding transportation and market, each dynasty in history has adopted different governance patterns over the Nanling Mountain, such as punitive expedition, pacification and other means. The empires of Ming and Qing Dynasties exercised territory management system over Nanling Mountain, which has exerted substantial bearings on the reform of military garrison system, accommodation form of the Yao nationalities in Nanling Mountain and the social structure. By taking the southern mountainous areas in Lanshan County, Hunan Province as an example, this paper mainly focuses on the guard and garrison system set in Ming Dynasty (1368-1644) and the military cultivation system, their transformations and effect on the change of the settlement pattern and offers a preliminary analysis of the people-land relationship in Nanling mountainous region from the 14<sup>th</sup> to 19<sup>th</sup> century.

### **Key words:**

Mountain Society; Settlement; Military; Ethnic label

## Cultural Practices against Militarization: The Resilience of Okinawan Culture

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### Abstract

War and occupation destroy and transform the lives and cultures of the occupied. However, the substratum of the destroyed and transformed culture leaves its trail in the memories and landscapes of the occupied. Culture is not unchangeable in time and space but can have the power of resistance and recovery or “resilience.” It is not the power of culture itself but the power of human agency that attempts to engrave lost cultures into and extract them from the memories and landscapes of the occupied. This paper focuses on “Okinawan culture.” Okinawa is a group of islands in Japan which became the stage of a fierce ground battle near the end of WWII and remained under the US military administration until 1972. 20% of the main island is still occupied by vast military bases and installations. Confiscated villages, sacred places, and cultural landscapes have been destroyed, buried, or left unpreserved within military bases. The ground battle and subsequent oppressive military administration have left deep scars in the memories and landscapes of the islanders. Based on this geo-historical context, this paper illuminates the significance of “regional history” studies that emerged after the 1972 reversion as activities of municipal historians and archivists and the value of cultural landscapes that are to be restored in the site of a military base planned to be closed.

### Key words:

cultural practice; militarization; Okinawa

## Evaluating the Occupation of Xinjiang by the People's Republic of China in the Early 1950s

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### Abstract

This paper examines the effects of occupation of Xinjiang by the People's Republic of China (PRC) before Xinjiang Uighur Autonomous Region was established (fall 1949-fall 1955). In the absence of a civilian provincial government, the People's Liberation Army (PLA) exerted military governance in Xinjiang, suppressing ethnic resistance, initiating development projects and setting up Han Chinese settlements. Most importantly, the PLA created an institutional legacy, Xinjiang Production and Construction Corps (XPCC, 1954), a quasi-military state enterprise that inherited much of the military economy-settlement complex. The legacy of XPCC is indeed multifaceted. While having helped solidifying the PRC's control over Xinjiang, XPCC may have also prolonged the perception of occupation among the local Muslim groups with its low-grade militarization and may have hindered the transition from "effective sovereignty" to "absolute sovereignty." The analyses of the PRC's "occupation" of Xinjiang may, on the one hand, benefit from theoretical conceptualizations in political geography, and, on the other hand, inform academic discourses and borderland policies, as Xinjiang remains a restive frontier for China.

### Key words:

occupation; militarization; Xinjiang; Xinjiang Production and Construction Corps

## **Gaza Strip and the West Bank – provisional Military Occupied Areas Which May Become an Independent State**

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### **Abstract**

Gaza strip and the West Bank are two parts of the area know today as Palestinian Authority, which, in the future, will become the indepent state of Palestine (Filistin). The areas of those two parts are about 20% of the area of the former British Mandate of Palestine 1920-1948.

In November 1947, the United Nation decided to present a partition plan for British Palestine, in which about 55% would became the Jewish State, about 44% would become the Arab State, and about 1% , which included mainly the cities of Jerusalem and Bethlehem, would to be under the UN.

This decision brought about the first Arab –Israeli war of 1948-9, in which Israel occupied and ruled about 80% of British Palestine, while the Jordanian Army (with the help of the Iraqi army), occupied some areas west of the Jordan River in Palestine, know later as The West Bank, The Egyptean army occupied area in south-western Palestine, later know as Gaza Strip. Those two areas, being occupied provisionally, are now became the area designated to become the Palestinian State, without any connection to any historical or geographical meaning.

### **Key words:**

Gaza Strip; West Bank; 1948 Arabs - Israeli war; Palestinian authority

## **“Lines of Contact” Between Parent States and Secessionist Entities: Linking Past, Present and Future in the War Zones**

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### **Abstract**

De facto states result from strong secessionist bids and the unwillingness of the international community to condone secession. Whereas international law is strongly on the side of parent states' claims to restore status quo ante situation, secessionist entities nevertheless carry on their nation-building and state-formation practices. Most of them exist only for the sake of great power rivalry, thus being entirely dependent on security guarantees and economic benefits provided by patron states. They live in the constant threat of being exterminated and forcefully reintegrated to the parent state. Yet these political entities with unclear legal status may desire to be integrated into the global system of communications and flows and have open border regimes with the rest of the world.

This article examines the extent to which de facto states have surrounded themselves with impermeable separation lines, have built fences and limited even the minimal contact with their previous masters in the embryonic stage of their emergent statehood. It questions whether several attempts to regulate these conflicts have intensified cross-border movements between parent states and their secessionist entities or vice versa, brought along self-perpetuating isolation. What factors do explain booming cross-strait relations between Mainland China and Taiwan, transparent Security Zone in Moldova, relative openness of Green Line regulations in Cyprus, highly restrictive Administrative Boundary Lines in Georgia or intact Line of Contact in Azerbaijan?

### **Key words:**

war zones; secessionist conflicts; de facto states; borders; conflict management

## Occupation Using a Sophisticated Matrix of Control; Israeli Occupation of Palestinian Territory

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### Abstract

Since 1967, Israel has occupied Palestinian territory. This is one of the longest occupations of the last century. During this occupation, Israel developed and used a sophisticated matrix of control which has hard and soft components. Parallel to managing the daily life of the indigenous urban and rural Palestinians, the Israeli occupation has created an Israeli system of urban and rural settlements. Despite the rhetoric of looking to end the occupation, including signing an Interim peace agreement between the Israeli government and Palestinian National Authority in 1994, the conflict is still hot. These interim agreements create at least three statuses of Palestinian people living in occupied territory, which is divided into four subareas, governed and managed by at least three systems of national and municipal governors. This division of the territory and the Palestinian people into different statutes enables implementation of the matrix of control by the occupiers. This paper will display and discuss the roots of the deep geopolitical conflict, and present the hard and soft components of the sophisticated matrix of control used by the Israelis to secure domination, a creeping system of apartheid and territorial fragmentation and annexation to Israel. The paper will concentrate on the dual land and restrictive spatial planning domination of the matrix of control.

### Key words:

Matrix of Control; occupation, Israeli; Palestinians; spatial planning

## Unbounded Territoriality: Territorial Control in the Occupied West Bank

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### Abstract

The “temporary” Israeli occupation of the West Bank, Gaza Strip, and East Jerusalem began in 1967. In the nearly five decades since, the settler population in the occupied territories has reached an estimated half million Israeli Jews. Excepting East Jerusalem, Israel has made no move to formally annex the territories. Neither are they withdrawing, which is made clear by continuous settlement growth. By what territorial logic does the occupation function, such that it can continue indefinitely but call itself a “temporary” military occupation? In *Human Territoriality: Its Theory and History*, Robert David Sack defines territoriality as “the attempt by an individual or group to affect, influence, or control people, phenomena, and relationships, by delimiting and asserting control over a geographic area” (Sack, 1986, p. 19). One of the three requirements of territoriality is delimiting the area under control. In stark contrast to this, I suggest the territorial logic of the Israeli occupation of the West Bank and Gaza Strip represents what I term *unbounded territoriality*, a form of territorial control best exercised by *not* delimiting boundaries. This form of territoriality complicates the connection between sovereignty and territory in the nation-state system. This is not because Israel is incapable of exercising territorial control as traditionally conceived, but is rather proof of Israel’s overwhelming power to control territory in a fuzzy, piecemeal fashion. This project expands on efforts by scholars such as Israeli philosopher Adi Ophir to rethink familiar facts and the existing discourse about the Israel-Palestine conflict (Azoulay & Ophir, 2012).

### Key words:

territoriality; sovereignty; occupation; Israel; occupied Palestinian Territories

## C12.33 Political Geography

### Changing Geopolitical Imaginations of Asia



#### Oral

1. [Evolving Regional Order in East Asia](#)  
Won Bae Kim (Korea Research Institute for Human Settlements, South Korea)
2. [Revival of Silk Route and Its Geopolitics](#)  
Geetanjali Sharma, Ajay Kumar Sharma (Samrat Prithviraj Chauhan Government College Ajmer (Maharshi Dayanand Saraswati University), India), Raihan Ahmed
3. [The Analysis of the Central Asian Geo-Cultural Setting Under the “One Belt and One Road Initiative”](#)  
Ma Hongchuan (Information Engineering University, China)
4. [The Planning and Reconstruction of Roads in Shantou Port in Late Qing Dynasty and the Republic of China](#)  
Linhao Ouyang (Sun Yat-sen University, China), Shi Xie (Sun Yat-sen University, China), Wei Yu (Sun Yat-sen University, China), Tao Wu (Sun Yat-sen University, China)
5. [US Pivot to Asia: Geopolitical Re-production of Indo-Pacific](#)  
Krishnendra Meena (Jawaharlal Nehru University, India)
6. [War Memorial in Space Politics —East Asian Geopolitical Relations Reflected in China’s 9.3 Parade](#)  
Qiqi Liu, Xiang Kong (East China Normal University, China)
7. [Wars of ‘Keyboard Men’: The online geopolitics in Chinese cyberspace](#)  
Ning An (South China Normal University, China)

## Evolving Regional Order in East Asia

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### Abstract

This paper discusses the evolution of regional order in East Asia. Following Mark Seldon, three periods of East Asia's regional order are briefly examined. They are Pax Sinica before the late 19<sup>th</sup> century, Pax Nipponica/Pax Americana in the 20<sup>th</sup> century, and the 'bifurcated' regional order since the 1990s. The paper focuses on the recent period of bifurcated regional order where the rise of China began to make substantial impacts on its neighbors via its strengthened economic centrality in East Asia, while many of East Asian countries depend on their security on the United States. Given the geopolitical and geoeconomic fluidities such as North Korea's provocations, China's assertive policies in the South China Sea, and the Sino-Russian strategic cooperation, the paper speculates alternative scenarios of regional order in East Asia such as Pax Sinica, Sino-American co-management, and Pax Americana. Finally, the implications of these alternative scenarios for regional development in Northeast Asia will be discussed.

### Key words:

regional order; East Asia; pax Sinica; pax Americana; Sino-American co-management; regional development

## Revival of Silk Route and Its Geopolitics

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### Abstract

There are always provincial variations which deserve more detailed treatment. Before the arrival of modern era, geography and cultural homogeneity were determining factors of human habitat and migration. Boundaries as if we see them, did not exist earlier. The reinforcement of the silk route will improve economic cooperation and connectivity between Asian countries, but obviously it is designed to improve China's geopolitical and geostrategic position in the world. The paper begins with an explanation of the historical background of the Silk Road, its origin and development, trailed by an analysis of latest declarations by the Chinese leaders to revive it. It also discusses the impacts of its revival on India's economy and cultural exchange between silk route associated regions. Lastly, the paper sums up the findings and suggestions for keeping balance between the security and economic relationship between the two countries. It concludes that the Silk Road is an effort in commencing a 'grand strategy' for global trade and cooperation. The Silk Road revival could be very helpful in reinforcing cooperation and raising it to a new level of economic establishments. However, China has yet to promote the much-needed political and strategic trust.

### Key words:

Silk Route; geopolitics; economic relation and security concerns

## The Analysis of the Central Asian Geo-Cultural Setting Under the “One Belt and One Road Initiative”

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### Abstract

September 7th 2013, the chairman of the P.R.C XI Jinping proposed the “One Belt and One Road Initiative” in Kazakhstan. There exists an analogy about the initiative that is “passing through the heartland and embracing the world island”. In this sense, the Central Asia plays a core region role. Not only is it the central zone in the concept of the Eurasian geography, but it is also the hub of land transportation and the intersection of the diversiform cultures. The geo-cultural setting consists of the geo-cultural entities, the geo-relations between the geo-cultural entities and the geo-structure between the geo-cultural entities. Consequently, it is reasonable to dissect the temporal and spatial evolution of the Central Asian culture and the space distribution of the Central Asian cultural conflicts from the standpoint of geo-cultural setting, hence interpreting the impacts of its geo-cultural setting towards the “One Belt and One Road Initiative”.

### Key words:

Central Asia; One Belt and One Road Initiative; geo-cultural setting; cultural evolution; cultural conflict

## The Planning and Reconstruction of Roads in Shantou Port in Late Qing Dynasty and the Republic of China

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### Abstract

At the beginning of the nineteenth century, even though Shantou was not officially opened to the outside world, it has played a more and more important role in commercial activities. Since 1860, when Treaty of Tientsin was signed, this city has been officially opened to foreign ports in modern China. And with the rapid development of the steamship industry, Shantou entered into a new phase of development and it served as the only port which can berth ships in Hanjiang river basin. As a new important chapter in the modern development of urban areas, the evolution of Shantou's pattern, the construction of its roads and the political power, social organizations and economic profits behind it have presented the world a charming and unique dynamic scene. Thanks to historical files, newspaper, journals and books, the thesis has discussed the establishment of municipal systems and laws and regulations with the background of the evolution of the city's pattern and its history. And the analysis of the construction of roads can also be seen in the thesis, which aims to reveal the interaction of the government and merchants and how merchants pursued their profits through the municipal systems in the urban renewal.

### Key words:

Shantou; Modern times; The reconstruction of city; The planning of road

## US Pivot to Asia: Geopolitical Re-production of Indo-Pacific

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### Abstract

Geographical names are embedded, reinforced and established by their continuous use and proliferation by geopolitical actors again located within the three registers of critical geopolitics (practical, formal or popular). Often, these geopolitical categories may not have valid geographical basis, but such terms take root through production of geographical knowledge which promotes the interest of certain dominant producers who hold the resources to create these knowledges. The re-imagination of the space extending from the eastern coast of Africa in the Indian Ocean to the western littorals of the Pacific as 'Indo-Pacific' displays such biases associated with the re-production of international space. The paper will examine the term from its origin in bio-geography in the nineteenth century to its contemporary usage by the main geopolitical actors in the 'Indo-Pacific'. The major promoter states using the term in their political and academic discourse are Japan, Australia and India. China's emergence as an economic power as well its maritime disputes in the South and East China Seas play a critical role in such formulation of the Indo-Pacific space by the two states which could indicate an encirclement strategy by Japan, Australia and India. On the other hand, the paper will also try to engage with the validity of the term through the climatic classification proposed by Wladimir Koeppen in 1936.

### Key words:

Geopolitics; Re-imagination; Indo-Pacific

## War memorial in space politics

### ——East Asian geopolitical relations reflected in China's 9.3 parade

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#### Abstract

Research in new cultural geography focuses on the space politics interpreted in the context of cultural landscape, and the influence of memorial activities on collective memory and cultural identity specifically. This article studies the feasibility to interpret space politics and geopolitical relations reflected in memorial activities. Based on the analyses of the significance of war memorial activities and the mechanism of emotion, the study discusses the east Asian geopolitical relations reflected in the war memorial activities with text analyses of East Asian media reports, along with interviews of the staff in the Institute of Global Chinese Language Teacher Education at East China Normal University. The study shows competition for space that exists in war memorial activities is embedded with meaning that varies between areas due to local values. Historically, different positions and costs of east Asian countries during the WWII have played into the interest structure hitherto, which is vividly reflected in the current geopolitical relations in the east Asia as their different attitudes toward 9.3 parade. In spite of the common interest and perception of Chinese culture, staff in the Institute of Global Chinese Language Teacher Education at East China Normal University bear different attitudes toward the memorial activities. This shows the imagination of east Asia is still closely related to the history of war, which would risk the mutual trust and stable relationship between east Asian countries if not handled appropriately.

#### Key words:

memorial activities; East Asian; collective memory; cultural identity; 9.3parade

## Wars of 'Keyboard Men': The Online Geopolitics in Chinese Cyberspace

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### Abstract

Spaces of geopolitics have gradually moved from the materialized spaces, such as lands, seas, and mountains, into the virtual spaces, such as printed media, films, comics, and video games during past decades. Along with the rapid expansion of the Internet and Internet-based social media, however, these 'Keyboard Men' who stay in front of computers all the time and angrily shout patriotic slogans fighting with their dissenters are often neglected by current geopolitics research. In the meantime, the vast majority of current imaginary geographies studies have focused empirically on the Anglophone geographical imaginations of the non-Anglophone, the non-Western, the Oriental, or the Global South, while there are less studies paying attention to the non-Anglophone imaginaries of the Anglophone. In this paper, I focus on Chinese geopolitical imagination of the US from the special perspective of online users' discussion of terrorism through the investigation of Chinese Internet-based social media, *Sina Weibo*, under the framework of 'critical geopolitics'. The results illustrate that, the '*Five Dimes Party*' which is in close relation to the radical Chinese nationalism and the '*US Cent Party*' which is linked to the radical Chinese populism are two major and conflicting opinions on the geopolitical imagination of the US in current Chinese society. Based on the discussion of Chinese imaginary of the US in Chinese cyberspace, I believe this research will have significant implications for both non-Anglophone geopolitics research and the discussion of spaces of geopolitics.

### Key words:

critical geopolitics; non-Anglophone geopolitics; Chinese geopolitics; online geopolitics; social media; terrorism; *Sina Weibo*; 'Keyboard Men'

## C12.33 Political Geography

### China's Geopolitical (Re) Positionings in a Changing World



#### Oral

1. [China's Peaceful Rise and Its Expanding Pattern of Power Space: An Analysis Based on the Sensitivity and Vulnerability of States Interdependence](#)  
Du Debin; Duan Dezhong; Yang Wenglong (Institute for Innovation and Strategic Studies, East China Normal University, China)
2. [Chinese Geopolitical Imagination of The US: A Perspective from Terrorism](#)  
Ning An (South China Normal University, China)
3. [Critical Geopolitics, Chinese Exceptionalism and the \(Ab\)uses of History: Towards a Contingent Conception of China's 'Rise'](#)  
Chih Yuan Woon (National University of Singapore, Singapore)
4. [Disaggregating China's foreign policy in Africa](#)  
Marcus Power (Durham University, United Kingdom)
5. [Economic & Trade Exchanges of Port Cities and the Border Region Cooperation between CHINA and DPRK](#)  
Ying Nan; Hua Li; Kun Li (Yanbian University, China)
6. [Narrating Territory and Security in Remote Border Places: The Kokang Dispute and the Evolving Borderlands between China and Myanmar](#)  
Victor Konrad (Carleton University, Canada); Zhiding Hu (Yunnan Normal University, China)
7. [Progress of Geopolitics of Chinese Geography since the 1990s](#)  
Du Debin; Duan Debin; Liu Chengliang (Institute for Innovation and Strategic Studies, East China Normal University, China)
8. [The Domestic Significance of the Belt and Road](#)  
Ye Kaizhen (The PLA Information Engineering University, China)
9. [The Planning and Reconstruction of Roads in Shantou Port in Late Qing Dynasty and the Republic of China](#)  
Linhao Ouyang; Shi Xie; Wei Yu; Tao Wu (Sun Yat-sen University, China)
10. [The Progress of International Research on Geopolitics for Nearly 20 Years](#)  
Tao Song; Dadao Lu; Yi Liang (Institute of Geographical Sciences and Natural Resources Research, CAS)



11. [The Trans-Political Nature of Southwest China's Energy Conduit, Yunnan Province](#)

Thomas Ptak (University of Oregon, United States); Jussi Laine (University of Eastern Finland, Finland)

12. [Using China's Stamp Issues to Document Economic and Political Transitions](#)

Stanley Brunn (University of Kentucky, Australia)

## poster

1. [Analysis on China's Energy Geopolitical Environment](#)

Zhang Hong (China, The Information Engineering University)

2. [Study on The Spatial-Temporal Evolution and Internal Mechanism of Geo-Economics Connection in China](#)

Wenlong Yang; Debin DU; Chengliang LIU (China, School of Urban and Regional Science, East China Normal University)

3. [The Connotation, Function and Organization of Global S&T Innovation Center](#)

Debin Du; Shunhui He (China, East China Normal University)

## China's Peaceful Rise and Its Expanding Pattern of Power Space: An Analysis Based on the Sensitivity and Vulnerability of States Interdependence

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### Abstract

Based on the theory of economic interdependence, this paper constructs the Expanding Potential Index of Power Space (EPIPS) through analyzing the sensitivity and vulnerability of the world's countries to China's Global trade by adopting the trade data between China and the rest countries of world in 2013 and 2002, so as to study the power space expanding pattern following the steps of China's rise. From 2002 to 2013, China's global trade patterns had developed from the tripartite confrontation pattern dominated by East Asia, Western Europe and North America to Multi-polar pattern. However, the dependence spatial pattern of world trade and economy to China global trade has presented the other scene, showing a good spatial and temporal inertia that is highly concentrated in Asia, Africa and Latin America near the equator. From 2002 to 2013, the distribution of the areas sensitive to China's global trade showed an advancing trend from Asia-Pacific to Africa, Latin America, but the distribution of the areas vulnerable to China's global trade had evolved from point spread to contiguous growth. From 2002 to 2013, China's power space has been expanded from peripheral to the world, and to the developed countries and regions, while the United States in the same period, showed significant contraction trend.

### Key words:

Sensitivity; vulnerability; power space; expanding potential; China's rise

## Chinese Geopolitical Imagination of The US: A Perspective from Terrorism

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### Abstract

Geographical imagination plays significant role in both international relations and diplomacy. However, the vast majority of current imaginary geographies studies have focused empirically on the Anglophone geographical imaginations of the non-Anglophone, the non-Western, the Oriental, or the Global South, while few studies have paid attention to the non-Anglophone, non-western, Oriental and Global South's imaginaries of the Anglophone. In this paper, I focus on Chinese geopolitical imagination of the US from the special perspective of terrorism. Under the theoretical framework of 'critical geopolitics', I examine the narratives of both terrorism and the image of the US in Chinese newspapers, *People's Daily* and *South Weekend*. Drawing on the archival data about terrorism and the US in *People's Daily* and *South Weekend*, 2001-2014, I display a Chinese geopolitical imagination of the US. The results show that, the term terrorism has been endowed with different meanings when it is put into different languages and socio-political context; and moreover, the US, especially its war and hegemonic behaviour, has been gazed under the magnifying glass of Chinese Confucianism which still influence on current Chinese political ideologies. Based on the analyses of Chinese discourses of terrorism and the US, I believe this research will have significant implications for both non-Anglophone geopolitics and critical geopolitics research, particularly from the perspectives of 'translating political geographies' and 'Chinese Confucian geopolitics'.

### Key words:

critical geopolitics; non-Anglophone geopolitics; Chinese geopolitics; geopolitical imagination; terrorism; imaginaries of the US; Confucianism; *People's Daily*; *South Weekend*

## **Critical Geopolitics, Chinese Exceptionalism and the (Ab)uses of History: Towards a Contingent Conception of China's 'Rise'**

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### **Abstract**

This paper examines the intimate association between narratives emanating from China and their discussions about Chinese history, and how such perspectives inform the way a 'stronger' China may relate to the rest of the world. Taking inspiration from the deconstructive impetus of critical geopolitics, I contend that these historical claims to China's rise constitute deterministic accounts, hinging on the notion of Chinese exceptionalism to provide discursive backing for a Sinocentric geopolitical order in the coming decades. This in turn downplays 'alternative' historiographies that can shed light on how the nature of China's rise may be more dependent on and shaped by the external environment than previously acknowledged. Building on geographical expositions related to the idea of contingency, I demonstrate how China (whether it be in the past or present) cannot be seen as operating in a vacuum but has to constantly negotiate and adjust its strategy of engagements/interactions based on the specific demands imposed by world politics. As such, a contingent conception of China's rise can raise important questions for us to critically appreciate the contextual actors, processes and relationships that differentially impact on China's engagements in the world.

### **Key words:**

Critical Geopolitics; Chinese Exceptionalism; History; China's 'Rise'; Contingency

## Disaggregating China's foreign policy in Africa

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### Abstract

In its quest for a closer strategic partnership with Africa, China has developed increasingly dynamic economic, political and cultural activities on the continent, attracting considerable attention and controversy in the process. This paper examines the geopolitical imaginaries that have been utilised by Chinese leaders and strategists in an attempt to show that China's historical experience and vision of development resonates powerfully with African counterparts and that its history of friendly political linkages and development co-operation offers a durable foundation for future partnership. Exploring China's use of soft power and the different forms of economic and cultural diplomacy that have been deployed, the paper considers the implications of China's rise for African geopolitical landscapes and the ways in which an increasingly internationalised Chinese state is reshaping geopolitical and developmental spaces on the continent. In so doing it examines the transformation and disaggregation of Chinese statehood under globalisation, the diversification and proliferation of foreign policy actors it has produced and the internal differences it has consequently generated over external relations. The paper argues that China's fragmented and decentralised state apparatuses and quasi-market actors are increasingly pursuing their own independent interests and agendas overseas, generating conflict-ridden, incoherent policy output, often mistakenly interpreted as a single 'national' position or 'grand strategy'. Rather than highlighting one strand of Chinese relations with African states (such as aid or governance) the paper argues that a wider critical geopolitics of China-Africa relations is necessary in order to adequately comprehend how interactions with China are reshaping Africa's political geographies.

### Key words:

China; Africa; geopolitics; foreign policy; development

## **Economic & Trade Exchanges of Port Cities and the Border Region Cooperation between CHINA and DPRK**

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### **Abstract**

Along with the rapid development of economy, the Chinese government actively promote aiming at development of northeast three provinces of northeast China. Via the border ports of China and the DPRK, exchange of goods and travelers between two countries are more and more active. On the basis of geographical proximity and complementarity, the network between China-DPRK border cities gradually become closer together. From the view of northeast China, Changjitu(长吉图) diagram development, and even northeast Asia regional cooperation strategy perspective, stability and development of border area is of great significance to the Korea Peninsula and northeast Asia.

On the border area, as the center of cross-border exchange space of the Korean nation, Koreans Chinese, Chinese in North Korea and Koreans is forming a close link in economy and society. Conditions of border cities have played a key role in the regional development. When equipped with the conditions of the resources and economic complementarity on the both sides, border cooperation has far reaching possibilities. Cross-border trade is the main form of communication on the border areas. The border cities maintain a close link to economic trade and human exchanges via road ports and railway ports.

### **Key words:**

Border Cities of China and DPRK; Economic and Trade Exchanges; Human Exchanges

## **Narrating Territory and Security in Remote Border Places: The Kokang Dispute and the Evolving Borderlands between China and Myanmar**

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### **Abstract**

In 2015, the remote border region of Kokang in Myanmar experienced armed conflict that was reported around the world. Many of the estimated 100,000 refugees from the conflict crossed the border to China while hostilities continued from February through August with temporary truces punctuating the fighting. Unlike the other ethnic minorities fighting the Myanmar government forces all along the extensive, mountainous border with China, the Kokang are Han Chinese with a well-established and nurtured relationship with China. Based on more than 400 interviews of Chinese and Kokang, media reports, and official government releases, this paper explores the varying imaginaries of territory and security in remote Kokang, by the residents of the cross-border region as well as the analysts viewing the conflict from afar. The study offers a lens through which border studies may view the multi-scalar and extended geopolitics of nation states and their peripheral sub-national components. Specifically, the study addresses the changing role of the border under conditions of conflict and security enhancement, and the malleable definition of borderlands territory. The study reveals how borders are utilized creatively by territorial inhabitants, their neighbors and their governments, how borders work in remote places, and how cross-border culture operates even in conflict situations to mediate borders. The study enlarges our understanding of evolving borders in simultaneous globalization and localization.

### **Key words:**

territory; remote border; Kokang; China; Myanmar; border security narrative; evolving borderlands

## Progress of Geopolitics of Chinese Geography since the 1990s

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### Abstract

Nowadays, the world is undergoing profound changes and re-constructing, the shifting of world power center and the restructuring of the international order, which are bound to put forward a new theoretic demand for geopolitical research in China and bring new opportunities for the geography development due to Chinese development. This paper summarized the achievements and analyzed the deficiencies of Chinese geographers in the fields of geopolitics in the past half a century. For example, Chinese geopolitics has made great progress in team building and academic achievements and some breakthroughs in some aspects recently, however, some problems still exist in Chinese geopolitical research. Firstly, the theoretical system is not complete and the academic community is disunited yet. Secondly, the disciplinary position is not clear, resulting in limited academic development potential. Thirdly, compared with other subjects, Chinese geography, the basic subjects of geopolitics and geo-economic study, is in an obvious weak position. So there is a serious shortage of outstanding achievements. Fourthly, the current research mainly focuses on the phenomenon description, and the mechanism examination is insufficient. Lastly, Chinese geographers excessively relied on western thoughts, lacking independent value judgments. On the basis of the above points, the authors suggest an action plan of strengthening Chinese geopolitical research, including the studies of geopolitical philosophy and methodology, geopolitics basic theory, global geopolitical situation and the major geostrategic powers, and the analysis of China's surrounding geopolitical environment.

### Key words:

geopolitics; geo-strategy; world geography; Chinese geography; research progress

## The Domestic Significance of the Belt and Road

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### Abstract

In this competitive world it is essential for our Chinese people to know how to peaceful rise in order to revive our country. The belt and road which has epoch-making significance is proposed in this background. Until now, this plan has begun to take shape, and in an orderly way. Hereon base, I brief discuss the significance of the plan in China's domestic.

On the one hand, our country has the world's best technology of infrastructure construction. But surplus of capital and overcapacity trouble our economy. It's Capital, technology, productivity that is what those lack. The belt and road strategy can help us get rid of the problem of overcapacity and promote capital expansion.

On the other hand, because of the great gap between eastern region and western region, the western region needs a lot of support from government. The new silk road strengthens the western region's cooperation with foreign country in energy, trade and transportation. It will balance domestic development strategy and promote the development in the Midwest. Meanwhile eastern region can accomplish Industrial transition and structure upgrading.

OBOR like a landmark in our country. Its future development will be more striking.

### Key words:

domestic significance; the belt and road



## The Planning and Reconstruction of Roads in Shantou Port in Late Qing Dynasty and the Republic of China

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### Abstract

At the beginning of the nineteenth century, even though Shantou was not officially opened to the outside world, it has played a more and more important role in commercial activities. Since 1860, when Treaty of Tientsin was signed, this city has been officially opened to foreign ports in modern China. And with the rapid development of the steamship industry, Shantou entered into a new phase of development and it served as the only port which can berth ships in Hanjiang river basin. As a new important chapter in the modern development of urban areas, the evolution of Shantou's pattern, the construction of its roads and the political power, social organizations and economic profits behind it have presented the world a charming and unique dynamic scene. Thanks to historical files, newspaper, journals and books, the thesis has discussed the establishment of municipal systems and laws and regulations with the background of the evolution of the city's pattern and its history. And the analysis of the construction of roads can also be seen in the thesis, which aims to reveal the interaction of the government and merchants and how merchants pursued their profits through the municipal systems in the urban renewal.

### Key words:

Shantou; Modern times; The reconstruction of city; The planning of road

## The Progress of International Research on Geopolitics for Nearly 20 Years

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### Abstract

Geopolitics, which researches on the international relations in view of geographies, exerts powerful influences on the course of economic and political development in the world. In the tide of globalization and information technology, the geopolitics has become an important subject of global pattern interpretation and policy making. It is important to have a scientific and systematic review of international geopolitics' latest development to promote the development of this discipline. Based on the bibliometric statistics, the paper reviews the research development of geopolitics on the Web of Science since 1996 to 2015. The history, journals, papers and key research areas of geopolitics have been revealed in the paper. By the analysis of bibliometric statistics, the number of papers recently published in the journals of political geography and related geography continues to increase. The key areas of geopolitical papers which are global highly cited include geopolitical interpretation of the countries and the borders, critical geopolitics, emotional geopolitics, feminism geopolitics and other topics. Before the year of 2000, the state and the borders are hot topics of the geopolitical research. Since 2000, it is of great significance that the geopolitics should be placed in the context of geographical implications. At the same time, critical geopolitics appears to be the main area of geopolitical research, especially the shifts from traditional geopolitics to the humanism (such as emotional geopolitics, feminism geopolitics). The paper then systematically reviewed the branch trends of geopolitical research, including the borders and the territory, global geo-culture and geo-economics, Chinese models of geopolitics, resource conflicts and ecological politics, emotional geopolitics. Finally, it puts forward that Chinese geopolitical studies should reinforce the importance of geographical space and scale, use the process of description and multiple methods, as well as integrate humanistic thoughts, to further enrich the theories and practices of geopolitical research.

### Key words:

Geopolitics; discipline development; scientometrics; international research progress

## The Trans-Political Nature of Southwest China's Energy Conduit, Yunnan Province

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### Abstract

Transboundary flows of energy across Yunnan Province in China and to Southeast Asian states provide insight into the changing nature of borders and border areas. Rather than monolithic symbols of state sovereignty, China's southwest borders in Yunnan can be more accurately characterized as zones of connectivity and exchange, serving a range of local, national and regional objectives. Energy production and distribution in and across Yunnan can be understood as functioning in a set of dynamic transnational processes that serve as economic and political bridges—increasing interaction and deepening regional integration—while also working to mitigate risk to China's energy demands. In this paper, energy projects in Yunnan and Southeast Asia demonstrate the ways border regions can respond to increasing globalization, simultaneously strengthening national energy security while promoting regional interconnection and diplomacy. Thus, connections to and through a once peripheral region present an apparent contradiction: once rigid territorial borders are increasingly characterized by transboundary infrastructure development and exchanges of energy, capital and diplomacy, while promoting broader, diversified national energy security objectives—essentially strengthening national security through transnational energy projects. This paper investigates how energy development works to shape Yunnan's role as an “energy conduit,” while advancing both transnational and geopolitical objectives, and thus, suggesting these projects as components of broader objectives can be understood as trans-political in nature.

### Key words:

China; Yunnan; Energy; Globalization; Borders; Regional Integration

## Using China's Stamp Issues to Document Economic and Political Transitions

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### Abstract

Stamps are visual products of the state that present information to those inside and outside the state's boundaries about events, personalities and subjects it considers important. States issues stamps that reflect events from the past and present that it wishes to depict about changes. Political geographers and others in recent years have undertaken a number of studies about stamp themes, issues and changes. In this study we seek to answer stamps that were issued in China's recent transition periods. We examine the topics, themes and subjects of stamps in three periods: the years before and after the Cultural Revolution (1966-69), the years before and after Mao's death (1976) and the years before and after China joined the World Trade Organization (2001). A close reading of the stamp designs and topics reveals there were changes in the subjects and topics in the "before" and "after" periods. We illustrate examples of the stamp issues. We conclude that stamps can be and are important product of state politics that can be used to reflect internal and external cultural, political and economic changes.

### Key words:

stamp issues; visualization; politics; ocial changes



## Analysis on China's Energy Geopolitical Environment

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### Abstract

Today China is the largest importer of petroleum in the world. In 2015 oil and nature gas respectively have the external dependence of 60.6%, 32.7%. Highly external dependency is the weakness of nation's energy security. Especially the Strait of Malacca as the "choke points" threat to the energy-supply security. In the paper, the evaluation system of China's energy geopolitical environment developed by utilizing NET and ArcGIS Engine has effectively managed the spatial geographic data including the import channels of petroleum, "choke points" and "transit countries" of transportation, as well as various kinds of data related to energy. The system is capable of managing, analyzing, and expressing that the spatial distribution of energy-importing regions, varying import channels, and the changes of energy geopolitical environment impacted by geopolitics around "choke points" and "transit countries". Finally put forward to ensure Chinese energy channels security strategies.

### Key words:

China; petroleum; energy geopolitical environment; import channels; choke points; transit countries

## Study on the Spatial-temporal Evolution and Internal Mechanism of Geo-economics Connection in China

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### Abstract

The interdependence of economics among countries has been distinctly enhanced due to the end of the Cold War and the intensification of globalization. In terms of its content and form, geo-politics has shifted from a “high politics field”, which focuses on safety, to a “low politics field”, which emphasizes economics; making geo-economics the focus of the researches. This paper revealed China’s evolutionary characteristics of geo-economics connections at the global scale, while exploring its internal mechanism. The results show: (1) China’s geo-economic connections have been through 4 periods of “Inoculating- Sprouting- Raising- Flourishing” respectively, which were significantly correlated to economic development and the adjustment of the industrial structures. (2) Labor-intensive industry is currently dominant in China, but capital-intensive and technology-intensive industry are gradually developing, and the disadvantages of primary goods is prominent. (3) China’s economic power is heterogeneous across space. The geo-economic connections could be identified as global powers’ agglomeration and geographical proximity, but it became homogeneous through time and the diameter of economic power has continuously expanded. China has not only maintained stable geo-economic connections with developed countries like the United States of America, Japan and some European countries, but it has also strengthened connections with developing countries in Africa and South America. (4) Capital endowment, technology endowment and labor endowment are the main internal driving forces behind the spatial-temporal evolution of China’s geo-economic connections, among which capital endowment is the key driving force, technology endowment is the important impetus and labor endowment is the fundamental advantage.

### Key words:

geo-economics; spatial-temporal evolution; production endowment; internal mechanism; Exploratory Spatial Data Analysis (ESDA)



## The Connotation, Function and Organization of Global S&T Innovation Center

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### Abstract

Based on specifying the connotation of global science and technology innovation center, this paper proposed four functions of global science and technology innovation center, including scientific research function, technological innovation function, driving function of industrial and leading function of culture. After that, the paper summarized five salient features, which are functional domination, structural hierarchy, spatial agglomeration, high-end Industries and tolerant culture. Finally, the component elements and structure of global science and technology innovation center were summarized into a multi-factor system with three levels, in which talents are the core elements of formation, university, industry and government are the driving factor during the period of development, innovation culture, innovation capital, innovation infrastructure and professional service are the environmental elements.

### Key words:

Global S&T innovation center; connotation; function; organization structure

## C12.33 Political Geography

### Changing Borderlands Between China and Mainland Southeast Asia: A Global Perspective



Home

#### Oral

1. [Borderland: Ritualized display of luxury hotels in Guangzhou](#)  
Xiaomei Cai (South China Normal University, China)
2. [Cross-border Trade and the Changing Landscape in border cities in Yunnan, China](#)  
Xiaobo Su (Department of Geography, University of Oregon, Eugene, OR, USA)
3. [Economic & Trade Exchanges of Port Cities and the Border Region Cooperation between CHINA and DPRK](#)  
Ying Nan, Hua Li, Kun Li (Yanbian University, China)
4. [Landscape of Incompatible Desires: Tea Production, Land Use Politics, and Ethnic Minorities in Southwest China](#)  
Hung Po Yi (Department of Geography, Taiwan University, Taiwan, China)
5. [Narrating Territory and Security in Remote Border Places: The Kokang Dispute and the Evolving Borderlands between China and Myanmar](#)  
Victor Konrad (Carleton University, Canada), Zhiding Hu (Yunnan Normal University, China)
6. [National and Psychological Boundaries of Dai People in Frontier Xishuangbanna](#)  
Chen Yapin (Yunnan Normal University, China), Zhou Shangyi (Beijing Normal University, China)
7. [The Mule Caravan as Social Agency of Borderland Reconstruction between the Yangtze and the Irrawaddy Rivers: Transportation and Social Integration](#)  
Jianxiong Ma (The Hong Kong University of Science and Technology, Hong Kong SAR, China)
8. [The Trans-Political Nature of Southwest China's Energy Conduit, Yunnan Province](#)  
Thomas Ptak (University of Oregon, United States), Jussi Laine (University of Eastern Finland, Finland)

## Borderland: Ritualized Display of Luxury Hotels in Guangzhou

CAI Xiaomei

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### Abstract

The border was not a line that circumscribed or delineated a territory. Instead, the border was multiple; it was found, practiced and enacted in a multitude of sites beyond and within the territory it was intended to secure. Border as Method, it considers the diverse operations of the border in producing landscapes and subjectivities. Hotel as the border of metaphor, consumers around the world need to provide the effective certificate such as a passport to check in. Besides, consumers that does not locate the ability to act politically in the traditional figure of the citizen, but rather, sees the struggles, contestations and negotiations of non-citizens as intrinsic to the enactment of citizenship and political subjectivity. The study selected 10 luxury hotel in Guangzhou as a case, and used the in-situ observation, depth interview, experience and other research methods. It found that: (1) Consumers through check-in, produce and inspection certificates and other forms of ritualization showed an acute manifestation of the “spectacle of the border”, citizen or non-citizen, resulted in the process of the ritualization of similar border checks are fuzzy. (2) The hotel through language, material products, cultural construction and so on produced blurred border landscape, rendering the multinational national contestations and negotiations. (3) In the process of the interaction of hotel producers and consumers, citizenship is a bordering practice that operates through exclusion and claiming. The study enriched the border related theory, also provides a new perspective for the research of the hotel.

### Key words:

Border; citizenship; landscape; subjectivity; luxury hotel

## Cross-border Trade and the Changing Landscape in Border Cities in Yunnan, China

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### Abstract

Situated in the context of China's border opening, this paper focuses on border cities in Yunnan, a southern province sharing a border with mainland Southeast Asia. The primary goal is to examine how the Chinese state rescales to promote cross-border trade in Yunnan's border cities and how cross-border trade shapes land development in these cities. Border cities in Yunnan such as Ruili and Mohan play a key role in promoting cross-border trade. The dynamic interaction between land development and cross-border trade is the key to understanding the spatial development and changing function of border cities. Specifically, my paper addresses three critical questions: 1) Why does the Chinese state reposition border cities as a new frontline of transnational regionalization? 2) How do subnational governments restructure power hierarchy to integrate this repositioning into economic development in border cities? 3) How does land development become a vehicle by which local authorities and trade companies promote cross-border trade? I argue that border cities in Yunnan have already become a key site of capital accumulation via cross-border trade and local governments in these cities harness this opportunity to promote land development and cater to the demand of investors and traders. Cross-border trade dramatically changes border cities and convert them into new hotpots of investment.

### Key words:

cross-border trade; land development; Yunnan; border cities

## **Economic & Trade Exchanges of Port Cities and the Border Region Cooperation between CHINA and DPRK**

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### **Abstract**

Along with the rapid development of economy, the Chinese government actively promote aiming at development of northeast three provinces of northeast China. Via the border ports of China and the DPRK, exchange of goods and travelers between two countries are more and more active. On the basis of geographical proximity and complementarity, the network between China-DPRK border cities gradually become closer together. From the view of northeast China, Changjitu(长吉图) diagram development, and even northeast Asia regional cooperation strategy perspective, stability and development of border area is of great significance to the Korea Peninsula and northeast Asia.

On the border area, as the center of cross-border exchange space of the Korean nation, Koreans Chinese, Chinese in North Korea and Koreans is forming a close link in economy and society. Conditions of border cities have played a key role in the regional development. When equipped with the conditions of the resources and economic complementarity on the both sides, border cooperation has far reaching possibilities. Cross-border trade is the main form of communication on the border areas. The border cities maintain a close link to economic trade and human exchanges via road ports and railway ports.

### **Key words:**

Border Cities of China and DPRK; Economic and Trade Exchanges; Human

Exchanges

## Landscape of Incompatible Desires: Tea Production, Land Use Politics, and Ethnic Minorities in Southwest China

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### Abstract

Tea production, especially Pu'er tea, has substantially changed the agricultural landscape in Southwest China, the borderlands of Yunnan in particular. by focusing on the landscape of what is deemed "ancient tea forest" (*guchalin*), this project aims to understand the interactions among tea trees, entrepreneurs, the state, and an ethnic minority population, the Bulang. I analyze the material and ideological components of the tea forest by examining ecological changes, market forces, and state interventions. Data are collected by the intensive ethnographic research to engage in local Bulang villagers' everyday life in a context where the tea landscape in southwest China is symbolically and materially reproduced. In accordance, I find the (re)construction of tea landscape has been a state intervention for the (re)construction of people on China's southwest frontier. In other words, I argue the (re)construction of landscape has been the state project for engineering an ethnic entrepreneurship to re-articulate China's southwest frontier with the market economy. Nevertheless, the (re)construction of both landscape and people, in practice, has been dilemmas between tradition and modernity, territorial margin and connected space, and primitive nature and civilized development.

### Key words:

Tea; Landscape; Ethnic Minority; Dilemma; Yunnan

## **Narrating Territory and Security in Remote Border Places: The Kokang Dispute and the Evolving Borderlands between China and Myanmar**

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### **Abstract**

In 2015, the remote border region of Kokang in Myanmar experienced armed conflict that was reported around the world. Many of the estimated 100,000 refugees from the conflict crossed the border to China while hostilities continued from February through August with temporary truces punctuating the fighting. Unlike the other ethnic minorities fighting the Myanmar government forces all along the extensive, mountainous border with China, the Kokang are Han Chinese with a well-established and nurtured relationship with China. Based on more than 400 interviews of Chinese and Kokang, media reports, and official government releases, this paper explores the varying imaginaries of territory and security in remote Kokang, by the residents of the cross-border region as well as the analysts viewing the conflict from afar. The study offers a lens through which border studies may view the multi-scalar and extended geopolitics of nation states and their peripheral sub-national components. Specifically, the study addresses the changing role of the border under conditions of conflict and security enhancement, and the malleable definition of borderlands territory. The study reveals how borders are utilized creatively by territorial inhabitants, their neighbors and their governments, how borders work in remote places, and how cross-border culture operates even in conflict situations to mediate borders. The study enlarges our understanding of evolving borders in simultaneous globalization and localization.

### **Key words:**

territory; remote border; Kokang; China; Myanmar; border security narrative; evolving borderlands

## National and Psychological Boundaries of Dai People in Frontier Xishuangbanna

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### Abstract

Border between two countries which is both national sovereignty border, namely national border, but also a psychological boundary for local residents on both sides. Besides psychological boundary and national border, there is a cultural boundary which is full of meaning and value of life. Residents on both sides have cultural flowing and imagination of it based on their rich experiences.

Microscopic geography prefers to trace daily life record, using interpretation, and analysis of activity subject, activity space, activity frequency, content of activity, event impacts, it also recognizes changes of these. This case takes Dai people who live on both sides of China and Myanmar as research target. We investigated their psychological icon of boundary from their memories, imaginations, and experiences. Then we give an interpretation of it and find its significance for Dai people.

This case study obtains the following conclusions Cultural spaces play an important role to Dai people's daily life who live on both sides. Even nation border establishes the national identity of local people, but it does not become a cultural boundary of Dai people living in China and Myanmar. It is a window of Dai's culture shown by the cultural activities of both sides. We can tell the psychological boundaries by the imaginations of Dai people, the living experience of Dai residents on each side practice the way of other side by their imagination, thus the understanding of their own life and culture. The flowing range of psychological boundaries take combined effects by local political, economic, cultural, social and other factors.

### Key words:

cross-border; cultural boundary; Psychological Boundaries; National Boundaries; Dai people

## The Mule Caravan as Social Agency of Borderland Reconstruction between the Yangtze and the Irrawaddy Rivers: Transportation and Social Integration

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### Abstract

The mule caravans had been the fundamental means of transportation to link Chinese domestic market along with the Yangtze River with the market circles along with the Irrawaddy River and Indian Ocean together. In order to maintain this transportation system, indigenous communities in Southwest China and highland Southeast Asia developed a regional cooperative network between communities in mountains, basins, and valleys. They were bound into this transportation network for material circulations. The basin communities provided the horsebean harvest to feed animals, while the mountain communities survived under the highland husbandry by providing mule training, and merchants relied on long distant trade to weave them into a network. In addition, the state financial system required for silver and copper supplies as currency, which also enriched the development of mule caravan transportation across different communities and political systems. This research focuses on the development of local social agency based on the mule caravan network, and studying a historical regional cooperative culture on the political borderland between Southwest China and highland Southeast Asia. The borderland communities were continuing reconstructed as a response to the state tax and carve policies in Qing dynasty, as they established pools of common property and managed around communal temples, to provide transportation service for the governments. Thus, transportation network, regional markets and state revenue policy facilitated local interdependency and social integration in different orientations. This is a different perspective to explain the highland-lowland relationship in this region against the Zomia assumption given by James Scott.

### Key words:

Yunnan-Burma borderland; Mule caravan; Southeast Asia; Southwest China; Highland-lowland; *Zomia*; Ethnic minorities in China; Animal studies; Social Agency

## The Trans-political Nature of Southwest China's Energy Conduit, Yunnan Province

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### Abstract

Transboundary flows of energy across Yunnan Province in China and to Southeast Asian states provide insight into the changing nature of borders and border areas. Rather than monolithic symbols of state sovereignty, China's southwest borders in Yunnan can be more accurately characterized as zones of connectivity and exchange, serving a range of local, national and regional objectives. Energy production and distribution in and across Yunnan can be understood as functioning in a set of dynamic transnational processes that serve as economic and political bridges—increasing interaction and deepening regional integration—while also working to mitigate risk to China's energy demands. In this paper, energy projects in Yunnan and Southeast Asia demonstrate the ways border regions can respond to increasing globalization, simultaneously strengthening national energy security while promoting regional interconnection and diplomacy. Thus, connections to and through a once peripheral region present an apparent contradiction: once rigid territorial borders are increasingly characterized by transboundary infrastructure development and exchanges of energy, capital and diplomacy, while promoting broader, diversified national energy security objectives—essentially strengthening national security through transnational energy projects. This paper investigates how energy development works to shape Yunnan's role as an “energy conduit,” while advancing both transnational and geopolitical objectives, and thus, suggesting these projects as components of broader objectives can be understood as trans-political in nature.

### Key words:

China; Yunnan; Energy; Globalization; Borders; Regional Integration

## C12.34 Population Geography

### Migration and Changing Social Worlds in Asia: Negotiating Gender Subjectivities and Family Relations



Home

#### Oral

1. [Inter-Caste Marriage and Forced Displacement in India](#)  
Pralip Kumar Narzary (International Institute for Population Sciences, India)
2. [Reintegrating Return Migrant Fathers into the Web of Care](#)  
Theodora Lam; Brenda Yeoh (NUS, Singapore)
3. [Reshaping Household Relations Through Translocal Connectedness: The Role of Gender in Remittance Practices](#)  
Luise Porst (Department of Geography, University of Bonn, Germany); Patrick Sakdapolrak (Department of Geography and Regional Research, University of Vienna, Austria)
4. [Rural-Urban Migration in Gender and Development Perspectives: a case of China](#)  
Zhenzhen Zheng (Chinese Academy of Social Sciences, China)
5. [Social Network as a Survival Strategy in Cities: A Case Study of Migrant Women Construction Workers in Delhi](#)  
chandrakanta (SBSC, New Delhi, India)

#### Poster

1. [Household Changes in India with Special Reference to North-Eastern States of India: Evidence from Four Recent Censuses](#)  
Donald Ricaldo Mawkhlieng; Laishram Ladusingh (India, International Institute for Population Sciences, Mumbai)
2. [The Characteristics of Residential Patterns and Population Movements Among Urban White-collar Workers: A Study on Workers of Private Enterprises in Hangzhou, China](#)  
Yasuhisa Abe (Japan, Kyushu University); Xia Hua (China, Lici International Education)
3. [Transnational Marriage Migration from Russia to Turkey](#)  
Ayla Deniz; E. Murat Özgür (Turkey, Ankara University)

## Inter-Caste Marriage and Forced Displacement in India

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### Abstract

In India woman leaves her parental home after marriage to live with her husband and his family. Due to caste system embedded in the Hindu religion, marriage is held within the same caste and mate selection is done usually by parents. Couple of inter-caste marriage may be out casted, driven out of parental home, in worse case may be honour-killed. Under such socio-cultural settings, it is pertinent to know which type of people/couple endeavor to take high risk of breaking such stringent social norms and its association with forced migration. Present study used data from the India Human Development Survey 2011-12 (IHDS-II), a nationally representative, multi-topic survey of 42,152 households. Appropriate bi-variate and multi-variate statistics are applied. Result shows that about 5 percent of the sample tied the nuptial knot outside their caste. The trend from 1980s–2012 shows a steady rise in the inter-caste marriage. Four percent of inter-caste married couples were forced to migrate. Parents prefer to bring up their children in the modern way, and that opens the new vistas for inter-mingling and inter-caste marriage. Hence it is most likely that the inter-caste marriage will rise and there will be more forced migration due to it. This type of displacement also causes similar mess as those of displacement due to other issues, however goes unnoticed in the academic arena and not gaining importance. But it has a great policy implication especially in huge country like India. Thus, present paper is a humble attempt in this direction.

### Key words:

Forced-Displacement; Caste; India; Marriage; Social norm; India Human Development Survey

## Reintegrating Return Migrant Fathers into the Web of Care

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### Abstract

In an era of increased feminisation of labour migration, the voices of migrant men-as-fathers have become largely muted. Even as men migrate to fulfil their breadwinning roles, they are expected to continue active fathering from afar and remain an 'absent presence' at home and in the lives of their left-behind children. As they reunite with their family members upon their return, whether permanently or temporarily, they have to adjust to living together with their families again and this may result in tensions and disruptions for the family and the newly spun web of care woven during their absence. Drawing on a larger mixed-method study titled CHAMPSEA (Child Health and Migrant Parents in Southeast Asia) comprising household surveys and in-depth interviews, this paper thus juxtaposes the transnational or long-distance fathering experiences of return migrants vis-à-vis those that (re) develop in the wake of their return. It probes into how migrant fathers' continued (or lack of) involvement in caring for their families while away eases or impedes their ability to reinsert themselves into the web of care upon return. Finally, the paper examines how gendered expectations of fathering remain sticky over time despite the coming and going of migrant and return fathers from the families.

### Key words:

Transnational fathering; return fathers; web of care

## Reshaping Household Relations through Translocal Connectedness: The Role of Gender in Remittance Practices

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### Abstract

Remittances are powerful resources mediating connections between migrating and non-migrating household members and inducing renegotiation processes of household relations. Meanwhile, remittance transfers are influenced by various factors. Although often neglected in migration research, migrants' embeddedness at multiple places plays an important role in reshaping household relations – given the diverse social settings that hence converge in one household. We therefore aim to disentangle gender effects on remittances and, in turn, implications of remittances for gender relations within multi-sited households. To account for the embeddedness of migrants and households of origin in a network of links between places, we employ a translocal approach, conceptualizing remittance sending as a practice to maintain translocal connections. Based on empirical research in Thailand, we examine how responsibilities among household members are modified or persist as affected by internal migration, mainly between rural communities and peri-urban areas around Bangkok. Applying a multi-sited research strategy, we conducted semi-structured interviews with current and return migrants, and with migrants' household members, in places of destination and origin. Our results corroborate the embeddedness of remitting in family structures. Furthermore, we find that remittance patterns reflect social norms, including gender-specific expectations and behaviour. At the same time, remittance transfers contribute to readjusting gendered roles. We conclude that gender in conjunction with other categories of social differentiation, incl. age and education, affects the intensity of translocal connections mediated through remittance practices, and thus influences the impact of financial and social remittances on the asset endowment of and the activity assignment within multi-sited households.

### Key words:

Multi-sited households; gender relations; remittances; domestic migration; translocality; Thailand

## Rural-Urban Migration in Gender and Development Perspectives: a case of China

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### Abstract

The relationship between population mobility and development is a study topic draw attention in China and worldwide. This paper will study the issue in a gender perspective, to exam the impact of migration to rural-urban migrants on men and women. Women migrants made almost half of labor migrants in the last decade in China. Using the Third Wave Survey on the Social Status of Women in China (2010), with a framework of resource/opportunity — agency/competence — decision making/choice — outcome/impact, this paper will analyze the impact of migration experience to rural women, and compare that with other reference groups, such as rural women never migrated or migrant men. Two sets of indicators selected for this study. The first set of indicators measures opportunity and choice, such as self-decision making on going out to study or work, main reasons for migrate out and return home, satisfactory to current job; the second set of indicators measures outcome or impact, such as employment, social welfare, marriage and family issues. The study find that migration provide more opportunities to rural women that never available before regarding economic participation and income earning, the impact could be observed also among returned migrants. However, some institutional constrains especially affected women, put them in a dilemma between work/career development and traditional family responsibility.

### Key words:

Rural migrants; gender differences; employment; gender role in family

## **Social Network as a Survival Strategy in Cities: A Case Study of Migrant Women Construction Workers in Delhi**

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### **Abstract**

It is a well-established fact that the pre-existing social connection makes migration less stressful leading to better migration, but the phenomenon of network is not the same for all; for example, there are gender differences in the type and use of social network. In India, where female migrants are relatively vulnerable mainly if they are migrating alone then these networks play the most important role in the decision-making process. It is well documented that women's network is composed of stronger and more kin-based ties than men's. The use of personal contacts in a job search continues to generate interest as a source of gender disparity in important employment outcomes such as occupational sex segregation, status and earnings. Historically, the building and construction industry has drawn heavily on migrant workers to meet labour needs. It also absorbs those who often migrate seasonally and work at construction sites to augment their farm income. Based on the field survey of construction workers at Delhi, present research paper tries to understand the role of women worker's social network in finding jobs at construction sites and their received pre/post migration assistance.

### **Key words:**

Migration; Construction Workers and Social Network

## Household Changes in India with Special Reference to North-Eastern States of India: Evidence from Four Recent Censuses

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### Abstract

Among other factors changes in the number of households are actively driven by the changes in fertility level. The household scenario in India is the outcome of decades of population policies adopted by the Government and government of India does not directly involve in birth control. Family planning policy in India is voluntarily not by compulsion and this have major contribution in increasing birth rates and hereafter household rates in the country. The paper specifically focus on household changes in the North-eastern states of India which has a distinction of comprising large tribal population. There is dearth of studies which emphasize on the trend of household changes in the region and also which focus on understanding the household composition and living arrangement of the elderly in India and North-eastern states of India. The data source used in the study is from the four rounds of Indian censuses that is from 1981 to 2011. Descriptive Statistics is used to fulfill the objectives of the study.

Results found that household growth rate in India is much higher than the population growth rate, however, the structure and composition of Indian households have been experienced changes over the four censuses. The household size is dwindling over time revealing that there is a continuous change in the structure and composition of the Indian families. North-East India too has experienced a shift from larger households into smaller ones both in rural and urban centers which reflects the changes in the sociological behavior of the population. The elderly is found to reside mostly in larger households which may be because of familial support from their children and relatives. Household head is found to be concentrated in the age group 30-49 years. Changes in household have serious implication on the demographic and socio-economic characteristics of the country and policy makers should pay attention to address these changes and frame policies adapted to these changes and there is also a need to expand the low cost housing provision to meet the increasing smaller households.

### Key words:

Household; North-East India

## The Characteristics of Residential Patterns and Population Movements Among Urban White-collar Workers: A Study on Workers of Private Enterprises in Hangzhou, China

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### Abstract

In this study, we targeted white-collar workers employed in private enterprises in the city of Hangzhou, Zhejiang Province, and examined the characteristics of residential patterns and population movements among urban white-collar workers, with a focus on attributes such as birthplace and gender and whether they lived together with their parents.

For the study methods, we conducted a questionnaire survey and interviews based on it. For the criteria on choosing the target companies and business offices, we first selected five private companies in Hangzhou. We distributed the survey form to the head offices of companies in which the rate of career positions was high. The selection criteria of career workers who were to be survey respondents were as follows: 1) workers who assume management positions, such as middle management, and 2) workers expected to rise to management positions in the future due to their academic background and intra-company evaluation. Human resources personnel in each company were asked to select candidates who satisfied these conditions. The candidates were then asked to respond to the survey. At the point in time of the survey, because we wished to conduct analysis with a focus on women from among the white-collar workers, we requested the names of about 30 women and 20 men from each company. As a result, we obtained responses from 226 workers (137 women, 89 men). In addition, we conducted interviews with five human resources personnel who served as the liaison for this survey in each company.

First, concerning the academic background of the survey respondents, 87.2% graduated from specialized colleges (equivalent to Japan's junior college) or above. This is a high rate considering China's college enrollment rate. The percentage of respondents with membership in the Communist Party was also high at 39.4%. Thus we were able to confirm that many of them were positioned as career-track employees in their companies.

Concerning commuting distance, overall women tended to travel shorter distances compared with men. Especially characteristic of this trend was the high rate of women commuting a distance of 3 km or less compared with men. In terms of commuting time, overall women also tended to have a shorter time compared

with men, with many of them commuting 30 minutes or less. A reason was that for men, a high percentage used their own cars as a method of transportation. This made it possible for many of them to live in areas distant from their workplace.

Also, for women, it was possible for them to choose workplaces near their residential places when finding employment. Moreover, there were those who chose areas close to their workplace when moving. Another survey question asked respondents who had experienced moving their reasons for doing so.

As for the birthplace of the survey respondents, many of both men and women respondents were born in Hangzhou. The results revealed that there were few respondents who had experienced moving outside the city for college or employment. Also notable was the living pattern in which parents lived together with the respondent or close to him or her. Among the results was the finding that compared with women there were relatively few men who were born in regions other than Hangzhou.

In contemporary Chinese cities, men tend to bear a heavy economic burden after marriage, as a result of purchasing a home and automobile, for example. This was also the case in Hangzhou. According to interviews, the reason that compared with women there were few men who were born in other regions was that when single men were employed in Hangzhou, they often returned to their birthplace when they became marriage-minded.

In contrast, because the economic load as described above for women is light when they marry, they remain in the same city. There are many cases of women continuing to live and work in Hangzhou if they marry a Hangzhou man.

Also, while it was assumed that the survey respondents had work positions that allowed them to earn relatively high incomes in their companies, because housing expenses took up a large part of household expenditure, regardless of whether or not the respondent was born in Hangzhou, many of them lived together with their parents (in the case of a respondents born in another region, with his or her parents-in-law) even after marriage. The living pattern that many of them desire was “living close to their parents.” However, in actuality nearly half of the respondents said that they had no choice but to live together with their parents.

In conclusion, we observed that a characteristic of white-collar workers of private enterprises in Hangzhou was the paucity of men who were born outside Hangzhou and the great number of them who lived together with their parents, primarily because of the high cost of housing.

**Key words:**

residential and working places, white-collar workers, gender, birthplace, Hangzhou City

## Transnational Marriage Migration from Russia to Turkey

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### Abstract

In the early 1990s, tens of thousands of Russian women have migrated from Russia to Turkey and many Turkish men have left for Russia for various purposes. With the increase of transnational mobilities and the use of internet, the number of Russian-Turkish marriages has become widespread. Russian-Turkish couples have made a bridge between two countries. They have started to effect these countries by economically, politically, socially and culturally. In addition to this, the relations between Russia and Turkey have effected on these couples.

In this paper I analyze some of the issues that enable the understanding of Russian-Turkish mixed marriage and transnational lives of these couples by presenting some preliminary empirical findings resulting from on-going qualitative research being carried out in İstanbul and Antalya.

### Key words:

Russian-Turkish; Transnational; Marriage Migration; İstanbul; Antalya

## C12.34 Population Geography

### Demographic Divide: Coping with Shrinking



Home

#### Oral

1. [Detached Housing Development in the Osaka Metropolitan Area since the Late 1990s: Focusing on Its Built-up Areas](#)  
Takafumi KUMANO (Graduate student, Kyoto University, Japan)
2. [Determinates of Unmet Need for Family Planning and Its Impact on Fertility Among Muslims in India](#)  
Meheebub Rahaman (Jawaharlal Nehru University, India)
3. [Growing Gap in Population Dynamics, Closing Gap in Population Size and Structure: The European Union and the United States Compared](#)  
Jirina Kocourkova; Ludek Sidlo; Martin Novak; Ludek Sykora (Charles University in Prague, Czech Republic)
4. [Maintaining Food Security in The Midst of Rising Land and Population Pressures in Rural Papua New Guinea](#)  
Gina Koczberski; George Curry (Curtin University, Australia); Veronica Bue (Unitech, Papua New Guinea); Emmanuel Germis; Steven Nake (PNG Oil Palm Research Association, Papua New Guinea)
5. [Shrinking Suburbs and Revitalization in Japanese Cities](#)  
Yoshimichi Yui (Hiroshima University, Japan)
6. [The Demographic Bonus in Romania](#)  
Daniel Tudora; Radu Dimitriu (University Al. I. Cuza, Romania)

#### Poster

1. [Shrinkage as a Challenge for Urban Regeneration. A Look at the East German Experience](#)  
Adam Radzimski (Italy, Gran Sasso Science Institute & Poland, Adam Mickiewicz University)

## Detached Housing Development in the Osaka Metropolitan Area since the Late 1990s: Focusing on Its Built-up Areas

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### Abstract

In an earlier phase of economic growth, the development of detached houses greatly contributed to the suburban expansion in Japan's major metropolitan areas. However, since the collapse of the bubble economy in the early 1990s, land use and population in metropolitan areas have been changing in a complicated manner. While the concerns of recent studies are concentrated on the development of condominiums in central areas and the decline of suburban detached housing areas, the detached housing provision from the late 1990s in Japan's major metropolitan areas has been neglected. Accordingly, this paper examines the geographic distribution and land use change of detached housing developments in the Osaka metropolitan area, an advanced example in terms of a shrinking metropolitan area in Japan, starting from the late 1990s. Next, it considers the influence of changes in socioeconomic conditions on housing development.

The results indicate that redevelopment in built-up areas has played an important role in detached housing provision since the collapse of the bubble economy. However, such small-scale and fragmented renewal in areas of dilapidated housing and population decline does not necessarily lead to an increase in the local population. The life cycle of population and housing in old built-up areas, as well as economic factors such as the collapse of the bubble economy, has influenced housing development. These findings suggest that an understanding of contemporary urban housing provision, based on the dichotomy of condominiums in central areas and detached houses in the suburbs, is insufficient.

### Key words:

Detached housing development; Built-up areas; The life cycle of population and housing; The collapse of the bubble economy; Osaka Metropolitan Area

## **Determinates of Unmet Need for Family Planning and Its Impact on Fertility among Muslims in India**

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### **Abstract**

Unmet need for family planning has a causal relationship with the fertility determination in India. It is evident that due to very high percentage of unmet need for family planning, unwanted fertility is very high among Muslim women. Therefore, present study examines the determinants of unmet need for family planning for Muslim women in India and assesses the demographic impact of unmet need for family planning of Muslims. The multinomial logistic regression results indicate that age, educational level, wealth index, number of living children, media exposure, place of residence and working status were significant predictors of unmet need. Further, potential use of contraception is estimated by Westoff and Bankole's Maximum, Minimum and Realistic need satisfaction models and then with Bongaarts Proximate Determinants Model we have estimated figures of implied fertility rate. Study suggests that TFR of Muslim women can be reduced to replacement level simply by meeting their unmet needs.

### **Key words:**

Unmet need; Muslims; Proximate Determinants; logistic regression; Westoff and Bankole's Model

## **Growing Gap in Population Dynamics, Closing Gap in Population Size and Structure: The European Union and the United States Compared**

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### **Abstract**

Differences in population development in the European Union and the United States are investigated. It is a response to the population projections recently published by the United Nations which forecast a growing difference in the population dynamics of the two regions that will lead to convergence between the two populations in the long-term in terms of population size and age structure. The paper aims to ascertain which components of population change are primarily responsible for the different population dynamics, especially the slowdown in growth and expected shrinking of the EU population and the continued growth in the US. We first explore the role of natural change and migration in total population growth. Then, we investigate fertility and mortality patterns focusing on the demographic behavior of ethnic/racial groups in the US and the regional disparities in Europe. With the aid of a detailed analytical comparison of the EU and the US, the paper discusses the determinants and factors that lie behind the disparities that have recently emerged in population dynamics, fostered above all by fertility differences.

### **Key words:**

population dynamics; European Union; United States; fertility; mortality; migration; regional differentiation

## Maintaining Food Security in The Midst of Rising Land and Population Pressures in Rural Papua New Guinea

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### Abstract

This paper deals with rising shortages of land for gardening among oil palm smallholders in Papua New Guinea (PNG) and how they are responding to the pressures to maintain household food security. In the oil palm growing areas of PNG, food production is a key strategy for maintaining household food and income security, and nearly all smallholder families cultivate food crops for home consumption and cash income. For the majority of women, local marketing of garden foods is their most important income source after oil palm, and gardens provide an important buffer against the vagaries of fluctuating oil palm prices. However, rising population and land pressures pose a threat to smallholder household food security. The average population per land holding has more than doubled from the early 1970s and access to garden land has declined significantly over the past 10 to 15 years as families' plant more of their land to oil palm. The presentation will outline the diverse adaptive strategies and farming innovations smallholders have developed to respond to land shortages and the important role of social and kinship networks to facilitate access to additional land and income.

### Key words:

Papua New Guinea; food security; agriculture; oil palm; land shortages; household adaptation strategies

## Shrinking Suburbs and Revitalization in Japanese Cities

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### Abstract

Suburb is not the dream place for every families and the depopulation has been occurred in several metropolitan regions. As for many traditional urban growth model, suburb is continuous growth and the population inflow occurred as a commuter town of the metropolitan regions. However, this trend has been changing, because population are decreasing in old suburban areas, on the other hand, population in innercity turns to increase. Recently, Japanese old suburban housing estates, which were developed before 1970s, are declining. They are facing several serious problems. Most serious problems are aging of residents and decreasing population, these are caused by long-term dwelling. Because many Japanese think that "Japan dream" is occupancy of detached house in suburb. Japanese suburban resident tends to stay after child rearing. And another severe problem is the increasing vacancy houses. In this study, we try to clarify the conditions of shrinking suburbs in Japanese cities and will introduce some activities for revitalization in suburbs. And we want to contribute the revitalization of suburb from the geographical studies.

As for aging of suburban residents, in old housing estates the first generation of migrants grew older and to continue to live in their own house in suburban areas. Furthermore, their children grew up and moved out. Therefore, aging communities without young generations will be popular in suburbs. These are caused by the failure of town planning, which supplied the same type of houses in short term. Furthermore, increases in vacant houses are seen throughout every old suburban housing estate, it induces new uneasiness and social troubles and drop in housing price. As a countermeasure against the above, some suburban communities try to vitalize and promote community activities.

As a countermeasure for shrinking in suburbs, I will introduce "the housing stock information system of vacancy houses in Hiroshima prefecture".

### Key words:

suburb; shrinking; ageing; vacant houses; revitalization

## The Demographic Bonus in Romania

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### Abstract

The income yielded by the manner in which a particular territory manages to balance its demographic structure may be termed **demographic rent**. From this perspective, the correlations between demographics and economy show that the decrease in the inactive population percentages in junction with the increase in activity rates within the population of working age result in diminished social-economic vulnerability within the respective population. This paper examines the distribution of demographic rent throughout Romania based on a multiple regression model where the dependent variables are the dependency rate of population and the turnover of enterprises, and the independent variable is the income of population. The influence of demographic structure on the distribution of financial welfare in Romania will be established by modeling residues and locking the model on the demographic parameter. Furthermore, by mapping the results, the following questions will likely receive answers: Which are the areas of accumulation of demographic bonuses, and which areas export this advantage? What is the location of discontinuities between repulsive and attractive areas? Which areas require special policies aimed at reducing the gaps generated by the demographic rent?

### Key words:

demographic bonus; Romania

## Shrinkage as a Challenge for Urban Regeneration

### a Look at the East German Experience

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#### Abstract

Urban shrinkage, which has recently emerged as one of the leading topics in the urban literature, has brought into question the widely used instruments of urban planning and urban regeneration. It has been stressed by several authors that a better understanding of policy approaches to shrinkage is needed. Therefore, the aim of this paper is to look at the relationship between shrinkage and the framework of urban policy, and more specifically the urban regeneration. The Urban Restructuring Programme for the new federal states of Germany is used as a case study to illustrate the evolution from a predominantly housing market oriented policy towards a more comprehensive approach. The transformation processes in Eastern Germany were accompanied by substantial population decline and a rise in housing vacancies, which reached 14% as of the year 2000. One year later a decision was taken by the federal government to launch a new instrument within the already existing framework of urban development support programmes. The Urban Restructuring Programme has become the first federal policy to explicitly address the issue of urban shrinkage. The methodological approach is based on a critical review of several qualitative and quantitative data sources. Sources include existing literature on the subject, policy reports, legal acts and financial data. With regard to housing vacancies, both data of the Federal Statistical Office, which are derived from microcensuses and refer to the overall housing stock, as well as annual data of the German federation of institutional landlords are used.

#### Key words:

shrinking cities; urban regeneration; Eastern Germany

## C12.34 Population Geography

### Demographic Divide: Coping with Growth



Home

#### Oral

1. [Education, Occupation and Associated Demographic Character in Bodoland Territorial Areas District, Assam \(India\)](#)  
Bimal Kumar Kar; Sibani Basumatari (Department of Geography, Gauhati University, India)
2. [Fertility Behaviours Among Tribals: An Insight from Some Tribal Dominated Districts of Rajasthan, India](#)  
Hemant Patidar (Dr. Harisingh Gour University, Sagar, India)
3. [Spatial Changes in Sex Ratio in India: A Geographical Analysis](#)  
Kishor Nehete (ADPM's Womens College of Arts Commerce and Home Science, Jalgaon, Maharashtra, India)
4. [The Motives of Migration to Germany: Cases of Refugees from Post-Soviet Countries](#)  
Alena Zelenskaia (The European University in St. Petersburg, Russian Fed)

#### Poster

1. [Spatial Distribution of the Elderly Population in Nanjing based on the Street Scale](#)  
Xin Xu; Yuan Zhao; Aimei Guo (China, Nanjing Normal University)

## **Education, Occupation and Associated Demographic Character in Bodoland Territorial Areas District, Assam (India)**

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### **Abstract**

The educational attainment and occupation of the people of an area greatly determine its demographic character and socio-economic well-being. This is also true in the case of Bodoland Territorial Areas District (BTAD) of Assam in India, which is inhabited largely by the scheduled tribes mostly belonging to the Bodo community and many non-tribal population groups belonging to varied ethno-religious identities. The demographic character as reflected in its high birth rate, high infant mortality rate, low life expectancy, high child dependency, early female age at marriage and so on has not been encouraging in BTAD. In the case of educational attainment and economic condition also, the picture is far from satisfactory in most parts of the region characterized by dominant agro-based economy. Moreover, prevalence of marked inter-community variation in educational attainment, occupational structure and demographic character in the region has made the picture quite complex. With this background, an attempt is made in this paper to understand the pattern of educational attainment and occupational structure and its influence on the demographic character in BTAD region in both social and spatial contexts. The necessary secondary data for the study have been primarily obtained from various Census of India publications covering the period 1971-2011. The primary data have been collected at household level from twenty-three villages and two towns through purposive sampling technique. The data so collected have been processed, analyzed and presented with the help of meaningful statistical and cartographic techniques.

### **Key words:**

educational attainment; occupational structure; demographic attributes; socio-economic well-being; BTAD

## **Fertility Behaviours Among Tribals: An Insight from Some Tribal Dominated Districts of Rajasthan, India**

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### **Abstract**

This study aims to examine the fertility behaviour among tribals across various socio-economic and demographic backgrounds utilizing the primary data collected from the 800 ever married tribal women of ten districts of South-East Rajasthan. Bivariate as well as multivariate regression analyses have been applied. The analysis reveals that fertility among tribal women varies across the socio-economic and demographic backgrounds. The multiple linear regression results demonstrate that socio-economic and demographic backgrounds such as residence type, education, occupation of husbands, wealth status of the family, tribe or caste, child survival ratio and modern contraception methods (other than sterilization) are the significant predictors of the number of children women have during their reproductive period.

### **Key words:**

socio-economic and demographic correlates; tribals; fertility; children ever born

## Spatial Changes in Sex Ratio in India: A Geographical Analysis

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### Abstract

In the study of population characteristic, age-sex structure is one of the most important characteristics of population composition. Age-sex analysis is based on age and sex structure of population. The data of age sex is more noticeable of rural-urban population, marital status, literacy, occupation structure, fertility and mortality. Apart from purely demographic concerns, age-sex data structure requires for educational, health services, planning, technical, political and commercial purposes. Sex composition directly affects on proportion of marital status, supply of labour, fertility, and migration and indirectly affects the literacy, birth rate and death rate. Imbalance in sex ratio is harmful to social structure. If proportion of males in total population is higher than the females, age of marriage for females decrease and it affects the female's health. In India, numbers of females are less than males because of male dominating culture, status of women in society; social security, educational facilities and less participation in decision making are the barrier. Therefore, study of sex composition becomes very significant for socio-economic planning. For this study data regarding sex have collected at district level for total and tribal population for the year 2001 and 2011. The data for study have been collected from District Census Handbook Jalgaon district for the year 2001 and 2011.

It has been found that the decline in sex ratio started from 1991 and currently it is in the worst situation from 945 girls for every 1000 boys in 1991, it went down to 927 in 2001 and 918 in 2011. The government has also identified 100 gender critical district in the country where the sex ratio is abysmally low.

### Key words:

Age-sex; Scheduled Tribe; fertility; migration.

## The Motives of Migration to Germany: Cases of Refugees from Post-Soviet Countries

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### Abstract

Since the end of the WWII Germany has experienced several so called „waves“ of migration. Different types of refugees were always presented in the „flows“ of resettlers. Part of them originate from the ex-Soviet republics. Although nowadays most of the Post-Soviet countries are peaceful, there are still a lot of people, who seek asylum in Germany alongside with refugees from Syria, Irak or Afghanistan. Why did they flee? Why did they choose Germany as a desired destination? Was Germany their first choice? What life projects in Germany do they have? These and other questions were in focus of the research, conducted from April 2014 till August 2015 in asylums of Berlin and Bavaria. The research was based on the participant observation and biographical interviews with refugees from Latvia, Russia, Turkmenistan and the Ukraine. Comparative and case-study analysis revealed, that refugees' reasons for moving to Germany often involve both push and pull factors. The decision is not obligatory due to hard life circumstances or need to flee wars, unrest, human rights abuse or poverty. The reasons for migration vary by the countries of origin, but also have common features. The main finding of the research is that the narration about the motives of migration has two modes: official and informal. Some stories, told by the same people in a different time, drastically differ from each other. The research contributes to a better understanding of migrants' experience, because it provides insights into their individual stories and examine challenges they undergo in Germany.

### Key words:

refugees; forced migration; motives; Post-Soviet countries; Germany

## Spatial Distribution of the Elderly Population in Nanjing based on the Street Scale

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### Abstract

Based on the fifth and sixth census towns, street data of Nanjing city, through the street and circle two scale, analyzing the space distribution pattern of elderly people. Secondly, the temporal and spatial characteristics of the elderly population in the streets were analyzed by the hotspot area evolution. The results show: 1) Nearly 10 years Nanjing street aging coefficient showed a "distribution spanning" circle spread space. The streets in the old population growth phase changes from the distribution in the central city and the main city of the junction zone to the main urban area; The streets of mild aging are distributed in the central city; In the middle of the aging stage, the streets are concentrated in the main urban areas and suburbs; and the streets of the old stage are mainly in the suburbs. 2) The density of the elderly population in the street is dense, and the highest density is located in the central city, the suburbs are second, and the density is the lowest in the main city. 3) Nanjing city street population aging rate is a significant positive correlation, with the passage of time, the difference of the street population aging in the space is increasing, the effect of agglomeration is weakened, the development of space is becoming more and more unbalanced. The hot zone distribution showed "coldest-cold-hot-hottest" circle spatial distribution pattern. 4) The main factors that affect the distribution and evolution of the aged population in Nanjing are analyzed from three aspects: the historical factor, the life cycle and the change of the city.

### Key words:

the elderly population; spatial evolution; influence factors; Nanjing City

## C12.34 Population Geography

### Processes of Population Change and Migration



#### Oral

1. [Analysis of Interprovincial Migration and Its Streams in China from 2000 to 2010 with Multilevel Modelling Focusing on Urban-Rural Divide and Origin-Destination Impacts](#)  
Xingna Nina Zhang (University of Bristol, United Kingdom)
2. [Bayesian Multiregional Population Forecasting: England](#)  
Arkadiusz Wisniowski (University of Manchester, United Kingdom); James Raymer (Australian National University, Australia)
3. [Bidirectional Migration Pattern in China—Interaction Value Analysis](#)  
Xiao Dou; Josep Roca Cladera; Blanca Arellano Ramos (Polytechnic University of Catalonia, Spain)
4. [Changing Trends of Population in Nashik District, Maharashtra, India](#)  
Mansaram Pagar (Savitribai Phule Pune University, Pune 7, India)
5. [Chinese Immigrants in Canada: Their Changing Composition and Economic Performance](#)  
Shuguang Wang (Ryerson University, Canada)
6. [Contesting Urban Citizenship or Rural Farmland? A Synthetic Analysis of Factors Affecting the Intention of Settlement of Rural Migrants in Urban China](#)  
Zuyu HUANG (University of Melbourne, Australia); Zehan PAN (University of Lethbridge, Canada); Guixin WANG (Fudan University, China)
7. [Demographic Behavior and Migration Processes in The Republic of Bulgaria in the Past 25 Years](#)  
Petar Slaveykov; Kliment Naydenov (Sofia University "St. Kliment Ohridski", Bulgaria)
8. [Determinants of Urban to Rural Return Migration in China: The Roles of Individual, Household and Regional Factors](#)  
Jianfa Shen (The Chinese University of Hong Kong, HongKong SAR, China); Qiang Ren (Peking University, China); Yu Zhu (Fujian Normal University, China); Wenfei Winnie Wang (University of Bristol, United Kingdom); Xiaoman Liu (The Chinese University of Hong Kong, HongKong SAR, China)
9. [Disparities of Sex Ratio in Maharashtra State of India](#)  
Pramod Waghmare (Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra, 431606., India)
10. [Error Analysis of Modelling Regional Migration in China](#)



Jianfa Shen; Yefang Huang (The Chinese University of Hong Kong, HongKong SAR, China)

11. [Finding Regions Where Non-Japanese Live Dispersed in Japan](#)  
Kohei OKAMOTO (Nagoya University, Japan); Masatoshi MORITA (Gifu Shotoku Gakuen University, Japan); Sayaka SHIMIZU (Nagoya University, Japan)
12. [General Aspects of Immigration in Brazil in the 21st Century](#)  
Roberto Rodolfo Georg Uebel (Federal University of Rio Grande do Sul, Brazil)
13. [Geographical Analysis of Population Settlement in the Southwest of the Caspian Sea](#)  
Nasrollah Molaei Hashjin (Full Professor at Geography Department, Rasht Branch, Islamic Azad University, Rasht, Iran, Iran)
14. [Geographical Factors Affecting Small Population Settlement \(Case from Mongolia\)](#)  
Batbuyan Batjav; Khishigdorj Davaakhuu (Institute of Geography and Geoecology, Mongolia)
15. [Have Many Children Have Been Lost? A Simulation of Post-Communist Social and Demographic Transformation on Population Ageing in Slovakia and the Czech Republic.](#)  
Branislav Bleha (Comenius University in Bratislava, Faculty of Natural Sciences, Slovakia)
16. [Household Population Dynamics and Livelihood Changes in a Rice Farming Village in Central Laos](#)  
NISHIMOTO Futoshi (Nagasaki University, Japan); PRELIC Team (Population dynamics, reproduction and livelihood changes in small scale communities of Laos) (PRELIC, Japan)
17. [How had Population Changes Affected Paddy Holdings? A Result of Dynamics for Three Generations in a Rice Farming Village of Central Laos](#)  
Satoshi Yokoyama (Professor/Nagoya University, Japan)
18. [Identities of Refugees from Post-Soviet Countries in Germany](#)  
Alena Zelenskaia (The European University in St. Petersburg, Russian Fed)
19. [Impacts of Rural-Urban Migration on Alleviating Rural Poverty in Different Landforms in Inland China](#)  
Zehan Pan; Wei Xu (University of Lethbridge, Canada); Zuyu Huang (University of Melbourne, Australia); Guixin Wang (Fudan University, China)
20. [Impact of Urban-Rural Return Migration on Rural Development in China](#)  
Wenfei Winnie Wang; Helen Du (University of Bristol, United Kingdom)
21. [Internal Displacement in Ukraine: Social Consequences, Territorial Disparities and Policy Implications](#)  
Ganna Gerasymenko (Institute for Demography and Social Studies, NASU, Ukraine)

22. [International Migration in Poland. A Migration Policy Perspective](#)  
ALINA POTRYKOWSKA (The Government Population Council of Poland, Poland)
23. [Investigation of Demographic Trends in Rural Areas Gilan Province](#)  
Vahid Riahi; farhad javan (Kharazmi University, Iran)
24. [Level and Trend of Internal Migration and Demographic Change in India](#)  
Sachin Lokhande (international institute for Population Sciences, Mumbai, India); Sayali Chavan (Population Sciences, Mumbai, India)
25. [Migration and Market Potential in China](#)  
Hua Zhang; Huimin Luo (School of Geography, Beijing Normal University, China); Hongsheng Li (State Key Laboratory of Resources and Environmental Information System, Institute of Geographic Sciences and Natural Resources Research, China)
26. [Modeling Skilled and Less-Skilled Interregional Migration in China, 2000-2005](#)  
Ye Liu (Department of Geography & Sustainable Development, University of St Andrews, United Kingdom); Jianfa Shen (Department of Geography & Resource Management, The Chinese University of Hong Kong, HongKong SAR, China)
27. [Occupational Changes of Migrants in China: Analyses of Three Censuses from 1990 to 2010](#)  
Cindy Fan (UCLA, United States); Zhongdong Ma (Hong Kong University of Science and Technology, HongKong SAR, China)
28. [Population Geography in China since the 1980s: Forging the links between population studies and human geography](#)  
Yu Zhu (School of Geography, Fujian Normal University / Asian Demographic Research Institute, Shanghai University, China); Jinhong Ding (Population Research Institute, East China Normal University, China); Guixin Wang (Institute of Population Research, Fudan University, China); Liyue Lin; Wenqian Ke (School of Geography, Fujian Normal University, China)
29. [Population Growth in the Adjacent Area of Bucharest \(Romania\) - Positive Effects?](#)  
Ilinca Valentina Stoica (University of Bucharest, Faculty of Geography, Interdisciplinary centre for advanced researches on territorial dynamics (CICADIT); Bucharest, Romania, Romania); Daniela Zamfir; Cristian Talanga (University of Bucharest, Faculty of Geography, Interdisciplinary centre for advanced researches on territorial dynamics (CICADIT); Bucharest, Romania)
30. [Recent Immigration to Czechia: A Case of Chinese](#)  
Tadeusz Siwek (University of Ostrava, Czech Republic)

31. [Region, Income and Urbanization of 200 Million People](#)  
Guixin Wang (Fudan University, China); Zehan Pan (University of Lethbridge)
32. [Regional Distribution of High Skilled Foreigners in Japan: Recent Trends and Underlying Factors](#)  
Erbiao DAI (Asian Growth Research Institute (AGI); Kitakyushu, Japan, dai@agi.or.jp, Japan)
33. [Return Migration and in Situ Urbanization of Migrant Sending Areas: Insights from a Survey of Seven Provinces in China](#)  
Yu Zhu (School of Geography, Fujian Normal University / Asian Demographic Research Institute, Shanghai University, China); Wenfei Winnie Wang (School of Geographical Sciences, University of Bristol, China); Liyue Lin (School of Geography, Fujian Normal University, China); Jianfa SHEN (Department of Geography and Resource Management, The Chinese University of Hong Kong, China); Qiang REN (Center for Social Research/Institute of Social Science Survey, Peking University, China)
34. [Return Migration and Rural Urbanization in Western China](#)  
Yong Chen (Institute of Population Research, Faculty of Social Development and Western China Development Studies, Sichuan University, China)
35. [Rural-Urban Commuting in Romania after the Fall of Communism \(1990-2015\)](#)  
Sabin Alexandru Nicula (Babes Bolyai University, Centre for Research on Settlements and Urbanism, Romania); Ioan Abrudan (Mihai Eminescu Secondary School, Zalau, Romania); Vasile Surd; Bogdan-Nicolae Pacurar (Babes-Bolyai University, Centre for Research on Settlements and Urbanism, Romania)
36. [Scenarios for the Near Future: The Demography of Africa at the Horizon 2025](#)  
Sofiane Bouhdiba (University of Tunis, Tunisia)
37. [Settlers, Floaters and Returnees: Settlement Intention and Topology of China's Rural Migrants](#)  
Shuangshuang TANG (Nanjing University, China); Pu HAO (Hong Kong Baptist University, China)
38. [Spatial Difference and Its Determinants of Migrants' Hukou Transfer Intention in China's Cities](#)  
Liyue LIN; Yu ZHU (Fujian Normal University, China)
39. [Spatial-temporal Dynamics of Population Distribution and the Influencing factors at county level in Guangdong Province](#)  
Jiaming He (School of Geography and Planning, Sun Yat sen University, China); Jiajia Cheng (1. Key Laboratory of Regional Sustainable Development Modeling, Institute of Geographic Sciences and Natural Resources Research, CAS, Beijing 100101, China; 2. University of Chinese Academy of Sciences, Beijing 100049, China); Suhong Zhou (School of Geography and Planning, Sun Yat-sen

University, China)

40. [Spatial-temporal Network of Child Trafficking Crime in China](#)

Li Gang (Northwest University, China)

41. [Spatiotemporal Analysis of the Population Drain in the Northeast China on Regional Economic Development](#)

Linfeng Wang (1, University of Chinese Academy of Sciences, 2, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China); Pingyu Zhang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China); Jie Huang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

42. [Study on the Population Distribution Prediction of Xi'an City Based on the Census](#)

MI Rui hua (Yanan University, China); SHI Ying (Shaanxi Social Sciences Academy, China)

43. [The Boom: Population and Urban Growth of Dubai City](#)

Fayez Elessawy (United Arab Emirates University, UAE)

44. [The Changing Population Distribution of Shanghai Metropolis: A Recent Study Based on Fine Spatial Units](#)

Chunlan Wang (Population Research Institute, East China Normal University, China); Shangguang Yang (Economic development institute, East China University of Science and Technology, China); Jun He (Population Research Institute, East China Normal University, China)

45. [The Impact of Local Factors on the Urban Integration for the Migrant Population](#)

Ming Tian (Beijing Normal University, China)

46. [The Relationship between International Migration to Thailand and Fertility Decline in Rural Laos](#)

Shinichi TAKAHASHI (Niigata Sangyo University, Japan)

47. [Transit Migrants in Northern Africa: Translocality as social practice](#)

Rainer Wehrhahn; Zine Eddine Hathat (University of Kiel, Dept. Geography, Germany)

48. [Transnational Behaviour of Ukrainian Remitting Migrants](#)

Eva Janska (Faculty of Science, Charles university in Prague, Czech Republic)

49. [Transnational Labor Migration from Lao PDR to Bangkok, Thailand: Perspectives from Sending and Receiving Areas](#)

Takahito NIWA (Teikyo University, Japan); Satoshi NAKAGAWA (Saitama University, Japan); PRELIC Team (Population dynamics, reproduction and livelihood changes in small scale communities of Laos, Japan)

## Poster

1. [A Study on Migrant Workers' Willingness to Cities of People Living in Minority Gathering Area](#)  
Tao Wang (China, Peking University); Qiqi Liu (China, East China Normal University)
2. [An Analysis on the Change of Employed Labor Force Spatial Structure in Guangzhou City](#)  
Lichun Zhong (China, South China Normal University)
3. [Migration Pattern of Floating Population in New Urbanization: A Case Study of Zhongda Cloth Market, Guangzhou](#)  
Xinjian Li; Miaoxi Zhao; Haitao Liu (China, South China University of technology)
4. [Overview on Domestic and Foreign Research of Low-Fertility Trap](#)  
CaiHong HUANG; XiaoQing ZHANG; ShuangShuang CHEN (China, Shandong Normal University)
5. [Seasonal Population in the Rural Areas of Central Russia: Opportunities for Research](#)  
Alexandra Fomkina (Russian Fed, Lomonosov Moscow State University)
6. [Space Pattern Evolution of Population Distribution and The Driving Factors in Northeast China](#)  
Tingting Yu (China, Northeast Normal University)
7. [Spatial Distribution of Migration and Economic Development: A Case Study of Sichuan Province, China](#)  
Chengfeng YANG (China, School of Geography, Beijing Normal University); Huiran HAN (China, College of Territorial Resources and Tourism, Anhui Normal University); Jinping SONG (China, School of Geography, Beijing Normal University)
8. [Spatial Pattern of Population Variations and Its Influencing Factors in Northeast China from 1990 to 2010](#)  
Zhimin Liu; Chunliang Xiu; Ye Wei (China, Northeast Normal University)
9. [Spatial Patterns of population migration in Thailand: Analyzing Population Census 2010](#)  
Takahito NIWA (Japan, Teikyo University)
10. [The Population Spatial Evolution in Hangzhou Main City under the Influence of Land Development](#)  
Chen Xin (China, College of Civil Engineering and Architecture, Zhejiang University); Li Wangming (China, College of Civil Engineering and Architecture, Zhejiang University)

## **Analysis of Interprovincial Migration and Its Streams in China from 2000 to 2010 with Multilevel Modelling Focusing on Urban-Rural Divide and Origin-Destination Impacts**

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### **Abstract**

Interprovincial migration in China has taken place with a massive magnitude for decades. This paper investigates how indicators of migration have changed between 2000 and 2010, as well as the differences and similarities among 2010's four different categories of interprovincial migration streams (urban-rural, urban-urban, rural-urban and rural-rural streams), using data from successive censuses and multilevel modelling based on the extended and enhanced gravity model, with particular attention given to the roles of rural/urban segment rather than total population and rural/urban income, as well as origin/destination impacts and the interaction between rural-urban divide and origin/destination impacts. After establishing the cross-classification multilevel model to measure and further explore beyond gravity models upon interprovincial migration and their associations in China from 2000 to 2010, this paper examines the importance of origin/destination impacts and temporal as well as spatial variations in association with interprovincial migration and socio-economic factors in the model. The preliminary results show that multilevel modelling is indeed effective to describe and explain interprovincial migration and its four streams in China, as China's internal migration is so highly directional and social network-induced that rural/urban segment populations are remarkably responsible to China's internal migration in gravity models. These findings are closely related to the unbalanced regional development in China, where the urban/rural divide has remained to be pronounced for the past few decades and rural areas are usually rated as the sending origin while their urban counterparts receiving destinations, with the evidence of China's predominant rural-urban flow.

### **Keywords:**

interprovincial migration; rural-urban divide; multilevel modelling; origin/destination impacts; China

## Bayesian Multiregional Population Forecasting: England

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### Abstract

In this paper, we extend the well-known multiregional population projection model developed by Andrei Rogers and colleagues to be fully probabilistic. Multiregional models provide a general and flexible platform for modelling and analysing population change over time. They allow the combination of all the main components of population change by age with various transitions that population groups may experience throughout their life course. What distinguishes these models from ordinary projections is that they include transition matrices of interregional migration by age. This information is an important component of subnational population change yet models for forecasting the patterns for use in population projections are largely non-existent. National statistical offices tend to rely on simple deterministic assumptions regarding net migration or gross flows of in-migration and out-migration. These models do not take into account the linkages between origins and destinations and often have to be adjusted to ensure zero net migration and the same totals for in-migration and out-migration. We focus on the full matrix of flows to avoid this problem. To deal with the large number of possible flows and provide measures of uncertainty, we develop a Bayesian hierarchical model to forecast age-specific interregional migration, and then include this information with probabilistic forecasts of regional births, deaths, immigration and emigration. The results demonstrate the differences that arise from different specifications and the promise of the general approach.

### Key words:

multiregional demography; population projections; Bayesian modelling; England

## Bidirectional Migration Pattern in China- Interaction Value Analysis

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### Abstract

Interaction value is proved to be one of the most famous methods for determining the spatial extension of employment areas (Travel to Work Areas) and urban systems, which highlights the significance of interaction relationship among the whole system. Introducing this concept, this article tries to explain the population migration pattern and some new characteristics since 1995 based on data of population flows among provinces from Census 2000 and 2010 of China as well as 1% population survey in 2005. Results show that the transition trend from “gradient eastern-ward one-way migration” to “stronger eastern-ward and weaker western-ward bidirectional migration” has been gradually enhanced (even though there is strong concentration of population migration in the eastern area, declining mobility and return migration occurred in some regions); multi-polarization tendency is apparent, Xinjiang and Liaoning add to the line; nearby transfer in the central and western regions accelerated gradually.

### Key words:

Interprovincial migration; interaction value; migration pattern; China

## Changing Trends of Population in Nashik District, Maharashtra. India

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### Abstract

The present paper aims to changing trends of population in Nashik district. The spatial variation of changing trends of population from 1901 to 2011. Nashik, lying between 19° 33' and 20° 53' north latitude and 73° 16' and 75° 16', with an area of 15530 Sq. K.M. North South lengths is 120 kms. East West length is 200 kms. Nashik has a population of 6,109,052 of which 3,164,261 are males and 2,944,791 and females. Average literacy rate of Nashik district in 2011 was 82.91 compared to 80.96 in 2001. In 1901 the density was 52 and in 2011 the density was 393 per sq. km. The progressive growth rate from 1901 to 2012 was 11.25 to 642.22 per cent, respectively. The population trend is calculated with the help of time series. In 1901 population was 45.44% more and less in 1941 i.e. -13.86. From 1921 to 1981 the population was below the population trend but after 1991 population it gradually increased. The average rainfall it receives is 1034 mm

In the present times, because of advances in good climate, industrialization, development of road, University level educational facilities, religious importance, cargo services, good quality of grapes, pomegranates and onions, more and more people are being attracted towards Nashik districts. Another cause for increase in the population is the main attraction of Ramkund, Muktidham Temple, Kalaram Temple, Coin Museum and Trimbakeshwar.

### Key words:

Density; Growth; Population; Population Trend

## Chinese Immigrants in Canada: Their Changing Composition and Economic Performance

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### Abstract

China continues to be a major country of origin for global migration, and Canada is one of the preferred destinations for many Chinese emigrants. In the recent two decades, more than half a million of mainland Chinese immigrated to Canada, where economic returns to their human capitals are expected to be higher than in their home country. Despite their improved human capitals, many Chinese immigrants have experienced different economic outcomes in the Canadian labour market with lower-than-expected earnings. This paper has two purposes. First, it analyzes the changing compositions of the Chinese immigrants who were admitted to Canada in the last two decades, with a focus on their human capitals brought to Canada from China, including levels of education, Canadian official language ability, and immigration class associated with pre-migration work experiences. Second, the paper examines the economic performance of the Chinese immigrants in Canada. Comparisons are made with both the native-born Canadians and the immigrants from India – another major source country of immigrants in Canada, to gauge the levels of integration of the Chinese immigrants in the Canadian economy. This study found that employment income of the Chinese immigrants is indeed lower than both the native-born Canadians and the Indian immigrants. Despite that many Chinese immigrants exhibited high consumption powers, particularly in consumption of real estate in major Canadian cities, their wealth seems to be brought to Canada, not earned here, and their powers of consumption may not be sustainable over the long run.

### Key words:

Chinese immigrants; Canada; China; settlement; labor market performance

## Contesting Urban Citizenship or Rural Farmland? A Synthetic Analysis of Factors Affecting the Intention of Settlement of Rural Migrants in Urban China

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### Abstract

The rapid development of urban industries, in combination with gradual relaxation of administrative constraints on rural-urban migration, makes possible numerous rural residents move to and work in cities in post-reform China. Nevertheless, few rural migrants, if not none, prefer to reside overlong in cities, this is especially evident when more and more policy-related benefits are attached to their rural farmland. Existing research on the intention of settlement of rural migrants in urban China explain its determinants and causes mainly based on either urban factors or rural factors. A synthetic analysis regarding this issue in the English-written literature is absent. This paper will provide a comprehensive analysis of factors affecting the intention of rural migrants' settlement in urban China through constructing an all-around urban-rural-migrant analytic framework within which not only objective factors but also subjective ones will be introduced. Our results indicate that whether rural migrants seek for a permanent stay in cities depends on the interaction of their urban performances, rural landholdings and demographic characteristics. The effects of urban performances and rural landholdings on rural migrants' settlement intentions are similar to the push and pull power widely analysed in the migration studies while the effects of migrants' demographic characteristics are non-monotone and conditioned.

### Key words:

Intention of Settlement; Rural-urban Migration; Urban Citizenship; Rural Farmland; China

## Demographic Behavior and Migration Processes in The Republic of Bulgaria in the Past 25 Years

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### Abstract

Due to the specifics of the historical and socio-economic development of our country, international migration has always been related mainly to emigration of the population. After lasted more than 40 years a ban on the free movement of people across the border in 1989 had caused a huge wave of emigration that in the coming years quickly reduce its scope. This wave in the beginning there were mainly political in nature and was ethnically motivated. Soon after, emigration from the country began to be determined by the conditions and factors that attribute a greater economic nature. Decision migration has become a particular response of the social and economic situation in the country. Bulgaria continues to be a departure of young and educated people, in which the state has invested and which are more easily adaptable to the requirements of the market economy. The emigration of young and highly educated people has serious economic and social consequences for the future development of the country. Emigration has a strong negative impact on the reproduction of the population, as by the export of women in fertile age decreased level of potential future fertility, not only for the next 10-15 years, but for a much longer period of time - 40-50 years. The reasons for emigration in recent years associated with the provision of employment, higher incomes and a higher standard of living for emigrants.

### Key words:

Economic situation; emigration; socio-economic development; young and educated people



## **Determinants of Urban to Rural Return Migration in China: The Roles of Individual, Household and Regional Factors**

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### **Abstract**

There has been large scale rural to urban migration in China since the early 1980s. Most rural migrants become temporary population in destination cities without local hukou (household registration). Such temporary population from rural areas reached over 200 million according to 2010 population census. These rural migrants have stayed in the urban areas for different periods of time. There has also been a count-stream of urban to rural migration which is called urban to rural return migration. Rural migrants return to their home villages or counties for various reasons at various life stages. This paper examines the determinants of return migration from urban to rural areas in China based on the sampling data collected in 2015. The paper will analyze the characteristics of return migrants and the roles of individual, household and regional factors in the decision of return migration. The findings will contribute to the understanding of the migration and return migration process and help the formulation of rural policies, migration policies and urbanization policies.

### **Key Words:**

return migration; individual factors; household factors; regional factors; China

## Disparities of Sex Ratio in Maharashtra State of India

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### Abstract

Sex ratio plays the pivotal role in assessing the reproductive performances, mortality, occupational structure and the migratory character of the population. There are many ups and downs in sex ratio over a period of time in 1901 to 2011. Some of the reasons commonly put forward to explain the consistently low levels of sex ratio are neglect of the girl child resulting in higher mortality at younger age, high maternal mortality, sex selective abortions, female infanticide. There were 984 females for every thousand males in the World in 2011. Europe had the highest sex ratio followed by North America and Africa. Asia, on the other hand, had the largest deficiency of females. India, there were 933 females for every thousand males in India, which increased to 940 in 2011. The country's sex ratio has declined from 934 in 1981 to 927 in 1991. In west Maharashtra has high sex ratio in comparison to other part of Maharashtra. The tribal belt of Maharashtra is characterized by high sex ratio. Highly urbanized districts of Maharashtra is Mumbai, Mumbai suburban and Thane (832, 860 and 886 females per thousand male) distributed sporadically also had a low sex ratio. In India urban sex ratio of 1901 census was 910 and 2011 are 926 females, whereas urban Maharashtra sex ratio was 862 in 1901 and which was increase slightly up to 899 females per 1000 males in 2011. We found lot of variation in rural and urban sex ratio in Maharashtra state.

### Key words:

Sex Ratio; Gender Imbalance; Trends in Sex Ratio; Mortality

## Error Analysis of Modelling Regional Migration in China

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### Abstract

There has been much methodological advancement in the regional migration modelling. Previous studies have focused on the modeling of the whole migration process and are not able to identify the bottleneck of achieving good model performance. Traditional migration modelling reports the overall performance of the migration model. The method developed in this paper can be used to determine whether modelling errors are due to poor performance of origin, destination variables or due to the poor modelling of spatial interaction. There are three steps for error analysis. The first step is the estimation of a migration model for a specific regional migration system. The second step decomposes each set of migration flows into the relative emissiveness, attractiveness and the level of interaction between pairs of regions. In the third step, the relative emissiveness, attractiveness and the level of interaction based on real and estimated migration flows can be compared to calculate the modelling error. This paper uses interregional migration of China in the period 2005-2010 as a case study. Error analysis shows that the modelling errors of the constant K, the relative emissiveness and attractiveness caused mean relative errors of -1.20%, 3.12% and 2.21% in migration flows. The spatial interaction caused the greatest mean relative error of 12.11% in migration flows. Thus the spatial interaction effect remains the most difficult to be modelled in migration modelling. The findings of this research contributes to a better understanding of migration process and points to directions to improve migration modeling.

### Key words:

migration modelling; error analysis; regional attribute; spatial interaction; China

## Finding Regions Where Non-Japanese Live Dispersed in Japan

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### Abstract

The Great East Japan Earthquake made a realization of non-Japanese living dispersed in various areas across Japan. The non-Japanese trainees working in the small-size factories in the underpopulated areas and the immigrant wives married to Japanese men in the farming areas were there to compensate for the decreasing Japanese working-age population and the decreasing number of Japanese women who will marry farmers. These women, mostly Chinese and Filipino, live in local communities, isolated from the other non-Japanese residents. Their distribution pattern is very different from that in foreigner-concentrated areas in metropolises like Tokyo and Osaka. This study analyses the pattern by using the Grid Square Statistics of 2010 Population Census and GIS. The Grid Square Statistics is one of the small area statistics which divides the whole area of Japan into small mesh. This study uses statistics of 1km x 1km grids. So far, we have seen that the degree of the isolation of the non-Japanese woman is remarkable in northeastern Japan. For example, among the 6,729 inhabited grids of Iwate Prefecture, one of disaster-affected Prefectures, 1,357 of which had non-Japanese residents, 704 had only one non-Japanese, and 617 of those 704 non-Japanese were women. In other words, of the one-square-kilometre grids with any non-Japanese, roughly half of them had only one non-Japanese resident and that person was female. On the other hand, this ratio was relatively low in the Prefectures of southwestern Japan. This regional difference would be based on how many foreign brides the rural areas adopt

### Key words:

Grid Square Statistics; GIS; foreign brides; Japan

## General Aspects of Immigration in Brazil in the 21<sup>st</sup> Century

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### Abstract

This paper analyzes through the thematic cartography, spatial data analysis and confrontation with the recent and classic literature, the immigration flows in Brazil and their dynamics and networks in the first two decades of the twenty-first century. According to the findings and reports obtained in the field researches in four regions of the country, we can infer that Brazil is definitely inserted on the routes and on the global agenda of international migrations. Therefore, with this research we also intend to identify and discuss the main migratory flows (of economic immigrants and refugees) from each continent towards Brazil nowadays.

### Key words:

international migrations; brazil; migratory dynamics; demographic profile; thematic cartography; 21<sup>st</sup> century

## Geographical Analysis of Population Settlement in the Southwest of the Caspian Sea

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### Abstract

With regard to the situation and geographical variations in the Southwest of the Caspian Sea, the formation and spread of urban, rural, and nomadic settlements is divergent in such a way that this area has been classified into two main parts of plain and mountainous and four parts of littoral, plain, piedmont, and mountainous. Guilan Province is located in the Southwest of the Caspian Sea. This province covers 14044 square kilometers and comprises three regions, two thousands and ninety-two villages. Findings of the research reveals that while 35.8 % of the Guilan area, 5027 square kilometers, 64.2 %, 9017 square kilometers, are located in the littoral-plain and piedmont- mountainous areas, respectively, the distribution of population indicates around 56 percent of rural settlements and 80 percent of rural population, around 83 percent of cities with 93 percent of urban population and the winter dwellers in littoral-plain, 44 percent of rural settlements with 20 percent of population, 17 percent of towns , with 7 percent of urban population and the areas of Spring and Fall dwelling and county side migrants in piedmont–mountainous regions.

### Key words:

Geographical analysis; population settlement; plain; mountainous; Southwest of the Caspian Sea; Guilan

## Geographical Factors Affecting Small Population Settlement (Case from Mongolia)

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### Abstract

This paper examines the potentials for creating a multi-center system of population settlement in Mongolia considering the present mixture of the traditional pastoralism and the sedentarized lifestyle such as a village type (soum center). In line with the three magnets law, the pull-and-push process of urbanization is rapidly increasing in Mongolia. As a result, the role and functions of some settlement have changed. A population growth in the larger cities has an effect of a territorial expansion of the settlements. One of the reasons for the migration of pastoral herders towards the urban centers is their interest in intensive farming business. Therefore, there is an urgent need to identify an appropriate planning of population settlement surrounding larger towns. We conducted this study in an area where rapid infrastructure development has been observed attracting intense migration to the cities. The study found that there are distinguishable agricultural zones created surrounding the big settlements such as provincial capitals in the form of the settlement network. The population of small settlements has decreased due to the influence of bigger settlements with the developed market and infrastructure. The roles of these little settlements become to host agricultural production as well as to provide new opportunities to migrant herders. Nevertheless, many of them still lack access to the social services and infrastructure. To address these issues, for many people centrality purpose deliver to social services, its preserve the central location in out-settled areas, value chain to create areas of the cities (soum centers) the particular role of the conditions of two bordering provinces first must to logically develop those areas (soum centers).

### Key words:

Migration; rural settlement; social services

## Have Many Children Have Been Lost? A Simulation of Post-Communist Social and Demographic Transformation on Population Ageing in Slovakia and the Czech Republic.

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### Abstract

The political changes in Europe around 1990 started a transformation, social changes and also rapid and fast demographic changes. These are known facts, analysed by hundreds of studies. However, so far, these changes in the dynamics and ageing have not been precisely quantified. Thus the main objective of this “what-if” study is to quantify the impact of changes in reproductive behaviour associated with social changes to the age structure in the example of the Czech Republic and Slovakia and their mutual comparison. How would the populations of the transition countries look like if socialism had not ended, and if the pronatalist socialist regimes had continued? How many children were “lost”, or unborn, and how many more seniors will be there as a consequence of the fall of the communist regimes? A theoretical simulation, retrodiction using the cohort-component method, was carried out. Parameters of reproduction actual at the end of the socialist period (1989) were extrapolated until 2040. Differences in the medium scenario of official forecasts and in the theoretical simulation are more or less surprisingly significant and, in the more distant future, they increase rapidly. The more communism “preserved” higher levels of fertility and mortality, the more their rapid and fast decline has been manifested after 1990.

### Key words:

Czech Republic; Slovakia; transformation; ageing; simulation

## Household Population Dynamics and Livelihood Changes in a Rice Farming Village in Central Laos

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### Abstract

Household undergoes the change of size and composition over time as its members come and go through birth, death and migration. Such household population dynamics is one of the important variables to see the process of population and migration change in small areas. This is true for rural society in Laos, where single households have great power to make livelihood decisions. Based on the retrospective survey of changes during the last fifty years in a rice farming village in central Laos, this study aims to identify the development process of household with the key demographic and livelihood factors affecting that process. The study village had 110 households with a population of 765 at the end of Y2014 while almost 300 people were temporarily away for work and study. There were 159 families of husband and wife both alive with children. Among them, 60 husbands and wives (37%) left their children at grandparents' care to go to work. Back in Y1970 when there were few opportunities for migrant labour, the village had 50 households with a population of 335. The average number of persons per household was almost the same between the two periods. But its composition and the form of cooperation between households was changed in response to the demographic and livelihood changes over the time. Acknowledgement: This work was supported by JSPS KAKENHI Grant Number 25257004.

### Key words:

Household demography; Laos; Development Cycle; Kin Cooperation

## How had Population Changes Affected Paddy Holdings? A Result of Dynamics for Three Generations in a Rice Farming Village of Central Laos

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### Abstract

It is hardly clarified detailed population dynamics in the small-scale community in developing countries which does not exist complete data of residents. However, an accumulation of the case studies in those communities from comprehensive perspective must be needed to estimate future population trends of the world, because most of world population are occupied in developing countries. Therefore, we are trying to clarify the interrelationship between population dynamics and livelihood changes at the household level for three generations in a rice farming village of central Laos. In the study village, paddy reclaiming began from the lowlands along the stream from the 1930s, but the rate of paddy reclaiming has sharply decreased since 1960s because the lack of lands within the village. Then villagers have begun to purchase the paddy since 1970s. The source of purchase funds was due to migrant to Thailand that has been made since the 1970s. The first migrant worker in the study village was seen in the early 1960s, and villagers have constantly been going to work to Thailand since the 1970s. With an increase in the migrant workers, purchase of paddy from the neighbouring villages and from ex-villagers who went to out of the village made vigorous. As a result, the study village has achieved rice self-sufficiency. Regarding the relationship between population increase and paddy holdings, it is greatly affected by temporary transnational migration under the movement toward regional integration of mainland Southeast Asia. Acknowledgement: This work was supported by JSPS KAKENHI Grant Number 25257004.

### Key words:

Laos; population changes, paddy holdings; temporary transnational migration;

## **Identities of Refugees from Post-Soviet Countries in Germany**

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### **Abstract**

Europe and Germany in particular are facing an ever increasing influx of refugees since the 1990s. Today most refugees come from the Middle East, Africa and the Western Balkans. By the end of 2013, however, the major donor country was Russia. Since the refugees from Russia and other Post-Soviet countries do not originate from war ridden countries, they wait for the official refugee status for months or even years. During the whole period of the asylum procedure they remain between two worlds. The aim of this research project was to shed light on how these migrants adapt to new life circumstances, whether they conserve their various identities (ethnic, religious, professional, linguistic, etc.) and which strategies they employ to do so. The field research was conducted from 2014 to 2015 and was based on participant observation in German asylums in Berlin and Bavaria as well as biographical interviews. Among the interlocutors were not only refugees from Latvia, Russia, the Ukraine and Turkmenistan, but also German asylum wardens, social workers and decision makers. The interviewing of both sides allows a more balanced perspective. The results reveal that the ways these refugees keep and form their identities highly depend on the legal framework they are confronted with and how they are perceived by the host society and by other refugees. My research can contribute to a better understanding between migrants from Post-Soviet countries and the host society. It may also assist decision makers in the area of integration.

### **Key words:**

refugees; forced migration; identity; Post-Soviet countries; Germany

## Impacts of Rural-Urban Migration on Alleviating Rural Poverty in Different Landforms in Inland China

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### Abstract

Large scale of rural to urban labour transfer is widely acclaimed as major factors for reducing rural poverty as a whole in China. However, most of the poor are living in the remote, mountainous rural areas in inland China, where are the main migrants sending areas, with a concentrated tendency. Why does the poverty still concentrate to the mountainous rural areas in inland China as the huge amount of rural labour transfer? Whether labour transfer alleviates the poverty in mountainous rural area compared to the plain rural area in inland China? If it is same in the effects of labour transfer on rural productivity under different landforms in inland China? Few scholars have realized that the effects of labour transfer on rural productivity may depend on the topographic conditions and try to compare the effects under different landforms. This paper will provide some insights into these questions based on the data collected from a recent survey of intentions of rural labour transfer in several inland provinces of China. The results show that labour migration exercises much less negative influences on the income of rural households who reside in the plain area than that of those in the mountainous area. Therefore, the local wage in plain rural areas can be improved more easily by labour migration. The deep reason lies in the greater difficulties in applying modern agricultural technologies and consequently slower agricultural productivity growth in rural areas characterised by rough terrains.

### Key words:

Rural-Urban Labour Transfer; Topographic Conditions; Alleviating Poverty; Inland China

## Impact of Urban-Rural Return Migration on Rural Development in China

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### Abstract

Population mobility is an essential element in the livelihoods of many households in developing countries as a diversification strategy. However, migration remains a selective process as the poorest of the poor do not have the connections and resources that are needed to engage in migration. While alleviating rural poverty and reducing rural-urban disparity have been imperative issues in developing nations, urban-rural return migrants who are equipped with accumulated human, financial, and social capital through their migration experiences are capable of acting as agents of change to bridge the gaps between the origins and destinations and facilitate rural industrialization and urbanization. China has experienced massive rural-urban migration over the past 30 years. Recent research has shown that the majority of the rural migrant workers do not have the intention to settle permanently in cities due to structural and institutional constraints and many have returned. This study aims to analyse both economic and social impacts from return migrants on rural development in China using a multilevel approach. The empirical study will be based on a primary data set collected from seven provinces in China in 2015. The study examines the impacts of returnees' economic engagement on job creation, investment and economic diversification as well as how the livelihoods of non-migrants are affected by return migration over time. The results provides valuable implications for policy makers in China on how to effectively incorporate return migration to stimulate rural development and help the rural poor to exit poverty.

### Key words:

return migration; rural development; economic impacts; China

## Internal Displacement in Ukraine: Social Consequences, Territorial Disparities and Policy Implications

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### Abstract

Political destabilization and armed conflict in Eastern Ukraine (2014) has led to development of a new social phenomenon – the large-scale internal displacement of people. Such process posed a new development challenge for the whole country, as thousands of people have to leave their households; they still are particularly vulnerable in many aspects, facing unemployment and lack of income; they also could experience the increased risks of social exclusion, discrimination and stigmatizing in hosting communities. In practice, internal displacement is associated with losses of dwellings, land plots, usual environment, as well as disintegration of family ties. Moreover, the consequences of internal displacement could be seen in the long-term run, affecting economic stability, facilitating humanitarian and environmental problems, posing new treats in terms of population health and epidemiological safety, etc. Internal displacement affected the regional development as well, leading to the increase in territorial disproportions and inequality.

The proposed paper deals with analysis of the current and potential challenges caused by development of the internal displacement flows in Ukraine. Official data on the registered IDPs are used, as well as data of a special population-based survey in the conflict-affected regions. The paper provides assessment of the major social consequences of displacement, including demographic processes, trends at the labour market, increased pressure on the social safety nets and environmental risks of displacement.

### Key words:

Ukraine; migrations; internal displacement

## International Migration in Poland. A Migration Policy Perspective

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### Abstract

The phenomenon of migration, which is associated with the globalisation process of the world's economy, is also reflected in Poland. The emigration of Poles indicates a tendency of temporary or seasonal departures, which is in accordance with the migration trends observed in Europe or throughout the world. The current migration processes and the consequences of implementing the Union's principle of the free flow of workers, are not reflected in the state strategies. Their presence is required in light of the data concerning emigration potential and emigration resources, as well as the newest CSO demographic projections up to the year 2050. The treatment of the migration policy as a permanent element of the state's development and modernisation strategy requires it to be based on solid knowledge regarding the nature and results of migration.

From the perspective of the ensuing migration processes in the world, Poland plays a dual part. On the one hand, we are observing the phenomenon of migration for work and permanent residence by Poles, mainly to other highly developed countries. From this perspective, Poland can be described as a source country. On the other hand, to a considerably lesser extent, we are dealing with an inflow of young persons to Poland seeking employment and/or wishing to settle here, or to continue their education. Above that, even refugees are looking for shelter in our country, so immigrants escaping armed conflict and other disasters which confronted them in their own countries. We are also noting returns of country mates on the basis of the Repatriation Act. Finally completing the picture of immigrant inflow to Poland are persons who attempt to cross the border illegally. Poland therefore also plays the role of a destination country. The migration process from and to Poland is therefore very complicated and, due to this, difficult to capture, and additionally its nature is very dynamic, as can be observed with the changes related to the worsening of the economic situation in the world.

### Key words:

International migration; Poland; migration policy

## Investigation of Demographic Trends in Rural Areas Gilan Province

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### Abstract

In today's world the importance of awareness of statistics and information has been increasing Valuable increased, such a way that having detailed information and statistics on every section of society directly associated with the correct planning and decision-making. Of the most important required statistics and information in the different sectors of society IS Having awareness of population statistics That not only have been considered in the past but also has been facing a hundredfold importance in recent decades. An accurate understanding o Iran's rural community's related issue is very important Because root cause of all problems and issues of retardation Such as widespread poverty, growing inequality, rapid population growth and rising unemployment Located in rural areas. In this research has been paid TO demographic trends in Gilan rural settlement in three censuses, to be determined The process of transformation in the past and New strategies for rural situation OF PROVINCE in the future. In this framework the required information were taken from Central Organization for Statistics and Population and housing censuses. After extraction of required data transformations was shown in map form in Arc GIS software. The results showed that the rural population in Gilan province during the years 1355 to 1390 Has changed So that the population of rural areas in 1355 was totaled 1,120,517 persons With a growth rate of 5.1 percent in 1365 increased to 1,296,859 persons This increase was stopped the next few decades So that during the 136,575 the rural population at an annual rate 84 / -0% to 1,191,916 persons , During the decade 1375-85 annual growth rate 72 / -0% to 1,109,110 persons And in the years 138,590 with an annual growth rate of 37/2% to 983 704 persons have fallen . This indicates the urban unbalanced growth in the province. That continued of this trend leading to the elimination of rural settlements and a sharp decline in agricultural production in the province will follow, therefore seems to be one of the government policy during the future program should prove to be the rural population.

### Key words:

population changes; rural areas; spatial distribution; Gilan Province

## Level and Trend of Internal Migration and Demographic Change in India

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### Abstract

The study of internal migration or the movement of population within the boundaries of the country is important for the valuable insights it may provide regarding the social and economic forces responsible population redistribution. It has a strong linkage with the social, political and economic constraints of the place of origin or destination. According to census of India 2011 data there are 7935 towns, more than 6 lakhs of villages and pattern of internal migration is from rural to urban areas. This has caused many implications like population imbalance, health issues and other. This paper ascertains the level and tend of internal migration and demographic change in country using the data from Census of India (1991, 2001, and 2011). Level and trend analysis were used to understand the internal migration scenario with time. Descriptive Statistics were used to understand the social and economic forces responsible for migration. The study shows that internal migration has resulted in the population redistribution and is associated with political, economic and social factors. Population redistribution can also occur due to differential rates of natural increase. There are striking differences in the characteristics of out-migrants from villages by sex, associated with the basic differences in the motives for out-migration. Since marriage is main reason for female out-migration. This signifies the difference in the factors affecting migration by sex. There is a need to scrutinize the causes, pattern and consequence of migration at lower levels which may throw interesting light in the dynamics of migration in India

### Key words:

Internal migration; demographic change; Political; social and economic factors

## Migration and Market Potential in China

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### Abstract

The core-periphery model, as a basic model of New Economic Geography, describes a cumulative causation process resulting from interaction of two centripetal forces: First, considering low transport costs and scale economies, firms seek to concentrate in the location with good market access, which is called backward linkage; second, the labors would like to migrate to the industrial agglomeration in order to save the living costs and purchase all kinds of commodities, which is called forward linkage. More attention has been paid to test the backward linkage, while the empirical research on forward linkage is limited. China, as a developing country, has a large number of migrants and a special migration mode considering migration period, the stability of migration and migrants' returning flow. Based on the NEG theoretical model, the paper estimated the market potential index in 283 cities of China, using the data from China Population Census, China City Statistical Yearbook and China Statistical Yearbook for Regional Economy. Then the relationship between market potential and migrants is proved by using the method of regression aiming at testing forward linkage. The results show market potential decreases from the eastern coastal regions to the western inland in Chinese cities, which is consistent with the spatial distribution of economy development. The market potential index of Yangtze River Delta, Pearl River Delta and Jingjinji region is the highest and the market potential degrades from the centers (Shanghai, Guangzhou and Beijing) of three city clusters to periphery. The spatial distribution of migrants is similar with that of market potential in China. The cities with the largest amount of migrants are located in Yangtze River Delta, Pearl River Delta and Jingjinji region. The market potential makes contributions to labor migration. The regression results show that the market potential, staff annual wage and per capita GDP make significantly positive effects on migration in all the cities.

### Key words:

Labor migration; Market potential; New Economic Geography; Forward linkage

## Modeling Skilled and Less-Skilled Interregional Migration in China, 2000-2005

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### Abstract

Previous studies on interregional migration modeling in China have tended to treat migrants as a homogenous group. The rise of skilled migrants became a hot topic in recent years, while far less attention has been devoted to the comparison between skilled and less-skilled migration. This paper aims to advance our knowledge of internal migration in China by analyzing the difference between skilled and less-skilled migration in terms of migration patterns and determinants. It also contributes to the study on Chinese migration by using eigenvector spatially filtered method to capture network autocorrelation among migration flows. Results from descriptive analysis show that both skilled and less-skilled migrants tend to move away from the interior to the coastal region. Results from eigenvector spatially filtered negative binomial regression model shows that, compared to the migration of less-skilled people, the migration of skilled people is less influenced by the friction of distance, regional unemployment rate, and the concentration of foreign investment but is more affected by regional wage disparity. With respect to the effect of amenities, climatic amenities exert a strong influence on skilled migration but have positive effect on less-skilled migration at origin and no effect at destination. Quality medical services are influential for the migration of less-skilled people to destinations but no effect on skilled people. Our findings suggest that the decisions of migrants in China increasingly resemble those in Western developed countries, but the migration of skilled people in China is unique as a result of Chinese social and cultural particularity.

### Key words:

Skilled migration; Less-skilled migration; Negative binomial regression models; Spatial econometrics; China

## Occupational Changes of Migrants in China: Analyses of Three Censuses from 1990 to 2010

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### Abstract

Informed by dual labor market theory and reinforced by hukou barriers, it is generally understood and expected that Chinese migrant workers are segregated into the lowest urban occupational rungs, sometimes referred to as 3D (dirty, dangerous, and difficult) jobs such as construction, recycling, and factory work. This paper is concerned with if and how migrants' employment and occupations have changed over a 25-year period, from the mid-1980s - when rural migrants began to enter the urban labor market in large number – to 2010. We argue that the dual labor market framework as well as the hukou lens privilege a top-down and static perspective. Meanwhile, increased market forces, the labor market's changing skills demand, as well as new migrant demographics have all tended to foster occupational mobility of migrants. Hukou is not as important as before. Rapid economic changes have generated new jobs that require higher skills. Compared to older and earlier migrants, younger and new-generations migrants have stronger human capital and are more selective and less tolerant. Through analysis of micro-data from the 1990, 2000 and 2010 censuses, with over ten million records for each census, this paper documents the occupational changes of labor migrants at the one and two-digit levels. Our findings highlight changes "up the skill ladder" within the same occupational category as well as occupational diversification into other categories especially services.

### Key words:

migrant workers; occupational change; census data

## Population Geography in China Since The 1980s: Forging The Links Between Population Studies and Human Geography

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### Abstract

This paper reviews the progress of population geography in China since the 1980s. The review results suggest that contrary to the common perception of its invisibility and marginalized status in the field, tremendous progress has been made in population geography in China since the 1980s. Population geographers have made significant contribution to the understanding of a wide range of population issues from geographical perspectives, including migration, urbanization, population distribution, the relationships between population, environment and resources, aging, marriage patterns, and migrants' crimes, although such contribution often did not appear in the geographical circle. Furthermore, population geographers have played an indispensable role in revitalizing population studies in China and forging its links to human geography, occupying an important position in this multi-disciplinary field. Population geographers' contribution to the areas of migration and urbanization research has been particularly significant, playing a leading role in these multidisciplinary research areas. The paper demonstrates that population geographers in China have gone through a process of catching up and increasing engagement with developments in social sciences since the 1980s, and have benefitted greatly from it; however, there is an tendency for population geography to be increasingly alienated from the main stream human geography. The paper argues that population geography is only half way in the course to forge the links between population studies and human geography, and it needs to strike a healthy balance between the field of population studies and that of human geography so as to promote its further development in a multi-disciplinary field.

### Key words:

population geography; the 1980s; population studies; human geography; links; China

## Population Growth in the Adjacent Area of Bucharest (Romania) - Positive Effects?

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### Abstract

After 1990, within the socio-economic transformations that have taken place on the background of the political regime change, there has gradually begun to emerge a process of emigration of the population from Bucharest to the adjacent area (predominantly rural). As a result, there has been a population growth and the emergence of new residential areas. The process of urban sprawl was not radial around the capital, noting the existence of certain attractive areas, which registered an increase in the number of inhabitants by 50%, simultaneously with an increase in the number of new housing units (in certain situations by more than 70%). The work can be divided into two parts, the first focusing on identifying settlements that have registered a significant increase in population, as well as the causes that led to the manifestation of these migratory flows. The second part focuses on analyzing the changes manifested locally, from several points of view: demographic (changes in structure by major groups of age), services (in terms of education and health), local infrastructure, pressure over the environment and land use changes. Simultaneously, there is also analyzed the way the process of territorial development is managed, being under constant pressure due to the proximity to Bucharest. In this sense, to investigate the perception of the local authorities' representatives, there was applied a questionnaire in several representative settlements. To overview all the registered changes, there will be calculated more demographic and socio-economic indicators.

### Key words:

Bucharest; adjacent area; urban sprawl; population growth; local authorities

## Recent Immigration to Czechia: A Case of Chinese

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### Abstract

Czechia as a small country (10.5 million inhabitants) in Central Europe is not too attractive place for immigrants. Only 0.5 million foreigners live in this country today (4.3 % of total population), and their number has not been growing in the last 5-7 years. But among former European communist countries number of foreigners in Czechia is quite high. Foreigners in Poland, Slovakia, Hungary, Romania and Bulgaria share on the total population less than 1.5%. First part of the paper presents the immigration to Czechia.

Second part of the paper deals with Chinese immigrants to Czechia. Chinese are small part of foreigners living in today Czechia: their number is only about 5,500 (1.2% of all foreigners and 0.05 % of total population of the country). Chinese are relatively new immigrants in Czechia, but their number is quickly increasing especially during the last decades. They come to Czechia predominantly due to business, most often to small family enterprises like restaurants and shops. Big Chinese investments in Czechia started last year (2015). Economic success of Chinese strengthens their position despite of their small number and a big cultural distance from majority of Czech population. Last part of this paper presents the formation of their community predominantly in Prague, a capital of Czechia, during last two decades.

### Key words:

Czechia; immigration; Chinese immigrants

## Region, Income and Urbanization of 200 Million People

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### Abstract

China's population urbanization process specially develops a "two-stage" pattern, from "formal centralization" to "essential citizenization", under the dualistic society based on the "Hukou" system since the Reform and Openness, and is moving forward with the Reform and Openness going on. The government raised 3 questions about how to promote the urbanization of "300 Million People" before 2020 in the "National Plan of New-Type Urbanization (2014-2020)". Among the 3 questions, one is how to help 100 million people who have migrated from rural areas to urban areas but can't enjoy the rights of citizens get "Hukou", the process of which means the "essential citizenization". Another question is how to conduct 100 million rural people to become urban citizens in nearby cities and towns directly, the process of which means the accomplishment of "formal centralization" and "essential citizenization" simultaneously. The population distribution and migration choices vary inside the vast country where the natural environment and the development level of social and economic also differ in different regions. Generally speaking, both of the abovementioned questions are related to the regional location and the income level in there. This paper is to analyse where are the reasonable regions to solve the above 2 questions of 200 million people respectively. This will afford scientific references for achieving the 200 million people's urbanization.

### Key words:

Region; Income; Urbanization; 200 Million People



## Regional Distribution of High Skilled Foreigners in Japan: Recent Trends and Underlying Factors

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### Abstract

After 2005, Japan's total population turned to decrease. Its negative impacts of population decline on labor supply, domestic consumption demand and the national pension system are deeply worried by the government and the economic society. Besides the decrease in labor quantity, the shortage of skilled workers in some fields also attracted high concerns. In order to improve Japan's economic competition power and maintain its leading role as one of the major countries in the world, it has been recognized that it is necessary for Japan to receive more young foreign-born labor, particularly those with high skill and challenge spirit. Under such a background, many cities in Japan have implemented related policies for attracting highly skilled foreigners. However, the regional distributions of skilled foreigners are quite uneven. Based on official statistical data, this paper analyses the characteristics of regional distribution of various categories of skilled foreigners in Japan and examines the underlying factors of these distributions.

### Key words:

Migration; High Skilled; Foreigners; Regional Distribution; Underlying Factors; Japan

## Return Migration and *in Situ* Urbanization of Migrant Sending Areas: Insights from a Survey of Seven Provinces in China

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### Abstract

Based on a survey in migrant sending counties of seven provinces, and drawing on the experiences of *in situ* urbanization in the coastal areas, this paper attempts to examine whether the emerging trend of return migration of migrants from the inland areas could play a similar role to that of overseas Chinese, who served as catalysts in *in situ* rural-urban transformation of their hometowns, and contribute to closing the gap between the inland and coastal areas in urbanization and regional development. The paper first looks at the characteristics of return migrants in comparison to non-migrants, and demonstrates that return migrants are more advantaged in educational attainment and income level, and their migration experience has been conducive to their increase in capital accumulation, innovative spirits and entrepreneurship, creating an important condition for rural-urban transformation of their hometowns. The paper then shows further that there has been some noticeable increase in the share of non-agricultural activities in return migrants' employment structure and income sources, and in the share of town centers in their employment and residential location, suggesting that return migrants have contributed to the accumulation of urban elements in their hometowns. The paper also identifies some major drawbacks in *in situ* rural-urban transformation of migrants' hometowns, suggesting that measures should be taken to tackle the problems of weak manufacturing industries and small and over-dispersed patterns of non-agricultural activities to promote further development of *in situ* urbanization in migrant sending areas.

### Key words:

return migration; *in situ* urbanization; migrants; sending areas

## Return Migration and Rural Urbanization in Western China

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### Abstract

Hundreds of thousands of migrant workers return to their homeland when they retreat from labor market or grow aged. Instead of going back to their villages doing farm work, the bulk of them opt to settle down in towns or small cities near their villages. Different from distance migration-driven urbanization in big cities, local or rural urbanization are pushed by demand by returned migrants and local farmers. While local towns and small cities play a major role in absorbing retired farmers and promoting rural urbanization in agricultural areas in western China, there emerge some challenges and problems facing their sustainable future: lack of sustained industrial activities, outflow of active labors, high vacancy rate of houses, inadequate provision of social services. It is desired that preferential policies be put in place for development of rural nonagricultural industries and more public investment be streamlined in urban infrastructure and social services for rural towns and small cities in western China.

### Key words:

return migration; rural urbanization; western China

## Rural-Urban Commuting in Romania after the Fall of Communism (1990-2015)

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### Abstract

The paper at hand aims to present a general view of the rural-urban commuting in Romania, after the fall of the socialist regime. The employed methodology involved the processing of statistical data provided by the Romanian National Institute of Statistics (for the year 2015), followed by their cartographic representation in ArcGIS 10.2.2. The results emphasize a massive decrease of the commuting phenomenon in the last 20 years, caused by the general break down of the national industry. Furthermore, the structure of the current rural-urban commuting presents a strong tertiarization, commuters being employed mostly in the low-skill service sector. The strongest commuting flows were found in tier-one urban centers (provincial metropolises): Cluj-Napoca, Constanța, Timișoara, Brașov, Craiova, Galați, and Iași. The intensity of the current rural-urban commuting has a strong correlation with the number of inhabitants of those urban centers with a strong services tradition, even in the interwar period.

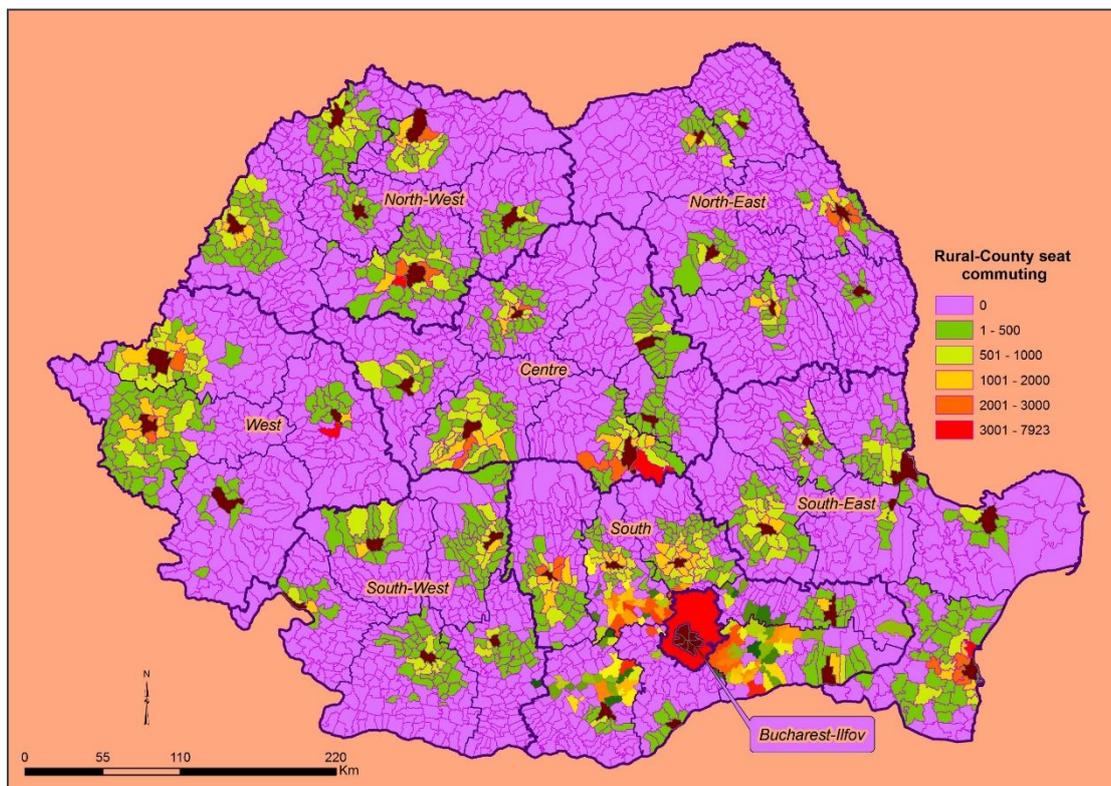


Fig. 1. The rural-urban commuting in Romania (2015)

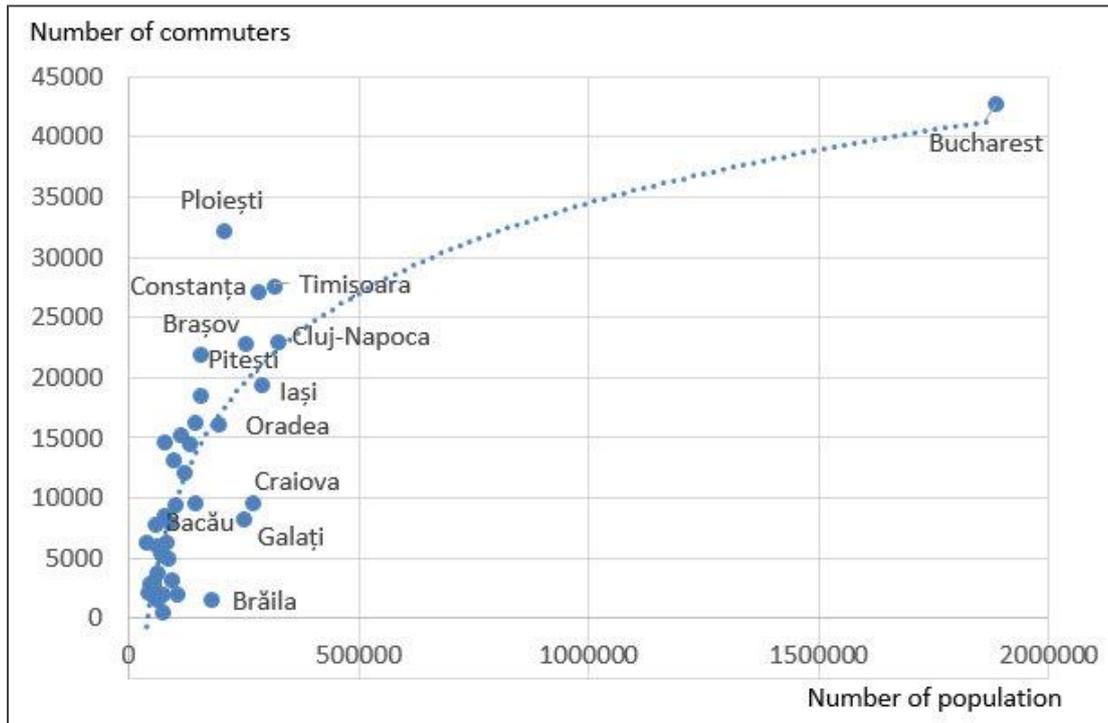


Fig. 2. Correlation between number of commuters and population of county capitals (2015)

**Key words:**

commuting; rural-urban; Romania

## Scenarios for the Near Future: The Demography of Africa at the Horizon 2025

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### Abstract

The XXI<sup>st</sup> century poses many challenges to the African populations, and an intensive debate is addressing the global prospects it offers. This study examines the possible scenarios concerning the populations living in Africa in the XXI<sup>st</sup> century. I propose to examine more specifically fertility and mortality.

Will fertility stay high in Africa? What can we expect mortality levels to be in the region in the coming years? What about the African epidemiological transition in the XXI<sup>st</sup> century? What are the causes and consequences of the main demographic changes we expect in Africa? Can we expect a change in the current “demographic images” of Africa (high mortality, high fertility, overcrowding)? These are some the questions to which I will try to find an answer in my research.

The study is organised into three sections. The first one exposes the possible scenarios of fertility (fertility rates, fecundity,) and mortality (mortality rates, life expectancy, main causes of death,) in Africa at the horizon 2025, basing on the prospects issued by the United Nations (United Nations, *World population prospects, the 2013 revision*, New York, 2014). The second part of the research discusses the major determinants that will lead to such demographic changes. The last part of the paper deals with the demographic, economic and social consequences of these demographic scenarios on the African society.

In each part of the study I will try to show to what extent there will be a drastic change in the current images of the African population.

### Key words:

Demography; population; future; Africa

## Settlers, Floaters and Returnees: Settlement Intention and Topology of China's Rural Migrants

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### Abstract

In the rapid urbanization process, settlement intention of rural migrants has been paid increasing attention by scholars and policy-makers. In the Chinese context, settlement is closely related to both settlement places and *hukou* conversion. According to the definition, rural migrants in China could be classified into four sub-groups: settlers (rural migrants aiming to settle down in cities through *hukou* conversion), floaters (rural migrants floating between rural and urban areas and postpone their settlement decision), rural returnees (rural migrants who have no intention of converting *hukou* and will return to their home villages) and urban returnees (migrants who intend to convert *hukou* but settle in rural areas). Although previous studies have compared the migration or settlement decisions of several groups amongst rural migrants, the settlement intentions of the four sub-groups, especially under the changing context, have been rarely concerned. Therefore, based on a recent survey, the paper tries to examine the disparities between the four sub-groups of rural migrants and to explore the causes of their varied settlement intentions under the changing circumstances. Both statistical analysis (multinomial regression models and ANOVA testing) and in-depth interview are adopted in the paper. The results indicate that the settlement intentions of the four sub-groups are based on two separate decision-making schemes, which are to maximize individual and family utilities. And with the changing context, such as the increase of rural migrants' human capital and the development of countryside, rural migrants have had some new considerations of the settlement places and identities.

### Key words:

settlement intention; rural migrants; regression model; ANOVA testing; China

## Spatial Difference and Its Determinants of Migrants' Hukou Transfer Intention in China's Cities

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### Abstract

Based on data from the 2012 national migrant population dynamic monitoring survey and related statistics, this article examines the spatial pattern and its determinants of migrants' intention of *hukou* transfer in China's 276 prefecture- and provincial-level cities, using GIS spatial analysis and statistical modelling. The results show that the overall level of migrants' *hukou* transfer intention in the cities is not high, and has significant spatial differences. Migrants' *hukou* transfer intention is generally higher in coastal mega-city regions than in other cities, but it is also relatively high in some provincial capital cities and small and medium-sized cities in inland regions with good transport location and resource endowment. Meanwhile, the intention of migrants' *hukou* transfer increases as the administrative level and/or the size of their destination cities increase. The spatial pattern of migrants' intention of *hukou* transfer is shaped jointly by the characteristics of the destination cities and migrants' individual factors, with the former exerting more influence than latter. High level of socioeconomic development and good location of the destination cities can effectively promote their migrants' intention of *hukou* transfer; however, their level of basic public services does not have the same effect. The degree of migrants' social integration in the destination cities can also exert positive effects on their *hukou* transfer intention. However, having medical insurance, the concentration in the secondary labor market and higher household income are negatively related to such intention; furthermore, the individual and family characteristics of migrants do not have a significant impact on it.

### Key words:

migrants; *hukou* transfer intention; spatial difference; prefecture- and provincial-level cities; China

## Spatial-temporal Dynamics of Population Distribution and the Influencing factors at county level in Guangdong Province

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### Abstract

Regional population distribution has been increasingly concerned in the field of population geography, but still lack of research in a long time series analysis and fine scale estimation in China. This paper focuses on the spatial-temporal characteristic and dynamics of the population distribution in a long time series, taking Guangdong province in the past 50 years as an example. Previous population census data of all the 92 counties in 1964, 1982, 1990, 2000, and 2010 are collected. By using the Lorenz Curve and some quantitative models in Arc GIS and surfer software, to analysis the variation of population distribution, spatial agglomeration, population gravity centre and the population potential over the past 50 years. This study also uses the grey correlation analysis and stepwise regression to discuss the influencing factors in the population change. The result shows that: (1) the population distribution tends to be concentrated in some high population density areas. The population density gap between different counties is widening, and the gravity centre is moving to the southeast. (2) The spatial distribution of potential population could be described as "point - zone" shape characteristic, forming the "Pearl River Delta – East Guangdong high concentrated region" and the "West - North Guangdong low concentrated region". The population density contour of the three high density areas are moving to southeast; (3) The economic and social factors are the main driving forces, and at the same time, the improving transportation condition and the regional policy also directly influence the characteristic of the changing distribution.

This case study could provide valuable experience for cognizing the mechanism of population evolution, also are of great essential to optimizing the spatial distribution, setting up a scientific and sustainable population development policy in other similar regions.

### Key words:

population distribution; influencing factors; characteristic; Guangdong Province

## Spatial-temporal Network of Child Trafficking Crime in China

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### Abstract

Child trafficking crime caused huge losses and damage on society and families and in recent years it become the focus of attention. Current related studies made few progress due to the lack of relevant empirical research and overall knowledge, especially the lack of basic knowledge of the macroscopic features of child trafficking crime in China. Consequently, based on 647 pieces of successful relative-seeking data from the online public platform "Baobeihuijia" and the socio-demographic characteristics and spatial-temporal network features of child trafficking crime in China were examined through using SPSS and ArcGIS analysis methods from the perspective of crime geography. This study found that the crime presented "centralized trafficking-out while decentralized trafficking-in" and "trafficking-out from the west while trafficking-in to the east" features: the core area of trafficking-out concentrated in Southwest China while the core area of trafficking-in concentrated in South China and North China. The crime also presented the main "field-flow" features of the spatial pattern as "three-area and two-route" and the two crime flows were formed between the three crime areas: the south route was from Southwest China to South China and the north route was from Southwest China to North China. South route was much severer than north route. Both trafficking-out and trafficking-in crimes occurred in the southeast half of Huhuan Line. Child trafficking crime presented a geographical proximity effect and reflux phenomenon occurred in several provinces and cities. Gradually in future, the crime was sure to be developed from regional to national, which would be a big challenge for future prevention and control.

### Key words:

child trafficking crime; spatial-temporal distribution; crime network; crime geography; China

## Spatiotemporal Analysis of the Population Drain in the Northeast China on Regional Economic Development

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### Abstract

Since 2000, the population drain issues and the economic recession problems have become the bottleneck to the sustainable development of *Heilongjiang, Jilin, Liaoning Province* in China. Based on the Fourth, Fifth, sixth national population census data in China and economic statistical data of the three provinces, this study firstly analyzed the population flow and general economic conditions since 2000, by taking city scale as the research unit and using GIS Spatial Analysis method. Then, convergence theory and multiple regression analysis methods were used to quantitatively analyze the impacts of the population flow of the three provinces in Northeast China on the regional economy. The results show that:(1) The extent and intensity of the outflow of the population are increasing, while the net outflow is about 2.191 million in 2010 and about the five times compared with 2000, which indicates the population loss crisis. The spatial distribution of population mobility on city scale tends to be intensified in core-edge, which agglomerates along the Harbin Dalian railway line direction.(2) The economic situation of the three provinces in Northeast China is grim, while the average GDP growth rate is only 5.97% in 2014, far below the national average of 7.4%.(3)The population flow on city scale reduces the rate of convergence of economic growth to a certain extent, but the different types of population mobility areas are significantly different. Population mobility has a negative effect on regional economic growth, which is about -3%. This study is helpful for the government to make differentiated population policies and promote regional economic development.

### Key words:

the population drain; economic development; the Northeast China; region study

## Study on the Population Distribution Prediction of Xi'an City Based on the Census

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### Abstract

The prediction of urban population distribution is significant to protect the correctness of the urban population policy and the planning of the supporting facilities. The research visual displays the population distribution trend in the central area of Xi'an city in 2020, by using the methods of the grey prediction in population and the 36-dimensional space expansion, which is based on the District census data from the second to the Sixth (1953~2010). Projections indicate that the core area of Xi'an will remain high population density in 2020, urban areas continued to spread to the surrounding suburbs, around the circle type and enclave expansion function zones, the industrial parks will gather population and service industry and commerce, forming a construction which was super positioned by the sheet, shaft, and ring to formed a series of large and mixed function areas. This study can help to understand the spatial distribution and evolution of the urban population, and the conclusion can be used as the reference of city planning, public service, business location, et al.

### Key words:

population distribution prediction; census data; gray theory; GIS; grids; Xi'an city

## The Boom: Population and Urban Growth of Dubai City.

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### Abstract

The total population of Dubai has grown by 1000% over the last 40 years alone. In 1975 the total population was 183,000 inhabitants which increased in 2015 to about 2 millions. This increase makes Dubai population one of the fastest growing in the world. In a related context, the guest workers (immigrants) have profoundly contributed to this population growth since they constituted 91% of the total population.

Dubai is a good example of a rapidly developing city. Until 1955 Dubai was characterized by its slow growing economy. Its population lived in traditional houses made of palm fronds with poor infrastructure. In 1957 Dubai municipality was established and the first master plan was formed which resulted into the appearance of a road system and a new town center in addition to the construction of new modern buildings made of concrete blocks. These buildings started to emerge at that time. Nevertheless, the urban growth continued on a slow pace. From 1975 to present the urban area expanded enormously, the rapid development of the city transforms Dubai from a small regional business, financial and leisure hub into a global center. During the last two decades Dubai built up area expanded like never before, the economic growth accelerated and so did the investment level, more development projects were planned to support the urban growth. The total built up area increased from only 54 square Kms in 1975 to 977 square Kms in 2015, as Dubai (1700 %) that high percentage make Dubai one of the fastest growing cities in the world.

### Key words:

Economic boom; Guest workers; Asians; Infrastructure; Built up area; global business hub

## The Changing Population Distribution of Shanghai Metropolis: A Recent Study Based on Fine Spatial Units

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### Abstract

Population distribution of Metropolises has been a focus issue for more than one hundreds. And as early as in the middle of the 20<sup>th</sup> century, researchers, including Steward and Clark, have found a close relationship between distance away from city center and population density. Since the reform and opening up, Chinese large cities quickly expand. A huge number of descriptive studies and simulation models have been done, and demonstrated that multi-centered pattern has emerged in Chinese metropolises, which would has significant influence on public policies and urban governance in the next decades. However, there exists research limitation in the previous studies, including the availability of census data and official statistical consistency. With the recent census data in fine statistical units of so called residents' committee which is much smaller than town or neighborhood and just a little bigger than census unit, we describe and simulate the population distribution change of Shanghai metropolis in the first decade of the 21<sup>th</sup> century, and compare the results with that of the previous studies which were mainly based on statistical units of neighborhoods, explore the differences and deviations caused by data spatial fineness. We also analysis the deviations that are caused by area of non-residential land which is usually accounted in gross population density. In the conclusion, we mainly discuss the problems of official statistics such as consistency of statistical codes and optional adjustments of administrative division, and the influence of metropolitan population distribution change to public policies.

### Key words:

Population Distribution; Data Fineness; Public Policy; Shanghai Metropolis

## The Impact of Local Factors on the Urban Integration for the Migrant Population

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### Abstract

From geographic perspective, based on a survey of 2496 migrant workers in nine cities in eastern and central China, this research investigated the impact of local factors on social integration of migrant workers. A multiple-level regression model was applied to analyze and reveal the differential impact of local factors, including level of economic development, intelligibility of local dialect, population share of migrants, and cost of rent. The cities with the characters that the more difficult to join the local endowment insurance, the higher level of the economic development, the greater gap between the earnings of the migrant workers and urban capita income, the higher rent, the urban dialect that is more difficult to master and the higher proportion of urban immigrant population, have a lower integration. Those cities which attract a smaller scale, whose migrant population are mainly from the province inside, have a higher inclusion degree of the migrant population. The results of the analysis affirmed the importance of local factors and their differential impact on social integration. Given the large variety of cities, it was suggested that localized social policies are promoted to ease the integration of migrant workers in urban communities.

### Key words:

migrant workers; social integration; urban; local factors

## The Relationship between International Migration to Thailand and Fertility Decline in Rural Laos

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### Abstract

In last year's IGC, I presented how population growth gave impact to various aspects of the villager's livelihood changes, particularly to temporary international migration to Thailand, using results of a village survey in central Laos by PRELIC project funded by JSPS (Japan society for the promotion of science). High fertility rate which was one of the major causes of the population growth in the village had continued for long time, but since the 1990s it gradually declined. In this presentation I would like to examine how and why fertility rate declined that related to international migration.

Population growth in the village brought about reclamation of forests for paddy land. The paddy increase finished almost in the 1970s, although fertility rate has still remained in high level. In the 1990s, the villagers began to temporarily migrate to Thailand, and young families experiencing the migration could build new houses and buy paddy lands of mainly other villages, that enabled increased population to absorb in the village. At the same time international migration to Thailand forced to practice birth control to young people because it is difficult to have babies during their staying in Thailand. Was this migration the first cause of fertility declines in the village? The answer is no. It will be considered that first cause of fertility decline is development of market economy, and international migration to Thailand is a factor to accelerate the fertility decline.

### Key words:

rural Laos; international migration; fertility decline; market economy; Thailand

## Transit Migrants in Northern Africa: Translocality as Social Practice

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### Abstract

For several decades the mobility of African migrants between Africa and Europe has attracted attention from numerous politicians and scholars across different disciplines. While this mobility has been analyzed for the most part in the context of irregular migration and/or European security policies, this paper conceptualizes the movements of African migrants as part of a “migration space” that has always been characterized by mobility, fluidity and transition. Based on qualitative empirical studies that were conducted during several stays in Algeria between 2014 and 2015 we will focus on transit migrants, their different translocal social practices and connections to other migrants in other places in the Maghreb. The aim is to identify processes of incorporation, belonging and local place attachments. The results show that, depending on the translocal connections and relations between the migrants, different information about changing policy decisions, migration routes and successful or unsuccessful border crossings are exchanged among the migrants. This plays an important role for the strategies of the migrants and is essential for their decision to continue migration or to settle down in the region for some time.

### Key words:

transit migration; translocality; social practices; North Africa and Europe

## Transnational Behaviour of Ukrainian Remitting Migrants

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### Abstract

In connection with the growing trend of so-called transnationalism in international migration flows, increases in recent years in the world and in the Czech Republic the number of transnational communities circulating migrants' specific way, the target country's migration to their mother country of origin. The aim of this paper is to describe the transnational processes using the example of Ukrainians and Ukrainian workers in the Czech Republic. The research was conducted with immigrants in the Czech Republic and their families in Ukraine. There were conducted more than 50 interviews, which were analysed using qualitative content analysis. Based on the remittances sent, marital status and gender was created typology of remitting, in which then was assessed specifics of transnational processes. Different behaviour of transnational migrants because, inter alia, a reflection of their socio-demographic characteristics, e.g., family status, education or number of children, and as they may change over time.

### Key words:

Transnationalism; Ukrainians; gender; typology; remittances; labour migration

## Transnational Labor Migration from Lao PDR to Bangkok, Thailand: Perspectives from Sending and Receiving Areas

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### Abstract

Many studies conducted about transnational labor migration to Thailand focused on the illegal situation of foreign workers in Thailand. However, most of them have not been interested in the sending areas of the migrant workers. Therefore, we conducted field surveys in Bangkok and in a sending village in central Laos, as well. The village (Pop: 765) is sending their ca.273 young villagers to Bangkok and we made interviews to 83 villagers among them in Bangkok. The main results of the survey are as follows: First, most of the interviewees got job information in Bangkok in advance from their relatives and friends, which suggests the villagers' transnational network is important for their decision-making. Second, the average monthly income (8,400 Baht =240 USD) of them is upon the official minimum wage in Bangkok. All of the villagers work in small firms in manufacturing and service sectors as unskilled workers and some of them don't have any official documents. There seems thereby to be a win-win relationship between the Lao villagers and the Bangkok labor market suffering from labor shortage. Third, the average remittance reaches 4,000 Baht (=115 USD) per month, which is a quite large amount for the village. The remittance has been used mainly for building houses and expanding paddy fields. The transnational labor migration has been changing Lao villages' main source of income from agriculture to remittance. Acknowledgement: This work was supported by JSPS KAKENHI Grant Number 25257004.

### Key words:

Transnational labor migration; chain-migration; remittance; Bangkok; Laos

## A Study on Migrant Workers' Willingness to Cities of People Living in Minority Gathering Area

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### Abstract

Since the 1980s, with the rapid development of China's market economy and urbanization, research on urbanization response become the hotspot. Based on field research and mathematical analysis, this study uses Cross Analysis, Fuzzy Comprehensive Evaluation and builds a Logistic Regression model to investigate the minority groups' response to urbanization issues in Guanghe County, Gansu Province, focusing on migrant workers' willingness to cities and the factors in individual characteristics, economic, cultural and environmental aspects. Although of the research has placed the emphasis on minority populations who live in urban area, this study considers the opposite point of view, selecting minority gathering area to investigate. It can be the effective supplement of current study of minority.

The results show that (1) the top three factors in individual characteristics, economic and cultural level are gender, education level and family income. (2) In the environmental aspects, migrant willingness is less affected by environmental factors, because more people will choose the profits and try to adapt to the environment. But for Muslims, environment and activities of religious sites is particularly important, which of course affects a certain number of people's migrant decisions.

### Key words:

migrant worker; minority group; willingness; work in city

## **An Analysis on the Change of Employed Labor Force Spatial Structure in Guangzhou City**

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### **Abstract**

The employed labor force is one of the most active factor of urban spatial structure evolution. Setting the township streets as the basic geographical unit, this thesis using the data of Fifth (in 2000) and Sixth (in 2010) Establishment Census of Guangzhou to research the labor force's spatial and time distribution, evolution features and its employed centre's spatial structure base on GIS spatial statistical analysis and mathematical statistics. Studies show that:(1) The employed labor force has the trend that the density of old town area drop while the centre ara and the suburb area increate obviously. (2) On the scale of space, the general characteristics of Guangzhou employed labor force is that the density is thereby diminishing lower and lower from old town area to peripheral area. The gravity of employed labor force moved to the north and the distribution of employed labor force tend to be regularization and equilibrium. (3) Through curves fitting, the employed labor force fit the discipline of density diminished with the distance increased and Exponential can match the distribution of employed labor force density properly. (4) The features of Guangzhou employed labor force distribution show that the points of peak number of employed labor force are more than before and the employed centre turn form single-core to pollcentric by using spatial interpolation methods.

### **Key words:**

Employed labor force; Spatial and time distribution; Guangzhou; Urban spatial structure

## Migration Pattern of Floating Population in New Urbanization: A Case Study of Zhongda Cloth Market, Guangzhou

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### Abstract

Migration is the major way and the kernel body of the China 's urbanization. However, there are few studies about the migration pattern of the floating population from the perspective of microcosmic angle. This paper is based on the investigations of questionnaire surveys and in-depth interviews about 619 subjects of floating population working in typical floating population gathering area in Guangzhou. With an aim to understand their migration pattern and its influence mechanism, we systematically introduce the demographic and social characteristics of the subjects, analyses their migration process, the degree of social integration and the scale of the city they will migrate to. By the statistical methods such as factor analysis and cluster analysis, the results illustrate that in the study area: 1) 34.5% of floating population keeps to migrate to the larger cities, while the economic factor is the key factor. 2) nearly 86% of floating population tends to settle in the super city with a population of 10 million or the small town with a population of 0.5-1 million in the future. 3) the degree of social integration has a great impact on migration model. Floating population with the higher social integration usually holds the less frequency of migration, while inclined to live in the larger city in the future. On the basis of the above, we propose the refinement suggestions according to the different scales of the cities. We believe the proposed approach will have significant implications for population management and urban planning research during the new urbanization.

### Key words:

Floating population; migration pattern; social integration; new urbanization; Zhongda Cloth Market; Guangzhou

## Overview on Domestic and Foreign Research of Low-Fertility Trap

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### Abstract

We have been facing a worldwide low fertility since the 1990s. Related research puts forward the “low-fertility trap” hypothesis, besides discusses the causes of the phenomenon, mechanism and its social and economic influence. Based on a theoretical model of low fertility and continuous development of calculation method of the total fertility rate, scholars estimate the fertility changing trends by using multiple sources of data has become a research hotspot. There are two kinds of judgment according to whether China has falling into the “low-fertility trap”, while estimation of Chinese fertility under the universal two-child policy are also different. Tracking survey should be taken in order to explore the new trend of China's fertility.

### Key words:

Low-Fertility Trap; Total Fertility Rate; A Universal Two-Child Policy

## Seasonal Population in the Rural Areas of Central Russia: Opportunities for Research

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### Abstract

The continuing depopulation in the rural areas of Central Russia is well-known process. According to the recent studies there are some other trends also. The population is pulsating more and more depending on the day, week or season. As a result, many rural settlements are becoming seasonally inhabited; especially in summer when the townspeople come to countryside for recreation. However, the issue how and why the permanent settlement turns into temporary is not well-understood yet. Our field work, which was conducted in rural areas in Tver region has shown that one of the main factors influencing the placement of seasonal households is the size of the settlement. If it is smaller, the proportion of seasonality is higher. But what is more important, the basic cause why people choose the particular place for second summer living is their "roots" and relations with local community. In fact, there are a lot of other reasons in this process. Advice of friends, attractiveness of landscapes, and the cost of the land could influence people's choice. The case studies in different villages of Tver region demonstrated the important role of the people who live there only during the specific period of time (week, month, etc.). As they live in cities most part of a year; they are often more creative and initiative. In our point of view, this role of the "temporary", seasonal, population will become more significant in future. The study was funded by Russian Foundation for Humanities (project № 15-03-00743).

### Key words:

Seasonal population; rural area; Central Russia; Tver region

## Space Pattern Evolution of Population Distribution and The Driving Factors in Northeast China

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### Abstract

Northeast China is considered as the important old industrial base. However, the change of population distribution and its driving factors were not clear yet under the circumstance of a new round of revitalization. Therefore, based on the population census data in 1900, 2000 and 2010, this paper employs Lorenz curve, relative change rate of population density, and Moran's I to analysis spatial pattern evolution of population distribution in Northeast China from 1990 to 2010, which consists of 176 counties. Subsequently, based on the partial least squares (PLS) regression method, 10 natural and socioeconomic factors are recognized to conduct quantitative analysis on spatial pattern evolution of population distribution in Northeast China. Major conclusions can be drawn as follows: (1) Population density changed from comparative dispersion to comparative concentration. And the areas which had higher population density occupied smaller land, while those with lower population density hold larger land; (2) From the perspective of the change of overall distribution pattern in nearly 20 years, average population density shows: HeiLongjiang < Jilin < Liaoning province. There was growing tendency of the multicenter "T" type population distribution pattern with the provincial capital as the core; (3) Population distribution presented remarkable and positive spatial auto-correlation. From the perspective of the changing type of population density, 80 counties' population were increased and 96 are decreased over 20 years; (4) Natural and socioeconomic factors were acting together on the change of population density, but the level of socioeconomic development was the major factor that influenced the change of population density.

### Key words:

population distribution; spatial-temporal evolution; driving factors; old industrial base

## Spatial Distribution of Migration and Economic Development: A Case Study of Sichuan Province, China

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### Abstract

The spatial distribution of China's rapid growth in population and economic development is uneven, and this imbalance leads to migration. However, the literature concerning migration in China has been primarily focused at the provincial scale and on eastern parts of the country. Relatively few studies have examined migration between counties and these rarely involve poor areas, and even more rarely involving out-migration areas. Using statistical data, this study analyzes the spatial correspondence between population distribution and economic development in Sichuan with an index, the Correspondence of Population and Economy (CPE). We also build a regression model of net-migration to analyze the driving forces of migration. The results include the following: (1) The distribution of population, population density, GDP, and GDP growth are all similar, and the high value areas are mainly concentrated in eastern Sichuan; (2) The number of counties that are balanced in CPE dropped from 30 to 12 from 2005 to 2012, but the counties did not overlap; (3) Most in-migrants come from Sichuan itself, and in-migration areas are primarily concentrated in cities; (4) In the regression model, the four economic factors have a positive influence on net-migration, but rural employment has a negative influence; (5) CPE has a weak negative correlation with net-migration.

### Key words:

correspondence of population and economy index; migration; linear regression

## Spatial Pattern of Population Variations and Its Influencing Factors in Northeast

### China from 1990 to 2010

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#### Abstract

Regional spatial pattern of population variations depicts the evolved path of human-land relationship. Though analyzing population variations during a period, the integrated development of socioeconomic laws can be extracted which hidden behind. As China's old industrial base, Northeast China, which has made great contributions to our country's economic prosperity after the foundation of the PR China, was honoured as "the eldest son of the Republic". However, since the end of 20th century, it suffered from "Northeast Phenomenon" and "New Northeast Phenomenon", also the nationwide economic "New-Normal". As a result, Northeast China is facing with the unprecedented low economic growth and a huge loss of population at present. Based on some kinds of statistic methods, the article researches spatial pattern of population variations and its influencing factors in Northeast China from 1990 to 2010, with a view to achieving its economy and society coordinated development. The results reveal that:1)The number of population is growing, but the growth rate has slowed down, and the continuously decline in natural population growth rate and expanding size of net emigration have led to the trend.2)Despite the "core-periphery" gradient pattern has not changed, population variations manifests clearly "polarization" pattern.3)Significant population variations units demonstrate "little centralized and big decentralized" distribution and central city proves might be "near domain deprivation".4)Densely populated units have reduced, meanwhile, the density pattern shows more differences between the north and south.5)Economic development, industrial structure, employment levels and medical services have a significant impact on population variations, and economic factors perform more important functions.

#### Key words:

population variation; spatial pattern; influencing factor; Northeast China

## Spatial Patterns of Population Migration in Thailand: Analyzing Population Census 2010

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### Abstract

This research investigates on features of population migration in whole of Thailand. Although many research studies on migration in Thailand have been conducted, most of them have focused on before 2000. Thailand experienced economic growth after the Asian currency crisis, and its economic event might cause Thai people to change their mind of migration. In addition, they have been little interested in foreign migrants in Thailand. This presentation tries to clear the spatial patterns of population migration in Thailand. Furthermore, I try to clear detail relationship between population structures and socioeconomic structures overly spatial patterns and socioeconomic structures by GIS analysis. This viewpoint will be important for the future of Southeast Asian economy since AEC started.

From this research, most of migrants still tend to move to the Bangkok Metropolitan Region. In addition, the number of immigrants to the East region considerably increased. This result illustrates that metropolitan areas of Bangkok have been expanding to the Extended Bangkok Metropolitan Region. This phenomenon was occurred by that job opportunities, especially engineering jobs pull migrants relating with industrial aggregation.

On the other hand, some provinces in rural region have a feature as center of their region, but pull factors of them are very weak.

### Key words:

spatial pattern; population migration; socioeconomic structure; GIS

## The Population Spatial Evolution in Hangzhou Main City under the Influence of Land Development

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### Abstract

Based the statistics of land development projects in Hangzhou main city from 2001-2010 and combined with Hangzhou's fifth and sixth census data, this paper analyzes the characteristics of population spatial evolution under the influence of land development from two aspects, the population and population density by using surfer8.0 and arcgis10.0. The study found that the suburbanization was co-existed with the population reflux to central area in the main city of Hangzhou; urban population concentration and diffusion of the internal space has become more complicated, and the expansion of the regional population diffusion has increased; suburban high intensity of land development kept the developments in suburban areas and the outer suburb areas in a high-rate growth; the demographic structure of the city was transferred from the "one main two" into "a main three times."

### Key words:

population spatial evolution; land development projects; influence mechanism; Hangzhou main city

## C12.34 Population Geography

### ‘Urbanization and Population Change in China: Parallels and Differences to the Developed World’



Home

#### Oral

1. [Aging in Place in Shanghai? A Demographic Equation Approach](#)  
Banggu Liao (Shanghai Normal University, China); W. S. David Wong (George Mason University, Armenia)
2. [Anglophone Concepts in China: Cul-De-Sacs or Avenues of Opportunity?](#)  
Darren Smith (Loughborough University, United Kingdom)
3. [Coupling Coordination between Population Change and Land Change in the Urbanization of Pearl River Delta, China](#)  
Shijie Li; Chunshan Zhou (Sun Yat-sen University, China)
4. [Culture-led Urban Regeneration in China: A Case Study of Dayuan Road Culture Square District in Xiamen](#)  
Xun Li (Urbanization Institute, School of Geography and Planning, Sun Yat-sen University, China, China); Yaofu Huang (Academy of Urban & Rural Planning and Design, Sun Yat sen University, China, China); Xiayan Mai (Urbanization Institute, Sun Yat sen University, China, China); Edwin H.W. Chan (The Hong Kong Polytechnic Univeristy, HongKong SAR, China); Wei Lang (The Hong Kong Polytechnic Univeristy, China)
5. [Demographic Trends and Spatial Distribution of Taiwan Ethnic Minorities: Some Implications for Ethnic Policy in Taiwan](#)  
Andrew Dikarev (MGIMO, Russian Fed)
6. [Environmental Cleanup and a Reconfigured, Rescaled “Right to the City” In Jing-Jin-Ji](#)  
Samuel Kay (Ohio State University, United States)
7. [Explore The Relation Between the Growth of Population and the Expansion of Land in Different Scales with the Newest Standard of Urban Division](#)  
Chan Jian (south china normal university, China)
8. [How Should We Understand / Frame ‘Alternative Food Networks’ in China’s ‘Ecological Civilization’?](#)  
Leigh Martindale (Lancaster University, United Kingdom)
9. [Induced by International Students but Displaced by Local Gentrifiers: The Evolution of a](#)

## Studentified Area in Nanjing, China

Jie Sun; Xigang Zhu; Fengbao Liu; Jiao Chen (Nanjing University, China)

10. Polarization or Professionalization? Social Structure Changes in Chinese Global Cities: The Case of Beijing

Qiujie Shi (Peking University, China), Tao Liu (Hong Kong University, China), Guangzhong Cao (Peking University, China)

11. Population Distribution and Polycentric Spatial Structure of Chinese Megacities: Taking Hangzhou, Wuhan, Xi'an and Shenyang as Example

MENGXUE LI (Northwest University, China)

12. Research on Spatial Distribution Characteristics of the Elderly Population Based on Multi Scale Analysis

Yishan XU; Dian ZHOU; Zhe LI; Zhiwei QIU (Xi'an Jiaotong University, China)

13. Semi-Urbanization and Evolving Patterns of Urbanization in China: Insights from the 2000 to 2010 National Censuses

Guangzhong CAO; Xiang LIU (Peking University, China)

14. Studentification in China: Changing Geographies of Haidian District, Beijing

Hao Gu (Tsinghua University, China)

15. Study of Spatial-Temporal Change of Population Distribution of China in Recent 60 Years

Jiang Yao; Yin Weixia; Wu Yaoyao; Gu Shuran; Wang Jing'ai (School of Geography, Beijing Normal University, China)

16. Why Are Population Growth and Housing Price Growth Coexistent in China's Metropolitan Area?

Chen Le; Li Xun (Sun Yat-sen University, China)

## **Poster**

1. Analysis of Development Features, Mechanism and Strategy of the In-situ Urbanization in Metropolis Fringe Area: A Case study of Wenzhou

Mingu Zhang; Wangming Li (China, Zhejiang university)

2. Differences of the Construction of Social Network of the New Generation Rural Migrant Workers Under Different Housing Morphologies

Xinyu Wei; Qing Zhu; Cuicui Kong (China, Beijing Normal University)

3. From Urban Village to International Community: Space Production of South Korean Enclave in Yuanjing Road, Guangzhou



Zhou Wenting; Liu Yungang (China, Sun Yat-Sen University)

4. [Spatial Pattern and Dynamic Mechanism of Rural-town Migration in China](#)

Shaofei Wang (China, Beijing Normal University)

## Aging in Place in Shanghai? A Demographic Equation Approach

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### Abstract

The English literature on the geography of ageing argues that migration shapes the spatial patterns of ageing population at the intra-country level, and housing choice is the primary determinant at the intra-city level. But this framework based upon developed countries may be not applicable to developing countries and cities. As many large Chinese cities experienced the influx of floating population, ageing in Chinese cities may have a more complicated picture. This paper hypothesizes that migration, both the floating population migrating into cities and intra-urban migration of local residents are the main determinants shaping the spatial patterns of ageing in Chinese large cities. Using Shanghai as a case study, and based on the 5th and 6th Chinese population censuses at the committee level, this paper describes the changing geographical distribution of ageing population in Shanghai from 2000 to 2010. We then analyzed the extent that the distribution of ageing was contributed by the floating population in the Chinese context and intra-urban migration. This analysis was based upon the projection of ageing in place, which was compared with the actual 2010 population. We conclude that the spatial patterns of ageing in Shanghai can be described as a rippling pattern with polarized age distribution, which was accentuated by the arrival of floating population.

### Key words:

ageing; spatial pattern; migration; ageing in place; projection of ageing; Shanghai

## Anglophone Concepts in China: Cul-De-Sacs or Avenues of Opportunity?

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### Abstract

This paper will draw upon the work of Warde (1991), Lees and Davidson (2008) and Clark (2002) to reflect on the salience of mainstream anglophone definitions of gentrification, and their transposition to the context of China. Developing a diagrammatic representation of gentrification, the paper will focus on the social, economic, cultural and physical manifestations of mainstream gentrification, and consider their pertinence alongside scholarship of broader urban changes to Chinese cities and rural places. This will then be considered in relation to the transformations associated with studentification in the Chinese context (He, 2015; Gu,2015), to address the main question: is studentification an expression of gentrification in the Chinese context.

### Key words:

Gentrification; studentification

## **Coupling Coordination between Population Change and Land Change in the Urbanization of Pearl River Delta, China**

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### **Abstract**

Land and population are two key and interactive factors in urbanization, and it's extremely important to coordinate them for healthy urbanization. This paper aims to examine the coordinate development between population change and land change in the urbanization of the Pearl River Delta, China and provide some scientific basis and references for its future urbanization development. A comprehensive evaluation index system on population change and land change, including population structure, population quality, life quality, land structure, input and output is respectively established. On the basis of calculating the level of population change and the level of land change by using the variance of the weight method, the coupling coordination model is used to calculate the coupling degree, coordination index, coupling coordination degree between them in 9 cities of this region from 2004 to 2013. Based on the results obtained from the calculation, the coupling coordination between population change and land change is empirically analyzed. The results are as follows. (1) Both of the level of population change and the level of land change rose continuously with fluctuations between 2004-2013, and the advances of the two levels were extending from center to periphery. (2) The population change lagged behind the land change, but the gap between them was narrowing. (3) The coupling coordination relationship between the population change and the land change was unbalanced spatially, and it presented a spatial difference in different cities.

### **Key words:**

urbanization; population change; land change; coupling coordination; Pearl River Delta

## Culture-Led Urban Regeneration in China: A Case Study of Dayuan Road Culture Square District in Xiamen

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### Abstract

In China, after the rapid urbanization in the last 30 years, urban renewal has become a critical approach to enhance urban competitiveness and facilitate the transformation of extensive development paradigm. Since space is the container and carrier of culture, society and industry, urban renewal as a process of spatial reconstruction brings the threat of losing local culture and breaking traditional community with the challenge of reconstructing urban industry. Besides, various interest groups are co-related, which make it difficult to tackle interest redistribution. It is important to find out effective approaches to lead urban renewal and to create a more socially sustainable urban area. The Dayuan Road Cultural Square renewal project in Xiamen has provided a valuable practice of culture-led, organic and gradual renewal approach. By studying this case, the paper tries to examine the ‘catalyst effect’ of the approach. Through analysis, three strategies have played a key role, including (1) place making of the public space which triggered a self-sustaining “virtuous circle” of renewal of the nearby buildings, (2) organizing cultural activities to rediscover cultural resources and flourish local cultural industries, (3) encouraging local particularities (both social organizations and NGOs) to help the elderly and children so as to “de-code” the use values of people’s live spaces and give them a sense of belonging. The paper points out that the “catalysted” model of culture-led regeneration is an alternative approach to sustainable urban revitalization in China in future from social, cultural and economic perspectives.

### Key words:

Culture-led; Urban Regeneration; Place-making; Catalyst Effect

## Demographic Trends and Spatial Distribution of Taiwan Ethnic Minorities: Some Implications for Ethnic Policy in Taiwan

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### Abstract

In the official publications of mainland China all ethnic minorities of Taiwan have usually been nominated as “gaoshan” (literally: “living in the hills”) though most of them live in coastal areas. In Taiwan modern approach to serious studies of these people and their culture actually was applied at the end of 20-th century only. As a result, several ethnic communities were nominated as separate national minorities.

Beginning from 2008 when Guomindang came back to power the main task was to define further strategy of the policy towards aborigines. The modernization process and economic development resulted in massive outflow of aborigines to the industrial regions of Taiwan where they can get jobs much easier. Now more than 40% of aborigines live out of the 55 townships historically (from the times of Japanese occupation) designated as territories with predominance of aboriginal population.

Strategic approach to ethnic policy can be formulated as one of the choices: Separation and conservation (case of Indians in the USA) or participation and progress. It is clear that for Taiwan with its extremely limited natural resources it will be absolutely necessary to develop and use rich resources of central and eastern parts of Taiwan. The question is: will it be possible for aborigines to keep their habitat, culture and traditional activities intact or they will merge somehow with Han majority.

### Key words:

Taiwan China; aborigines; ethnic policy; population

## Environmental Cleanup and a Reconfigured, Rescaled “Right to the City” In Jing-Jin-Ji

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### Abstract

Environmental cleanup, increasingly high on the agenda of both municipal and national authorities, is reshaping where different types of people and industries fit into China’s urban network. Insofar as the right to occupy particular places has become linked to freedom from exposure to toxins, emerging environmental policies and discourses may be reconfiguring the “right to the city.” We are thankfully past the time when it might be acceptable for Western scholars to write about X “with Chinese characteristics,” a time when transformations taking place in Chinese society were written about as variations on a theme already composed in Europe and North America. Urban scholarship, as Robinson and Roy (2015) have argued, is now in “a phase of rich experimentation” which stems from taking seriously places beyond Europe and North America as theory-producing sites. Many China scholars have already begun the challenging work of rethinking urban theory for a Chinese context. This paper adds to that work by examining in particular the usefulness and limitations of “the right to the city” and other critical urban theory concepts derived from the likes of Marx, Harvey, Lefebvre, Soja, Smith, and others for work in Chinese contexts. Ran Liu has more than ably taken up this specific question in her recent book, and I seek to build on her analysis to look more closely at environmental issues, and also consider the role of foundational concepts such as space, nature, and scale.

### Key words:

Urban studies; migrants; environmental justice; scale

## Explore the Relation Between the Growth of Population and the Expansion of Land in Different Scales with the Newest Standard of Urban Division

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### Abstract

In this paper, we research the relation between the population and land in urbanization according to the latest State Department criteria for the classification of the city from 2003 to 2012, and calculate the rate of urban population growth and land expansion of 277 cities to analyze the coordination. It shows ① type I small and medium-sized cities changed most severely in recent decades, there are many type I small-sized cities changed to medium-sized cities, and medium-sized cities changed to type II big-sized cities. ② type II big-sized cities and medium-sized cities show to population urbanization. ③ all of these seven standards cities appear to a trend that land expansion faster than population growth in the macro scale, and show that the model of urban development is extensive.

### Key words:

population growth; land expansion; urbanization; urban development.

## How Should We Understand / Frame ‘Alternative Food Networks’ in China’s ‘Ecological Civilization’?

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### Abstract

China’s project of ‘Ecological Civilization’ can be seen as an explicit recognition on behalf of the Chinese Communist Party (CCP) that a version of ‘green development’ is becoming necessary due to the rising tension between essential economic growth and the increasing levels of environmental degradation. This paper probes this need for a green transition via the issue of food. Food is a pertinent framing to analyse this transition as agriculture accounts for nearly 50% of China’s pollution and issues concerning food safety have been brought to the fore in China due to a succession of recent food scares and poisoning incidents (Yan, 2012). This paper critically interrogates the emergence of so called alternative food networks (AFNs) that have arisen to counter China’s chemical intensive industrialised food system. Instead, AFNs are often organic community farms, in peri-urban areas, which are run by white collar professionals who emphasise face to face contact, not distribution by supermarkets. In a Western discourse the study of AFNs has often been impeded by dichotomized ways of thinking, i.e. by binaries of scale (local/global), ethics (neoliberal/participatory) or difference (mainstream/alternative) (Holloway et al, 2007; Levkoe, 2011; McClintock, 2014; Turner & Hope, 2015). That Chinese AFNs have generally emerged out of practicality – in response to issues of food safety – and are not driven by ethical, environmental or anti-capitalist motives, this paper argues that Chinese AFNs can perhaps offer novel ways of understanding AFNs that somewhat challenges, and somewhat breaks with, established Western theories.

### Key words:

Alternative Food Networks (AFN); Ecological Civilisation

## **Induced by International Students but Displaced by Local Gentrifiers: The Evolution of a Studentified Area in Nanjing, China**

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### **Abstract**

The last decade has witnessed evolutionary diversification in the form of studentification in western countries. However, little attention has been casted on its evolution trajectory which helps to trace the internal relation between studentification and gentrification. This study aims to illustrate a unique transformation process of studentification taken place in China. A line of empirical evidence is presented based on fieldwork in Jinyin Street, Nanxiu Street, Hankou Road and Shanghai Road, four neighborhoods close to Nanjing University campus that exemplifying how a studentified area foremost composed of international university students gradually displaced by increasing local mature gentrifiers that developed into a gentrified area. Notably, the renewal of Jinyin Street was leaded by city government and university administration in early to cater to international university students' tastes aimed at creating an international cultural atmosphere contributes to learning. And it stimulated private business owners along nearby streets& roads to repair their shops by changing style and scale, as well as updating the item of business spontaneously, which attracted more and more local gentrifiers for consuming diverse education services or experiencing multinational lifestyles. Subsequently, international university students were marginalized for their smaller population and lower economic ability. In the Chinese context, studentification formed by international students acted as the accelerant of gentrification promoted by marketing. This research reveals profoundly the nature of capital accumulation in the process of uneven development and provides a prism to understand the complex dynamics of urban transformation in Chinese cities with the commercialization of education and culture consumption.

### **Key words:**

studentification; international university students; local gentrifiers; gentrification; Nanjing University

## **Polarization or Professionalization? Social Structure Changes in Chinese Global**

### **Cities: The Case of Beijing**

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#### **Abstract**

Social structure changes in global city have been debated over the past decades with multiple factors being taken into account recently. It is admitted that economic globalization, large-scale migration and institutional factors, especially welfare states and the developmental state, are three main forces shaping the social outcomes in global city, which remains unstudied under Chinese context where all these factors are endowed. This paper, constructing on theoretical explanations for social structure changes in global city, takes Beijing – the capital city and a ‘global city’ of China – to discern its social structure changes over the past decade by large-scale quantitative economic censuses data. The results show that although economic globalization and large influx of migration occurred in Beijing, which may indicate a trend of social polarization, it was an accelerating professionalization with an increasingly relative growth in the upper class at the expense of all other groups that prevailed in Beijing during 2004-2013. These results implicate that institutional factors – the localized and biased welfare system and government-centred developments – are still important in shaping the social structure in Chinese global cities, where the influential forces should be re-considered in a broader way in future theoretical and empirical works.

#### **Key words:**

global city; social structure; institutional factors; Beijing

## Population Distribution and Polycentric Spatial Structure of Chinese Megacities: Taking Hangzhou, Wuhan, Xi'an and Shenyang as Examples

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### Abstract

Based on census data of 2000, 2010 and Exploratory Spatial Data Analysis, this paper examines the spatial distribution and evolution characters as well as the spatial structure of four Chinese megacities including Hangzhou, Wuhan, Xi'an and Shenyang, which represent the megacities in Eastern, Central, Western and Northeastern regions respectively. We found: 1) there are significant regional difference between four megacities and circle difference in each megacity. Suburbanization exists in each city. The population density difference is increasing between different towns in suburb region. Two spatial expansion models are summarized for the megacities. In the first model, megacities are mainly expanded in inner suburbs as well as very few broken in outer suburbs. In the second model, megacities are sprawling very far along with river, mountain or transport lines. 2) The population spatial agglomeration very high and increasing. Both spatial agglomeration and spatial diffusion are existed in the megacities. 3) Polycentric population spatial structure of megacities has been formed and is constantly enhanced.

### Key words:

Spatial structure; Suburbanization; Polycentric; Megacities

## Research on Spatial Distribution Characteristics of the Elderly Population Based on Multi Scale Analysis

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### Abstract

Research on the spatial distribution characteristics of the elderly population is of great scientific and practical significance for the rapid aging of the population and the construction of a livable environment for the elderly. In this paper, the data from PUWU and PUTIU in XI'AN city is used to explore how to provide a scientific basis for building urban facilities for the elderly and pension policy-making. To achieve this, method of ring structure and statistical correlation analysis is applied such that GIS spatial processing works on the elderly population density and aging rate, from two dimension (city and street) to expose spatial distribution of the elderly population.

### Key words:

elderly population; spatial distribution; multi-scale analysis; spatial processing works

## Semi-Urbanization and Evolving Patterns of Urbanization in China: Insights from the 2000 to 2010 National Censuses

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### Abstract

Based on the prefecture-level data of the 2000 and 2010 national censuses, the spatial evolution of China's semi-urbanization is analyzed in this study. The stages of urbanization are re-examined by considering semi-urbanization. Nine models of urban development are presented according to the relations between semi-urbanization and urbanization, and China's urbanization is divided into five stages, namely, high incoordination, incoordination, low coordination, coordination, and high coordination. Results show that China's semi-urbanization rate varies significantly from one area to another; its order in 2010 from the highest to the lowest value was as follows: east, middle, west, and northeast. Urbanization and semi-urbanization rates in inland cities increase more than those in coastal cities. In addition, semi-urbanization displays a spatial pattern similar to that of urbanization across China, with the sole exception of the northeastern region. Through a spatial autocorrelation analysis, the spatial concentration of semi-urbanization is determined to be increasing. High-value concentration areas are expanding in the coastal east, whereas low-value concentration areas are growing in the northeast. Lastly, the evolution of China's urbanization model suggests a weakening trend of coordination between urbanization and semi-urbanization over the studied decade. Semi-urbanization can be viewed as a special production of China's *hukou* system, which restricts the permanent settlement of migrants in cities. As such, China's semi-urbanization trend is expected to exhibit a reverse U-shaped pattern as urbanization and citizenization develop.

### Key words:

semi-urbanization; urbanization; spatial evolution; hukou; census; China

## Studentification in China: Changing Geographies of Haidian District, Beijing

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### Abstract

Processes of studentification encompass socio-economic, cultural and physical changes which are tied to seasonal population movements of university students. To date, most empirical investigations of studentification have tended to take place in Anglophone contexts. This thesis extends the lens of study to China, and shows the salience of the concept for understanding urban transformations which have unfolded since the introduction of a new state policy in 1999 for the expansion of higher education. Using the case study of Haidian District (Beijing), and focussing on Peking University students, the thesis makes original contributions to academic knowledge. First, it argued that the concept of studentification can be transposed to the Chinese context, and that social, cultural, economic and physical signifiers of studentification are evident in Beijing. Second, four main geographies of studentification are revealed, which concur with Smith and Hubbard's (2014) discussion of the co-existence of diverse geographies of studentification in the UK. By contrast to the UK, it is shown that all geographies of studentification are 'gated'. Yet, differential residential and socio-cultural experiences are highlighted, in part, influenced by state regulations for Chinese students to reside within university-managed dormitories, or acquire permission to live off-campus; contrary to less-regulated accommodation patterns of International students. This division marks a conceptual difference between studentification in China and UK, with international students more aligned to stereotypical cultural/lifestyle traits of UK students (e.g. noise, partying), as opposed to Chinese counterparts residing in regulated (study-oriented) spaces on-campus.

### Key words:

studentification; students; student housing; community; urban change; Beijing

## Study of Spatial-Temporal Change of Population Distribution of China in Recent 60 Years

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### Abstract

The spatial and temporal distribution of population are the critical attributes of hazard bearing body. Long period and high resolution of the distribution of population are important to the research of the exposure and risk of the population to natural disasters. This study was based on 6 times' Chinese census data from 1953—2010. The results showed that: from 1953 to 2010, the spatial distribution of Chinese population was rarely changed, a wide range of high population density areas are concentrated in the North China Plain, the Yangtze River region and the Sichuan Basin region; besides the little people area, the population density was gradually increased, the high population density area was gradually expanded, the area ratio of population density > 300 people / km<sup>2</sup> was increased from less than 15% in 1953 to 30% in 2010. In economic zone scale, the ratio of the area of high population density in Eastern area was the largest and increased fastest. The area ratio of population density > 300 people / km<sup>2</sup> was increased from 20% in 1953 to 40% in 2010. In basin scale, the ratio of the area of high population density in the Huaihe River and Haihe River Basin was the largest and increased fastest. The area ratio of population density > 300 people / km<sup>2</sup> in Huaihe River Basin was increased from 35% in 1953 to 60% in 2010. This study provides a powerful support for the accurately estimate of the number of the population exposed to the natural disasters.

### Key words:

Population distribution; Change; Different scale; China

## Why Are Population Growth and Housing Price Growth Coexistent in China's Metropolitan Area?

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### Abstract

Population growth and housing price growth are significant in China's Urbanization process, but why are the contradicting phenomenon could coexistent in China's Metropolitan Area? In this article, we choose a sample of 287 cities in China from 2005 to 2014, present a simple model that provides a framework for doing empirical work that integrates the heterogeneity of housing supply into population and housing price development. The results show that: coexistent between population and housing price growth is durable for metropolitan cities but not for small urban. High amenity investment plays the dominant role in explaining the coexistent phenomenon, the share of skilled workers could significantly affect housing price growth, but could not significantly affect population growth in current China.

### Key words:

population growth; housing price growth; housing supply elasticity; metropolitan area

## **Analysis of Development Features, Mechanism and Strategy of the In-situ Urbanization in Metropolis Fringe Area: A Case study of Wenzhou**

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### **Abstract**

Due to the typical urbanization mode, 'Wenzhou mode', which is based on the rural industry development, the metropolis fringe area of Wenzhou changed from dualistic structure to ternary structure gradually. Meanwhile, with the transformation of regional growth mode and the adjustment of industry structure, there are new development features presented in the regional spatial pattern and urban system. So, this article thinking, the dualistic structure of household registration system, land property system, primary administration system and the social-economic ternary structure are the reasons for the in-situ urbanization dilemma in Wenzhou metropolis fringe area, and the comprehensive dynamic mechanism of in-situ urbanization also makes contribution to the lack of urban infrastructure construction. Based on the analysis above, this paper illustrates the connection between the updated social-economic background and the modern growing tendency, trying to explore the suitable development strategy of urban planning and government management, in order to promote a healthy, energetic and harmonious metropolis fringe area.

### **Key words:**

Wenzhou Mode; In-situ urbanization; Dualistic Structure; Ternary Structure; Dynamic Mechanism

## Differences of the Construction of Social Network of the New Generation Rural Migrant Workers Under Different Housing Morphologies

### ——A Case Study of Beijing

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#### Abstract

With the rapid development of urbanization, more and more rural migrant workers move into cities, looking for jobs and other opportunities. Compared with the first generation of rural migrant workers, new generation rural migrant workers are much more desired to integrate into urban society. Under the background of new urbanization, the citizenship of new generation rural migrant workers has caused high attention. Accordingly, the study about the way of new generation rural migrant workers adapt themselves and develop in urban society is of great significance. Under geographical perspective, this paper used questionnaire survey method for data collection. And then measured the social networks of new generation rural migrant workers and analysed the relationship between different types of residential space and the construction of social network based on factor analysis method. The results show that scattered residence is of great benefit for rural migrant workers to expand their social network size, enhance the heterogeneity and increase levels of their social network. While concentrated residence can help rural migrant workers fasten the strength of ties. Concentrated residential spaces, such as urban villages and collective dormitories is useless for rural migrant workers to construct social network. New generation rural migrant workers should live together with other social groups, so as to improve the quality of their social network and help themselves to integrate into urban society better.

#### Key words:

social network; accommodation; new-generation peasant worker; social capital

## From Urban Village to International Community: Space Production of South Korean Enclave in Yuanjing Road, Guangzhou

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### Abstract

With a near-20-year development, the Yuanjing Road, Guangzhou got rid of the label of impoverished urban village and transformed into an international community mainly resided by South Korean Transmigrants. With the theory of space production, this research shed light upon Yuanjing Road, taking it as a case to examine the space production of South Korean enclave. Based on first-hand data gathered from field surveys and interviews in February, May and October 2015, we found that Yuanjing Road's transformation from an urban village into an international community, is a joint product of the local government, investors, villagers, migrant population, and South Korean Transmigrants. The South Korean Transmigrants, especially the businessmen, mainly clustered in Yuanjing Road due to two factors: first, the geographical accessibility to land and air transport hubs and large-scale wholesale markets; second, the cheap rental estates provided by urban villages cut the living costs. Meanwhile, the South Korean ethnic economy has developed and conducted trade activities. The South Korean ethnic economy was provided for South Korean Transmigrants' daily needs, which were owned and managed by both self-employed South Koreans and Chinese people. As a result, the development of South Korean Enclave in Yuanjing Road has resulted in the following changes: (1) provided employment opportunities for urban villagers and migrant population alike; (2) stimulated the economic growth of Yuanjing Road, with a general revaluation of real estates as an international community; and (3) reshaped its space landscape and reproduced the social relations of production.

### Key words:

Space Production; Urban village; International community; South Korean Transmigrants; Guangzhou; Yuanjing Road

## Spatial Pattern and Dynamic Mechanism of Rural-town Migration in China

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### Abstract

Urbanization in China is a highlighted character since reform and opening-up. With the development of megacities, rural-town migration feels huge flow under the surface of water in the new stage. By comparing and analyzing the data from the Sixth Population Census in 2010 and the Fifth Population Census in 2000, the fact that the growth rate of town population was 61% from 2000 to 2010, and city was only 23%. Overall, through the spatial analysis by GIS, it is these places, where are traditional inland and relatively far from megacities, are the agglomeration areas of town development in attracting much more external population, which are the majority of North China Plain, Jiangxi province and Hunan province in Southeast Hills, Yungui Plateau, west of Sichuan Basin and the southwest of Loess Plateau. It's also clear that the external population of town are most from nearby rural area. The social survey and quantitative analysis indicate two main categories of rural-town migration in dynamic mechanism. One is rooted in the huge disparity between urban and rural areas, such as income, education, infrastructure and so on. Towns are living and consumption space rather than working and production space. Though part capital comes from the income in megacities, towns have been attracting rural migration for its modern life, lower housing price and consumption, relaxed household registration policy and local culture. The other rural-town migration is promoted by industrialization. Typically, Jiangxi province has been receiving the industrial transfer from Pearl River Delta for its location advantage and presented brilliant balanced development of town all over the province. According to the study, rural-town migration is intertwined with megacities in China, and alternative paths in different regions and social factors deserve attention.

### Key words:

rural-town migration; China; spatial pattern; dynamic mechanism

## C12.34 Population Geography

### Migration and Climate Change an Overview with a Specific Focus on China and Asia



Home

#### Oral

1. [Changement Climatique, Mobilités et Migration en Afrique de l'Ouest: le cas du Sénégal](#)  
Pape Sakho; Henri Mathieu Lo; Oumoul Khaïri Coulibaly Tandian (Université Gaston Berger de Saint Louis, Senegal)
2. [Climate Change in the Pamir Region of Tajikistan: Towards New Internal Mobility and Migration?](#)  
Suzy BLONDIN (University of Neuchâtel, Switzerland)
3. [Climate Change, Mobility and Resettlement: Policies and Conflict in the Pacific Islands](#)  
Eberhard H. Weber (The University of the South Pacific, Fiji)
4. [From Data to Argument: The Challenges of Generating Policy-Operable Understanding from Empirical Knowledge on Climate Change's Relationship with Migration](#)  
Calum Nicholson (Refugee Studies Centre, University of Oxford, United Kingdom)
5. [Rebuilt Risk: Involuntary Return, Voluntary Migration, and Socioeconomic Segregation in Post-Tsunami Aceh](#)  
Jamie McCaughey ((1) Earth Observatory of Singapore, Nanyang Technological University; (2) Climate Policy Group, ETH Zürich, Singapore); Patrick Daly (Earth Observatory of Singapore, Singapore); Ibnu Mundzir (International Centre for Aceh and Indian Ocean Studies, Indonesia); Saiful Mahdi (Syiah Kuala University, Indonesia); Anthony Patt (Climate Policy Group, ETH Zürich, Switzerland)
6. ['Trapped Populations' in Coastal Odisha, India: Understanding Environmental Migration Discourse beyond Dichotomies](#)  
Subhakanta Mohapatra (Indira Gandhi National Open University (IGNOU), India)
7. [Vertical Differentiation of Vegetation Cover Related to Population Migration of Mountain Areas: Taking Taihang Mountain Areas as a case](#)  
Wei Li (Institute of Geographic Sciences and Natural Resources Research, China)

#### Poster

1. [The Impact of Soil Erosion on Human Migration in China](#)  
Li Zhuang (China, Institute for Urban and Environmental Studies, Chinese Academy of Social Science); Hua Zhang; Jinshe Liang (China, School of Geography, Beijing Normal University)

## Changement Climatique, Mobilités et Migration en Afrique de l’Ouest : le cas du Sénégal

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### Résumé

Les liens entre Changement climatique et mobilité humaine sont aujourd’hui au cœur du débat international. Depuis le rapport 2007 du GIEC, il est généralement admis qu’en Afrique les manifestations selon les régions en seront l’élévation des températures, la désertification, la rareté de l’eau et une fréquence accrue des phénomènes météorologiques extrêmes (Chemnitz et Höffler, 2011 : 54). Les prévisions controversées du nombre de migrants et de réfugiés climatiques induits (Afifi et Warner, 2008, Morton et al., 2008; Black et al., 2011, Piguet et al., 2010), illustrent cet intérêt. Et il est majeur pour l’Afrique de l’Ouest et en particulier le Sénégal marqué par une économie basée sur les productions agricoles sous pluies et une urbanisation littorale. Que sait-on des liens entre les manifestations et les mouvements de population dans la sous-région ?

Pour répondre à la question, la communication exploite une revue de la littérature sur la question en Afrique de l’Ouest et les données d’une enquête qualitative réalisée au Sénégal en 2012.

La communication a pour objet un exposé des principales conclusions de la revue qui sont ensuite confrontées aux données de terrain du Sénégal

### Mots-clés:

Changement climatique; migrations; Afrique de l’Ouest; Sénégal

## Climate Change in the Pamir Region of Tajikistan: Towards New Internal Mobility and Migration?

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### Abstract

Natural disasters that occurred in the Gorno-Badakhshan region of Tajikistan recently resulted in a lot of material destructions and numerous human displacements and resettlements. These events stress the need of new researches on the effects of climate change in the region and the new movements and migrations they are very likely to induce. Tajikistan is socioeconomically vulnerable, landlocked and highly exposed to geophysical related disasters such as earthquakes and landslides and to weather related disasters such as droughts, floods and avalanches.

Lately, studies on the region focused especially on the socio-economic importance of the international, seasonal and very manly migrations to Russia, but the internal migrations, for the purpose of work or in the context of forced resettlements are still to be analyzed.

The paper is a preliminary attempt at synthesizing the main environmental issues at stake in Takjikistan as well as to observe the resilience of the local population, the risk management issues and the projects implemented to assist the populations affected. New environmental issues will very probably give a new shape to the Tajikistani territory by enhancing rural-to-urban migrations and resettlements to less-exposed lands.

Very recently, various humanitarian associations conducted assessments of the immediate and mid-term needs of last year's disasters' affected populations and presented the repairing and relocation strategies managed by the associations and the government. Our paper will be mainly based on these data and on the existing literature regarding the Pamir region.

### Key words:

Environmental change; socio-economic vulnerability; resilience; internal migration; resettlement

## Climate Change, Mobility and Resettlement: Policies and Conflict in the Pacific

### Islands

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#### Abstract

Climate change has the potential to trigger large migration flows. Atolls, coastal areas and low lying river deltas / estuaries are particularly exposed to climate change impacts. In countries such as Bangladesh huge populations are threatened not only by sea-level rise, but also by other impacts such as intensifying tropical cyclones.

Also islands in the Pacific are severely exposed. In extreme cases entire states can become inhabitable and then challenges of unprecedented dimensions come up when entire states disappear. People living in these states need to resettle to other countries. For the Pacific Islands *Campbell* (2009) estimates that by 2050 between 665,000 to 1,725,000 people will be displaced because of climate change; some 320,000 live on atolls and low lying coral islands and require international resettlement. In other cases, resettlement within the same country might be an option.

The paper looks at Kiribati and the Fiji Islands and analyses risk scenarios for these countries. The paper uncovers political discourses about resettlement as they emerge on national and international fora. Based on this the paper reflects on challenges that relate to international movement as a result of climate case in the case of Kiribati and small-scale local relocations in the Fiji Islands.

Besides new insights in climate change migration and resettlement the paper also discusses appropriate methods to conduct research on such issues.

#### Key words:

Climate change; mobility; resettlement; Kiribati; Fiji Islands

## From Data to Argument: The Challenges of Generating Policy-Operable Understanding from Empirical Knowledge on Climate Change's Relationship with Migration

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### Abstract

Since the mainstreaming of climate change as a key topic of public and political debate a decade ago, its relationship with human migration has gained increasing prominence among researchers and policy-makers.

However, among the most common refrains (and conclusions) of empirical research is that climate change is one among many variables interacting - in a complex manner - to 'drive' migration. In other words, the framework for determining the causal relationship between climate change and migration, and the threshold by which we might distinguish such migrants from any other sort of migrant, remains unclear.

The paper will argue that considering such frameworks and thresholds is an integral step in any attempt to assess the state of empirical knowledge on the topic of climate change and migration. Only with such thresholds and frameworks in place may data lead to persuasive arguments for institutional investment in particular policies, actions, and interventions.

Given the currency of both climate change and migration as themes of political and popular concern, and the associated risk of their expedient use and abuse in the service of private agendas that are not in the public interest, addressing these two considerations is especially important.

In light of the panel's focus on assessing the state of empirical knowledge in China and Asia, this paper will therefore do three things: argue that a recognition of multi-causality and complexity is widespread in research; discuss the importance of attending to frameworks and thresholds; and emphasise the potential real-world ramifications of failing to do so.

### Key words:

Climate change; environment; migration; causality; epistemology; knowledge; understanding; policy; displacement.

## Rebuilt Risk: Involuntary Return, Voluntary Migration, and Socioeconomic Segregation in Post-Tsunami Aceh

McCaughey JW, Daly P, Mundzir I, Mahdi S, Patt A

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### Abstract

Resettlement choices after a disaster often involve a tradeoff between the risk of recurrence of a disaster and the risks that relocation may pose to livelihoods, social patterns, and land rights. Many studies find that people tend to return after a disaster; consistent with this, a consensus has emerged in the humanitarian sector that it is best to avoid relocation. We ask whether this is what people actually want, using the case of post-tsunami Banda Aceh City, Indonesia. Following the 2004 tsunami there, survivors were generally offered housing aid only to return to their original land. We find that this did not suit a substantial proportion of the affected population, using new quantitative and qualitative evidence from 1160 households and 121 village leaders. While many survivors wanted to return, some wanted to relocate further from the coast but did not have the chance to do so. Since that time, selective out-migration by those with the means and socioeconomic sorting of newcomers have led to a new socioeconomic segregation of the tsunami-affected parts of the city. More broadly, these findings suggest that short-distance socioeconomic sorting into and out from exposed areas may be an important migratory response to a newly recognized risk.

### Key words:

post-disaster resettlement; migration; natural hazards; tsunami; Aceh; post-disaster relocation

## **‘Trapped Populations’ in Coastal Odisha, India: Understanding Environmental Migration Discourse beyond Dichotomies**

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### **Abstract**

Climate change has brought a range of calamities in coastal areas like cyclone and sea ingress. It has wide spectrum of impacts on vulnerable people in India. As a result, people are either migrating or helplessly stranded depending on the sources of income, types of assets and availability of choices. To understand the complexity, the paper argues that there is a need to relook at the mainstream discourse in India which is mainly dichotomous in nature-voluntary vs. forced migration, adapted vs. maladapted and security vs. development etc. The study was conducted in coastal villages of *Satabhaya* (Odisha), India located in the east coast, having long coast line and one of the most disaster prone states of India-Odisha. *Satabhaya*, a cluster of seven villages, has already lost five villages due to sea ingress. People of these villages are shifted many times during their life time. The idea of ‘Trapped Population’ is taken from the Foresight Report and contextualized in the study area. This is a unique case in which these villages are trapped between fury of advancing sea, frequent cyclones and legality of *Bhitarkanika* Biosphere Reserve and Government of Odisha. The study analyzed the processes which lead to migration that look beyond these dichotomies. The paper also critically reviewed policies, legality prevalent in the country to find out gaps to address the emerging situation and has used narratives, concepts of geographies of everyday life and affects to understand this complex and non-linear events.

### **Key Words:**

Environmental migration; trapped population; narratives; Geographies of everyday life; Geographies of affect

## Vertical Differentiation of Vegetation Cover Related to Population Migration of Mountain Areas: Taking Taihang Mountain Areas as a case

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### Abstract

With the rapid advance of urbanization, rural population emigration has become a key indicator of transformation relationship between people and land in mountainous areas. Using trend line analysis method based on pixels and multi-regression model, this paper presented regional trends in vegetation greenness in different elevation of Taihang Mountain during the period of 2000~2010 based on MODIS data, using average NDVI (Normal Difference Vegetation Index) of growing seasons as the most important index. The relationship between vegetation greenness change in different elevation and population emigration were also explored based on the analyses of DEM data and the change of temperature and precipitation. The results included: 1) Over the past 11 years' rural population emigration is significant in taihang mountain areas, and the rural population emigration rate is 16.3%. 2) Taken as a whole, the vegetation in Taihang Mountain has improved. That is to say, during the specific period NDVI showed a trend of increase: it has increased 19.0%. About 96.2% of vegetation cover in this area has increased and this ratio increases with the increase of elevation: low, middle, high elevation are 92.5%, 96.2% and 98.8% respectively. 3) NDVI change trend is different in different elevations: NDVI growth increased slow in high elevation while NDVI growth increased obviously in middle and low elevations. 4) The main influence factors of NDVI were different in the regions with low, middle and high elevations: in the region with low elevation, NDVI was mainly influenced by both natural factors and the factors of human activities; In middle and high elevations, the effects of natural factor become more significant and the effects of human activities got weaker.

### Key words:

Population migration; Vertical differentiation; Vegetation cover; NDVI; Taihang Mountain areas

## The Impact of Soil Erosion on Human Migration in China

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### Abstract

The impact of environmental change on human migration has been widely paid attention in recent years. However, there are still many problems that remain arguable and need to be resolved. Mass human migration has been a significant social phenomenon in China, while soil erosion is a major environmental problem that impacts socio-economic sustainable development. This study is aimed to identify the impact of soil erosion on human migration in China at the county level by analyzing related data. Results of spatial overlay could not identify an obvious relationship between soil erosion and net out-migration in China. We modified the gravity model of human migration to isolate soil erosion from other factors. The estimate results indicate that only serious soil erosion could increase the possibility of migration, and the impact is way higher in agricultural counties than in non-agricultural counties. In general, the impact of soil erosion on human migration is far less than the impact of socio-economic factors.

### Key words:

soil erosion; human migration; gravity model; county level; China

## C12.35 Sustainability of Rural Systems

### Globalization and Rural Sustainability



Home

#### Oral

1. [A Review of Interventions to Break the Link between Food Insecurity and Conflict in Ethiopia](#)  
Esubalew Abate; Negussie Semie (Addis Ababa University, Ethiopia)
2. [An Analysis of the Income Components of Rural Households in Xinjiang, China](#)  
Chen Jianying (Qiannan Normal College for Nationalities, Guizhou P. R. China, China)
3. [Assessment of the Rurality and its Driving Mechanism of Oasis City in Arid Zone—A Case Study in Wuwei](#)  
Xiaoying NIE; Peiji SHI; Xuebin ZHANG (College of Geography and Environment Science, Northwest Normal University, China)
4. [“Città Slow”: Catalyst and Anchorage for Rural Sustainable Development](#)  
Ana Firmino (CICS.NOVA, Universidade Nova de Lisboa, Portugal)
5. [Construction of Agricultural Innovation System Based On Agricultural Cluster: A Case Study of Vegetable Cluster in Shouguang City, Shandong Province](#)  
Erling Li; Yanwen Shi (Henan University, China)
6. [Coping with the End of the Commodities Boom: A Socioeconomic Analysis of Rubber Smallholders in Southern Thailand](#)  
Edo Andriess (Seoul National University, South Korea); Puntita Tanwattana (Chulalongkorn University, Thailand); Sutarat Sukapan Andriess (Independent, South Korea)
7. [Cost of Cultivation and Farm Income of the Tribal Households: An Analysis of Hilly and Plain Regions of Rajasthan \(India\)](#)  
Ajay Meena (Department of College Education, Government of Rajasthan (India), India)
8. [Development and Livelihood Sustainability: Pangi Tribal Region of Western Himalaya, India](#)  
Khyal Chand (St. Bede's College, India)
9. [Economic Development and Cultural Change in Rural Guangzhou](#)  
Yasuo Kojima (Kyoto University, Japan)
10. [Forced Displacement and Socio-cultural Adaptability among the Tribal Population: A Study of Sardar Sarovar Dam in India](#)  
Sushil Dalal (Jawaharlal Nehru University, New Delhi, India)
11. [Impact of Urbanization on Rural West Bengal in India](#)

Falguni Dey (Department of Geography, University of Calcutta, India)

12. [Livelihood Strategies of Ethnic Minority in the Borderlands: Case Study of the Bru-Van Kieu in Northern Central Vietnam](#)

Doo Chul KIM (Professor/ Okayama University, Japan), Trinh Minh Anh Nguyen (Graduate student/ Okayama University, Japan), Fumikazu Ubukata (Associate Professor/ Okayama University, Japan)

13. [Market Failure in Global Production Networks and the Emerge of New Market Opportunities for Small-Scale Dairy Producers in Slovenia](#)

Nicolai Dellmann; Markus Hassler (University of Marburg, Germany)

14. [Metabolizing the Rural, Fermenting the Landscape: Considering Wine as A Driver of Social and Environmental Change Along the Rural-urban Interface](#)

Colleen Hiner (Texas State University, United States)

15. [Multifunctionality, Resilience, and Globalization: Building a Theoretical Perspective from Brazil in the Context of Rural Change](#)

Felipe Machado (Plymouth University, United Kingdom)

16. [New Age of Agrarian Transformation in Sumatra, Indonesia: The Expansion of Oil Palm Cultivation and Its Impact](#)

Yusuke Koizumi (The University of Tokyo, Japan)

17. [Peasants and Agribusiness in the Middle-income Trap: The Case of “Safe and Traceable” Asparagus Production in Thailand](#)

Fumikazu Ubukata; Hisashi Datai; Doo Chul Kim (Okayama University, Japan)

18. [Roles of Rural Communities and Smallholders in REDD+ and Community-Based Forest Management: A Case of Vietnam](#)

Mucahid Bayrak (Harbin Institute of Technology Shenzhen Graduate School, China)

19. [Roraima: The Latest Soybean Growing Frontier of Brazil](#)

Alexandre Diniz (Pontifical Catholic University of Minas Gerais Brazil, Brazil); Elisangela Lacerda (Federal University of Roraima Brazil, Brazil)

20. [Rural Resilience in Response to the Decline of Rural China](#)

Yuheng Li (Institute of Geographic Sciences and Natural Resources Research, China)

21. [Rural Space and Concept of Social Representation. Case of Poland](#)

Marcin Wójcik (University of Lodz, Poland)

22. [Socio-Economic Analysis of Informal Activities: A Case Study of Women Participation in Local](#)

[Embroidery \(Dinkin Zargo\) In Wudil Town](#)

Bichi Ado Mukhtar (Kano University of Science and Technology, Wudil, Nigeria)

23. [Tea Plantations and Socio-Cultural Transformation: The Case of Assam \(India\)](#)

Bimal Kumar Kar; Chandra Kala Magar (Department of Geography, Gauhati University, India)

24. [The Allocation and Management of Critical Resources in Rural China under Restructuring: Problems and Prospects](#)

Hualou Long; Shuangshuang Tu; Dazhuan Ge; Tingting Li; Yansui Liu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

25. [The Impacts of Globalization on the Sustainability of Rural Areas Communities Adjacent the Sues Canal Corridor, Egypt](#)

Salah Eisa (Faculty of Arts, Menofia University, Egypt)

26. [The Spatial Patterns and Influential Factors of the Development of SVAT in China](#)

Jiajun Qiao (Henan University, China); Jay Lee (Kent State University); Liuchang Shao; Yuling Ma (Henan University, China)

27. [The Study on Formation Mechanism of Market Town System in Southwest Mountain of China - A Case Study of Xuanwei City](#)

Chao Zhang; Yingmei Wu (School of Tourism and geographical Sciences, Yunnan Normal University, China)

## Poster

1. [Beyond Soybean Fields: Rural Diversity and Resilience in Grande Dourados Region, Central Western Brazil](#)

Felipe Machado (United Kingdom, Plymouth University)

2. [From Mechanical to Organic—Research on the Change Characteristics of Village Collective Consciousness in Industrial Transformation](#)

Fang Yuan; Li Wangming; Zhu Lixiong (China, College of Civil Engineering and Architecture, Zhejiang University)

3. [Research on Dynamic Model of Urban-rural Interface](#)

Yuling Ma; Jiajun Qiao (China, Henan University)

## **A Review of Interventions to Break the Link between Food Insecurity and Conflict in Ethiopia**

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### **Abstract**

The link between food insecurity and conflict is context-specific and varies according to a country's level of development and the strength of its political institutions and social safety nets. Other factors that heighten the chance of conflict include demographic factors such as whether a country has a relatively large number of unemployed youths, coinciding with high rates of urbanization which increases the ratio of food consumers to producers.

Moreover, it is becoming apparent that food security is a pre-condition for stability and stability is a condition for food security particularly in low income countries. Furthermore, food shortage and high food prices should be seen as signals of potential conflict breaking out and governments need to be alert in taking actions like reducing import tariffs and taxes on food items and increasing subsidies to lower food prices, as well as releasing grain buffer-stock to increase supplies. In line with these, governments of low income countries like Ethiopia must strengthen the capacity of institutions responsible for addressing and watching food insecurity and the drivers of conflict in both urban and rural areas of the country to ensure peace and stability.

### **Key words:**

Food insecurity; conflict; institutions; urban and rural areas; stability

## An Analysis of the Income Components of Rural Households in Xinjiang, China

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### Abstract

Using data from 1982 to 2009, this paper examines how components of rural household income contribute to the major income gap between 30 poverty-stricken counties in Xinjiang and the national average in China. Income from family businesses account for 80% in Xinjiang, while income proportions from wages and salaries, property and transfers are very low. The analysis shows that farmers' income depends on the family business for regular income and that the regional economy in rural areas is still dependent on direct consumption by producers. Living standards are declining because of extra educational expenditure for children, modern medical services and inflation. Income growth from wages and salaries is the major driving force for poverty reduction in Xinjiang. Fundamental ways to address poverty are to establish training programmes for farmers, improve employment opportunities, hasten construction of towns and small cities, promote the transfer of rural surplus labour, and escalate the proportion of income from wages and salaries, property and transfer.

### Key words:

income components; income growth; labour transfer; Xinjiang

## Assessment of the Rurality and its Driving Mechanism of Oasis City in Arid Zone— —A Case Study in Wuwei

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### Abstract

Basing on 65 years social and economic statistical data and taking the counties as the basic spatial unit, we evaluate the rurality indexes by using factor analysis and examine the spatial-temporal differentiation of rurality in Wuwei with the help of one-dimensional linear regression model, wavelet analysis and differentiation index model, and then discuss the influencing factors of rurality development from social economic and technical economic aspects. The conclusion as follows: ①rurality indexes showed a trend of weakening in counties of Wuwei during 1949-2013, while there are differences around decreased amplitude and speed. ②the rurality differentiation index presents a fluctuates growth trend and rose sharply after 2000 which indicate an increasing rural difference. ③social economic and technical economic are two main factors of rurality variation, with the development of industrial structure, traffic, policy, labor force, agricultural mechanization and agricultural structure, the value of rurality become smaller and smaller and the urbanization level is on the contrary.

### Key words:

rurality; differentiation index; driving mechanism; Wuwei City

## “Città Slow”: Catalyst and Anchorage for Rural Sustainable Development

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### Abstract

Pursuing the ideal of sustainable development in the rural areas is often rather illusory or transitory since many initiatives are lacking a specific frame that may give them local anchorage in the medium/long run and thus, many of these projects are ephemeral.

The concept of “città slow” created in Italy in the late nineties, aims at supporting quality of life in small municipalities/cities with less than 50 000 inhabitants, this quality being measured in 7 categories:

Environmental policies, infra-structures policy, technologies for the urban quality, promotion of local products, inhabitants’ awareness, social cohesion and networking.

Since 2011 the municipality of Vizela has been one of the 6 certified città slows in Portugal and will be presented as a case-study.

In the last 5 years the municipality has worked in favour of the local community, starting with the youngest ones at school, who attend a special program tailored according to the concept of città slow. Furthermore they have been active in initiatives aimed at strengthening the ideals subjacent to the concept, i. e. encouraging the diversity and originality, supporting the local culture and traditions, gastronomy and wines, handicraft, developing a better environmental quality and creating conditions which offer a healthier life style based on the Slow Food Movement.

The “città slow” can thus act as catalyst and anchorage for different activities in the rural areas, attracting visitors who ensure the sustainability of the local economy.

### Key words:

città slow; smart projects; local economy; rural areas; sustainable development

## Construction of Agricultural Innovation System Based on Agricultural Cluster: A Case Study of Vegetable Cluster in Shouguang City, Shandong Province

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### Abstract

Agricultural innovation in developing countries has attracted the attention of many scholars. Constructing agricultural innovation system is an effective way to develop modern agriculture and agricultural innovation, and agricultural industrial clusters are effective carriers for agricultural innovation system. This paper constructs the theoretical framework of agricultural innovation system, through field survey of 68 households, 32 agricultural enterprises, local government and industrial association in vegetable industrial cluster in Shouguang City, Shandong Province, using social network analysis to conduct an empirical analysis on the structure of agricultural innovation system. It is shown that, agricultural innovation system is composed of three parts of innovation subject, innovation networks and innovative environment. Local large enterprises and corporate group play a leading role in the vegetable cluster innovation; The small businesses and farmers have a key function on the popularization and application of innovative technology; Higher heterogeneity of the status of innovation in local enterprises; the direct role of government in the innovation of agricultural clusters is smaller, but the hybrid organizations set up by government, enterprises and the non-government institutes have a significant function of incubation; Close linkages among enterprises, universities and research institutes can significantly improve the innovation capacity of cluster enterprises. Relative to the cooperative networks, knowledge networks show a mononuclear structure and the centralization and density of the networks are higher. Although there is strong international and domestic environment for cooperation in Shouguang cluster, the institutional construction for improving the local innovation environment still needs to be strengthened.

### Key words:

agricultural innovation system; agricultural industrial clusters; social network analysis; vegetable industrial cluster in Shouguang city

## **Coping with the End of the Commodities Boom: A Socioeconomic Analysis of Rubber Smallholders in Southern Thailand**

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### **Abstract**

The ongoing slowdown of the Chinese economy has triggered serious economic geographical repercussions across the globe. Most remarkably, countries dependent on exporting commodities to China have witnessed profound challenges with respect to maintaining economic growth as well as maintaining employment in commodities' industries. Several reports claimed that we are now seeing the end of the commodities boom. This paper focuses on the steep fall in the international natural rubber price, and investigates its impact on the socioeconomic situation of rubber smallholders in southern Thailand. In light of the highly volatile rubber price the aim of this paper is to unravel the coping mechanisms of rubber smallholders by focusing on two issues: diversification and community development. The main empirical analysis is based on a survey of 53 smallholders in a village in Nakhon si Thammarat Province. Besides rubber these smallholders also grow fruits in particular mangosteen for the domestic market. This is complemented with a smaller survey in another village which is much more dependent on rubber as well as several semi-structured interviews with community leaders in two best practices villages in Rayong Province in central Thailand. This paper highlights the vulnerability of rubber smallholders. Although household activities have become substantially diversified, volatility in the international rubber price still causes households to zigzag back and forth between the categories of ordinary farmers and accomplished middle class earners within a time span of a few years. It also highlights the challenges of achieving successful rural community development across Thailand.

### **Key words:**

Rubber smallholders; boom and bust cycles; diversification; community development; Thailand

## Cost of Cultivation and Farm Income of the Tribal Households: An Analysis of Hilly and Plain Regions of Rajasthan (India)

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### Abstract

Agriculture is the most important source of livelihood of the tribal households of Rajasthan (India) and the level of earnings from this source is an important determinant of their well being. In this Paper, attempts have been made to explain the economic characteristics of agriculture in terms of cropping pattern, cost of cultivation, cost structure and net farm income of the households. It is an analysis of the tribes living in two different geographical settings (hilly and plain regions) of Rajasthan. The source of data is the field survey which has been carried out in December 2011 and April 2012. The methodology adopted for estimating the cost of cultivation is that followed by the Comprehensive Scheme for Studying Cost of Cultivation/ Production of Principal Crops in India. The cropping pattern of the hilly region is subsistence type whereas it is diversified towards the commercial crops in the plain region. The relatively greater share of the modern inputs in the total cost of cultivation reflects the elements of modern agriculture in the plain region. Both the physical productivity and the gross value of output for most of the crops are comparatively low in the hilly region. The net farm income (net of Cost  $C_2$ ) is negative for almost all crops in the hilly region whereas it is positive for majority of the crops in the plain region.

### Key words:

Tribes; Cropping Pattern; Cost  $A_2$  & Cost  $C_2$ ; Cost Structure; Gross Value of Output; Net Farm Income

## Development and Livelihood Sustainability: Pangri Tribal Region of Western Himalaya,

### India

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#### Abstract

The Pangwala tribal community lives in close proximity of nature with typical mountainous specificities. By and large, the inhabitants of Pangri region depended on subsistence agriculture, livestock rearing and allied activities to support their livelihoods. Therefore; the present paper explores the impact of development programmes on the sources of livelihoods of people of the study area. The livelihoods of people have been examined in terms of their means of living including types of crops grown, food, income and assets. The study reveals notable changes in the livelihood options in remote tribal region of Himachal Himalayas. The traditional foodgrain crops a major source of sustainable livelihood, cultivated in the study area have been replaced by cash crops which are more market driven and less sustainable. The study shows that food habits of the scheduled tribes have changed considerably during the study period. The impacts of developmental activities on the livelihood options and strategies are largely determined by expanding connectivity of villages through surfaced road and growing social media in the study area. These factors along with topographic controls are responsible for spatial variations in the livelihood options and strategies in this tribal area. The changing livelihood arrangements among the scheduled tribes of Pangri region also raise issues of different facets of sustainability.

#### Key words:

Pangri Region; Scheduled Tribe; Development; Livelihood; Sustainability

## Economic Development and Cultural Change in rural *Guangzhou*

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### Abstract

*Zhujiang* Delta has been one of the most developed areas in contemporary China. Analyzing data from the field survey that we conducted in two villages, near *Guangzhou* city, this presentation discusses the process of rural change. Industrialization in the field was launched in the late 1980's and now the landscape of modern factories besieges old villages. Migrant workers for factories live in densely built-up area in the village. The rent of houses and factories has increased villagers' income, so there are few villagers working for factories or working away from home. Another rural change is observed in cultural dimensions. *Longzhou*, dragon boat is essential to traditional festival in the area, some village has bought *Longzhou* according to the improvement of living standards. *Citang*, ancestral hall which characterize the religion of southeast coast also has repaired in these years. The aim of this presentation is not causal inference of economy and culture, but describing the place where economic development under globalization and cultural revival in local context has gone side by side as the regionality of rural *Guangzhou*.

### Key words:

rural change; industrialization; traditional culture; regionality; *Guangzhou*; *China*

## Forced Displacement and Socio-cultural Adaptability among the Tribal Population: A Study of Sardar Sarovar Dam in India

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### Abstract

The building of large dams invariably results into forced displacement of human population which causes social, political, demographic, economic and environmental repercussions. The displaced people try to adapt themselves to the alien social and cultural environment for their survival. The life in tribal communities particularly in and around the reservoir area of Sardar Sarovar Project in India largely partakes of prevailing socio-cultural systems in the adopted environment. For instance many social and ritual practices in tribal communities revolve around worship of supernatural power. Due to the construction of Sardar Sarovar Dam on river Narmada, the tribal people are forced to settle down in the plain areas with communities practicing alien cultures as a consequence of which these resettled tribes are forced to adapt to the socio-cultural practices of the alien milieu.

The present paper attempts to find out the socio-cultural adaptability of the displaced population for their survival in an alien environment due to the construction of the dam. The study is mainly based on primary source of information and the data has been generated from ten resettled sites selected through stratified random sampling method from different physiographic regions. The study reveals that there is significant change in social and cultural life of the affected families as a result of which the practices of traditional social and cultural rituals show signs of transformation. In nutshell, people have adopted alien social and cultural practices while the relation with environment and ecology has been negatively affected due to the process of displacement.

### Key words:

Forced Displacement; Sardar Sarovar Dam; Survival

## Impact of Urbanization on Rural West Bengal in India

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### Abstract

Urbanization in west Bengal has been a long but slow process. Since colonial days West Bengal experienced early advent of urbanization process mainly in the capital city Kolkata, erstwhile Calcutta. On the other hand vast areas of west Bengal remained under deprived rural areas even after independence where agriculture has been the main stay since generations with no alternate mode of earnings. Much change did not take place in last fifty years because almost 70 percent people of west Bengal still lives in rural areas. Census of India on the other hand has strong evidence of decreasing number of villages due to sprawling and outgrowth of urban areas. The balance between rural and urban development did not run hand in hand rather an imbalance could well be visible. Kolkata being the capital city enjoyed highest primacy of ranking of urban areas as no alternate city came up except a little effect of Asansol, Durgapur and Siliguri. It could easily be said that entire west Bengal is oriented unidirectional towards Kolkata. The authors in this paper attempt to introspect into the changing agricultural, demographic and socio-economic scenario of west Bengal in recent times and to find out the role of urbanization process to accelerate it. The result shows that southern part of Bengal is well influenced by the Kolkata, whereas northern part is controlled by Siliguri town. National and state highways and alongside urban areas are transforming into a promising agglomeration. Land values are well affected by distance decay effect.

### Key words:

Agricultural development; Urbanization process; Rural Development; Demographic Change; Land Value

## Livelihood Strategies of Ethnic Minority in the Borderlands: Case Study of the Bru-Van Kieu in Northern Central Vietnam

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### Abstract

The Bru-Van Kieu, one of ethnic minorities in Vietnam, have lived in the mountainous area along the border with Laos for centuries. Approximately by the end of the Second Indochina War, the Bru-Van Kieu were still a kinship-based and non-stratified societal group relying mainly on subsistence economy. Their traditional physical geography, nonetheless, has been transformed vigorously during the last few decades as a result of state-formation processes and changes in macro-economic policies. The paper aims to examine how ethnic minority adapt their livelihood to challenges instigated by macro political and economic processes. By examining livelihood adaptation of the Bru-Van Kieu, the study also identifies strategies that ethnic minorities use to negotiate with more powerful political and economic forces. The authors argue that the Bru-Van Kieu have deployed a strategy combining everyday resistance to maintain their limited social and cultural agencies and utilizing of these agencies in economic adaptation with other cross-ethnic non-state actors, enabling them to tap into new type of resources and opportunities.

### Key words:

livelihood strategy; ethnic minority; state formation; borderlands; Vietnam

## Market Failure in Global Production Networks and the Emerge of New Market Opportunities for Small-Scale Dairy Producers in Slovenia

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### Abstract

The Slovenian dairy industry is determined by processes of consolidation which lead to a dramatic decrease in the amount of small-scale producers. Contemporary GPN literature allows for an understanding of the underlying links between globalization and the restructuring of regional production systems. A blindspot/, however, remains on processes caused by the exclusion of actors from such systems, notwithstanding the concomitant implications on the local production system. Based on a qualitative research, this paper analyses the various sets of activities small-scale producers develop in order to cope with the changing economical environment. Interviews with different Slovenian actors of the dairy industry revealed alternative forms of direct marketing as opposed to the distribution through intermediaries, such as cooperatives. These forms of direct sales empowered the actors to overcome income uncertainty induced by volatile milk prices instead of realizing economies of scale through enlarging the herd.

This contribution enhances the benefits of locally organized, disintegrated distribution systems as well as its limits, predominantly driven by the consumer's choice. It furthermore offers a wider and deeper understanding of how the GPN framework can be used to portray market failures in selected sectors.

### Key words:

GPN; dairy sector; small-scale producers; alternative distribution

## Metabolizing the Rural, Fermenting the Landscape: Considering Wine as a Driver of Social and Environmental Change along the Rural-Urban Interface

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### Abstract

The study of “fermented landscapes” involves examining how shifting patterns in the production and consumption of beer, wine, cider, and spirits impacts physical-environmental and socio-cultural landscapes. Specifically, the concept hones in on the production, distribution, and consumption of fermented beverages as a focal point in the complex study of rural-urban exchanges or metabolisms over time and space. In this paper, I investigate how differing forms of production/consumption influence material and symbolic landscapes at a variety of scales. Drawing on qualitative fieldwork and secondary data analysis in California, Arizona, and Texas in the United States, this paper describes the crucial role fermentation places in the politics of placemaking and associated processes of ecological change in “emerging” wine regions in the United States. Using the wine industry from “grape to glass” as a lens through which to examine landscape production and consumption, I outline the impetus and justification for a comprehensive conceptualization and political ecology of “fermented landscapes” that examines the environmental, economic, and sociocultural implications of fermentation in both expected and unexpected places and ways. Further, I explore how the pursuit of a “wine country” identity does or does not improve local and regional attempts at sustainability.

### Keywords:

wine; fermentation; production vs. consumption; landscape; political ecology; rural-urban interface

## **Multifunctionality, Resilience, and Globalization: building a Theoretical Perspective from Brazil in the context of Rural Change**

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### **Abstract**

With deepening industrialization Brazil has gone from being the 14th largest global economy in 1970 to 10th in 1990 and to the 7th largest economy in recent years (Becker and Egler, 1992; Cohn, 2012). As the economy globalized away from metropolitan areas, profound changes have occurred in the rural areas. The research question relates to how rural areas in transition economies such as Brazil will be affected by socio-economic, political and environmental changes expected in this country over the next decades.

Using transition theory, to discuss a temporal and spatial model for transition in different dimensions, the aim of this study is to bring together a transition theory approach with the areas of investigation of rural multifunctionality and rural community resilience. The argument is based on the contemporary debates concerning rural change in the context of economic globalization and should be seen as a theoretical perspective of interconnections between globalization and rural community resilience in a rapidly changing world.

Wilson (2010, 2013) has discussed the complex interlinkages between community resilience and policy challenges, linked especially to the notion of policy corridors and who should be in charge of the global resilience transition. This approach relates to attempts to understand how transitions in community resilience pathways are linked to various capitals and how these interact with exogenous policy processes. According to Wilson (2012), human geography is particularly well placed to provide insights into the spatial discontinuities and heterogeneities of community resilience across a range of various community types and globalization processes.

### **Key words:**

multifunctionality; rural community resilience; globalization; rural change; transition economies; Brazil

## **New Age of Agrarian Transformation in Sumatra, Indonesia: The Expansion of Oil Palm Cultivation and Its Impact**

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### **Abstract**

As the demand for edible and vegetable oils has increased on the world market, the area dedicated to oil palm cultivation in Indonesia has dramatically expanded. As one of the unique characteristics of oil palm cultivation in Indonesia, the number of smallholders is increasing and their economic position is improving to an unprecedented extent. This situation has drastically changed livelihood strategies and the landscape of rural societies in the outer islands of Indonesia, especially in Sumatra Island. Several studies have already noted that differentiation was brought into rural societies in Sumatra as the consequences of the expansion of oil palm. Others have admitted that the regional economy was substantially improved because the income of smallholders is higher than other jobs. In addition, new job opportunities were provided by plantation companies as well. However, it is still unclear how the new social and economic system has been created and maintained after oil palm has prevailed in rural areas. Therefore, this study tries to figure out the recent chronological changes of rural societies in Riau Province, which is located in the middle of Sumatra where oil palm cultivation by smallholders is most expanding. As for the research method, this study firstly analyses the meso-scale dynamics of social changes with census data, and secondly conducts intensive interviews with local people. In Riau Province, there are many in-migrants from other provinces and they are playing a key role both as labour in plantations and small scale cultivators.

### **Key words:**

Indonesia; oil palm cultivation; smallholders; rural economy

## Peasants and Agribusiness in the Middle-income Trap: The Case of “Safe and Traceable” Asparagus Production in Thailand

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### Abstract

It is widely known that Southeast Asian peasants have been actively involved in commercial agricultural production since the colonial time. However, due to the recent development of downstream agroindustry and the introduction of strict quality control measures by developed countries (major importers), many agricultural commodity chains have been rearranged toward larger integration into global agribusiness. Coordination between peasant-based production system and global agribusiness can thus be one emerging issues in Southeast Asian agricultural sectors. Taking example of “Safe and Traceable” asparagus production in Thailand, this study therefore examined how Thai peasants have become integrated into such a rearrangement of commodity chains.

After the series of surveys during 2012-2015, the study found following results. First, development process of the commodity chain could be divided into three phases: 1) early phase, 2) matured phase and 3) transition phase due to severe international competition. A Japanese packer played leading roles throughout the process, while the state sector played coordinating roles. Second, many peasants had started to enter the contract scheme during the second phase and gradually developed their technical, organizational and negotiation capacities. And third, both private and state roles for industrial upgrading were limited. The R&D activities were inadequate in both sectors, thereby caused initial failure to tackle diseases damage in the third phase. As a result, many peasants have exited from production. These findings indicate that Thai peasants are facing an agribusiness system which falls into the middle-income trap.

### Key words:

Peasants; agribusiness; integration; upgrading; asparagus; Thailand

## Roles of Rural Communities and Smallholders in REDD+ and Community-Based Forest Management: A Case of Vietnam

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### Abstract

The Reducing Emissions from Deforestation and Forest Degradation (REDD+) programme is offering developing countries financial incentives by creating financial values for the carbon stored in forests. The main aim of this initiative is to combat climate change, deforestation and forest degradation. It also includes forest conservation, sustainable management of forests and enhancement of forest carbon stocks. In a decade in which community forest management initiatives are rising, the REDD+ programme could reverse this process in putting forest governance on national level again. This could have severe consequences for local forest-dependent communities. REDD+ could recentralize forest governance if it is not sufficiently integrated in the local context, and therefore exclude rural communities and stakeholders who depend on their forests for their livelihoods and food security.

This paper examines how REDD+ can be compatible with local forest-dependent communities, smallholders and community-based forest management (CBFM) in Vietnam. The results of this paper are based on household-surveys (n=187) in Thua Thien-Hue, Quang Tri, Lam Dong and Kon Tum province. The communities in these sites are involved in CBFM, REDD+ or benefit sharing mechanisms in forest protection (BSM) in various degrees. The central question of this paper reads as: What roles do community-based forest management (CBFM) and communities play in BSM/REDD+, and in what way does CBFM align with the programmes' respective objectives? We aim to summarize this paper through a renewed typology of community-based forest management within the context of Vietnam and beyond.

### Key words:

REDD+; community-based forest management; Vietnam; forest governance; indigenous peoples; climate change mitigation

## Roraima: The Latest Soybean Growing Frontier of Brazil

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### Abstract

Roraima is the northernmost Brazilian state, located along the borders with Venezuela and Guiana. Deeply rooted within the Amazon rainforest, the state also encompasses large tracts of savanna. Roraima has a short history of occupation and economic exploration. It was not until the 1980s when a more liable terrestrial link with the rest of Brazil was materialized. Since then Roraima has experienced tremendous population growth with thousands of migrants arriving in search of mineral riches, land in colonization projects, and employment in the tertiary sector of Boa Vista, the capital city. Roraima still represents one of the last resorts for the Brazilian landless, displaying active agriculture frontier areas; vast tracts of pristine lands; national parks; and native people's reservations. Despite its strategic location Roraima has established only feeble and indirect links with global markets until recently. Responding directly to the international appetite for commodities and mimicking processes undergone by the southern fringes of the Amazon, Roraima witnessed the progressive arrival of soybean during the 2000s given its low land markets values; favorable climate; and its location. Roraima is much closer to major consumers markets, and soybean can be easily shipped abroad through Venezuela and Guiana. Russia and Holland are major importers, and in 2014 soybean surpassed Roraima's historical leading exporting good: wood. This study explores the recent historical and geographical expansion of soybean plantations in Roraima examining some of its social, economic, cultural and environmental impacts based on secondary data and fieldwork.

### Key words:

Globalization; Soybean; Amazon; Roraima; Socioeconomic Impacts

## Rural Resilience in Response to the Decline of Rural China

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### Abstract

When urbanization in the developing world still mainly occurs at the expense of the countryside, the hollowing out of the countryside has become a widespread concept in many developing countries. China witnessed rapid urbanization development in the past decades, however, this development has been accompanied by the ever decaying countryside when huge amounts of peasants have migrated to cities. As a result, the once self-sufficient villages of China become hollowed and declined, and face challenges like labor shortage, industry recession, infrastructure backward, cultural loss and social conflicts.

What are the villages' capability to prepare for, respond to, and recover from significant socioeconomic threats in rural China? How to understand rural resilience? What are the implications for policy making? Bearing these questions in mind, we tend to investigate the villages' resilience capability in response to the decline of rural China. Firstly, the paper makes theoretical interpretation of rural resilience towards the decline. Secondly, historical review of how villages start to decline and the driving forces will be made. Then, the paper tries to analyze ways of improving villages' resilience capability in China, which is followed by policy implications towards sustainable rural development in the future.

### Key words:

Rural resilience; Socioeconomic decline; Urbanization; Sustainability; China

## Rural Space and Concept of Social Representation. Case of Poland

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### Abstract

The proposed project applies to space realized in specific forms of cultural landscape (forms of human settlement). The main aim of the research is to determine the diversity of spatial representation of rural settlements in Poland, based on the model developed using the concept of "production of space" (H. Lefevbre, D. Harvey, K. Halfacree). Representations of space are the ways of cultural creation of life environment and they include various material (forms of its spatial organization) and mental structures (such as images of spaces). In other words, spatial representations are specific forms of space (landscape) appearance - being visible (real structure) and images of space (mental structures). Three objectives were formulated according to this model, namely: 1) Multifaceted determination of the forms of rural spatial practices. The aim is to analyze the forms of cultural landscape (settlement landscape - spatial structure (arrangement) and settlement physiognomy) interpreted as a material effect of social and economic practices 2) Identification of methods of representations of rural space. The aim of the research in this area is the analysis of various types of documents - historical and contemporary 3) Determination of spaces of representation. The aim of the research in this area is to present proposals for the analysis and classification of "freehand sketches", which could be used in studies of subjective rural spaces (structure of "human spatial images").

### Key words:

rural geography; rural settlements; social representations; imaginations

## **Socio-Economic Analysis of Informal Activities: A Case Study of Women Participation in Local Embroidery (Dinkin Zargo) in Wudil Town**

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### **Abstract**

The research explores the socio-economic benefits of local embroidery among women in Wudil town. A questionnaire survey was used on two hundred and thirty five households' carefully selected using stratified random sampling technique. The households were drawn from the old Wudil town and the new residential area popularly known as Sabon Gari. The result shows that the production and marketing of locally embroidered textile products is one of the major occupations in Wudil town generally. The findings reveal that the benefits from embroidery improve women's standard of living and their economic status. It shows most of the income generated by women through this activity is spent on contributions to friends and family towards wedding and naming ceremonies as it accounts for 43.3%. This is compared to all the other benefits that jointly account for the remaining 57.7%. A Chi-square test was conducted to determine whether there is any relationship between the marital status of the respondents and the type of benefit derived from their engagement in local embroidery, the result shows a p- value of 32.910 has a probability value ( $p < 0.05$ ). The study recommends that for the informal economic activities to proffer, the government should as a matter of serious intervention provides funding to the rural women in order to promote their artisan skills. Women should be encouraged to form community based organizations to help their informal economic activities.

### **Key words:**

Wudil; embroidery; women; informal activities; benefits

## Tea Plantations and Socio-Cultural Transformation: The Case of Assam (India)

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### Abstract

The tea plantations of Assam in India, which constitute country's 53 per cent tea area, 49 per cent tea worker population, and 51 per cent tea production, occupy an important place in the economy, culture and polity of the state. The onset of tea plantations during British colonial rule has not only changed the landscape of the upper Brahmaputra valley through green tea bushes being nourished by tea tribes from east-central India, but also evolved a distinct tea culture. Although formation of small tea growers has added a new dimension to the growth of tea industry of Assam in recent times, the culture that emerged due to the long continued interaction of British planters, tea worker tribes and indigenous Assamese is well reflected in the language, way of life, work culture, food habit and many other socio-cultural practices in most of the large tea estates in the state. In fact, the impact of tea culture is so penetrative that it has been able to bring about development in the form of tea festival, tea tourism, tea folk songs and dances, etc in the state. An attempt is made in this paper to explore the role of tea plantation and the people associated with it to the socio-cultural transformation of Assam based on both secondary data and primary data through field study. The primary data have been collected from selected tea estates, tea garden worker colonies, tea-tribe villages and urban dwellers.

### Key Words:

tea plantation; Assam; tea tribes; tea culture; socio-cultural transformation

## The Allocation and Management of Critical Resources in Rural China under Restructuring: Problems and Prospects

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### Abstract

Rapid and far-reaching development transition has triggered corresponding restructuring in rural China especially since the turn of the new millennium. Recently, there has been an increasing trend emphasizing regional resources in formulating rural development policy and restructuring rural areas. This paper analyzes the rural restructuring in China affected by the allocation and management of critical resources including human resource, land resource and capital, by establishing a theoretical framework of “elements-structure-function” of rural territorial system. It is argued that rural restructuring is a process of optimizing the allocation and management of the material and non-material elements affecting the development of rural areas and accomplishing the structure optimization and the function maximum of rural development system. Due to the constraints from the maintained urban–rural dualism of land ownership and household registration, the rapid rural restructuring under both globalization and the implementation of the national strategies on industrialization, urbanization, informatization and agricultural modernization, the changes of the allocation of critical resources have brought about many problems and challenges for the future development of rural China, such as the nonagriculturalization, non-grain preference and abandonment of farmland use together with the derelict and idle rural housing land, the weakening mainbody of rural development, the unfair urban–rural allocation of capital and its structural imbalance, and so on. Aiming at how to resolve the problems and adapt to the challenges, it is pivotal to restructure the rural development space, rural industry, and rural social organization and management mainbody.

### Key words:

spatial restructuring; industrial reshaping; social restructuring; urban–rural development

## The Impacts of Globalization on the Sustainability of Rural Areas Communities

### Adjacent the Sues Canal Corridor, Egypt

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#### Abstract

This paper focuses on the sustainability challenges of rural communities in the age of globalization, which is a deeply complex phenomenon. The impact of globalization activities on rural areas does exist within changing agricultural and food systems through new technologies for huge production, which may decrease labor input, then, may enforce rural people to emigrate.

The Suez Canal is a global navigation passage in Egypt between the Mediterranean and the Red Sea. A new achievement for upgrading and enlargement has been carried out in order to allow big ships to cross the canal. The Suez Canal Corridor Project (SCCP) has been designed to transform Port Said and Suez ports, beside others, into global warehouses, and to build industrial projects and traffic businesses served by logistics.

The eastern strip of Nile Delta, covering some districts of Ismailia and Sharqia governorates, and keeping territorial, economic, and social access, is the nearest neighbor rural area to the west bank of Suez Canal Corridor.

The present study aims at enhancing solutions for the sustainability of the mentioned rural area that faces the challenges of globalization related to the ascendant (SCCP). This will be approached in four steps: 1) mapping features of the rural area and tracts of access to Suez Canal corridor, 2) understanding the traces of globalization on study area before (SCCP) implementation, 3) expecting the impacts of globalization on study area relating to the intended targets of (SCCP), 4) trying for promoting the capacity of study area to preserve its rural sustainability.

#### Key words:

Globalization; rural sustainability; Suez Canal Project; rural east Nile Delta

## The Spatial Patterns and Influential Factors of the Development of SVAT in China

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### Abstract

Under the banner of One Village, One Product (OVOP), many villages and towns in China had developed into specialized villages and towns (SVAT). Each of them had its specialty enterprises or engaged activities that dominated local economy. Based on the analysis of data collected for 1,605 specialized villages and towns in China we found that special villages and towns distributed spatially unevenly and their economic performance showed spatial inequality. We also found that the majority of these villages and towns focused on agriculture-related economic activities. The major spatial cluster of specialized villages and towns was in Beijing-Tianjin region. The secondary clusters were in Jiangsu, Zhejiang, and Shanghai areas. Using spatial statistical methods, we also found that promotions and assistance program by local governments as well as resource endowments were the major influencing factors to the development of specialty villages and towns in China.

### Key words:

One Village One Product (OVOP); SVAT; point pattern analysis; surface pattern analysis; agglomeration



## The Study on Formation Mechanism of Market Town System in Southwest Mountain of China - A Case Study of Xuanwei City

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### Abstract

The new urbanization in the southwestern region is different from the countries in the eastern plain, which is because of the mountain environment. Based on the comprehensive view and time-space view of geography, and the urban and rural settlements in southwestern mountain region were regarded as an organic integrity of continuous development, and the important role of the market town in the development of the southwest mountainous settlements was emphasized. At the present stage, and the Temporal-Spatial coordination and scope dimension were adapted as the theoretical basis points to explore the formation mechanism of the southwest mountain market town system. The results indicated that: the market town was the main carrier and hub to link the urban and rural settlements in southwest mountain region. Meanwhile, the spatio-temporal synchronization and scope maintain were the main driving force mechanism of the formation and evolution of the market town system, and the geographical environment, population distribution, traffic conditions and macro-policy were the factors to influence the size, rank and spatial form of the mountain market town system. Therefore, following the development laws of the mountain market town system, and regulating it scientifically, which is directly related to the directions and characteristics of the new urbanization in the southwestern mountain region.

### Key words:

Southwest Mountain; urban and rural settlements; market town system; formation mechanism

## **Beyond Soybean Fields: Rural Diversity and Resilience in Grande Dourados Region, Central Western Brazil**

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### **Abstract**

At present, great enthusiasm is expressed by the media and government concerning development and economic growth directly related to the spread of agribusiness-scale soybean production in the Cerrado savanna bush lands of the Brazilian Central Plateau. In contrast, academics have explored agroindustrial food networks through a critical perspective, placing agribusiness-scale soybean production within a mass production model which includes volume and standardization (Bernardes, 2015; Bernardes and Freire Filho, 2005; Hosono *et al.*, 2016). Questions about social and environmental impact, conflict of land use, and toxicity pose recurring problems to this agro-industrial dynamic. In these cases, the study of globalization in a rural context has commonly focused on transnational commodity chains and its contradictions.

According to Wilson (2010, 2012) and Woods (2007), for the majority of rural communities, globalization is experienced in more complex pathways. Against linear thinking concerning soybeans and regional development, the paper debates rural diversity and social resilience in Grande Dourados Region and discusses how the rural in agribusiness area such as Central Western Brazil will be affected by socio-economic, political and environmental changes expected in this region over the coming decades. The research was conducted on small and mid-scale farms, Jaguapiru indigenous community and at the Regional Documentation Center of the Federal University of Grande Dourados (UFGD) over a one month period. In summary, the research is based on debates concerning contemporary rural space with an emphasis on the territorial dimension and multifunctionality.

### **Key words:**

rural diversity; resilience; multifunctionality; Grande Dourados Region; Central Western Brazil; Brazil

## From Mechanical to Organic——Research on the Change Characteristics of Village Collective Consciousness in Industrial Transformation

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### Abstract

Village collective consciousness is the villagers' identity attitude towards the collective. In the traditional villages where the labor division is at low level, collective consciousness assumes mechanical solidary collective unconsciousness, due to the villages' strong sense of belonging and consistency. With the development of emerging industries and the transformation of village, the village collective consciousness inclines to individual consciousness. The division of mechanical solidarity and the imperfection of labor division make the villagers more willing to act selfishly regardless of collective interest, which results difficulties in collective action. Under this circumstance, the rational ideology and the rural elites with social capital are the key factors in getting out of the dilemma, recreating the organic solidarity, promoting the healthy development of industries and the smooth transition of villages. The research is performed based on spot investigation and questionnaire survey in some distinctive pension villages of Hangzhou. With the help of the Social Solidarity Theory and Collective Action Theory, the change characteristics of village collective consciousness and the internal rules of village development are revealed.

### Key words:

village collective consciousness; change characteristics; distinctive pension village; Social Solidarity Theory; Collective Action Theory

## Research on Dynamic Model of Urban-rural Interface

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### Abstract

In space location, urban-rural interface locates at the junction of Urban and rural areas. In function, it plays a role of spatial carrier for communication of urban and rural elements. Its development has great significance for the coordination of urban and rural areas. From the angle of element flow, this research established the theoretical framework of urban-rural interface based on system dynamics, built the quantitative model to characterize dynamic evolution mechanism of urban-rural interface by the method of quantitative geography, and drew the following conclusions by solving the model: (1) In different stages of development, urban-rural interface is effected to different degree by endogenous and exogenous dynamic power. (2) With the development of urban-rural interface, the effect transited from the negative effect to the positive effect, and the value of effect depends on the cycle accumulation capacity of urban-rural interface. (3) The balance condition of urban-rural interface is mutually affected by urban-rural elements exchange rate, its internal power and cycle accumulation ability. The equilibrium of an urban-rural interface is constant, but that of different spatial scales is not equal. (4) The switch model depicts the function of gate, and the interface equilibrium is the critical point to decide whether to open and close the switch. According to the above conclusions, the paper put forward policy recommendations respectively from the time scale and spatial scale.

### Key words:

Urban-rural interface; Dynamic model; Switch model; Gate

## C12.35 Sustainability of Rural Systems



### Environment Change and Migration in the Rural-Urban Interactions

#### Oral

1. [Accidental Participation: Post-Disaster Reconstruction and the Emergence of Participatory Planning in Southwest China](#)  
Yifei Li (University of Wisconsin Madison, USA); Xiaohua Zhong; Jiayu Ding (Tongji University, China)
2. [Between the Rural and the Urban: Translocal Social Networks as a Source of Resilience to Climate Related Risks in Rural Northeastern Thailand?](#)  
Till Rockenbauch; Patrick Sakdapolrak (Department of Geography, University of Bonn, Germany)
3. [Changing Occupation with Changing Climate in India: A Case study](#)  
Nirmala Velan (Pondicherry University, India)
4. [Climate Change and Rural-Out Migration: A Farmers' Perspective from Rural Pakistan](#)  
Muhammad Abid; Jürgen Scheffran (Institute of Geography, University of Hamburg, Hamburg Germany, Germany)
5. [Conceptual Explaining of Effective Factors on Economical Security in Rural Area and Its Effect on Rural Migration](#)  
Tahereh Sadeghloo (Universty oh Ferdowsi Mashhad, Iran)
6. [Does Migration Increases Resilience of Households in Environmental Disasters? Leanings from the Gorkha Earthquake of Nepal](#)  
Amina Maharjan; Anjal Prakash; Chanda Goodrich (International Center for Integrated Mountain Development, Nepal)
7. [Environmental Change and Migration in China: Process, Pattern and Trends](#)  
Liang Yang (Universiät Kiel, Germany), Jürgen Scheffran (Universität Hamburg, Germany), Xiaoqing Song (Guangzhou University, China)
8. [Gender-wise Workers' Mobility to the Textiles and Apparels Industrial Tirupur City, Tamilnadu, India: A Coping Strategy under Climatic Change](#)  
Vijay Prakash (Department of Commerce CA, Kongunadu Arts and Science College, Coimbatore 641029, Tamilnadu, India. Affiliated to Bharathiar University, Coimbatore 641046., India)
9. [Influence of a Logging Ban on the Development and Transformation of Forest-Dependent Districts in China: The Case of the Wangqing Forest Region](#)

Zhichao Hu (Peking University, China); Hualou Long (Chinese Academy of Sciences, China); Yanglin Wang; Jian Peng; Zhiqing Song (Peking University, China); Guang Xu (Wangqing forest department, China)

10. [Livelihood Vulnerability of Post-disaster Resettlers: Case Studies in the 2008 Wenchuan Earthquake Resettlement Areas, China](#)

Yong Chen (Institute of Population Research and Institute of Environment and Regional Development, Faculty of Social Development and Western China Development Studies, Sichuan University, China)

11. [On Relationship between Winter Fallow Field and Outflow Population](#)

Hongsheng Li (State Key Laboratory of Resources and Environmental Information System, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

12. [Policy Options to Support Climate-Induced Migration: An Perspective of Disaster Relief in China](#)

Hongjian Zhou; Xi Wang (National Disaster Reduction Center of China, China)

13. [Research on Spatial Pattern Evolution Mechanism of Rural Settlements in Peri-Urban Areas: A Case Study of the Kangdu Village from South-University Town in Xi'an](#)

Enpu MA; Li Tongsheng; Wei Q R; Li M X; Xie Y L; Li J L; Chen Y S (College of Urban and Environmental Science, Northwest University, China)

14. [Rural Depopulation and its effects on settlement in North China Plain](#)

Wang Jieyong; Sheng Pan (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

15. [Rural-Urban Interactions in Kenya with Focus on Environmental Change, Migration and Conflict in the Informal Settlement of Kibera, Nairobi](#)

Janpeter Schilling; Jürgen Scheffran (University of Hamburg, Germany)

16. [Rural-Urban Migration and Agricultural Change: A Translocal Perspective on Herding and Farming Societies in Eastern and Southern Africa](#)

Clemens Greiner (GSSC, University of Cologne, Germany)

17. [Rural-Urban Migration as Adaptation to Environmental Change: The Move to Resilience](#)

Susanne Melde; Frank Laczko (International Organization for Migration (IOM), Germany)

18. [Spatial Analysis of Work-Related Floating Population in Rural Areas, Iran with Exploratory Spatial Data Analysis Approach](#)

Mohammad Reza Rezvani (University of Tehran, Iran)

19. [Strategy to Address Environmental Induced Migration in India](#)

Nabaghan Ojha (Bangor University, UK, India)

20. [Sustainable Food Production Practices in Victoria: The Emergence of a Breed of New Farmers Engaged in the ‘Beyond-Farm-To-Table’ Agrarian Concept](#)

Zainil Zainuddin (RMIT University, Australia)

21. [The Adaptation-Gender-Migration nexus: the case of the Mahanadi delta, India](#)

Giorgia Prati (University of Southampton, United Kingdom)

22. [The Impact of Climate Change on Rural-Urban Interactions  
The Case Study: Iran](#)

Reihaneh Soltani Moqadas (Assistant professor Payam noor university, Iran)

## Poster

1. [Analysis on the Effect of New Urbanization on Population Deloading in Three Gorges Ecological Protective Zone](#)

Huazhong Zhang; Jiajun He; Liansheng Fan (China, ChangJiang Project Supervision & Consultancy Co. Ltd)

## Accidental Participation: Post-Disaster Reconstruction and the Emergence of Participatory Planning in Southwest China

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### Abstract

Be they rocks, roads, or rivers, spatial objects are of pivotal interest to planners. Much of urban and regional planning seeks to create and maintain a spatial order that enhances the aesthetics of these objects. In the planning process, visual attributes of space often times overpower human attributes. The human user of space is typically presented in the generic or aggregate form. In the context of China, where a democratic accountability system is lacking, this problem is most pronounced. Despite more than a decade of efforts to “humanize” (yirenweiben) planning, participatory planning remains a marginal practice in the People’s Republic. This article provides an ethnographic account of participatory planning in the Southwest city of Dujiangyan during its recovery from the devastating 2008 earthquake. The earthquake not only disrupted the spatial order of the region, but also brought havocs to the social fabric of communities. Under such circumstances, the planner had to attend to both spatial and social aspects of reconstruction. In fact, much of the post-disaster planning process revolved around household surveys, town hall meetings, and consultations. As it organically evolved, post-earthquake planning in Dujiangyan prioritized community interests over spatial attributes. Planners and officials came to appreciate the “soft” concerns of individuals, households, and communities, deviating from their standard commitment to “hard” concerns of zones, parks, and roads. The emergence of participatory planning in Dujiangyan, which was in large part an unintended by-product of post-earthquake reconstruction, offers a unique opportunity to examine challenges and opportunities for “humanizing” planning in China.

### Key words:

participatory planning; disaster recovery; aesthetics; spatial order; Southwest China

## Between the Rural and the Urban: Translocal Social Networks as a Source of Resilience to Climate Related Risks in Rural Northeastern Thailand?

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### Abstract

Migration is a major livelihood strategy of rural households in Thailand (Rigg 2012). Both internal migration to urban centers and international migration to countries such as Korea, Singapore or Germany have fostered the emergence of social networks that span various places and scales thereby replacing traditional kinship based networks at the village level. There is growing evidence that these translocal networks have the potential to strengthen the resilience of households and communities in rural areas by facilitating the exchange of people, resources, ideas and practices between the areas of origin and destination of migration (Scheffran et al. 2012, Sakdapolrak 2014). However, there is little knowledge about which structure and which resource flows actually facilitate or even impede resilience. In this paper we investigate the role of translocal support and innovation networks for the resilience of rural households to climate-related risks, such as drought and floods, in three study sites in Northeastern Thailand. Drawing on resilience research and social network analysis (SNA) we provide a conceptual framework and methodology for systematically assessing and evaluating the role of social networks for different resilience capacities. We reveal that translocal connectedness varies with socio-economic background and migration patterns between different study sites. We hence conceptualize translocal networks as being a context-specific source of resilience embedded in the process of rural transformation. We further suggest that our approach, through combining quantitative and qualitative data, holds potential for closing the gap between intensive and extensive vulnerability and adaptation research (Birkenholtz 2011).

### Key words:

Agricultural transformation; climate related risks; migration; Northeastern Thailand; resilience; social network analysis; translocality

## Changing Occupation with Changing Climate in India: A Case study

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### Abstract

The neighbouring States of Jammu and Kashmir (J&K), India, are affected by climatic changes like drought, heat-waves, and flood, besides unemployment and poverty. Such spells of times, induce especially the rural poor families to move to J&K in search of employment in brick kiln. The proposed study examines the nature and background of the migrant families; factors determining their migration; and the benefits and problems of having migrated. It would be based on primary data collected from 113 respondent families engaged in brick kilns in two districts of the State during June 2012. The study revealed majority of the migrants to be of younger age groups, illiterates, having poor economic background with low living standards, no land assets or proper employment in their native lands. They mainly migrate seasonally during March-November, when the brick kilns work in J&K. Their main reasons reported for mobility are climatic change, poverty, and to repay debts in home land. The analysis of determinants of migration indicates climate to be the most significant factor inducing mobility, followed by higher earnings in J&K. Whereas, better living standards in native land significantly discouraged it. The benefits of migration were free fuel for cooking, easy access to drinking water, employment and better income. Whereas, the problems reported were debt bondage, job insecurity and their migrant status. The study recommends job and social security measures to protect the migrants from exploitation by contractors who hire these workers, discriminations and employment insecurities, besides education and health facilities for their children.

### Key words:

climatic change; migrant families; brick kilns; benefits and problems of migration

## Climate Change and Rural-Out Migration: A Farmers' Perspective from Rural

### Pakistan

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#### Abstract

In the last few decades, the agriculture sector and related rural livelihoods in Pakistan have become highly vulnerable to climate change. Along with other measures, farm households could potentially consider rural-out migration (either completely or partially) as an effective adaptation measure to climate change. This study investigate the farmers' perspective on rural-out migration using a survey of 450 farm households collected through face-to-face interviews from 76 villages in three agro-ecological zones of Punjab, Pakistan in 2014. Particularly, we analyze the farm households' perception of village level rural-out migration trends. In addition, we examine the rented-in and -out trends using local land tenure data. Furthermore, we analyze the farm households' rural-out migration intentions and possible reasons for not adopting it as an adaptation measure. The findings of the study suggest that mainly farm households perceived an increase in the rural-out migration trend since 2009 which was mainly due to reduced agricultural productivity and income due to climatic-related risks such as floods, excessive rainfall, and crop diseases. Further, the analysis of the land tenure data also shows an increase in rented-in trends which also confirms local perceptions of increasing rural-out migration trend. Furthermore, one-tenth of the farm households intend to migrate due to farm level vulnerability to climate change, however only one-third of them actually adopted it. The major reasons for not adopting migration as an adaptation option were the perceived lack of opportunities and required skills for jobs in urban areas. Intentions to migrate were shown mainly by small farmers but actually adopted more by large farmers.

#### Key words:

Climate change; Rural-out migration; Farm households; Agriculture; Pakistan

## Conceptual Explaining of Effective Factors on Economical Security in Rural Area and Its Effect on Rural Migration

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### Abstract

Nowadays, desire to emigrate from rural to urban and decreasing of rural population is a common perspective in so many of countries especially, in developing countries that have so many driver causes and dimensions. In so many of cases, leakage of cultural and infrastructural services, Reduced quality of life or supply in excess of demand for manpower in rural areas can be considered as most important factor of such movements. But, among all of these factors, economical dimensions as a main and basic reasons, play important role in forming these population spatial movement. Lack of employment and economic revenue, non-diversified rural employment opportunities, and most importantly, low economic security of economic activities in rural areas, is important reason for the formation of temporary or permanent migration ideas and permanent evacuation of so many rural settlements. Climatic changes, drought, lack of adequate water resources, unplanned agriculture, ambiguity of the sales price and profit from agricultural activities as well as the loss of environmental capabilities in many rural areas could be mentioned as most important dimensions and indicators of lost economic security in rural area. In such circumstances, seasonal or permanent migration to rely on or employing in the false but lasting activities in urban areas such as services and itinerant peddlers, day laborers, to ensure cost and annual expenditures could be accounted as accessible solution for rural populations. Meanwhile, absence of governmental supportive policies for farmers, lack of insurance, farmer's limited knowledge or ability to pay for their own insurance against the risks, and etc, increase the economical insecurity and improve migration of rural area. Thus, this article had been tries to category and conceptual explaining of effective factors and impacts of economic insecurity in rural area.

### Key words:

economic security; agriculture; migration; rural area; rural development

## Does Migration Increases Resilience of Households in Environmental Disasters?

### Leanings from the Gorkha Earthquake of Nepal

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#### Abstract

Migration is considered to be a self-insurance strategy adopted by households. The literature points at the crucial role often played by remittance in times of crises, and specifically in the aftermath of environmental disasters. This hypothesis was tested using the Gorkha earthquake in Nepal, where a 7.6 magnitude earthquake hit central Nepal, followed by more than 300 aftershocks including one of 6.8 magnitude, causing massive damage to life, livelihoods and infrastructure. The study, which was conducted in two of the most heavily earthquake-affected districts, show that the out migration of youth from the villages had both positive and negative impacts at different stages after the disaster. During the rescue phase, migrant households were more vulnerable than non-migrant households as they had fewer able-bodied members to rescue people and other assets. In the relief phase, migrant households were slightly more vulnerable than non-migrant households in accessing relief. To access government support, lack of legal documents was a major obstacle, whereas to access non-government support lack of male members to carry relief stuff was a bottleneck for the migrant households. However, high migration communities managed to overcome some of these challenges by taking a group approach. Social remittances/social network were found to play an important role in accessing relief. With regards to post disaster recovery, migration and remittances is expected to support in quicker recovery as remittance income is not affected by the local destruction. Thus, the resilience of the migrant households differed at various stages post disaster.

#### Key words:

Migration and disaster response; remittance and resilience; mountains and disasters

## Environmental Change and Migration in China: Process, Pattern and Trends

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### Abstract

Climate change and its adverse effects lead to increasing environment vulnerabilities and disaster risks both globally and regionally. It is therefore a major source of concern regarding degrading human livelihood, ecosystem services and social security that is likely driving present and potential human migration. This study is based in large part on literature data in Ningxia, Chongqing and Guangdong in China, representing respectively the ecological migration, disaster migration and economic migration in the climate change context. Results show that, though human migration is often caused by combined many factors, climate change related environment degradation and livelihood difficulties are indeed part of the concerns. Planned and well organized migration plays a significant role in improving the livelihood of migrants. However, migration is still an option of last resort after the vulnerable populations attempting to cope with new and challenging circumstances have exhausted other options such as harvesting less, suffering disasters, or continuing poor. Actually, local people acted diverse adaptation measures with aids from government and external sources, which at a certain level mitigated climate stresses and reduced the necessity of migration. The study concluded that it is necessary to classify the causes of migration and propose specific migration plans which consider both instant settlement and long-term development. Further, an integrative framework of top-down and bottom-up approaches would optimize the utilization of various resources from, e.g., individuals, governments, enterprises and international aids.

### Key words:

Climate change; migration; vulnerability; disaster; China

## **Gender-wise Workers' Mobility to the Textiles and Apparels Industrial Tirupur City, Tamilnadu, India: A Coping Strategy under Climatic Change**

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### **Abstract**

The textiles and apparels industrial Tirupur city of Tamilnadu, India, attracts migrant workers from all over the country. It provides employment to both male and female workers, who seek alternative employment to their climate change affected villages. Majority of the workers move into the city from rural areas of the country, owing to droughts affecting agricultural employments and shrinking cultivable land. This paper attempts to investigate the factors influencing mobility of workers into the city. A gender-wise treatment of the issue is crucial, due to varying factors affecting male and female decisions to migrate differently. This also warrants a decomposition analysis of their migration decision. This study is based on primary data collected from a random sample of 340 male and female workers (170 each) engaged in textiles and apparel industries in Tirupur city, during May-August 2010. The study uses simple averages, percentages, ratios and regression. The findings reveal climate change and poverty to be the driving force behind workers' mobility to the city, mainly as an income coping strategy. They are largely the poor, less educated/skilled, and young, lacking assets, and job security and social security. The women migrants are more vulnerable than their male counterparts, as they are treated as reserve workers and easily targeted during crisis. The determinants of migration shows income to be the most significant factor drawing the unskilled rural workers to the city. The study recommends awareness generation on their rights as a worker and provisions of social security measures for the migrant workers.

### **Key words:**

textiles and apparel industries; migrant workers; exploitation and discrimination; climate change

## **Influence of a Logging Ban on the Development and Transformation of Forest-Dependent Districts in China: The Case of the Wangqing Forest Region**

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### **Abstract**

Forest-dependent districts provide substantial wood resources for economic development, playing an irreplaceable role in the national strategy. However, some forest-dependent districts are facing challenges related to industry restructuring and urban transformation, as well as an intense trend of degradation. The Chinese government implemented a series of policies and measures, such as the Natural Forest Protection Program (NFPP) and the Returning Farmland to Forest Project (RFFP), to address those challenges; in 2014, the government decided to stop commercial logging completely and conducted a pilot study. We constructed a theory of coordinated evolutionary framework based on “forest ecosystem – forest economic system – society system” for a forest-dependent district. We examined the Wangqing forestry department to analyze its development status and identify the prominent problems based on the three-system theory. We discuss the potential influence that the forest logging ban will have on the Wangqing forestry department based on our framework, and we provide suggestions to promote the transformation and development of forest-dependent districts if the logging ban is implemented in these areas.

### **Key words:**

logging ban; forest-dependent district; wangqing forest region; development and transformation

## Livelihood Vulnerability of Post-disaster Resettlers: Case Studies in the 2008

### Wenchuan Earthquake Resettlement Areas, China

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#### Abstract

China has been frequently struck by natural disasters so it is an expedient alternative to resettle people out of disaster-prone areas. There is not much means to survive for those devastated by natural disasters unless they are resettled away from their original places. However post-disaster resettlers still face numerous challenges although they are well supported with preferential policies in their new resettlement communities. The paper takes two resettlement villages in Nanbao township of Sichuan province where long-distance (trans-prefectural) post-disaster migrants were resettled after the Wenchuan Earthquake in 2008, as case study areas. The study constructed an empirical framework for analyzing and assessing livelihood vulnerability of these resettlers. Findings show that post-disaster migrants have fewer livelihood assets than before displacement and that they face higher livelihood risks and vulnerability than local host people. Resettlement policy and programs need to address the needs of resettler households to improve their livelihood capability.

#### Key words:

post-disaster resettlement; livelihood vulnerability; livelihood asset; risk to livelihood; Wenchuan earthquake; China

## On Relationship between Winter Fallow Field and Outflow Population

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### Abstract

There are many studies focusing on interaction between floating population and regional economic development, social integration of migrant people etc. However, the research on relationship between winter fallow fields and floating population in outflow places remains blank. In recent 20 years, more and more famers have given up autumn sowing, which contribute to lots of land unused from harvest in last autumn until next year sowing. Thus, the assessment of impact of rural labour migration on farmland vacancy is significant in optimizing winter fallow fields development and food security.

Taking Guizhou province as an example, the study extracts the winter fallow fields and summarizes regionally in 2010 through cloud removing, HANTS and NDVI dynamic threshold methods, based on Guizhou land use data and SPOT-VEGETATION NDVI data. According to the ordinary least squared regression method, the size of winter fallow fields is related to outflow population which is significant at  $P \leq 0.000001$  level. But the adjusted R-squared is 0.26 which means the outflow population can explain 26% of winter fallow fields. Moran's Index of the winter fallow field size and outflow population is 0.5821 and 0.4905 respectively which indicates strong spatial dependence. Thus, the spatial error model is used here. The result shows that adjusted R-squared is 0.65 which means the outflow population can explain 65% of the size difference of winter fallow fields. These results indicate that outflow population has strong impact on cultivated land use pattern. If more and more population floats out to other developed regions for better revenue, more cultivated land will be left unused which in turn affects the food production.

### Key words:

Winter fallow field; floating population; spatial error model; SPOT Vegetation; Guizhou

## Policy Options to Support Climate-Induced Migration: An Perspective of Disaster Relief in China

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### Abstract

Attention to climate-induced migration has grown considerably in recent years, reinforced by high frequency of droughts, storms and flooding. Focusing on migrations induced by flash floods in Zhouqu and droughts in central Ningxia, China this study illustrates key factors in the process of policy options to support climate induced migration. The study is based on stakeholder interviews and secondary data processing. The findings show that integrating sudden and slow-onset hazards, combining top-down and bottom-up methodology and encouraging private sectors to establish Public-Private Partnership, are the main policy options from disaster relief perspective. Otherwise, two prospective transformations are proposed in policy options, transferring from re-active migration to pro-active migration, and from move & stay to hope & development in the aspect of migrants' livelihood improvement.

### Key words:

Migration; Climate change; Policy response; Sudden disaster; Slow-onset disaster

## Research on Spatial Pattern Evolution Mechanism of Rural Settlements in Peri-Urban Areas: A Case Study of the Kangdu Village from South-University Town in Xi'an

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### Abstract

Peri-urban areas has been widely discussed by scholars from multiple disciplines including geography, urban planning, ecology and sociology due to its transitivity, diversity and dynamism in socio-economical structure and landscape features. The study aims to find the fluctuation rule of urban and rural settlements in peri-urban areas during the process of urbanization, and discuss the spatial pattern evolution characteristics of retained villages. Based on the review of theoretical research on rural settlements in peri-urban areas, this paper takes the Kangdu village in South-University Town of Xi'an as a case study area, and explores its spatial pattern as well as evolution mechanism by comprehensive application of remote sensing imagery interpretation, field investigation and statistical analysis. Results indicate that a total four times building boom and two significant employment changes emerged in 15 years from 2001 to 2015, and most of local residents' house lease appeared in 2006. We found a high consistence between the villagers' employment change and the main node of urbanization; and the system evolution characteristics of "stimulus-feedback" is found between the change of employment and building boom. This study shows that external drive of urbanization pushed by near domain and local residents' self-adaptation is the main dynamic mechanism of rural settlements' spatial pattern evolution in peri-urban areas.

### Key words:

peri-urban areas; rural settlements; spatial pattern evolution; dynamic mechanism;

Kangdu village

## Rural Depopulation and its effects on settlement in North China Plain

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### Abstract

Economic reforms since the late 1970s have brought about significant changes in rural China. Academic and policy debate has primarily focused on farmland loss and construction land expansion in rural areas caused by rapid economic development and increasing urban population. Meanwhile, the changes of rural depopulation and its effects to settlements have received less attention. Because of high migration rate of rural to urban and low fertility rate resulted by one-child policy, rural areas have been undergone a process of rapid depopulation since the middle of 20th century. Rural depopulation changed the pattern of man-land relationship in rural areas, which caused some problems such as shortage of agricultural labors, domestic vacancy, abandoned farmland, and degraded rural inhabitable environment. In this article, using series data of six national censuses and land use survey, the process of rural depopulation and its pattern in North China Plain were analyzed, and land use changes of rural settlements was evaluated. Rural depopulation has changed the settlement patterns which formed by traditional cultivation culture in the past several thousand years. What patterns of settlements will be formed after rapid depopulation in rural areas? Then, Zhaozhuang Village is selected as samples. Based on historical aerial photographs and participatory rural survey, the land use maps of the village in different decade were rebuilt, the rural depopulation process and its effects to settlements were explained. In the end, the way to rural restructure of settlements were discussed, and some suggestions for improving rural land system were given.

### Keywords:

rural depopulation; effects; rural settlement; North China Plain

## Rural-Urban Interactions in Kenya with Focus on Environmental Change, Migration and Conflict in the Informal Settlement of Kibera, Nairobi

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### Abstract

In Kenya, less than a quarter of the population lives in urban areas which is changing rapidly. The annual rate of urbanization between 2010 and 2015 was 4.4%. The capital Nairobi has a current population of about 3.1 million which is expected to almost double by 2025. Kenya and particularly Nairobi offer opportunities to study how climate change, resulting in increasing temperatures and rainfall variability, affects income, water and food security which in turn drive rural-urban interactions. These will be most visible in informal settlements such as Kibera, an important destination for migrants and one of Africa's largest informal settlements. It is exposed to heavy rainfall events and seasonal flooding which aggravate the existing environmental problems of pollution and lack of access to basic services. In 2007 Kibera was a hotspot of the post-election violence in Kenya and insecurity continues to be a significant risk to local livelihoods. The presentation will highlight some of the key rural-urban interactions between Kibera and rural areas of Kenya. Particular attention is paid to migration, environmental changes and conflict implications. The study is based on qualitative research conducted in Kibera between November 2012 and February 2016. Preliminary results suggest that rural-urban interactions, mostly in the form of migration, contribute to both tensions and opportunities in Kibera.

### Key words:

Rural-urban interactions; migration; environmental change; conflict; Kenya

## Rural-Urban Migration and Agricultural Change: A Translocal Perspective on Herding and Farming Societies in Eastern and Southern Africa

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### Abstract

Circular rural-urban migration and social and economic transfer relations between cities and their rural hinterlands are fundamental to African social life. They are deeply embedded in historically processes of land dispossession, colonial endeavours to exploit and control native labour, and post-colonial economic dynamics. Based on empirical cases from Eastern and Southern Africa, the paper explores the effects of rural-urban interactions in rural sending areas, particularly in wetlands and savannah environments. It focuses on groups, which are believed to be most vulnerable to changing environmental conditions: small-scale farmers and pastoralists. The conceptual framework of translocality is used to explore and compare patterns of migration, flows of social and economic remittances and the different effects on the rural sending areas, particularly their impact on land-tenure, agricultural investments, farming practices, knowledge and livestock husbandry. Based on empirical and secondary data, this paper demonstrates that a range of variables mediate the environmental impact of rural-urban relations, particularly socio-economic inequality, labor, gender dynamics, cultural factors and local environmental conditions. It argues that a comprehensive analysis of these variables and their dynamic interplay is essential to come to a more holistic understanding of the wider environment-migration nexus.

### Key words:

small-scale farming; pastoralism; land-use; migration; rural-urban relations; translocality; Africa

## Rural-Urban Migration as Adaptation to Environmental Change: The Move to Resilience

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### Abstract

Urbanization, demographic growth and the impacts of environmental change and disasters are one of the key challenges of our time. More than 26 million people have been estimated to have been displaced by disasters annually since 2008 and many more move to reasons linked to environmental degradation affecting livelihoods. Research on the topic of environmental migration has increased over the past years, but a gap remains with regards to comparable data across countries.

This paper presents innovative research based on household surveys in 5 countries (Dominican Republic, Haiti, Kenya, Mauritius and Viet Nam) comparing how rural-urban migration has enabled households to adapt to environmental change and disasters as well as undermined potential adaptation strategies. Findings indicate that households with migrants are better able to respond to environmental challenges but still have less resources available than the richest quintile of the population that can adapt in the place of origin. Confirming previous research, the poor cannot move due to a lack of resources and are the most vulnerable in light of natural hazards. Policies should therefore aim at making internal migration an accessible adaptation strategy, while at the same time increasing disaster risk reduction and resilience strategies to adapt *in-situ*.

### Key words:

Migration; urbanization; adaptation; resilience; displacement; environment; climate change

## Spatial Analysis of Work-Related Floating Population in Rural Areas, Iran with Exploratory Spatial Data Analysis Approach

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### Abstract

The workers flows is one of the most important of rural- urban linkages. This flows in many cases is in form of work-related floating population. The work-related floating population in this paper is a group of people who reside in villages a county, but works in cities and thus they have a daily movement between villages and cities. The paper analyses the spatial distribution of floating population in Rural Areas of Iran using the data gained from the Population and Housing Census (2012) Statistical Centre of Iran (SCI). The employment population over 10 years in Iranian rural areas in 2011 was 6058902 people which about 12.93 % of them works in urban areas. In provinces levels, this ratio is changing from maximum 36.59 % in Qom province to minimum 6.27 % in *Sistan and Baluchistan*. In counties level, this ratio is changing from maximum 43.77 % in *Baharestan County (Tehran province)* to minimum .22 % in *Rudbar Jonub County (Kerman Province)*. Results of exploratory spatial data analysis indicate clustering (positive spatial autocorrelation) and spatial heterogeneous in spatial distribution of work-related floating population in rural areas in Iran's counties.

### Key words:

Rural-urban linkages; floating population; work commuter; spatial analysis; Rural Areas; Iran

## Strategy to Address Environmental Induced Migration in India

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### Abstract

In the 1990s, as the agrarian crisis in India intensified, migration of rural populations for work rapidly emerged as a major source of rural livelihood. Odisha, a State in eastern India, has emerged as a key labour sending region. With declining agricultural incomes and inability of rural households to cope with the current environmental shocks due to climate change, about 1.53 million people use to migrate each year to adjoining cities in search of livelihoods. Among them the case of distress migration is quite high which are seen mostly in western Odisha. To address it, a strategy has been deployed by government of Odisha and a programme supported by DFID UK. The strategy which has been operational since 2013, aims at creating climate resilient assets through convergence of different government schemes and programmes. Water conservation and water harvesting structures, land development and afforestation activities etc have been taken up under the strategy which provide local services such as ground-water recharge, enhanced soil fertility and increased biomass. These assets have also ensured at least 100 days of employment provision for each migrant households in every financial year with a stipulated wage rate defined by Government of India. The strategy has also introduced different climate resilient livelihoods models for the migrant households. It is proved that when employment created locally, the migrant people prefer to stay back. The strategy is being revised now to use it as an adaptation strategy to climate change.

### Key words:

Migration; adaptation strategy; climate change

## **Sustainable Food Production Practices in Victoria: The Emergence of a Breed of New Farmers Engaged in the ‘Beyond-Farm-To-Table’ Agrarian Concept**

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### **Abstract**

The paper will explore the emergence of a breed of new farmers in Victoria and Tasmania. These are farmers by choice, often professional with no background in farming but who have decided to engage in sustainable and ethical farming as a full-time occupation. It will interrogate the socio-demographic characteristics of these new farmers and more importantly their motivation for taking up ethical and sustainable farming, their farming practices and the values and ethos for these choices.

The paper focuses on one small aspect of the food system — farming and food production. It is about who, why and what, of this “new” approach to farming and food production in Victoria. These are farmers and food producers by choice, often with no prior background in farming or food production.

They tend to be small-scale family oriented, exclusively organic with diverse income streams from the one farm. They are ethically minded in their farming practices with emphasis on sustainability.

The research interrogates how this approach is framed often as sustainable and ethical farming practices. In doing so it will investigate the following characteristics:

- socio-demographic profile
- individual motivations
- values and ethos

It will also investigate the socio-technical aspect of the modern farmer communities use of digital platforms to enhance their community of practice. It will explore the relational dynamic between these farmers of ethical and sustainable produce with their consumers by exploring their usage of digital medium in their business engagement, social activism and online networking.

### **Key words:**

Ethical and sustainable farming practices; civic agriculture; farmer-hipster (farmster)

## The Adaptation-Gender-Migration nexus: the case of the Mahanadi delta, India

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### Abstract

There is a growing interest in understanding changes in migration patterns as response to climate hazards. However, the feedback process of migration on the families left-behind is rarely explored and even less is known about its gendered implications for adaptive capacity. Adaptation strategies, including migration, could reinforce inequality and vulnerability of some social groups with differentiated effects on the socio-cultural barriers to adaptation. Migration and adaptation are not gender neutral processes. Still, gender remains an often neglected dimension of the climate change-migration debate. This research seeks to investigate how migration shapes gender and power relations with consequences on women's adaptive capacity in the sending areas. The study draws on field research conducted in the Mahanadi delta as part of the 'Deltas, Vulnerability and Climate Change: Migration and Adaptation' project. In the delta migration remains a male dominant phenomenon that leaves women behind with social, economic and physical consequences. In contrast to traditional binary approaches, this study employs different qualitative tools to explore gender through the lens of *intersectionality* so as to disentangle the multiple dimensions of power and vulnerability. The findings show that migration can play a significant role in shaping women's adaptive capacity in the migrants' places of origin with differentiated impacts across the spectrum of caste, class, gender and other social identities. To fully understand migration in the framework of adaptation, there is a need to investigate its implications for the adaptive capacity of those who remain behind through gender analyses that break down intersectional inequalities.

### Key words:

Adaptive capacity; Vulnerability; Gender; Migration; Intersectionality; Adaptation; Resilience

## The Impact of Climate Change on Rural-Urban Interactions

### The Case Study: Iran

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#### Abstract

Nowadays many factors play a role in changes in interactions between the urban and rural regions. Several factors play an important role in the development of local rural networks. The shortcomings of local economics due to the reduction of environmental resources that have evolved as a result of climate changes have had a decisive role in regional migration of rural youth. This is because the basic rural economy that is the foundation of the production of rural products faces a decline in efficiency. The continuation of this trend does not answer rural income requirements. Drought, loss of vegetation growth and trees would result in a reduction of rural income and the marketing of rural products which result in a reduction of household income. Moreover, any additional income that may be obtained from food processing economic activities will also drop due to its dependence on the agricultural sector. This will result in a further drop in the sources of household income. It is under such conditions that villagers choose to migrate to cities and towns in order to engage in unproductive urban jobs. This will result in the destruction of positive and efficient interactions between the villagers and a one-sided interaction between the urban and rural regions. Therefore, local rural networks will get destroyed and rural economic growth will be hampered. This will result in rural residential instability and an imbalance of regional networks. On the whole, this trend will yield a reduction in national food security and increased dependence on food imports which negatively affects rural residence and regional networks.

#### Key words:

Climate changes; environmental resources; rural-urban interactions

## **Analysis on the Effect of New Urbanization on Population Deloading in Three Gorges Ecological Protective Zone**

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### **Abstract**

The Three Gorges Reservoir is a national strategic Fresh Water Resource Reservoir. According to The Three Gorges Follow-up Work Plan approved by the National State Council, the Ecological Protective Zone has been prioritized as an important task for protecting the Three Gorges Fresh Water Reservoir as well as ensuring its longterm safe run. The major problems are the highly intensive population and improper land utilizing structure. In this sense, population deloading has become a must for activating the ecological functions. This thesis researches on comparative analysis on ecological migration, land requisition and resettlement, new migrations including population transfer by new urbanization and its the necessity, the promoting effect of urban infrastructure and public services on the population deloading of Three Georges Reservoir, the significance of constructing ecological protective zones in over 4000 big or middle water reservoirs.

### **Key words:**

New Urbanization; Ecological Protective Zone; Population Deloading

## C12.35 Sustainability of Rural Systems

### Land Use and Rural Sustainability



Home

#### Oral

1. [A Characterisation of Resilient Agro-Small and Medium Enterprises in Zimbabwe](#)  
Dumisani Shoko; Edmore Kori (University of Venda, South Africa)
2. [Change in Socio-economic Behavior in Urban Rural Interface Area in North India: A Geographical Analysis](#)  
Nizamuddin Khan (Aligarh Muslim University, India)
3. [Combined Analysis of Land Cover Change and NDVI Trends and Its Implications for Regional Sustainable Development in the Loess Plateau, China](#)  
Zhi Cao; Yurui Li; Yansui Liu; Xiaoyu Zheng (Institute of Geographic Sciences and Natural Resources Research, China)
4. [Crop Diversification and Sustainable Agriculture: A Geographical Analysis from Malda District of West Bengal](#)  
Hasibur Rahaman; Dr. Fazlur Rahman; Dr. Shamsul Haque Siddiqui (Aligarh Muslim University, Aligarh, Up, India 202002, India)
5. [Dose Three Rights Separation Policy in China lead to sustainable land use? Evidence from China](#)  
Yuting Xu; Xianjin Huang (Nanjing University, China)
6. [Effects of the Influence of Cultivated Land Transfer on Food Production: A Case Study of Henan Province](#)  
Yating Li; Shaoqi Pan; Changhong Miao (Henan University, China)
7. [Farmland Degradation in Heilongjiang Province, China: Human factors and Land-Use Policy](#)  
Shufeng Zheng (Heilongjiang University, China), Shuying Zang (Haebin Normal University, China)
8. [Feasibility and Presenting a Model of "Rural Collective Management" in Mountainous Region of the Southwest of the Caspian Sea](#)  
Nasrollah Molaei hashjin (Full Professor at Geography Department, Rasht Branch, Islamic Azad University, Rasht, Iran, Iran); Isa Pourramezan (Assistant professor, Geography Department, Rasht Branch, Islamic Azad University, Rasht, Iran, Iran); Isa Mahdavihadormahaleh (Ph.D. Candidate in Geography and Rural Planning, Rasht Branch, Islamic Azad University, Rasht, Iran); Masoumeh Hasannezhad (Ph.D. in Geography and Rural Tourism, Iran)
9. [Functional Changes of Land Use in Hubei Province](#)

Jiaxing Cui; Mengli Hua; Xuesong Kong (Wuhan University, China)

10. [Impact of Rural Road Construction on Agriculture Sector in Jaipur District of Rajasthan, India](#)  
Sarina Kalia; Richa Singh (University of Rajasthan, Jaipur, India); K.K MISHRA (PWD, Jaipur, Rajasthan, India., India)
11. [Land Consolidation and the Sustainability of Rural Community: A Case Study in Traditional Agricultural Areas of China](#)  
Yurui Li (IGSNRR, CAS, China)
12. [Land Cover Change and Diversified Rural Development – A Croatian Case Study](#)  
Aleksandar Lukić; Marin Cvitanović; Petra Radeljak Kaufmann; Luka Valozić (University of Zagreb, Faculty of Science, Department of Geography, Croatia)
13. [Land Use and Sustainable Agriculture under Climate Change in China](#)  
Yansui LIU (Academy of Land and Urban Rural Development, Beijing Normal University, Beijing 100875, China; Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China, China)
14. [Land Use Transition and Land Management](#)  
Hualou Long (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
15. [National Agritourism Parks in China: Distribution Characteristics, Types and Spatial Optimization](#)  
Fuyuan Wang; Kaiyong Wang; Tian Chen (Institute of Geographic Sciences and Natural Resources Research, China)
16. [Planning for NGO's at Districts Level along the River side of Jamuna, Bangladesh: Using GIS and Remote Sensing Technology](#)  
Tanjinul Hoque Mollah; Kun Xiao; Sharmin Shishir; Takaaki Nihei (Hokkaido University, Japan)
17. [Research on the Quantitative Evaluation Model of the Restriction Effect of Farming Radius on Rural Settlements Relocation](#)  
Zhuolin Tao (Peking University, China); Jinshe Liang; Qingjing Zheng (Beijing Normal University, China), Teqi Dai (Beijing Normal University, China)
18. [Resource Utilization Vs Sustainable Development in India](#)  
Sarda Prasad (Jawaharlal Nehru University, India)
19. [Rural Households' Perception of Rural Residential Land Consolidation and Their Satisfaction with The Processes and Results ——A Case Study of Yuanqiao and Baihui Rural Communities of Dezhou](#)

## Country, Shandong Province

Xiaoyu Zheng; Yang Zhou; Zhi Cao; Yansui Liu (Institute of Geographic Sciences and Natural Resources Research, China)

### 20. Rural Settlement Land Use of China: Evolution, Research Status and Research Prospects

Zhenzhen Zhao (School of geographic and Oceanographic Sciences, Nanjing University, China); Lijie Pu (School of geographic and Oceanographic Sciences, Nanjing University, China)

### 21. Rural Transformation from the Perspective of Regime Shifts of Socio-Ecological Systems in the Loess Plateau

Xin jun Yang (College of Urban and Environmental Sciences, Northwest University, China)

### 22. Rural Transformation Model through Integrating Improved Bee, Coffee and Goat Farming with Agro-Forestry in Kamwenge District-Uganda

Fredrick Tumwine; Frank Mugagga (Makerere University, Uganda); George Tunanukye (Kamwenge Bee Keepers Cooperative Society, Uganda); Jennifer Tumushabe (Kyabwanswa Rural Integrated Farming Systems, Uganda)

### 23. Spatial Allocative Efficiency of Construction Land Expansion and Its Optimum Control Strategy in China

Zhou Yang; Yansui Liu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

### 24. Spatial-Temporal Change of County-level Inequality and Social Deprivation During the Continuous Growth of Grain Production in Henan Province, China

Junbo Gao; Yansui Liu; Yurui Li (Institute of Geographic Sciences and Natural Resources Research, China)

### 25. Spatiotemporal Evolution and Driving Mechanism of Rural Settlements in the Poverty Belt Around Beijing and Tianjin, in China

Sun Piling; Xu Yueqing (China Agricultural University, China); Liu Qingguo (Qianjiang Xinhua Middle School, China); Liu Chao; Wang Hongliang (China Agricultural University, China)

### 26. Sustainability of Commercialisation of Agriculture in Tribal areas of the North-East India: The Case of Meghalaya

Debendra Kumar Nayak (North Eastern Hill University, India), Rabi Narayan Behera (North Eastern Hill University, India)

### 27. Territorial Changes in Municipal Limits of Statutory Towns in Haryana: An Overview of Causes and

## Consequences

Randhir Singh Sangwan (Indira Gandhi University, Meerpur, Rewari, India)

28. [The Evaluation of Land Consolidation Policy in Improving Agricultural Productivity in China](#)

Xiaobin Jin (Nanjing University, China); Yang Shao (Virginia Polytechnic Institute and State University, USA); Zhihong Zhang (Nanjing University, China); Lynn Resler; James Campbell Campbell (Virginia Polytechnic Institute and State University, USA); Xindong Du; Xiaomin Xiang; Wei Sun; Yinkang Zhou (Nanjing University, China)

29. [The Evolution and Regulation of Rural Settlements](#)

Guohua Zhou; Yanhua He; Chengli Tang (Hunan Normal University, China)

30. [The Logical Framework of Rural Land Comprehensive Consolidation during New Period](#)

Qiao Luyin (China urban rural development institute, Shanxi University, China)

## Poster

1. [A Comparison of the Means and Ends of Rural Construction Land Consolidation: Case Studies of Villagers' Attitudes and Behaviours in Changchun City, Jilin province, China](#)

Fang Yan-gang; Shi Ke-jian; Niu Cai-cheng (China, School of Geographical Sciences, Northeast Normal University)

2. [Assessment of Peasant Household' Sustainable Livelihoods on the Poyang Lake Region](#)

Li Ping; MA Guo (China, JiangXi Normal University)

3. [Comparative Analysis of Village Infrastructure Planning and Construction—The Example of Quzhou City](#)

Lixiong Zhu; Wangming Li; Yuan Fang (China, Institute of Urban and Rural Planning and Design, Zhejiang University)

4. [Currentstate, Problems and Countermeasures of Beijing Urban Agriculture](#)

Shanshan DU (China, College of Arts & Sciences, Beijing Union University); Jianming CAI (China, Institute of Geographic Sciences and Natural Resources Research, CAS); Yijie CHEN (China, Beijing Rural Economy Research Center)

5. [Erosion Gully Information Extraction Based on Remote Sensing Images with Different Resolution](#)

Luoman Pu (China, Northeast Institute of Geography and Agroecology, Chinese Academy of Science)

6. [Examining the Causes and Consequences of the Expansion of Second Homes in Rural Areas and Suburban in Iran \(1990-2015\)](#)

Hassan Izady (Iran, Department of Urban Planning, Shiraz University)



7. [Exploring the Factors Influencing Land Use Conflict Based on Multilevel Model: A Case Study in the Poor Belt around Beijing-Tianjin, in China](#)  
Yu Zhonglei (China, School of Geography, Beijing Normal University); Sun Piling (China, College of Resource and Environmental Sciences, China Agricultural University); Zhang Hua (China, School of Geography, Beijing Normal University)
8. [Geographical Feature Recognition and Classification of Ecological Restricted Development Zones — Using the Case of Lianhua of Jiangxi Province as an Example](#)  
Li Ma; DingGuo Ma (China, Jiangxi Normal University)
9. [Identifying Disparities During the Implementation of Land Consolidation in China by Coordinated Evaluation](#)  
Xiaomin Xiang; Xiaobin Jin; Xindong Du (China, Nanjing University)
10. [Landscape Planning and Design Based on Ecosystem Services Evaluation and Trade off Analysis: A Case Study in Ansai Watershed](#)  
Wenwu Zhao; Xuening Fang (China, Beijing Normal University)
11. [Research of Fallow Scale in the Yangtze River Ecological Barrier—A Case Study of Chongqing, China](#)  
Chen Zhantu; Yang Qingyuan; Yang Renhao (China, School of Geographical Sciences, Southwest University)
12. [Spatial Organization Mechanism of Rural-urban Integration in Urban Agglomeration Area](#)  
Anhua he; Guohua zhou; Chengli tang (China, Hunan Normal University)
13. [Study on Influence Factors of Farmers' Willingness in Rural Residential Land Consolidation: An Empirical Study of Zhongdu village, Tongnan county](#)  
Pei en Li; Qingyuan Yang; Yao Fan (China, School of Geographical Sciences, Southwest University)
14. [Study On Spatial Distribution Optimization of Rural Settlements Land Use in Hilly Area a Case of Gulu Town, Chongqing in China](#)  
Yaoyao kuang; Qingyuan Yang (China, Southwest University)
15. [Study on the Compensation Standard of Fallow in Ecological Barrier area of the Upper Yangtze River —the Case of Chongqing](#)  
Li Zeng; Qingyuan Yang; ZHantu Chen (China, Southwest University)
16. [Study on the Spatial Reconstruction of Rural Settlement in Western China—A Case Study of Xianyang City in Shaanxi Province](#)  
Simin Zhao (China, Northwest University)



17. [Study on Water Supply Project Planning of Villages Based on the difference of Water Use Behavior](#)  
Lixiong Zhu; Wangming Li; Yuan Fang (China, Institute of urban and rural planning and design, Zhejiang University)
18. [The Changes of Spatial Pattern of China's Grain Output and its Impact on Resources and Environment](#)  
Jieyong Wang; Ziwen Zhang; Yansui Liu (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
19. [The Realization Mechanisms of Urban-Rural Integration of Shaanxi](#)  
Ren Yi (China, North-West University)
20. [Zoning of Rural Residential Land Consolidation in LiangJiang New Area in Chongqing based on the Urban-rural Integrated Development](#)  
Guo-hua Bi; Qing-yuan Yang (China, School of Geographical Sciences, Southwest University)

## A Characterisation of Resilient Agro-Small and Medium Enterprises in Zimbabwe

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### Abstract

Agro-Small and Medium Enterprises (agro-SMES) are engines of economic growth and catalysts of socio-economic transformation in many countries. Their contribution to socio-economic development includes employment creation, income generation, GDP contributions, export earnings, women empowerment and provision of basic goods and services. In a country like Zimbabwe where agricultural land use is the mainstay of the economy, land use sustainability becomes indispensable. The land users operating a business model, called agro-SMES, form the central cog of the economy. As such their resilience, the backbone of land use and rural sustainability, is important to the national economy at large and land use and rural development in particular. It is acknowledged that flexibility, adaptability and responsiveness make agro-SMES resilient in challenging operating environments. These resilience capabilities are, however, a result of the interplay of particular agro-SME characteristics. This paper outlines agro-SME characteristics that make them resilient in challenging operating environments using results from an investigation carried out in Kwekwe District, Zimbabwe. All the agro-SMES established before 2005 and survived the 2000-2010 challenging operating environment constituted the study population. Total population sampling was used. A questionnaire was administered to collect data that was used to characterise agro-SMES that were still operational in 2013. Frequency distribution analysis, measures of central tendency and content analysis were used to characterize the agro-SMES. Results revealed that socio-demographic characteristics of agro-entrepreneurs and operational characteristics of agro-SMES have a significant influence in enhancing agro-SMES' resilience under such circumstances. This set of characteristics enhanced their establishment, growth and survival during the challenging environment.

### Key words:

resilient; survival; characteristics; entrepreneur; agro-SME

## Change in Socio-economic Behavior in Urban Rural Interface Area in North India: A Geographical Analysis

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### Abstract

The urban rural interface area is dynamic in nature, moving in response to horizontal expansion or urban sprawl. It is passing through transitional stage of modification slowly under mutual exchange of socio economic interaction. Rurality of area is threatened and urban influence is imposed and consequently remarkable transformation is observed. The study is based on primary and secondary sources of data. Dynamics of urban rural interface region is also identified by GIS and remote sensing technique. Four villages were selected for detailed survey in the interface area of Aligarh city. Study revealed that the interface area witnessed change in house type, food habits, and means of livelihoods as well as socio cultural transformation to a considerable level. Environmental challenges are also emerging on account of socio-economic transformation in the study area.

### Key words:

Urban Rural interface; Rurality; Livelihood; Transformation

## Combined Analysis of Land Cover Change and NDVI Trends and Its Implications for Regional Sustainable Development in the Loess Plateau, China

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### Abstract

China has witnessed accelerated industrialization and urbanization over the past three decades, which also happened in Loess Plateau. Loess Plateau in China also has implemented “Grain for Green” project since 1990s. All of the human activities above-mentioned and climate changes have influenced land cover and land use changes. Plenty of studies have addressed the land conversion and vegetation growth of Loess Plateau with land use data or NDVI data. But Land cover change is discrete change, ignoring the quantitative change with in one classification, and NDVI data can show continuous, gradual changes on the land surface, unable to identify land cover clearly. Using either land use data or NDVI data alone cannot uncover the impacts of human activities on ecosystem effectively. With land use data of 1990, 1995, 2000, 2005, 2010 and NDVI data from 1990 to 2010, this paper analyzes the land use and land cover change (LUCC) during 1990-2010 in Loess Plateau. The LUCC were mostly among farmland, forested land and grassland. And the NDVI changes can be divided into three stages: it kept stable during 1990-1998, decreased during 1998-2001 and increased during 2002-2010. The LUCC and NDVI changes also presented spatial difference. This paper also detected and compared land use types between the regions where NDVI rapidly changed, and create a combined analysis method of LUCC and NDVI changes, excluding the incorrect recognition that higher NDVI represents better ecology. Besides, this paper analyzes driving force of LUCC and NDVI changes with field investigation and statistical data analysis. The rapid industrialization and urbanization and “Grain for Green” project played an important role. Given the complexity of coupling human-environment system, more studies should be on LUCC change simulation and multiple scales analysis, supporting understanding the dynamics of eco-environment and decision making on ecosystem conservation.

### Key words:

Loess Plateau; land use and land cover change (LUCC); NDVI; regional sustainable development

## Crop Diversification and Sustainable Agriculture: A Geographical Analysis from Malda District of West Bengal

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### Abstract

Crop Diversification is the multiple cropping system i.e. addition or replacement of more crops to the existing cropping system. Growing multiple crops pays wider scope and opportunities in socio-economic transformation backed by sustainable farming. District like Malda, having dominance of agriculture and occupied by different crops has maintained a tendency to diversify the crops symbiosis. In the study area agricultural sustainability is consequent outcome come of crop rotation crop diversification and use of organic fertilizers. The present paper is an attempt to find out the consensus relations between 'drivers of crop diversification' and sense of sustainable agriculture. Variations of crop diversification in response to fast changing physical in general but, socio-cultural conditions in particular are studied for 'rabi' and 'kharif' crops for 2015. The study is carried by both primary and secondary sources of data and prior, collected through households and institutional (contract farmer) survey. Simpson Index of crop diversification found both positive and negative relations with sustainable agriculture. Quantitative techniques and GIS approach used to shown the distribution of data. Result shows that the marginal farmers (<1 hectare of land) cultivate multiple crops but lack of institutional and infrastructural support they increasingly merge towards organic farming. Contract farmers and, large and medium land holders are in the race of diversification enhanced by larger investment away from sustainable farming.

### Key words:

Crop diversification; agricultural sustainability; organic farming

## The Impact of Cultivated Land Rental Markets on Sustainable Land Use: Evidence from China

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### Abstract

The purpose of this paper is to empirically track the progress and consequences of the emergence of cultivated land markets in China since 2008. We draw on a set of nationwide, household-level pool data (for 2008 and 2014) and find that the markets for cultivated land rental have emerged robustly. According to our data, 28 of China's cultivated land was rented in farm operators in 2014. We also find that the nature of China's cultivated land rental contracts has become more formal and lengthened the period of time that the tenant is able to cultivate the rented-in plots. While there may be benefits for lessors and tenants, our data show that there are falling rates of investment in organic manure. The analysis, however, does not find that improved property rights in cultivated land rental affect investment largely because property rights have largely been established by 2008, the first year of our sample. Our results, however, also show that there are forces that appear to be mitigating the negative consequences of rising cultivated land rental. After holding constant initial rental rates and other factors, we find that the gap between investment in organic manure in own land and rented-in land is narrowing. One interpretation of our findings is that if policymakers can find ways to even further strengthen the rights of lessors and tenants as well as lengthen contract periods, farmers—even those that rent—will invest more in their land, because they will be able to capture the returns to their investments.

### Key words:

Land tenure; Land markets; Land Use Sustainability; China

## Effects of the Influence of Cultivated Land Transfer on Food Production: A Case Study of Henan Province

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### Abstract

In recent years, the cultivated land transfer in China accelerates constantly and the scale continues to grow, the transfer area also extended from the coastal developed area to the traditional agriculture area. “Non-agriculturization”, “non-food”, reduced productivity of arable land and other issues arise in some regions in this process, this probably affect the national food security. What impact does the cultivated land transfer in the major grain-producing area have on regional food production? Whether it will threaten regional food security? Aimed at these problems, this article took the major grain producing area Henan province as the research case, through large-scale peasant household survey, analyzed the influence effect of the cultivated land transfer on the food production in the province; calculated the critical value of cultivated land transfer which may threaten regional food security and the capability of grain export in Henan province under certain conditions. This study will be helpful to provide decision-making basis for stabilizing grain production in major grain-producing area and ensuring national food security.

### Key words:

cultivated land transfer; food production; Henan province

## Farmland Degradation in Heilongjiang Province, China: Human factors and Land-Use Policy

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### Abstract

There are a lot of land-use problem in Heilongjiang Province due to the rapid urbanization. These land-use problem including land degradation, land pollution, food security problems, and ecological issues. Taking the case of Daqing City and Suihua City for study, this paper presenting the farmland degradation reality, such as soil erosion, soil deterioration, pollution, nutrient loss, and salinization in Heilongjiang Province. Analyzing the human factors and land-use policy that impact on farmland degradation, some countermeasure, such as formula fertilization by soil testing technology, grazing exclusion, grain for green, and using organic fertilizer was proposed. We belied that the farmland degradation will be curbed with these countermeasures.

### Key words:

Farmland degradation; human factors; land-use policy; Heilongjiang province

## Feasibility of Presenting a Model of "Rural Collective Management" in Mountainous Region of the Southwest of the Caspian Sea

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### Abstract

Regarding the different needs of people in rural areas according to variations in facilities and resources, rural management acts differently, and a fixed management pattern cannot be considered for all villages. Establishing Islamic council and village management office for villages fewer than 20 families and 50 families, respectively is impossible, and the problems faced by villages in mountainous and piedmont regions have caused migration which in turn results in low number of families, and no residency, at the end. The present article aiming at measuring the feasibility and presenting a model of rural collective management by merging villages that lack managers with villages enjoying managers has presented a new definition of scales in order for villagers lacking managers to enjoy manage. Utilizing a descriptive-analytic research method and collecting data and needed information by library and documentary search, especially, field study through 138 questionnaires distributed in 13 towns located in piedmont and mountainous areas of 26 districts, 10 counties, and 12 villages. Findings indicate that villages with management offices and Islamic councils believed in the establishment of rural collective management and their roles with regard to the implications and positive consequences. Providing the accessible road between villagers with and villagers without management, providing vehicles, and reducing the threshold level of establishing village management office and Islamic council for villages fewer than 20 and 50 families, respectively, are the main findings of the present study.

### Key words:

Feasibility; rural collective management; mountainous region of the Southwest of the Caspian Sea; Guilan

## Functional Changes of Land Use in Hubei Province

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### Abstract

Land cover has always been the primary study section of land use due to the possibilities to map and characterize land cover based on observations and remote sensing. However, the communication of land cover change cannot fully reflect the land use change because there is no one to one relation between land cover and land functionality. This paper attempts to investigate the functional structure of land use by decomposing the land function into five functions: agricultural production, non-agricultural production, social security, cultural heritage and ecological service. A comprehensive framework for integrated assessment of the functional development of land use was presented. The framework was applied to assess the functional changes of land use within Hubei province during 2000 and 2010. Results showed that, the land function of agricultural production went steadily up due to the improved planting technology and breeding technique. There has been enormous growth in non-agricultural production because of the rapid economic development. The land function of social security was improved modestly due to the improvement of public service facilities. The high value region of cultural heritage transferred from the central region to the eastern region because of the cultural development in the Wuhan metropolitan area. The ecological service of west part of the province has been improved due to "the grain for green" policy. In the contrast, the ecological service of eastern part of the province declined due to the sprawl of the urban area. In addition, land areas with each prevailing land function were identified.

### Key words:

land function valuation; land use change

## Impact of Rural Road Construction on Agriculture Sector in Jaipur District of

### Rajasthan, India

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#### Abstract

Rural roads act as catalysts, linking villages and providing opportunities for villagers to reap the benefits of the development. Efficient rural road connectivity puts strong impact on development of agriculture, health, education, forestry, fisheries, small scale industries, trade, commerce etc. Rural roads provide the access to basic amenities and means of transporting agricultural products to the nearest market centres. Realizing the role of rural road connectivity, Government of India, launched its ambitious programme Pradhan Mantri Gram Sadak Yojana (PMGSY), in the year 2000, to provide connectivity to all habitations up to a population of 500 and more in general areas and a population up to 250 in hilly, desert and tribal areas. This paper, studies the changes occurred in agriculture sector after construction of all-weather roads under the scheme. Analysis of the primary survey and Land Use Land Cover maps of Dudu and Phagi blocks of Jaipur district of Rajasthan indicates major changes have occurred in the land use pattern and farming techniques. Farmers have started employing modern methods of farming and are shifting to agro based ancillary productions. Villages situated within 50 kms to the city centre have started growing perishable agriculture products. Various spatial analysis tools have been used to find out the impact of rural roads on agriculture sector in Jaipur district.

#### Key words:

Rural roads; PMGSY; Agriculture; Villages; Jaipur

## Land Consolidation and the Sustainability of Rural Community: A Case Study in Traditional Agricultural Areas of China

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### Abstract

Under the background of economic globalization, rapid industrialization and urbanization, the man-land relationship has changed dramatically in traditional agricultural areas (TAAs). Hundreds of millions of rural labors left home and work in cities every year. And more problems have been driven by vast and increasing out-migration of rural labors under urban-rural dual-track system, such as rural hollowing, farmland abandon, and infrastructure shortage, and those have imposed huge obstacles on improving land use efficiency and coordinating urban-rural development in China. Therefore, it's necessary to implementing land consolidation in rural China. With its wide ranges and complexity, rural land consolidation may have a far-reaching influence on the sustainability of rural community. This paper established a framework and index system for evaluating the sustainability of rural community. Then, takes three typical rural communities in TAAs as an example, this paper analyzes the impacts of three typical land consolidation (rural residential land consolidation and allocation, gully land consolidation and high quality farmland construction) on the sustainability of rural communities, using the data gotten by questionnaire survey and depth interview. On considering the sustainability of rural community, suggestions for future rural consolidation in China have been put forward.

### Key words:

rural community sustainability; rural residential land consolidation and allocation; gully land consolidation; high quality farmland construction; case study

## Land Cover Change and Diversified Rural Development – A Croatian Case Study

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### Abstract

The environmental and land cover change is influenced by demographic, cultural and economic factors, physical characteristics of the environment itself, and their complex interactions. The question this paper focuses on is the connection between land cover change and dynamics of rural development in Croatia. The presented research is a part of a broader study which aims to produce a set of alternative future scenarios for Croatian rural areas in 2030 with the goal of encouraging informed and evidence-based public debate on rural futures. Land cover change trajectories are analysed using object-based analysis of LANDSAT and SPOT multi-spectral imagery for 1991, 2001 and 2011 using ArcGIS 10.0 and eCognition 9.0. By comparing the 1991, 2001 and 2011 datasets major environmental change trends are detected and quantified, which helps in discovering direct causes of environmental change. The results of land cover change analysis are compared with different developmental types of rural areas in Croatia, recognized by aggregative approach and techniques of multivariate analysis (factor and cluster analysis). The recognized types of rural areas confirm strong diversification of Croatian countryside (e.g. dynamic, demographically stronger areas, market oriented agricultural areas, economically diversified, mainly tourist areas, rural periphery etc.). Preliminary results confirm the hypothesis about the correlation between intensity and type of land cover change on the one side, and developmental dynamics of rural areas on the other.

### Key words:

land cover; rural development; rural areas; typology; Landsat; SPOT; Croatia

## Land Use and Sustainable Agriculture under Climate Change in China

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### Abstract

Food is the fundamental of people's livelihood, but also an important strategic material of national economic security. As a major grain producer and most populous country, China's food security issues have aroused widespread concern in the community. Food security in China is undoubtedly under threat as limited arable land availability, deteriorated soil quality, water scarcity, climate change and intensive reliance on fertilizers and pesticides, which will all begin to limit or reduce agricultural production. In this study, we investigated the relationship between climate change, grain production pattern and potential agriculture crisis in China. We found that warming has induced staple crop cultivation boundary moving northward over the past decades and made it possible to increase marginal land reclamation in northern China. Accompanied by rapid urbanization, cultivated land occupation by construction and abandoning as well as arable land using for non-food production purposes in south China has accelerated the northward migration of gravity centre of national grain output. The deep reason for the migration lies in the inequality of economic development between north and south China, land policy being out of control and comparative advantages driven. Confronted with the reality of water shortage, ecologically fragile, low land productivity and more marginal farmland in north China, some major national policies and measures, e.g., the south-to-north water diversion, requisition-compensation balance of arable land, and wasteland reclamation, will likely bring water resources, ecological and agro-climatic security. Although China's crop output has continuously increased in the past twelve years, this increment is mainly sourced from agricultural structure adjustment. Under the climate cooling scenarios in the future, the grain production in north China, especially in the northeastern region, would suffer more low temperature and cold damage, which will result in hundreds of millions of acres of land out of agricultural production. China's food security and agricultural development would face supply shortage crisis.

### Key words:

Climate change; land use; food security; sustainable agriculture; China

## Land Use Transition and Land Management

LONG H

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### Abstract

Land use transition refers to the changes in land use morphology including dominant morphology and recessive morphology of a certain region over a certain period of time driven by socio-economic change and innovation. In general, dominant land use morphology refers to the quantity, structure and spatial pattern of land use, and recessive land use morphology includes land use features in terms of aspects of quality, price, property rights, management mode, input and productive ability, and function. This paper puts forward the theoretical model of regional land use transition as the following: with the socio-economic development, the transformations between different land use types during a certain period of time arise the changes of regional land use morphology pattern from strong conflict to weak conflict, i.e., coordination, which enable a new balance between different land use morphology patterns reflecting the development trend of different economic departments, and then realize the transformation of urban-rural land use system from quantitative change to qualitative change. Then, the mechanism of mutual feedback between land use transition and land management was probed based on a three-fold framework of natural system-economic system-managerial institution system. Generally, land use transition is affected by land management via economic measures, land resources engineering, policy and institution. Land use transition can also contribute to the adjustment of land management measures via socio-ecological feedback. Therefore, policy-makers need to adjust their land management policies taking into account the continuous change of land use morphology and different phases of regional land use transition.

### Key words:

land use transition; land management; theoretical model; policy-institution innovation

## National Agritourism Parks in China: Distribution Characteristics, Types and Spatial Optimization

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### Abstract

Leisure agriculture is an important starting point to promote agricultural modernization and upgrading, and the research on agritourism from a geographical perspective become a important topic for rural and tourism geography. The construction of national agritourism parks (NAPs) plays the leading role for the development of leisure agriculture, which may have significant implications for the future development of agriculture and tourism industry. The paper focused on the NAPs development characteristics and spatial distribution in China, and the basic data about 960 Chinese NAPs was collected as the basic data through the internet. Then, the GIS spatial analysis method was adopted to describe the spatial distribution patterns of NAPs at national, and the eastern, central, western and northeastern regional levels respectively. Inductive method and statistical methods (i.e. chi-square test and cross-table analysis) was used to analyze the type constitution of NAPs both in national and regional levels. The results shows that: firstly, the spatial distribution pattern of NAPs appears agglomerative both in nation and regions; secondly, the location of NAPs formed obvious agglomerate area within four regions, furthermore, these agglomerations tend to develop into a large agritourism belt (area) across regions; Thirdly, the type proportion in terms of dominant function and developing entities of NAPs had no obvious difference, but there are statistical differences between regions in terms of location and resource-dependent type. According to the results of the research, several optimization strategies were proposed from two levels in terms of overall space arrangement and regional NAPs' development.

### Key words:

agritourism; national agritourism park; spatial distribution; optimizing strategy

## Planning for NGO's at Districts Level along the River side of Jamuna, Bangladesh: Using GIS and Remote Sensing Technology

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### Abstract

This paper emphasis on planning and spatial distribution of NGO's provided services as education, agricultural sector, micro credit, health and sanitation to the rural poor people at districts level along the river side of Jamuna, Bangladesh. This study used satellite images from 1975 to 2015 years to identify the spatial and temporal dynamics of alluvial char as well as making the plan for the NGOs distribution to ensure the proper services for the rural poor. Every year the char land shifts due to multi-channel river flow, local topography, flood, erosion and sedimentation into the river bed as well as braided characteristics of the Jamuna River as a consequences severe damage to the agriculture, infrastructure, vegetation cover and so on. The rural poor along the river side of Jamuna suffers a lot as because they are not stable in a char land and consequently shifting one char land to another so that it requires a long term policy for the betterment of the char lands people's livelihood. The rural poor people live in remote areas that are often huge distances from centers of commerce and social services areas as a result difficulties in accessing market opportunities rural people don't get proper health facilities as well as increase high levels of illiteracy. The poor suffer from hunger, ill health, a lack of education and other environmental vulnerabilities. For all of these reasons, this paper makes a plan for sustainable development for the poor along the river side of Jamuna, Bangladesh.

### Key words:

The spatial and temporal dynamics; accessing market opportunities; sustainable development

## Research on the Quantitative Evaluation Model of the Restriction Effect of Farming Radius on Rural Settlements Relocation

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### Abstract

Farming radius plays an important role in the relocation of rural settlements, especially in underdeveloped regions. However, no efficient method has been developed to evaluate this impact. This study not only introduced but also improved the location set covering problem (LSCP) model in facility location-allocation models, thus proposed a quantitative model to evaluate the restriction effect of farming radius on rural settlements relocation. The model was empirically implemented in a case study of Chongkan Town in Chongqing, China. Several conclusions have been drawn as following: 1) the quantitative model proposed by this study for evaluating the restriction effect of farming radius is an important supplement for existing relevant studies; 2) this model can be used for modeling the evolving process of rural settlements relocation as farming radius increases, by quantitatively evaluating the restriction effects of various farming radiuses on rural settlements relocation, thus providing efficient instrument for the knowledge-based planning and guidance of rural settlements relocation. 3) the covering-sorting algorithm proposed by this study can efficiently support the application and promotion of the model; 4) the results of the case study can provide knowledge-based guidance for the relocation of rural settlements in Chongkan Town.

### Key words:

rural settlements relocation; farming radius; location set covering problem; multi-scenarios modeling; restriction effect

## Resource Utilization Vs Sustainable Development in India

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### Abstract

Availability and accessibility of resources (either natural or human) for sustainable development are influencing by social, economic and political factors. Some of us using resources more than optimum need and some are facing shortage of resources. This imbalance in using resources have created socio-economic inequality and led political activities. Inequality in using resources between haves and have not and over use of existing resources by upper economic strata of society create problems in environment. Population is increasing with decreasing growth rate since 1971. Objectives of this paper are- to measure the changes in demographic trends; to examine economic status of the population; and to find out the imbalances in using resources such as food, water, power, and space by using secondary sources of data from Censuses and NSSO. In one hand urban TFR is lower than that of rural and on the other hand urban population is increasing. Resultant of the rural out-migration widening gap between supply and demand in rural areas that has changed wage rate and bargaining power of labour for both agricultural work and non agricultural work. This change in rural labour market affects agricultural products by quantitatively as well as qualitatively. Similarly, soil fertility and input use in agriculture have affected. In one side rich are using all the resources more than requirement and in other side rest are suffering for resources for survival. That would create inequality in society and it also not good for sustainable development.

### Key words:

Resources; sustainability; labour market; migration; demographic change

## Rural Households' Perception of Rural Residential Land Consolidation and Their Satisfaction with The Processes and Results——A Case Study of Yuanqiao and Baihui Rural Communities of Dezhou Country, Shandong Province

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### Abstract

In recent years, with the rapid development of urbanization and industrialization, the contradiction between urban and rural land becomes obvious in China. In order to improve the rural residential land use efficiency, the rural economy and to meet the demand for land of rapid urbanization development, China Land and Natural Resources launched some pilot works of rural residential land consolidation(RRLC) at the end of 2005. From the perspective of practice, RRLC progress well on the whole, and plays a great role in improving the rural ecological environment, easing land conflicts and balancing the increase and decrease of arable land. However, some areas' government ignores the wishes of farmers in the implementation process of RRLC, merging villages and constructing center village blindly, forcing farmers to high rises, which runs contrary to the goal of promoting the sustainable development of farmers and countryside.

Taking YuanQiao community and BaiHui community of Dezhou city in Shandong province as examples, through questionnaires and in-depth interviews, using exploratory factor analysis and building satisfaction structural equation modeling, the paper explores the perception of rural households on the RRLC, which reflects actual impact of RRLC on rural households, and further probes into which factors influence rural households' satisfaction with RRLC. The results show that, firstly, after RRLC, social security function of land is still paid more attention than the functional production of land, but some residents view land as a burden, and hope to transfer the land. Secondly, though having experienced RRLC and allocation, rural households still lack of understanding of the RRLC policy, and some residents even hold the negative perception of it, this result may have a certain relationship with the singleness of land policies' dissemination channels. Thirdly, RRLC changes the rural households' production and lifestyle thus shifting the attitude of residents who do not support the RRLC initially. However, affected by the facilities construction, village collective strength, personal development and other factors, the changing degree and trends of production and lifestyle vary between people and communities. Fourthly, rural households' satisfaction evaluation of RRLC consists of four dimensions, from big to small are facilities, living conditions, housing conditions, policy fairness, among which

housing conditions and policies fairness have a significant positive correlation with rural households' satisfaction. In addition, rural households' socio-economic attributes such as gender, age are positively related to satisfaction, while there was a significant negative correlation between the number of family farmland and rural households' satisfaction. Fifthly, rural households are willing to recommend to others to carry out RRLC on the basis of their satisfaction with RRLC. Nonetheless, they are not necessarily likely to make positive comments on RRLC. The Paper provides a microcosmic perspective of RRLC research, improves RRLC study system, and broadens the study object of resident satisfaction. The recommendations for RRLC's continuous improvement exert an important guiding significance on the protection of rural households' interests and the smooth implementation of RRLC.

**Key words:**

rural settlement; land consolidation; perception; satisfaction; Dezhou country, Shandong province

## Rural Settlement Land Use of China: Evolution, Research Status and Research

### Prospects

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### Abstract

Since China's reform and opening up, with its process of marketization, industrialization and urbanization, rural settlement land use has been expanded massively, accounting for 2/3 of land for urban and rural settlement plus industrial and mining area, which is posing a great challenge for China's farmland protection and land intensive and economical use. The goal of this paper is to provide research prospects for more targeted and instructive research of rural settlement land use in the future through a review on the evolution and research status of China's rural settlement. Firstly, the development of rural settlement characteristics and its land use structure and function was summarized under some macro factors, including economy, land system and national policy, as well as some micro factors, including rural population, farmer's livelihood and income, farmer's traditional view. Secondly, a summary of the research contents, idea, methods for research of rural settlement under different scales was conducted, including nation, region, county, town and village. Finally, considering current integrated urban-rural development, new-type urbanization, a few perspectives are proposed for future research.

### Key words:

rural settlement; evolution; spatial scale; new type urbanization; China

## Rural Transformation from the Perspective of Regime Shifts of Socio-Ecological Systems in the Loess Plateau

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### Abstract

Socio-ecological system theory offers a conceptual model that has not been previously applied in the analysis of the process and evolution of rural transformation in China. Drawing on a theoretical framework of system transformation, we selected the town of Hongjia in Changwu County as a case study to explore the context of local rural transformation and its associated environmental factors. We examined village-level socio-ecological system dynamics, with a particular emphasis on influential factors associated with regime shifts and the robustness of rural socio-ecological systems. Our findings are as follows. First, the local rural socio-ecological regime has evolved through the transformation of the traditional agricultural regime, with some of the household regimes shifting to a non-agricultural system. Second, family characteristics constitute the objective conditions for the transformation of household regimes. Internal factors driving the transformation process include the quantity of the household's cultivated land as well as labor quantity and quality. Furthermore, householders' ages, degree of education, and social networks are major determinants of the transformation direction of the household regime. Third, the shift in household regimes presents a scattered and aggregated pattern, with obvious differences in the robustness of households. Rural households are classified according to the planting structure and households' incomes. Differences in the robustness of different types of rural households can, in turn, be expressed as follows: apple + non-agricultural production > non-agricultural production > grain + non-agricultural production > apple production > agricultural production. Lastly, the findings of rural transformation in the Loess Plateau are presented and discussed.

### Key words:

rural transformation; socio-ecological systems; regime shift; Loess Plateau

## Rural Transformation Model through Integrating Improved Bee, Coffee and Goat Farming with Agro-Forestry in Kamwenge District-Uganda

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### Abstract

Kamwenge is one of the districts in Uganda with one of the highest population growth rates in the country (3.91% compared to the national average of 3.03%) (UBOS, 2014). The department of Geography, Geo-informatics and Climatic Sciences (DGGCS) of Makerere University in collaboration with Kamwenge Bee Keepers Cooperative Society (KABECOS) and Kyabwanswa Rural Integrated Farming Systems (KRIFS) intend to reduce poverty through integrating improved bee, coffee and goat farming with agro-forestry in the district. The data for this paper was derived from a survey that was conducted in Kamwenge district in December 2014, records of KABECOS and KRIFS and other secondary data sources. Results show rural transformation of Kamwenge district. Improved bee farming has increased hive products. Increase in the number of bees, the best pollinators is expected to increase yields of crops. Agro-forestry shall increase the nectar and pollen for the bees by reducing the distance covered in collecting raw materials for the hive products. The trees will also provide shade for the coffee while at the same time increasing forage for the huge highly prolific zero-grazed boer goats. The goats will supply the highly required organic manure from their urine and droppings thereby sustaining soil fertility and increasing crop yields. Increase in production and productivity are expected to improve the livelihoods of the community.

### Key words:

Integrating; poverty reduction; improved farming; rural transformation and livelihoods

## Spatial Allocative Efficiency of Construction Land Expansion and Its Optimum Control Strategy in China

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### Abstract

Construction land and high-quality cultivated land is high degree of overlap in the spatial distribution in China. Over the past three decades, rapid expansion of construction land has further exacerbated the decrease in arable land resources, posing a serious threat to food security in the whole society. The question on how to further improve the allocative efficiency of construction land and to alleviate the contradiction between economic development and resources protection has become an urgent problem to solve under China's new normal. Here, based on a balanced provincial panel dataset in China over the period 1985-2012, we used an extended Cobb-Douglas production function to investigate the spatial allocative efficiency of construction land at the national and provincial scales. Empirical results showed that physical capital stock, construction land and labor force input have contributed to non-agricultural GDP growth in China. Investment in physical capital has a greater positive and significant impact on non-agricultural GDP growth in China as a whole and in its provincial levels than that in the labor force and construction land. The effects of construction land expansion to non-agricultural GDP growth were heterogeneous across the provinces. Further investigation demonstrated that the output elasticity of construction land has not corresponded to the level of economic development, indicating that there exists a greater room for improving the utilization efficiency of construction land in China. These findings indicated that, as the arable gradually approaching the red line, some economically developed provinces where the available cultivated land resources occupied by construction land are tightening needs to further improve spatial allocative efficiency of land use.

### Key words:

Allocative efficiency; construction land; Cobb-Douglas production function; optimum control strategy

## Spatial-Temporal Change of County-level Inequality and Social Deprivation During the Continuous Growth of Grain Production in Henan Province, China

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### Abstract

This paper examines the spatial-temporal dynamics of inequality from the perspective of social deprivation using the national census data of 2000 and 2010 in Henan province, China in the context of continuous growth of grain production. Our analytical results show an overall high level of social deprivation and a widening gap of county-level social deprivation. The county-level social deprivation was also significantly autocorrelated spatially, the spatial cluster pattern has changed from a low-low northwest and high-high south in 2000 to a core-periphery semi annular spatial structure in 2010. Similar to the spatial pattern of grain production in Henan, the county-level social deprivation also showed an overall "west high and east low" pattern. The social development in most counties in Yudong plain and south Henan was low despite the high level of grain production, meaning that high grain output did not result in expected high social development in traditional agricultural areas.

### Keywords:

Spatial-temporal change; continuous growth of grain production; county-level inequality; social deprivation; Henan province

## Spatiotemporal Evolution and Driving Mechanism of Rural Settlements in the Poverty Belt Around Beijing and Tianjin, in China

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### Abstract

Being the core of rural settlement geography, research on rural settlements has always been one of the key issues in regional system of human-environmental relationship research. Zhangjiakou city, located in the poverty belt around Beijing and Tianjin, was taken as example to analyze the evolution of rural settlements during 1985-2010 with mathematical statistics and spatial methods. The results demonstrated the following. (1) The area of rural settlements expanded from 665.76 km<sup>2</sup> to 928.14 km<sup>2</sup> during 1985-2010. The spatial distributions of rural settlements in terrain niche presented approximately normal distribution over the period studied. The rural settlements were usually distributed within in regions where the terrain niche indicated that an elevation of between 900 and 1500 m, and a slope from 5 to 20 degree. (2) The rural settlements in Zhangjiakou were characterized by obvious concentration with evident spatial variability. A clustered distribution appeared frequently in the administrative districts and their surrounding regions as well as the central plain area of Yuxian. The hot spots for the sizes of rural settlements were tended to be clustering in 2010, while the cold spots decreased significantly as compared to 1985. (3) Rural economic development, investment in agricultural technology and infrastructure improvement played important roles in the evolution of rural settlements. And there were spatial differences of the relationship between rural settlement distribution and socio-economic factors in Zhangjiakou. This study can provide practical significance for the achievement of urban and rural integration development and the promotion of new countryside construction.

### Key words:

rural settlement; spatiotemporal evolution; geographical weighted regression; Zhangjiakou city

## **Sustainability of Commercialisation of Agriculture in Tribal areas of the North-East India: The Case of Meghalaya**

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### **Abstract**

The paper investigates how diets and food security are altered by cash crops in previously shifting cultivation areas in Meghalaya plateau of India dominantly inhabited by the Khasi—Jaintia and the Garo Tribes practicing until recently slash and burn type of cultivation locally known as jhum. Phenomenal increase in land-man ratio in the past century has considerably reduced traditional agricultural land-use through increasing commercialisation in many parts of the plateau. With the help of agricultural census data and intensive field surveys conducted in six villages distributed over the plateau and representing diverse farming systems, the study analyses the magnitude and implications of the introduction of cash cropping in areas and among communities hitherto practicing traditional farming. The sample includes two villages under the jhum farming system, three other villages shifting to cash crops of the traditional type and one that has accepted modern cash crop introduced recently. It is argued that the drastic land use change have many food security implications including the alternation in local food systems. The study finds that the land-use change has brought major alterations in hill agricultural practices, enhanced cash-cropping and promoted mono-cropping, changed food consumption patterns, underpinned the emergence of a new food system, and exposed farmers and consumers to the vagaries of the market, all of which have both long and short-term food security implications.

### **Key words:**

Cash Cropping; Farming System

## Territorial Changes in Municipal Limits of Statutory Towns in Haryana: An Overview of Causes and Consequences

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### Abstract

The change in municipal limits of statutory towns is done to bring geographical growth of towns under administrative limits in order to regulate the haphazard urban growth on the periphery of towns, to increase the municipal income by imposition of taxes on enterprises that come up outside the legal limits of urban centres and to smoothen the future growth of towns. With a rise in the number of municipal towns from 58 in 1961 to 79 in 2011 in Haryana, the area under them has increased from 319.39 km<sup>2</sup> to 1499.84 km<sup>2</sup>, an increase of about 5 times. This represents an urban conversion of about 1180.45 km<sup>2</sup> of rural land. The present study is based on census data and attempts to analyse statistically the explanatory variables of territorial expansion and consequences of change in municipal limits of statutory towns in Haryana. It has been hypothesized that changes in the municipal limits of statutory towns is associated with their population growth, administrative status, non-agricultural workforce and location in respect of major roads. The statistical analysis confirmed close association of the variable 'change in territorial jurisdiction' of a town with the variables of 'connectivity' and 'administrative status'. Permanent loss of fertile agricultural land, rural-urban conflicts and the inability to revise municipal limits frequently and preferably much beyond the present urban built up land leading to chaotic land use are some of the consequences of changes in the municipal limits of statutory towns.

### Key words:

municipal limits; statutory towns; geographical growth; haphazard urban growth; urban conversion; population growth; administrative status; connectivity; rural-urban conflicts

## The Evaluation of Land Consolidation Policy in Improving Agricultural Productivity in China

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### Abstract

China's recent rapid economic development has resulted in rampant urbanization and substantial reduction in farmland, which makes food security a great concern not only to China but also to the whole globe. To stabilize and improve the quantity and the quality of national farmland, Chinese government has been implementing large-scale consolidation programs since 1998. However, no formal evaluation has been conducted on empirical projects at national wide. Thus, effectiveness of land consolidation policy remains uncertain. We got detail information of 3891 land consolidation projects implemented between 2006 and 2010, and used MODIS NDVI data from 2001 to 2013 to assess effectiveness of China's land consolidation policy in improving agricultural productivity. Different from optimistic estimates derived from regional statistical analyses and/or theoretical approaches, here we show that the overall effectiveness of land consolidation in improving agricultural productivity appeared to be low. Productivity in 36.44% of study projects did not increase as expected and 50.97% actually declined compared to control sites. Furthermore, we found effectiveness of land consolidation projects is of observable regional difference and influence factors are inconsistent with policy design. Based on the above analysis, we suggest Chinese government improving implementation methods and pay more attention to long-term mechanisms of land consolidation.

### Key words:

Land consolidation; agricultural productivity; effectiveness; NDVI; China

## The Evolution and Regulation of Rural Settlements

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### Abstract

Now there are more than 600 million rural population in China, 43.9% of the total population, and the rural settlement is still the main form for live. Rural settlements are diversity, regional and dynamic, and the research on the differentiation characteristics, evolution tendency and influence mechanism is the key to alleviate “country disease” of China, to promote rural transformation and development, to achieve urban-rural integration. Based on synthesis-coherence analysis of geography, sociology, economy, and ecology, with the central China as the study area, we studied the rural settlement types and regional differences, evolution mechanism and development trend, development stage, space optimization and so on. The study suggests that: space differentiation characteristic of rural settlements of size and shape, facilities and living conditions, subjects and social structure are obvious; Evolution of rural settlements are influenced by various factors, which are classified into base factors, new-type factors and mutation factors, working by “three-wheel” driving mechanism and three typical driver path; The general process of rural settlements evolution is divided into four stages, which includes initial stage, transitional stage, development stage and mature stage, with the tendency of system networking, scale rationalization, form intensification, function diversification, location to facilities, and so on; Organization of space function and control of scale is key to space optimization of rural settlements, so we talked about “Rural Road-Oriented Development Model”, referred to as “RROD”. We also believe the proposed approach will have significant implications for similar rural settlement research, especially oriented by life quality.

### Key words:

rural settlement; rural settlement evolution; driving mechanism; RROD

## The Logical Framework of Rural Land Comprehensive Consolidation during New Period

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### Abstract

Currently, the new countryside construction and agricultural modernization lack of a major hand-grip. Under this situation, there is an unprecedented strategic opportunity period for rural land comprehensive consolidation (RLCC). Therefore, the basic theory and top-level design of RLCC should be studied deeply. This paper has defined the concept firstly and then constructed the logical framework of RLCC, including five aspects such as guiding idea, aim system, macro strategy key points, project arrangement spatial system and function of RLCC. The conclusions are that **(1)** RLCC is complex system engineering, and its process should use several disciplines' basic theories, especially geography, land engineering and land management, therefore, the guiding concept must be inter-disciplinary and comprehensive; **(2)** RLCC should has a hierarchical aim system which include four levels such as actual target, basic target, middle target and strategic target; **(3)** the macro strategy of RLCC should clarify the key points and main aspects in the future, the arable land consolidation should be the base content, the rural construction land consolidation should be the emphasis, and the degraded and polluted land consolidation should be strengthened; **(4)** land consolidation project arrangement should follow a logic thinking, which is formed by strategy function areas, dominated type areas, main potential areas and consolidation project areas, to build the spatial hierarchical system of land consolidation projects from national level, regional level, sub-regional level and project level; and **(5)** RLCC could promote rural transformation development and push on urban-rural integration proceeding through space reconstruction, elements integration and mechanism innovation. We hope the study could be useful for practical work.

### Key words:

land comprehensive consolidation; logical framework; strategy emphasis; spatial hierarchy; rural transformation development; China

## **A Comparison of the Means and Ends of Rural Construction Land Consolidation: Case Studies of Villagers' Attitudes and Behaviours in Changchun City, Jilin Province, China**

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### **Abstract**

Rural construction land consolidation (RCLC) is an innovative approach to coordinating the outmigration of a rural population and the increase in rural housing land, thereby protecting farmland and ensuring food security, adding to urban construction land quotas, and improving the rural habitat environment in China. Since 2005, several different models or approaches to RCLC have been practiced by local governments. Its implementation is not successful without the cooperation of relevant villagers whose attitudes and behaviours in response to RCLC have thus far been given only minimal academic attention. Focusing on one of the approaches of RCLC, viz. the homestead exchange apartment approach (HEA), this paper analyses the means and ends of its practices and villagers' attitudes and behaviours in response to them based on a comparison of a failed case (Village A) and a successful case (Village B) in Changchun City, which is located in the northeast of China. The results show that the geographical location and associated socio-economic background of villages endow them with different potentials, strengths, and weaknesses in implementing HEA, the higher adaptability to urban living usually accompany with lower consolidation potential of rural construction land, and vice versa; The different means of HEA result in different ends, both absolute private property-based means and absolute population-based means are dogmatic and impractical; Under constrained socio-economic, biophysical, and institutional situations, the main factors influencing villagers' attitudes and behaviours in response to the various means of HEA include household population size, original housing conditions, livelihood, life course, and Guanxi.

### **Key words:**

Rural housing; Land consolidation; Homestead exchange apartment approach (HEA); Rural households; Attitudes and behaviours; China

## Assessment of Peasant Household' Sustainable Livelihoods on the Poyang Lake

### Region

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### Abstract

Poyang Lake region is located in the the middle and lower reaches of Yangtze river, which are belonging to Poyang Lake Ecological Economic Zone Lakefront. It is an important grain, cotton, oil, aquatic production base of Jiangxi province and even the whole country. The frequent floods and droughts seriously restricting the sustainable development of the regional agriculture and peasant household livelihoods which has become the main reason for the poverty of peasant household here. Taking Lakes farmers Floods and Droughts vulnerability analysis as the background, through the Poyang Lake region 754 household survey, Using DFID sustainable livelihoods analysis framework, combined with the feature of regional characteristics in poyang lakeregion and farmers, selected the 18 evaluation index of sustainable livelihoods, with analytic hierarchy process (ahp) to determine the weight of each index, fuzzy evaluation model was constructed, Build sustainable livelihoods fuzzy evaluation model, and then discusses the The level of sustainable livelihood. The results show that: in 754peasant household, the Sustainable livelihoods composite index between 0 to 0.2 , accounting for 8.09%, Accounting for 51.86% of all surveyed households between 0.2 to 0.4, Sustainable livelihoods composite index between 0.4 to 0.6 was 37.00%, Higher than 0.6, accounts for only 3.05% of all households surveyed. In general, The low level of peasant household sustainable livelihoods of poyang lake region. Therefore, the ability to expand farmers' livelihood strategies to improve sustainable livelihoods of farmers is very important.

### Key words:

Poyang Lake region; sustainable livelihoods; peasant household

## Comparative Analysis of Village Infrastructure Planning and Construction—The Example of Quzhou City

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### Abstract

In this paper, the situation of rural infrastructure planning and construction in Quzhou city is closely studied in the field. In the process of village renewal, there are problems of the lack of combination in planning and construction. For examples, Planning lags behind in the construction and planning and construction does not match the situation. Through interviews with village managers, engineering design units and design staff, and the research on the planning process, the engineering design process and the construction management of the three major processes. The village infrastructure planning should be improved through real-time update of technical specifications, multi-disciplinary integration and other measures to improve the science of planning. Meanwhile, improve the village construction management system also important to promote the planning and construction of village infrastructure. The construction and planning of village infrastructure should be based on the principle of multi disciplines, and set up a flexible planning technical specification and management system.

### Key words:

Rural infrastructure planning and construction; Planning technical specification; Engineering management system

## Currentstate, Problems and Countermeasures of Beijing Urban Agriculture

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### Abstract

Since the implementation of Modern Urban Agriculture (UA) Development Strategy in 2003, Beijing have gone through the initial and strategic adjustment stage. Now it is in a critical period for Beijing to plan the 13th Five-Year UA Plan. Based on the comprehensive data in recent years, this paper firstly summaries Beijing UA's current state from the aspect of economic benefits, function change and spatial distribution, then points out the problems needed to be solved in macro planning and implementation strategies. Finally, several suggestions, such as the ordination of Beijing's UA plan with the integration of Beijing, Tianjin and Hebei, and the relevant administration policies, are proposed.

### Key words:

urban agriculture(UA); problem; countermeasure; Beijing-Tianjin-Hebei region; Beijing

## Erosion Gully Information Extraction Based On Remote Sensing Images with Different Resolution

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### Abstract

In this study, based on multi-resource remote sensing images, combined with DEM data, using qualitative method, characteristics of erosion gully extracted from each remote sensing image are analyzed comprehensively, and two investigation units are selected in survey area for field verification. The results obtained are compared with the results of visual interpretation of remote sensing images. The results show that: (1) Although Pleiades remote sensing image with the highest spatial resolution and DMC image can express the information of gully erosion clearly, the increasing of spatial resolution of remote sensing images will increase internal details of erosion gully, which can cause interference for extracting information. (2) Different types of erosion gully can be extracted from different remote sensing images. Compared with Pleiades remote sensing image and Alos remote GF-1 satellite images, as the ideal images, can express the information of dissected gully and gulch that need to be researched mainly. (3) When resources satellite three and GF-1 images extract the information of quantity, length and width of dissected gully and gulch, which need to be investigated mainly, the results close to the field verification results, so they are more appropriate images.

### Key words:

remote sensing images; erosion gully; information extraction; field verification

## Examining the Causes and Consequences of the Expansion of Second Homes in Rural Areas and Suburban in Iran (1990-2015)

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### Abstract

The expansion of second homes has been an important feature of land use and landscape change in some of the rural and suburban areas in Iran. Although the creation of second homes has a long history in Iran, but it has been grown substantially over the past two decades, especially in the coastal areas of the Caspian Sea, around metropolitan cities and some rural areas. This paper investigates the causes and the economic, social and environmental consequences of the expansion of second homes in rural areas and suburban in Iran through content analysis method. Our findings show that the main causes of the expansion of second homes include: increased leisure time, rising household incomes, investment in housing in order to create added value and increasing household assets. Moreover, the results show that the expansion of second homes have had both positive and negative consequences. Some of the positive consequences include creating new job opportunities and increasing income in rural areas, improving the quality of life among local communities, improving local infrastructure and enhancing the quality of rural housing construction. Among the negative consequences the illogical increase in the price of land and housing, deep changes in traditional social values in rural areas, and the emergence of cultural conflicts between the local people and new settlers or the second homeowners, degradation of natural resources and changes in traditional land use can be mentioned. These findings suggest that negative consequences have resulted due to the lack of program and overseeing the building of second homes. Therefore, effective monitoring and control is essential over the construction of second homes and implementation of housing programs in rural areas and suburbs in Iran.

### Key words:

Causes; Consequences; Expansion; Second Homes; Rural Areas; Suburban; Iran

## Exploring the Factors Influencing Land Use Conflict Based On Multilevel Model: A Case Study in the Poor Belt around Beijing-Tianjin, in China

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### Abstract

Land use conflicts often result from the spatial arrangement of incompatible land uses representing different stakeholders' interests. In order to improve ecological environment, the policy of returning farmland to forest has been implemented in China, which requires the land with large slope must be used as forestland to protect public interests of ecological service. But there are still many sloping land are used for cultivating, which exacerbates soil erosion and threats ecosystem services. Comparing the public ecological benefit carried by forest in sloping land, the sloping cultivated land carries the households' private interests. Thus, we can define the land with conflict as the sloping cultivated land which should be used as forest. This paper selects Chicheng County in Poor Belt around Beijing-Tianjin as study area, which is one of the important sections of Green Wall of China, and with the function of soil and water conservation, wind-preventing and sand-fixing. We use the multi-level model to identify the influencing factors of land use conflict based on natural, socio-economic data and remote sensing images. The results show that land use conflict is driven by the factors at both town and raster level. At the town level, average cultivated land and population have negative relation with land conflict, while agricultural economic development plays a positive role. At the raster level, land use conflict is mainly driven by soil fertility and land relief, while restricted by elevation and distance to the nearest road and settlement. These can make a lot for land management decision.

### Key words:

Land use conflict; influencing factors; multi-level model; Poor Belt around Beijing-Tianjin in China

## Geographical Feature Recognition and Classification of Ecological Restricted Development Zones

### —Using the Case of Lianhua of Jiangxi Province as an Example

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#### Abstract

In the rapid economic development, under the natural ecological environment overload condition of reality, completes the ecological restricted development zone regional function identification and classification is helpful to maintain the country's ecological security, to solve the contradiction between ecological protection and economic development, reflects regional differentiation in the development and the ecological civilization. Using the case of Lianhua of Jiangxi province as an example, based on GIS technology, through the natural background conditions, protection of incremental demand present situation, the development and construction to carry out the single factor and integrated assessment analysis, Lianhua County is divided into ecological improvement, agricultural, urban development and prohibited development four types of functional areas. The results show that: (1) The county town covers an area of 53.32 km<sup>2</sup> accounted for 4.97% of the county area, mainly distributed in the flat plain of the southeastern; (2) For 22.08% of the total agricultural production area, it scatters in the lianhua county of eastern lowland, and in the western minority villages and towns; (3) Ecological improvement areas up to 72.95% of the total area of 782.04 km<sup>2</sup>, and covered in the county in the west, north, east mountain region. According to the characteristics of the various functional areas put forward its developing orientation and countermeasures and Suggestions to promote the regional development.

#### Key words:

Major Function Oriented Zoning; Ecological restricted development zones

## Identifying Disparities during the Implementation of Land Consolidation in China By Coordinated Evaluation

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### Abstract

China's recent rapid economic development has resulted in rampant urbanization and a substantial reduction in farmland, making food security a major policy concern not only in China but worldwide. Since 1998, land consolidation (LC) has been implemented in China in an attempt to stabilize and retain valuable farmland, improve farmland quality and promote adequate agricultural production capacity. Although the Chinese government fully controls LC, it remains unknown whether these LC implementation efforts have been successful. This study attempts to develop a factor-combination method that can be used to evaluate the coordination of LC implementation and its conformity to current land management plans, to explore any spatial disparities, and to especially identify any potential problem areas. The study period, 2006–2012, was based on data acquired from a LC project management dataset developed at the county scale. The study found that (a) by analyzing the intensity of, potential for and difficulties involved in LC, the coordinated evaluation method used here that is based on a mechanical balance model can effectively identify disparities that occur during the implementation of LC; (b) only 22.15% of all units are in the state of coordination, and incidents of uncoordinated implementation are mainly ascribed to a mismatch between the intensity and potential for regional LC; (c) six categories of problem areas can be identified in China where improvements are urgently needed related to the coordinated implementation of LC so that it conforms to planned goals.

### Key words:

China; coordinated evaluation; land consolidation; intensity; potential; difficulty

## Landscape Planning and Design Based on Ecosystem Services Evaluation and Tradeoff Analysis: A Case Study in Ansai Watershed

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### Abstract

The concept of ecosystem services facilitates the valuation of the multiple services from ecosystems and landscapes, the identification of tradeoffs between different land use scenarios, and also informs decision-making in land use planning. Unfortunately, ecosystem services evaluation and trade-off analysis has been mostly neglected within the landscape planning and design framework. In this study, we focused on analyzing three kinds of ecosystem services and their trade-off relationships based on field survey of the Ansai watershed, Yanan, Shannxi province. Our results show that (1) the three types of ecosystem services are not evenly distributed in Ansai watershed, the southeast region owns high soil erosion control services, high soil carbon sequestration services and low soil moisture conservation services capacity, while in northwest region the soil erosion services and soil carbon sequestration services are low, soil moisture conservation services is high. (2) Ecosystem services are significant different in various land use types, forest and shrub land own high soil erosion control services and soil moisture conservation services, farmland owns high soil carbon sequestration services, while in grassland the tree ecosystem services types are all at mediate level. (3) Significant tradeoff relationships exist in different ecosystem services types. Different land use types own different ecosystem services tradeoff relationships. (4) Detailed landscape planning and design strategy has been suggested based on ecosystem services assessment and trade-off analysis. This study explored a new method of landscape planning and design; it is of important practical significance for landscape sustainability management.

### Key words:

Ecosystem services evaluation; ecosystem trade-off; landscape planning

## Research of Fallow Scale in the Yangtze River Ecological Barrier—A Case Study of Chongqing, China

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### Abstract

The upper reaches of the Yangtze is an important ecological barrier of China, which related to the middle and lower reaches of the region's ecological security directly. Under the concept of green development and ecological civilization, China's arable land use transition gradually, from the predatory development to protective development. At the end of 2015, the central government put forward the implementation of arable land fallow pilot in official documents, but as far as we know, there is little research about this subject at home, especially a system survey. Chongqing on the upper reaches of the Yangtze river, fallow is an effective way of protect cultivated land production capacity and regional ecological environment, fallow scale is the key problem needed to solve before implementation of fallow. The paper take Chongqing, China as an example, from the perspective of both food security and ecological security, selected the population, per capita consumption of grain, multiple crop index, self-sufficiency rate of grain, slope cropland, rocky desertification land and other indicators, to research the fallow scale of Chongqing. The result shows that about 170 thousand hectares arable land could be fallow in Chongqing if the self-sufficiency rate of grain is 80%, and in the ecological security perspective, the fallow scale should reach to 300 thousand hectares. Therefore, the fallow scale of Chongqing should be between 170 and 300 thousand hectares, which accounting for 7% to 12% of the regional arable land.

### Key words:

The upper reaches of the Yangtze river; Fallow; Chongqing

## Spatial Organization Mechanism of Rural-urban Integration in Urban Agglomeration

### Area

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### Abstract

Spatial organization is always the core study field of geography, which is correlating with spatial pattern and spatial process. It is key to improve spatial welfare and construct spatial order. Spatial organization of rural-urban integration refers to configuration of rural and urban factors, action of spatial construction and following spatial correlation, which is to fulfill the goal of rural-urban integrating development. Taking Changsha-Zhuzhou-Xiangtan urban agglomeration in central China as the study area, we studies the connotation, characteristic and mechanism of spatial organization of rural-urban integration in urban agglomeration area. It can provide principal bases for quality urbanization and overall urban-rural development. The core research contents of spatial organization of rural-urban integration include optimizing the material morphology, improving the function structure, constructing the elements system and establishing behavioural paradigm. The characteristics of spatial organization of rural-urban integration is being networking, complex, overall, multi-directional and gradient, and it highlights integration across scales and progress by stages. At the macro level, the key points is sustainable for urban-rural ecosystem and efficient for operation of urban-rural economic system, and its core mechanism are agglomeration and diffusion of elements, while complex network model can indicate it well. On the contrary, at the micro level, it is focused on upgrading urban-rural living environment and social harmony, and spatial competition and interests pursued are the core mechanism, while multi-agent model is preferable in expressing it. We believe the proposed approach will have important implications for the optimization strategy research on spatial organization of rural-urban integration.

### Key words:

spatial organization; rural-urban integration; urban agglomeration; Spatial Organization mechanism

## **Study on Influence Factors of Farmers' Willingness in Rural Residential Land Consolidation: A Empirical Study of Zhongdu village, Tongnan county**

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### **Abstract**

Rural residential land consolidation is an important way to coordinate urban-rural development in the new era in China. Analyze the main influence factors of famers can help to understand the famers' true thoughts and provide a reference comments for advancing rural residential land consolidation. This paper based on the survey data of famers in Zhongdu village, Baizi town, Tongnan county, Chongqing, which concludes the information of person and family, living conditions, policy awareness as well as the willingness of rural residential land consolidation and its reasons. Structural equation model are implemented in this research in order to analyze the influence factors and the influence direction of famers' willingness in rural residential land consolidation. The results showed that: Firstly, 43.51% of the famers are willing to join the rural residential land consolidation, 47.08% of them do not want to do, 9.21% of them think it doesn't matter. Loving their homeland, being difficult to change the mode of production and life and worrying about the cost of living increasing are the main reasons why famers do not want to join rural residential land consolidation. Secondly, in the numerous factors, the key influence factors are the non-farm payrolls in family, non-farm income, the awareness of policy, the use of homestead and the structure of house. Combining the rural residential land consolidation with job training, industry development and good living, strengthening the propaganda of related policy and improving the social-security system of rural residential land consolidation are the effective way to enhance famers' willingness.

### **Key words:**

rural residential land consolidation; structural equation model; famers' willingness; influence factors; Zhongdu village

## Study on Spatial Distribution Optimization of Rural Settlements Land Use in Hilly

### Area: A Case of Gulu Town, Chongqing in China

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#### Abstract

Suitability evaluation on rural settlements' land is the basis for dividing rural optimization modes. This paper chooses Gulu Town in Chongqing as a case and builds a suitability evaluation index system of rural settlements' land based on spatial analysis and statistical analysis functions of GIS, and uses weighted average method to calculate the suitability scores of rural settlements. Accordingly, by superimposing construction land regulation region from general land use planning of Yubei District, the rural settlements' land is divided into five modes of optimization. And based on limited ranks of rural settlements land extension, the optimization strategies should give preference to the low restriction lands, and the adjacent areas are transformed gradually into construction areas. The results of the optimization are, firstly, the area of rural settlements in two modes of urban transformation and migration have a more substantial decrease to 222.47 hectares; secondly, settlements in key extension mode extend out to absorb the surrounding small settlements; thirdly, settlements in potentiality exploitation mode focus on economical and intensive land use through reclaiming unused settlements; lastly, settlements in merging mode focus on scale-up development by choosing the settlements with well location as the centers for integration.

#### Key words:

rural settlements; suitability evaluation; distribution optimization mode; Gulu Town

## Study on the Spatial Reconstruction of Rural Settlement in Western China—A Case Study of Xianyang City in Shaanxi Province

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### Abstract

With the rapid development of urbanization in China, the public facilities and infrastructures in rural settlements are not sufficient for the minimum threshold of population in China. The construction and operating costs of that are increasing continuously, and the normal operation and the improvement of facilities are also difficult. The improvement of living quality for residents and the amelioration of environment are hindered seriously.

Three typical rural settlements were examined to obtain information through interviews, surveys and field reconnaissance of Xianyang City in Shaanxi Province which located in a transition zone of the Guanzhong Plain and the Loess Plateau. The article reveals that firstly, the topography, the traffic conditions, the farming radius, the income constitute of farmers, the service scope of facilities and the social factors are the influencing factors of the spatial layout in rural settlements. And the traffic conditions and the service scope of facilities are the key factors. Secondly, the three orders of hierarchy including key towns, central communities and general communities are put forward according to the orders of public facilities. And the spatial layout of rural settlements should be reconstructed under the consideration of farming radius and the service scope of public facilities, which are different in every order of the hierarchy. Thirdly, according to the characteristic that the central place of a higher order has the functions of the central place of a lower order, the spatial layout of rural settlements is reconstructed based on the service scope of facilities in different orders.

### Key words:

rural settlements; spatial reconstruction; Western China

## Study on the Compensation Standard of Fallow in Ecological Barrier area of the Upper Yangtze River

### ——The Case of Chongqing

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#### Abstract

With the concept of Green Development, it is certain that changes in the protection of land capacity and function will take place in Chongqing, because it is an important part of ecological barrier of the upper Yangtze River. Fallow is a way to protect the land capacity and function. Compensation standard for fallow is the heart of fallow compensation mechanism. Based on the economy-society-ecology profit and loss of fallow in Chongqing, this paper measures the economic value, social value and ecological value of the cultivated land, using the theory of land value to build a quantitative evaluation model. It is measured that the total value of cultivated land in Chongqing is 63495.60 yuan per hectare, of which the economic value is 16705.50 yuan per hectare, the social value is 27331.05 yuan per hectare, and the ecological value is 19459.05 yuan per hectare, respectively, 26%, 43% and 31% of the total value. According to the principle of full compensation, the fallow compensation is between the economic value and the total value. In the current social and economic conditions, fallow compensation in Chongqing is presumably between 30% and 50% of the total value. And there are some suggestions:(1) The compensation standard vary by the cultivated land quality, the higher quality, the more output, then the standard is higher; (2) The compensation standard vary by fallow period, the longer the fallow period, the more cost the fallow management, then the standard is higher;(3) Taking the incentive mechanism to encourage fallow in ecological degradation area.

#### Key words:

The compensation standard of fallow; The cultivated land value theory; The calculation the cultivated land value; The ecological barrier area of the upper Yangtze River; Chongqing

## Study on Water Supply Project Planning of Villages Based on the difference of Water Use Behavior

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### Abstract

The scale of water supply facilities in the village of the old age pension is much higher than that of the average village. Through the field survey, we found there are many channels, multi water sources and independent water use behavior of the villagers. Traditional village water supply facilities planning could not adapt to this kind of behavior pattern. Based on the case study, this paper proposes a water supply project planning method based on the difference of water use behavior. Reasonably predict the scale of centralized water supply, and guide the standardization of the construction of independent water intake facilities. Scientifically construct water supply facilities for the actual life of the villagers.

### Key words:

water supply facilities; water use behavior; water supply facilities planning

## The Changes of Spatial Pattern of China's Grain Output and Its Impact on Resources and Environment

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### Abstract

Grain output is of irreplaceable importance in China's agriculture, social stability and national economy. This paper aims to investigate the spatial pattern of grain output in China and its changes in the period 1990-2014. The research findings show that the Northern China plays a major role in grain output though the hydrothermal conditions of Southern China are better. The gravity center of China's grain output has moved from the south to the north of the Huanghe River and reached the southern part of Hebei Province in 2014. Also, changes of grain producing structure could be seen in micro scale. What is more, we made a discussion on whether these changes are sustainable to the environment and agriculture development in the long run. Under the assistance of virtual water and virtual land measurement, it could be concluded that the northward movement of grain output away from the superior area for grain output in south China causes rising cost of resource utilization. With further analysis, intensive grain farming leads to hidden risk of environmental degradation. Besides of climate warming and construction of water conservancy facilities, economic benefit is another reason that directly leads the changes of grain planting pattern. To rectify the market failure in environment protection of grain production, however, regional grain producing policies need to be made scientifically and reasonably.

### Key words:

Grain Output; Spatial Pattern; China



## The Realization Mechanisms of Urban-Rural Integration of Shaanxi

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### Abstract

Urban-rural Integration is a higher stage of the relationship between urban and rural, it is also the primary approach to promote social harmony and justice. This paper have reviewed the literatures about urban-rural integration, researching the connotation and realization mechanisms of urban-rural integration. Finally, put forward the development strategy of Urban-rural integration According to the actual development of Shaanxi. The connotation of the Urban-rural Integration is to achieve the urban and rural residents' income equivalent, to achieve equalization of urban and rural public services and the development opportunities, urban space and orderly use of resources. First, rural incomes will be increased through the developing of modern agriculture and promoting the county urbanization. Second, we could commit to achieve equalization of public services under rural residential area system readjust background. Third, we can carry out to improve urban and rural development in the external environment, including extend the use of infrastructure to rural space and controlling generally the use of urban and rural space.

### Key words:

Urban-rural Integration; realization mechanisms; Shaanxi

## Zoning of Rural Residential Land Consolidation in LiangJiang New Area in Chongqing based on the Urban-rural Integrated Development

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### Abstract

China's urban-rural integrated development is not only about the integration of land use, but also concerning the harmony of human settlement environment and the equalization of basic public services between urban and rural area. With multiple targets of rural residential land consolidation under the perspective urban-rural integrated development, this paper, taking LiangJiang New Area as an example, investigated the scheduling and layout of the rural residential land consolidation based on the evaluation of rural human settlement quality, the evaluation of rural basic public services and the potential measurement of rural residential land consolidation. The results show that the schedule of rural residential land consolidation in LiangJiang New Area can be divided into 4 regions, including the key region, the sub key region, the general region, the reservation and optimization region. Based on the results of evaluation on rural settlements suitability, combined with the characteristics of rural residential land, we formulated 4 types about rural residential land consolidation, including the model of urban-rural combination, eco-development, foster transformation, optimization and potential tapping. To improve the comprehensive benefit of rural residential land consolidation, we should investigate the scheduling and layout of the rural residential land consolidation firstly. Than we can formulate the suitable and targeted models for rural residential land consolidation.

### Key words:

Rural residential land consolidation; Spatial-Temporal Collocation; Urban-rural integrated development; LiangJiang New Area

## C12.36 Toponymy

(Jointly with International Cartographic Association)



### Place Names As Social Constructs

#### Oral

1. [Catchphrases as Instruments of Social/Identity Recovery in Nigeria: A Sociolinguistic Study](#)  
Idowu Odebode (Redeemer's University, Nigeria)
2. [Communicative Community as the Core Criterion for the Endonymic Status of Toponyms. An Addendum to P. Jordan's Definition of Endonym](#)  
Wojciech Włoskiewicz (Institute of Slavic Studies, Polish Academy of Sciences, Poland)
3. [Constructing a Waterfowl Common: Toponyms, Monuments, and the Ecological Sciences](#)  
Matthew Hatvany (Université Laval, Canada)
4. [Cultural Interpretation of Place Name Brand in the Process of Marketization—As an Example of “ChenMai BaiLian Goose”](#)  
Zhaoliang Zhangzhengsheng (School of Geography, South China Normal University, China)
5. [Diachronic Analysis of the Godonymic \(street name\) Space of Astana City](#)  
Madina Tussupbekova; Sholpan Zharkynbekova; Zhanar Konyratbayeva; Assel Kozhayeva; Meruyert Kairova; Bekzhan Abduali; Kuandyk Kulmanov (L.N. Gumilyov Eurasian National University, Kazakhstan)
6. [Evaluating Toponymic Brand Equity: A Case Study of Gwanghwamun and Gangnam in Seoul, Korea](#)  
Heesu Kim; Sungjae Choo (Kyung Hee University, South Korea)
7. [Expressing ‘Far-Away-Ness’ In Exaggerations: ‘He Has an Ego from Here to Tokyo’](#)  
Riemer Reinsma (n/a, Netherlands)
8. [Geographers’ Approach to Naming the Physical Geographical Regions of Hungary \(1945–2015\)](#)  
Gábor Gercsák (Eötvös Loránd University, Budapest, Hungary, Hungary)
9. [How Egyptian Geographical Names Represent Identity and Cultural Heritage?](#)  
Eman Oriby (Central Agency for public Mobilization and Statistics, Egypt)
10. [La Toponymie Des Pays Du Sahel Et Du Maghreb: Une Homogenite Toponymique Et Spatiale](#)  
Brahim ATOUI (CRASC, Algeria)
11. [Metamorphic Toponymic Identities: Case Study of Urban Villages of NCT of Delhi](#)  
Kriti Kanaujia (Department of Geography, Delhi School of Economics, University of Delhi, India)

12. [Place Naming Between Words and Numbers and its Impacts on Place Identity](#)  
Rassem Khamaisi (Department of Geography and Environmental Studies, University of Haifa, Israel, Israel)
13. [Post-Colonial Urbanization and the Changes of Vernacular Toponyms around Bupyeong-gu, Incheon: A Critical Perspective](#)  
Je Hun Ryu (Korea National University of Education, South Korea)
14. [Probing the Place Identify via the Naming of Bus Stops](#)  
Dong Po Deng (Institute of Information Science, Academia Sinica, China); Peter Kang (Department of Taiwan and Regional Studies, Donghwa University, Taiwan, China)
15. [Southern African Place Names as Social Constructs](#)  
Peter Raper (Research Fellow, University of the Free State, South Africa)
16. [Spatial Patterns of Manchu Place Names in Northeast China](#)  
Zhu Zhenhua; Zhang Hongyan (Northeast Normal University, China)
17. [Spatial Politics of Street Names between Taipei and Shanghai](#)  
Huang Wenchuan (Dong hwa university, Taiwan, China)
18. [The Ancient Names of Cities in Mesopotamia and Their Changes over Time](#)  
Cosimo Palagiano (Sapienza Università di Roma, Italy)
19. [The Change of Specific Term of Marine Geographical Names in Old Sea Charts](#)  
Hyo Hyun Sung; Hyojung Kim; Sejin Ahn; Ji Won Suh; Won Young Lee; Jisoo Kim; Sanghee Jeon (Ewha Womans University, South Korea)
20. [The Definition of Toponyms Mentioned in Secret History of Mongols](#)  
Dash Doljin; NYAMTSEREN Mandakh (Institute of Geography and geocology, Mongolia)
21. [The Meaning of Space Perception for the Standardisation of Geographical Names – Poland’s Perspective](#)  
Tomasz WITES (Commission on Standardization of Geographical Names Outside Republic of Poland. Warsaw, 00 926, Poland, Poland)
22. [The Other Side of Place Names: Understanding and Investigating Their Economic Value](#)  
Sungjae Choo; Heesu Kim (Kyung Hee University, South Korea)
23. [The Partisan Odonymy as a Local Political Instrument of Franco-Algerian Disagreement](#)  
Ammara BEKKOUCHE (Centre de Recherche en Anthropologie Sociale et Culturelle (CRASC), Algeria)



24. [The Ups and Downs of German Exonym Use. Use of Exonyms as an Indicator of the User Community's Prestige](#)

Peter Jordan (Austrian Academy of Sciences, Austria)

25. [Tunisian toponyms as Social constructs. A case study from Sfax, Tunisia](#)

Mohsen DHIEB (King Abdulaziz University, Saudi Arabia), Tahar YANGUI (University of Sfax, Tunisia)

## Catchphrases as Instruments of Social/Identity Recovery in Nigeria: A Sociolinguistic Study

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### Abstract

Nigeria is located in West Africa. It is a country of almost 450 diverse ethnic groups and about 200 million people. It has three major linguistic groups: Hausa (North), Igbo (East) and Yoruba (West). It also has 36 states which have been (re)named by the colonial masters and the military in the pre and post independence era respectively. The name, Nigeria (*Niger Area*) was given by Flora Shaw, a European. *Niger* denotes the River of the Blacks according to Leo Africanus. This system of naming (after rivers) influenced the military in the post-independence era such that some states in Nigeria were named after one river or the other. But as power shifted through independence and ballots, Nigerians began to see inadequacies in some of the place-names, hence, the need for better description of such places through catchphrases. As a corollary to the initial historical emblems represented by the previous names, each catchphrase reflects the socio-cultural milieu of the people vis-à-vis occupation, religion, education and politics among others. Similarly, certain catchphrases have to be modified through negotiations because they generated conflicts among the diverse socio-ethnic groups in the country. Thus, Sokoto has to metamorphose from *born to rule* to *seat of the Caliphate*, and Osun has to drop its initial *state of the living-spring for the virtuous state*. This paper examines selected states' catchphrases in Nigeria with a view to unraveling the social constructs involved in (re)naming of such places.

### Key Words:

Catchphrases; Nigeria; Africa; sociolinguistics

## **Communicative Community as the Core Criterion for the Endonymic Status of Toponyms. An Addendum to P. Jordan's Definition of Endonym**

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### **Abstract**

Besides the UNGEGN-approved definition of endonym there are several new academic definitions and theoretical approaches that were proposed in recent years. They are generally based either on the language criterion or on the community criterion. The 2012 definition by Peter Jordan binds the endonymic status of a name with the toponymic usus of the community closest to the named feature (principle of subsidiarity). The aim of this paper is to elaborate on the very nature of such community and to redefine it as a communicative community according to the theory proposed by the Polish linguist Ludwik Zabrocki. This approach combines both sociological and linguistic aspects of the use of geographical names as the concept of communicative community is not limited by the concept of language and language community.

### **Key words:**

endonym; definition; communicative community; community; toponym; geographical name; exonym;

UNGEGN

## Constructing a Waterfowl Common: Toponyms, Monuments, and the Ecological Sciences

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### Abstract

Unusual toponyms and memorials mark the geography of Western Canada. Across the Prairie Provinces are numerous lakes and memorials reflecting the names of American cities, states and conservationists. This extrinsic place naming dates to the 1940s when one of America's most successful conservation organisations launched "The Lake that Waits" project. Emerging from the Dust Bowl, disappearing wetlands, and declining waterfowl, this project married ecological data, toponyms and other cultural symbols, and geographical imagination to encourage American waterfowlers to invest in the rehabilitation of Canadian duck breeding areas. Tina Loo remarks in *States of Nature* that this "was not simply re-engineering the landscape, it also re-colonized it in the name of conservation." But, is this an example of one national group using nature conservation as a means to colonize the resources of another? Or, is this problem more multi-layered? An historical geography relying upon a critical analysis of archival documents illustrates that this toponymic renaming and commemoration, rather than symbolic of the power of colonization, is an early example of using toponyms and memorials as tools in applied ecosystem management to encourage recognition of the shared responsibilities of national groups who, despite large distances and political and cultural differences, needed to reenvision the Canadian-American map not in political or nationalistic terms, but rather as a continental waterfowl common.

### Key words:

Toponyms; Place Naming; Colonization; Ecological Common; Nature Conservation

## Cultural Interpretation of Place Name Brand in the Process of Marketization—As an Example of “ChenMai BaiLian Goose”

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### Abstract

The place name brand contains rich and diverse cultural connotation. Therefore, this article chooses the trademark disputes as a research case, in regard to the trademark “Chengmai Bailian goose”. Next, the author studies the cultural meaning and market value of the place brand systematically. Furthermore, the author explores the place culture’s supporting effect on brands as well as the inheriting relationship between place culture and the wide spread of the brand, so as to prepare for the references about making the brand developing strategy and the enhancement of the brand awareness.

### Key words:

place name brand; geographical indication; trademark; culture; BaiLian goose

## Diachronic Analysis of the Godonymic (street name) Space of Astana City

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### Abstract

This paper explores the principles of forming onomastic space in the city of Astana using “godonyms” (street names). Using an analysis of historical archival documents, resource books, and theoretical and empirical research in onomastics, the formation of the modern “godonymic” space of Astana was examined, and the principles of naming policies in different periods of the city's existence were revealed. Directing the focus of research toward naming policy issues in the city is fully justified because of a number of problems regarding the naming and renaming of cities and streets that demand an immediate solution. In this respect, Astana, as the young capital of Kazakhstan, is of particular interest. The godonymy of Astana is a holistic historical and cultural phenomenon, in which each era has left a noticeable mark, which characterizes not only the semantics, but also its structure. As analysis of the research material shows, the street-naming system of the city has undergone tremendous changes. The reason for this is huge transformations, dictated by geopolitical, cultural, social and economic priorities.

### Key words:

city space; demonstrative; godonym; onomastic research; memorative; onyms; state and language policy

## Evaluating Toponymic Brand Equity: A Case Study of 'Gwanghwamun' and 'Gangnam' in Seoul, Korea

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### Abstract

This study, as an exploration of this economic value of place names by employing the concept of customer-based brand equity, developed in the debates of the business management attempts to evaluate the brand equity of place names. A framework to evaluate the brand equity of place names has been designed, which is composed of four elements; awareness of place names; evaluation of the quality of place names; association with place names; and loyalty to place names. Researchable variables have been drawn to concretize these elements. Some factors which may influence the brand equity are also suggested, such as demographic factors, social background, and more importantly, perception of the geographical boundary associated with the place names. A case study conducted on two place names, 'Gwanghwamun' and 'Gangnam' in Seoul, Korea. Results of the survey shows that the brand equity of place names is an effective tool to evaluate their economic value: 'Gwanghwamun' is positively evaluated in the respect of its historical value and 'Gangnam' in the respect of peoples' awareness. Research topics are suggested, including the process of becoming a place name as brand with economic value; the evaluation of each elements of the brand equity; and fundamentally the relationship between place and place name.

### Key words:

place name; toponym; economic value; brand; brand equity; toponymic brand equity; customer-based brand equity; Gwanghwamun; Gangnam

## Expressing 'Far-Away-Ness' In Exaggerations: 'He Has an Ego from Here to Tokyo'

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### Abstract

Metaphorical sayings which contain a toponym are a popular phenomenon in the Netherlands and some other countries. The toponyms concerned refer mostly to towns and cities, in the Netherlands as well as abroad.

The sayings express exaggeration, and are equivalents of

- 'huge/ large' (He has a criminal record from here to Maastricht)
- 'extremely' (I feel sentimental from here to Tokyo)
- 'intense, loud' and the like (I heard shouting from here to Jerusalem)
- 'many' (We heard stories from here to Malaga).

The earliest attestation in the Dutch language dates from 1528 (a fart from here to Jerusalem). Since then, over time tens of toponyms occurred once or repeatedly in these sayings. According to LexisNexis, a newspaper database, the name of Tokyo emerged in 1969 and has gradually become the most used toponym in this type of expressions. This paper will pay special attention to this name variant and propose an explanation for its rise in the last decades.

### Key words:

Metaphorical saying; toponym; Tokyo; exaggeration

## Geographers' Approach to Naming the Physical Geographical Regions of Hungary (1945–2015)

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### Abstract

The professional geographers' approach to giving names to physical geographical regions often confronts the accepted, traditional or local usage. Hungarian geographers consider it important to name the various levels of geomorphologic regions (macroregion, mezoregion, subregion and micro region) so that the name should reflect the geographic character (mainly the morphology) of the specific area. Even so, certain place names are changed almost periodically for various reasons. First, there may be different professional views of the same land area, which leads either to slight differences in the names or produces new names according to the opinion of authors. Second, with the development of research, scientists may realize that certain accepted place names do not describe the features of the area precisely any longer. Third, when the geographical borders or extent of the regions are revised, new regional divisions are set up with names newly introduced and others dropped. Further, political-administrative influences can result in new place names. This practice has brought about confusion in the usage of names mainly in schoolbooks, in the press and in everyday communication. These artificial names (professional constructs) often contain technical terms and strange word combinations the correct spelling of which challenges not only the common people.

The author has collected the name changes of the major physical geographical (landscape) regions of Hungary introduced by the scientists either from the academic institutions or the private sphere in the past seventy years, and analyzes the motives of these changes.

### Key words:

geographical regions; geographers; place names; Hungary

## How Egyptian Geographical Names Represent Identity and Cultural Heritage?

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### Abstract

This paper represents how place names are considered as a witness of history and memory of nations. I explain why we consider the geographical names as a part of the cultural heritage, how to express geographical names for identity, and the variables that affect the interaction and feelings of geographical names, what are the factors affecting our perception of place as an identity. I outlined the stages of the historical development of the Egyptian geographical names and the impact of foreign languages at the Egyptian geographical names pronunciation, the impact of the local dialects and Egyptian Literary languages on changes happened to Egyptian geographical names. The history of Egypt is categorized into several successive historical Eras. They are Pharaonic Era, Greek Era, Roman Era, Coptic Era, Islamic Era, Modern Era<sup>1</sup>. Through those eras The Egyptian spoken language has developed from Old Egyptian, Middle Egyptian, Late Egyptian, Greek, Demotic, Coptic, Arabic And Also Egyptian Literary language from Egyptian Hieroglyphs, Hieratic, Demotic, Greek, Coptic, Arabic.

Finally, I give a brief note about how changes of place names are happened according to social, political, commercial impacts.

### Key words:

Toponymy; GIS; Standardizing geographical names, Cultural Heritage

## La Toponymie Des Pays Du Sahel Et Du Maghreb : Une Homogenite Toponymique Et Spatiale

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### Résumé

Si les études de la toponymie des pays d'Afrique du nord et plus particulièrement ceux du Maghreb sont plus ou moins abondantes, celle des pays dit du Sahel ou sub-sahariens l'est très peu. Encore moins la relation qui pourrait existée entre ces deux parties de ce continent !

En effet, pour la toponymie des pays du Sahel, considérée, d'ailleurs en partie, à tort, comme une toponymie issue de langues orales, non écrites, nous nous enregistrons très peu d'études si ce n'est quelques tentatives de quelques érudits notamment européens, qui ont rédigés quelques notes éparses sur quelques toponymes des ces pays, souvent peu documentées ou peu objectifs car menées parfois avec une approche colonialiste.

Dans le papier proposé, nous essayerons de montrer que la toponymie du nord des ces pays, contrairement à ce qui a été écrits par certains, est issue de langues écrites et surtout qu'ils ont avec ceux du Maghreb , non seulement une continuité spatiale mais aussi une continuité toponymique.

On effet, si on observe la carte linguistique de la région dont il s'agit, on remarque qu'une partie de ces pays qui la composent, ont en partage la langue amazigh (berbère) , la langue arabe à côté d'autres dialectes et par conséquent l'espace couvert par ces langues, porte une toponymie issue soit de la langue berbère ou soit de la langue arabe toutes deux sont des langues écrites ! la langue arabe est d'ailleurs soit officielle comme au Tchad et au Mali soit nationale comme au Niger.

Dans ce papier proposé, nous essayerons de montrer la relation toponymique spécifique qui existe entre les pays du Nord de l'Afrique et ceux des pays dits du Sahel et d'en proposer une nouvelle approche pour des études futures de la toponymie de cet ensemble spécifiquement dite saharienne qui n'est ni rurale ni urbaine ! et qui exprime une mode de vie propre à ces pays.

### Mots-clés:

toponymie; langue écrite; langues parlées; toponymie Saharienne

## Metamorphic Toponymic Identities: Case Study of Urban Villages of NCT of Delhi

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### Abstract

Of the myriad characteristics that may define or identify a certain entity; animate or inanimate, name is perhaps one of the most significant portals providing access and passage to the inner most sanctum sanctorum of a specific entity and this becomes even more prominent when one observes the names of places. Toponymy gains prominence as identities traceable on maps as a place name is the primary identifier of locating a place in myriad spaces and places. But since change is the only constant in this world, toponymy as well is subjected to it. Numerous reasons may be attributed to toponymic erasures, erased-preservations and even unchanged existence. The urbanscape of Delhi, with its myriad urban villages is an exemplifier of diverse, inter-related and interactive toponymic identities as microcosmic reflections of the macrocosm of Delhi in context of nature, people, functions and patterns.

This toponymy does not exhibit a simple, generalized or coherent facade rather is entwined in class, caste, spatial location, resistance and acceptance to stereotypical norms of development, changing times and reality. The toponymy of these urban villages began in rurality, in social structures and stratification, entwined in socio- cultural topographical space and which is now subjected to the influences of politics, power and urban development.

### Key words:

Toponymy; urban villages; Delhi; urban development

## Place Naming Between Words and Numbers and its Impacts on Place Identity

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### Abstract

The process of place naming is not neutral; it is derived from socio-cultural identity and articulated as belonging to an ethno-national community. It contributes to shaping the identity of individuals in the society. In addition, the process of naming produces a differentiation between societies and communities, and presents diversity. Naming is part of the soft symbolic resources which have an impact on community awareness and place affiliation. Place names have an impact on defining and differentiating through words or numbers. In modern states and societies, every person has a name (words), and number such as identity or passport number. Geographic objects such as places, roads, mountains, valleys and caves often have names to define it by words or numbers or both. The topic of this paper is the roots of transformation of place naming by words and numbers, and its implications for identity of place belonging and affiliation. The paper will compare the context of place naming by words or numbers and its meanings and advantages, particularly regarding the situation of geopolitical and socio-cultural conflict in Israel between Arab Palestinians citizens and the State of Israel.

### Key words:

Place naming; words; numbers; identity; Arab Palestinian; Israel

## Post-Colonial Urbanization and the Changes of Vernacular Toponyms around Bupyeong-gu, Incheon: A Critical Perspective

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### Abstract

The present patterns of naming around Bupyeong-gu of Incheon reflect the long and contentious history of Japanese colonialism, the significance of reinstating Korean toponyms after liberation, and the contemporary politics of culture, identity, and belonging. The vernacular toponyms of Bupyeong have played an important role in the construction of identity among the people who identify themselves with the imagined community named Bupyeong. It is speculated that local Korean residents were still using these autochthonyms, or vernacular toponyms, as substitutes for the Japanese names during the Japanese colonial period. Since the 1980s, indigenous toponyms have disappeared in everyday conversations, while being replaced by the names of apartment complexes. Wontei Gogae, by contrast, is an old vernacular toponym that is still in use along with the creation of humorous nicknames. The toponym Datagumi can be classified as a kind of resistant toponym in that it has no alternative toponym. Since the 1940s, Samneung, the Korean pronunciation of a Japanese toponym, has been used as an alternative toponym to the official toponym Bupyeong 2-dong.

### Key words:

Bupyeong-gu; vernacular toponyms; indigenous toponyms; resistant toponym; alternative toponym

## Probing the Place Identify via the Naming of Bus Stops

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### Abstract

The name of bus stop is not arbitrary-given. The naming process actually considers the social and spatial context of the designated spot. It involves the locative memories and experiences of the people who live in the service areas of bus stop. The name of bus stop, nevertheless, reveals the different meanings for the people outside of the service areas. The shared experience of using and referring the bus stop name promotes the local people to constitute a social and spatial identity. This paper attempts to explore the naming of bus stops as a platform for the construction of place identity. We collect 3,794 bus stops of the greater Taipei area (both Taipei City and New Taipei City) and divide the nature of bus stop names into three themes: landmarks (points), transportations (lines), and places (areas). By way of geo-visualization, we may see the spatial distribution of the three themes reflecting the different naming genres from urban to suburban areas, which in turns demonstrates how we perceive the place identity in different areas.

### Key words:

toponym; bus stop names; place identify; spatial analysis

## Southern African Place Names as Social Constructs

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### Abstract

Place names, or geographical names, are social constructs, as are languages themselves. The natural geographical features to which names refer, and which they identify, presumably existed prior to the emergence of society, and are thus independent of social construction. Features made or adapted by human agency, on the other hand, are social constructs, as are the names allocated to them. The wide variety of languages from which place names are derived has necessitated, and resulted in, divergent constructs, reflecting language contact that incorporates adaptation, translation, hybridization and replacement of names. Evolutionary onymic formation involving the shift from appellative to proper name, and the shift from evolutionary to illocutionary formatives, also reflect social construction. In Bushman society the application of the name was dependent on the relevance of the feature to society, and geographical features and their component parts were thus named accordingly, resulting in toponyms incorporating different generics, from different languages, all being social constructs. The syntactic structures of toponyms are the result of social structuring, the generic term frequently designating the feature type, the specific term serving to distinguish the particular feature from others of the same class within the given context. This paper considers social variations reflected in toponyms coined by Bushman hunter-gatherers as compared to those of later inhabitants of Southern Africa.

### Key words:

Place names; Geographical names; Language contact; Social constructs; Bushman languages

## Spatial Patterns of Manchu Place Names in Northeast China

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### Abstract

Place names (toponyms) represent a wealth of information, which is closely related to the local civilization, language, environment, history and habit. UNESCO classified Manchu, Ewenki, Dagur and Manchurian Kirghiz in Northeast China's as critically endangered languages. It means the disappearance of the multiethnic heritage besides the reduction of linguistic diversity. While place names action as carriers of languages which can be preserved for a long time. For that Manchu known as "Mandarin" has significance in Qing dynasty, there are a large number of Manchu place names in Northeast China as "living fossils" storing local cultures. We study Manchu together with other ethnic place names in Northeast China, integrating spatio-statistical measures by GIS, in order to focus on the temporal and spatial distribution of place names in Northeast China. The objective is to explore the geographical factors in minority-inhabited areas with the relevant historical background, as well as the influences upon the original culture by Han Chinese immigrants. Through the evolution of place names to indicate the ethnic acculturation and assimilation during historical migration process. This article integrates the approaches to linguistics, geography, history and related disciplines, so as to promote the conservation of endangered languages.

### Key words:

Manchu toponym; GIS; spatial analysis

## Spatial Politics of Street Names between Taipei and Shanghai

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### Abstract

The naming of streets after historical figures and events is an important part of modern culture policy; it not only provides spatial and semiotic orientation to the city but also serves to naturalize and legitimize a selective vision of the past. Street naming thus can become a contest about who has the power to determine how the landscape is represented and whose history will be told.

According to the history of China, after the Chinese Civil War, the ROC government led by the Kuomintang (KMT) retreated to Taipei in 1949, while the CPC proclaimed the PRC government in Beijing. Since then, the relations between mainland China and Taiwan are in conflict with each other. However, unfolding the map of Taipei and Shanghai, we will find the street names have a high degree of correlation in these two cities. Both are all filled with place names of mainland China. The first street named after Chinese cities and provinces appeared in the British and American Settlements of Shanghai from 1863. Even Shanghai has undergone different political regimes and street names changed, but the principle of naming streets after Chinese cities and provinces become the main rule of street-naming, finally. On the other side, after the 228 accident in 1947, the KMT government decided to rename all the streets of Taipei with the place names of mainland China. From then on, the place names of Mainland China were inscribed on the streets of Taipei city. Although the place names of mainland China dominant the street names of Taipei and Shanghai city, but we still concerned about which place names were chosen to show the difference political ideology.

The paper will borrow the concepts of critical theories to argue street names as the illustration of state power on its spatial politics by examining the scale and location of the streets named after Chinese cities and provinces between Taipei and shanghai where base on their political difference on the two sides across the Taiwan Strait to compare and analyze the difference responses between PRC and ROC governments.

### Key words:

Street-naming; Spatial Politic; Shanghai; Taipei; PRC; ROC

## The Ancient Names of Cities in Mesopotamia and Their Changes over Time

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### Abstract

The great interest of both mass media and public opinion on the current situation of territories and their cities of ancient Mesopotamia have highlighted names and sorry business of cities that were largely unknown by the majority of the people. Many of these cities have discovered thanks to intensive archeological digs especially conducted in the last fifty years. In the ancient times the names of these cities were well known because they have flourished for many centuries some millennia B.C. under different governments. For this reason, the names could have changed, because the new powers could speak different languages, Semitic and Indo-European.

The aim of this study is to trace briefly the history of the names of these ancient cities and to classify the different types of city names according the different historical periods.

There are: (i) cities which have changed their name only with slight linguistic variation; (ii) cities that have changed the name but not the place; (iii) cities rebuilt with the same name in nearby locations; (iv) names of cities disappeared or destroyed totally or partially; (v) names of cities of undoubted location.

In conclusion I will try to draw up a table with the different name of cities in different historical times.

### Key words:

Mesopotamia; Syrian city names; Iraqi city names; City names changes

## The Change of Specific Term of Marine Geographical Names in Old Sea Charts

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### Abstract

This study aims to analyse the change of specific terms of marine geographical names in Korea which are inscribed in old sea charts. At first, about 300 marine geographical names were collected from 105 old sea charts around the seas of Korean peninsula published from 1800s to 1960 by U.S.A, Japan, U.K, France, Russia and Korea. In addition, those names were compared to the ones used in current charts to identify the changes of the geographical names. The history and origin of the specific term were analysed through <The Chronicle of Korea Fishery (1908)>, <Korea Pilots (2014)>, and <Oceans and Marine Geographical Names (2015)> published by KHOA.

The result of analysis shows the change of marine geographical names with the times. From 1800s to right before Japanese occupation period, specific terms of marine geographical names were named differently by each country. In many cases, the names were identical with the name of people or ship of several countries which came to survey Korea. The specific terms, used in charts published in Japanese occupation period, were similar to the currently used names. After the liberation of Korea, sea charts were newly published, adding survey data based on charts published by Japan. In this process, some of the foreign specific terms were changed to Korean alphabet and showed on the charts. Few of those names are still shown in current charts. This study will contribute to preservation of Korea's inherent marine geographical names and shed new light on the history and origin of those terms in Korea. Also, they can be used in changing foreign specific terms in sea charts to Korea's own.

### Key words:

marine geographical name; sea chart; specific term

## The Definition of Toponyms Mentioned in Secret History of Mongols

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### Abstract

Geographical names are the main socio-cultural artifacts to identify territorial extent, lingual belonging, and settlement patterns. Without knowing and understanding the hidden meanings of the geographic names the real features of the spatial objects cannot be defined.

The earliest publication in Mongolia which reflects the geographic names is the Secret history of Mongols. In other hands, this book replicates historic names of geographic objects not only for Mongolia but also other adjacent regions. This paper includes description of more than 70 toponyms and geographic names, which can be found in the Secret History of Mongols.

### Key words:

Secret history of Mongols; geography; toponym

## The Meaning of Space Perception for the Standardisation of Geographical Names – Poland’s Perspective

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### Abstract

Geographical names are settled and approved in a concrete social reality and hence often constitute the result of a compromise that takes into consideration a multitude of conditions. There are many factors that significantly affect the process of standardisation of names considered the most appropriate for objects. One of the stages on the path to standardisation of names is referring to the geographical space perspective. The basis for these analysis is the reference to two classic studies on geographical perception (LYNCH 1960, SAARINEN 1969). Perception develops in three stages, starting with the identification of elements of the environment and differentiating them from their surrounding. Next, you determine the spatial relations between elements of the environment, and in the end you define the meaning of the individual elements, which is tantamount to a practical evaluation thereof. Space perception is a complex cognitive process occurring under the influence of environmental and cultural stimuli, consisting in the establishment in one’s mind of structures that reflect the space surrounding man. This presentation will show the specifics of standardisation of geographical names in Poland, taking into account ambiguous criteria of determining names. In order to make the applied exonyms correct it is required to keep those Polish names that should be protected and to abolish those that have been introduced rashly or which are no longer in use. The paper also presents how the determining and the approval of geographical names changed in Poland over time.

### Key words:

space perception; standardisation; place names; Poland

## The Other Side of Place Names: Understanding and Investigating Their Economic Value

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### Abstract

This study investigates the economic value of place names, especially focusing on providing research issues and framework. Motivated by the finding that place names are highly capable of acting as one of the most conspicuous brands in the economy, this study has explored the essential nature of the brand value of place names and has suggested possible methodology to evaluate this value. As the place name brand has multi-dimensional elements mirroring the attributes of place, its understanding should be framed in terms both of users of place names as a subject and of place as an object. In order to evaluate the brand value of place names, the possibility of adopting the concept of customer-based brand equity, which is centered on the perception and assessment of customers, has been reviewed and more detailed items of evaluation have been addressed. A few future research topics are suggested: the nature of brand value; its relevance to place identity; the influence of place marketing; the significance of exposing place names to the public; the effect of geographic indication on brand value; delineating the spatial boundary of geographic indication items.

### Key words:

place name; toponym; economic value; brand; brand equity; customer-based brand equity; geographical indication

## The Partisan Odonymy as a Local Political Instrument of Franco-Algerian

### Disagreement

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#### Abstract

During the French colonial period in Algeria (1830-1962), the toponymic system generally glorified characters of Christian holiness or military known for their warrior feat against the indigenous population. The names of public places, however, show that some of them were distinguished by their Algerian origin. This award was a recognition sign of the "natives" personalities' collaboration with the colonizing country. After the independence of Algeria, place names are changed glorifying in part, the revolution martyrs died for their country. This change involved the decolonization process of Algerians in structuring their existence and ownership of their usurped intangible heritage.

On the French side, after 1962, selected names honor the rebellion's leaders and some Muslims favorable to France. As a resurgence sign of a grueling past, this symbolic act refers deliberately to the far right supporters of "French Algeria" proclamation. As such situation, it is interesting to question the characteristics of this social urban medium relating to this particular political use of choosing a place name. It implies the representations and the meanings denomination study which reflect different qualifications of the both countries' common history. Beyond designations that maintain rivalries by promoting the ex-colonial empire' events, their evocation is significant of stakes that restore them.

#### Key words:

Toponymy; local urban policy; place-name symbolic choice; social urban medium

## The Ups and Downs of German Exonym Use. Use of Exonyms as an Indicator of the User Community's Prestige

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### Abstract

Exonyms in the sense of place names used by a community for features outside its territory and differing from the place names used by the local community have the essential function of integrating foreign geographical features important enough for a certain receiver community into its cultural sphere, to facilitate domestic communication about them. What makes them politically delicate, however, is the fact that they are also sometimes regarded and used as expressions of political claims and that they are indicating the relative prestige of linguistic communities as well as power relations between them. It is, e.g., obvious that German-speaking communities use relatively few exonyms for geographical features in the Anglophone and Francophone world, while it is quite the opposite with features in the eastern part of Europe. Since the political, economic and cultural prestige of German-speaking communities, especially of Germans and Austrians, has undergone significant changes since the late 19<sup>th</sup> century, affected by the two World Wars, the Nazi regime, the Holocaust, Germany's political division and re-unification, Germany's and Austria's economic success and Germany's leading position among European Union countries, by the example of these communities also diachronic change in the relation between a community's prestige and its exonym use can be studied very well. This will be done by investigating into the use of exonyms in a representative selection of German and Austrian school atlases between the late 19<sup>th</sup> century and present.

### Key words:

Exonyms; toponyms; German; cultural prestige; critical toponomastics; cultural geography

## Tunisian toponyms as Social constructs. A case study from Sfax, Tunisia

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### Abstract

Departing from questionnaires related to a PhD research study on spatial dynamics in the Greater Sfax City, Tunisia, we discovered noticeable differences between official or institutional labels and the ways people designate place names.

This fact appears surprising to some extent. However, if we take into account the fact that names are living bodies that evolve through history as social constructs, more or less influenced by the manners people integrate place names and identify places, we may understand the reasons and the origins of these differences in perceiving and telling place names. Moreover, responses of people are not similar: another set of differences were observed in the place denominations with regards to the users depending on their social classes, their sex, their age and some other parameters that should be investigated.

Besides social aspects, there are individual reactions to place names. These latter demonstrate the influence of social and constructions much more than official or academic productions.

In this paper, we intend to measure and portray these differences, their origins, and probably give some insights to Officials, planners and deciders when adopting one toponymic policy.

### Key words:

Tunisian toponyms; Sfax; social labels

## C12.37 Transformation Process in Megacities

### Megacity Development and Governance



Home

#### Oral

1. [An Appraisal of the Trends, Patterns, and Determinants of Million Plus City Growth in India](#)  
Ismail Haque (Jawaharlal Nehru University (JNU), India)
2. [Analysis of the Zhoukou Pingfen Scandal from the Perspective of Landscape Politics](#)  
Yang Rong (Sun Yat-sen University, China)
3. [Extraction of Urban Residential Buildings Based on Object-oriented and Space Analysis](#)  
Liu Bo (Sun Yat-sen University, China)
4. [Pollution in Mexico City Metro Area; Public Policy Analysis 2000 - 2015](#)  
Tonatiuh Resendiz (UNAM, Mexico)
5. [The Emergence of City-Regionalism under Changing Central-Local Relations: Regional Cooperation in the Yangtze River Delta](#)  
Yi Li (Nanjing University, China); Fulong Wu (UCL, United Kingdom)
6. [The Interaction Mechanism Between Urban Planning, Land Supply and Tertiary Industry Spatial Structure in Hong Kong](#)  
Cao Zhejing (Tsinghua University, China)

## **An Appraisal of the Trends, Patterns, and Determinants of Million Plus City Growth in India**

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### **Abstract**

The Metropolitan Cities are the Million Plus cities or often called as 'Mother City', generally recognized through its urban way of life or urbanism and diverseness of population. The pattern of urban growth in these metro cities enjoyed extreme significance, as metropolitanisation has been a striking peculiarity of India's urbanization amid post-independence era, due to escalating growth in number as well as percent share of urban populace in these cities. Present study examines the trends, patterns, and determinants of growth of Million Plus Cities/UAs in India since 1901. Examination of census data revealed that post economic reforms period marks the beginning of a rapid pace of metropolitan development in India witnessing dispersed pattern of metropolitan growth during recent two decades. Result from multivariate regression analysis inferred that NSDP per capita, percent Urban literate, share of male main worker engaged in non-farm activities, railway connectivity and existing metro cities of a state/UTs seems to have statistically significant positive impact on metro city growth. It has too been discerned that cities having earlier birth have not grown at a rapid pace while many of them flagged negative demographic growth suggesting a tendency of population drift towards periphery from the core city leading to an 'agglomerated trend' of metropolitan development in India.

### **Key words:**

Urbanization; Million Plus City; City Growth; Periphery; India

## Analysis of the Zhoukou Pingfen Scandal from the perspective of landscape politics

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### Abstract

The modernity has become the dominant logic in social space operation by means of conquering and integrating space. Space is the site of reproduction of productive relations as well as the site of conflict between different social groups. However, there is few research on modernity view of urban development under the perspective of landscape politics in China. In this paper, the connotations of cultural landscape (especially deathscapes) from social & cultural geography is illustrated firstly. Then the intensive development of ceremony in the process of modernization in China is discussed. Taking the Zhoukou Pingfen Scandal in Henan province in 2012 as the study case, we analyze and capture the discourse practice as well as the space practice in order to summarize the consensus viewpoint together with cognition of each social group. In this research, the data and materials for analyzing come from text documents and statistics of government, speeches of leaders, mainstream media reports, thematic reports on the web as well as the corresponding comments, and semi-structured interviews on the part of the stakeholders. The results indicate that: landscape aesthetics, capital logic, concentration of power play a more important role in the urban development notion in modern China rather than the sacred needs, family identity, personal emotion and memory as the core of traditional deathscapes. In addition, conflicts and negotiations based on the landscapes have emerged during the current process of modernization and urbanization.

### Key words:

Zhoukou Pingfen Scandal; modernity; deathscapes; urban development notion; landscape politics

## Extraction of Urban Residential Buildings Based on Object-oriented and Space

### Analysis

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#### Abstract

The object-oriented ideas was many times integrated into the “top-down” multi-scale image segmentation, then combining space method to extract residential buildings in high resolution images. First, calculating each object segmentation feature information such as spectrum, space, texture, etc. According to the characteristics of different objects a different member function was selected for raster data spatial analysis, which preliminary realizes buildings edge extraction. And then the specific spatial clustering analysis and spatial convolution filtering operator were used for the building image microprocessor, which have better precision extraction results. Finally, the results are compared with the traditional information extraction method. The experimental results show that it has better accuracy and high adaptive when applying the idea of object-oriented multi-scale segmentation and integration of a variety of image space analysis method is targeted to extract residential buildings. For high resolution images accurately and rapidly extracting large areas of urban residential buildings is a good exploration.

#### Key words:

High resolution image; Residential buildings; Object-oriented; Spatial analysis

## **Pollution in Mexico City Metro Area; Public Policy Analysis 2000 - 2015**

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### **Abstract**

Mexico City is the largest city in the Western Hemisphere with a population ranging 23 million people in its metropolitan area. This overflowing urban mass is the political, economic and industrial center of the country; from the 1970s federal government have been applied an ambitious economic and development model, focused on the industrialization of the Mexican capital, a fact that has impacted the levels of contaminants in air, water, waste management and even auditive pollution. During the first decade of the XXI century, has been implemented program like vehicle restrictions, trying to reduce air pollution; however, these measures have not been entirely effective, plus they are very unpopular among the population. Environmental viability of the city is at high risk, if the state should not apply urgent public policies to save the health of its inhabitants.

### **Key words:**

Pollution; Latin America; environment risk; Public policies; vehicle restrictions

## The Emergence of City-Regionalism under Changing Central-Local Relations:

### Regional Cooperation in the Yangtze River Delta

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#### Abstract

China has recently witnessed the emergence of city-regionalism, and two different regional-scale mechanisms have influenced this integration and cooperation: the top-down state-mandated process and the bottom-up process initiated by local governments. Scale building in China is determined by changing central-local relations and the politics surrounding this change. This paper focuses on regional cooperation in the Yangtze River Delta and finds that top-down regional plan making has been undermined by economic decentralization, while the administrative and political hierarchies hinder bottom-up regional building. This paper argues that central-local dynamics are at the core of regional governance and state rescaling in China.

#### Key words:

central-local relations; city-regionalism; governance; state rescaling; China

## The Interaction Mechanism between Urban Planning, Land Supply and Tertiary Industry Spatial Structure in Hong Kong

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### Abstract

Hong Kong is among the mostly dense big cities and has blossomed from the fishing village all the way to the financial hub in Asia. Hong Kong government has taken the “little intervention” policy to facilitate free market economy and applied “high land price” strategy for sufficient land revenue. This paper established the economic-social model to examine the interaction mechanism between urban planning, land supply and tertiary industry spatial structure in Hong Kong. Firstly, the model is based on the assumption that (1) urban planning influences the primary land supply by strategic plan, OZP (outline zoning plan) and planning application system; (2) the secondary land supply is influenced by urban design guidelines, construction cost other than primary land supply; (3) the secondary land supply impacts the tertiary industry spatial structure which includes residential land, grade A office land, general business land and special industry land; (4) the spatial structure includes two dimensions of spatial economic structure and spatial concentration structure; (5) the spatial economic structure is determined both by secondary land supply and buying demand; (6) the buying demand is impacted by spatial concentration structure of the tertiary industry; (7) the spatial economic structure would regulate the primary land supply through feedback mechanism of land revenue. Secondly, the spatial economic structure and spatial concentration structure are analysed through GIS based on the data of 300,000 POIs (point of interest) of 2016, Hong Kong population census, annual digest of economic statistics, employment statistics. Thirdly, the relationship between urban planning and primary land supply is further judged in three aspects: the making of OZP under Hong Kong strategic planning (Hong Kong 2030, new town development policies); high land revenue, land bank and oligopoly; planning application system in controlling urban development. Fourthly, the relationship between secondary land supply and tertiary industry spatial structure is also studied in three aspects: spatial shaping mechanism of OZP and urban design guidelines; spatial economic structure impacted by secondary land supply and buying demand determined not only by individual economic situation but also geographic location; spatial economic structure’s feedback on primary land supply through land revenue. Finally, the urban space shaping mechanism of market and urban planning is briefly concluded.

### Key words:

Urban Planning; Land Supply; Tertiary Industry; Spatial Structure; Hong Kong

## C12.37 Transformation Process in Megacities

### Informality and the Transformation of Governance



Home

#### Oral

1. [Construction of High-Rise Buildings and Development of CBD in the Inner Area of Beijing City since the 1990s](#)

Jiang GU (Key Laboratory for Geographical Process Analysis & Simulation Hubei province, Central China Normal University, China)

2. [Informality as a Strategy: Urban Redevelopment in the Pearl River Delta, China](#)

Huang Yingmin (Sun Yat-sen University, China)

3. [Urban Informality in The Internet+ Era](#)

HongHu Deng; ChunShan Zhou (School of Geography and Planning of Sun Yat Sen University, China)

## Construction of High-Rise Buildings and Development of CBD in the Inner Area of Beijing City since the 1990s

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### Abstract

Since comprehensive reform and the Opening-up began in the first half of the 1990s, a remarkable level of urban development has taken place in Beijing. With the disintegration of the unit-yard system, and the introduction of new land distribution policies, a remarkable demolition-reconstruction process can be seen in the inner area.

In this study, we developed a new method of land use classification using remote sensing analysis --- based on the shadows of buildings and green space. Based on this method, we have confirmed that in Beijing city, a remarkable development process has occurred since the reform and opening up. The main driving force behind this urban transformation process was the expansion of high residential building areas. The construction of high-rise buildings began around the second ring road, gradually expanded to the outer part, and was distributed to the whole area within fifth ring road in the 2000s.

On the other hand, the Beijing CBD area is becoming one of the most important business centers, many offices of domestic and multinational companies have agglomerated in the CBD. However, most of the developers who obtained right of development in the CBD core area were state-owner insurance companies. The offices in CBD vary in size, activity, main customers, and length of establishment. It was the prestige of the CBD that many companies valued most in choosing the location of their office. Following this, high availability of offices, high quality of infrastructure and agglomeration of supporting services were evaluated as important advantages.

### Key words:

Beijing city; Reform and opening up; CBD development; urban transformation

## **Informality as a Strategy: Urban Redevelopment in the Pearl River Delta, China**

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### **Abstract**

Urban informality is a one of important agenda in global South study, it is also considered as a new urban theory in the future. Since 1978, the reform and opening up policy in China is the process of transformation of socio-economic institution with the characteristic of pragmatism and gradualism. During this process, the Chinese cities growth fast, and informal urban have been taken place. Some researchers think the source of the informal urban development is form “below”, or because of the market mechanism. Most of the informal urban research lack of focus on institution. This paper analyses the informal urban development and restructuring in the Chinese Pearl River Delta (PRD) in the field of urbanized village (UV) redevelopment—— Xiaobian Village in Chang’an Town of Donggun City. By introducing the notion of “conceded informality”, and emphasis will be put on restructuring processes of this village. Conceding informality can be seen as a coping strategy the Chinese governments are using as an experimental mode of governance in order to deal with new phenomena of urbanization and critical situations in times of permanent change and legal uncertainty.

### **Key words:**

Informal institutional change; Urban redevelopment; Informality; PRD

## Urban Informality in The Internet+ Era

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### Abstract

Urban informality refers to the informal forms of development in the process of urbanization. As the economy globalization and the advance of the era of Internet +, the urban informality enters the line of sight with new forms, Airbnb and Uber are the typical products of it. The concepts of disruptive innovation are used to consider Airbnb and Uber's business model, which is built around modern internet technologies and sharing economy, and their distinct appeal, which centres on cost-savings and convenience. Despite their growing popularity, many of them are actually illegal. These legality issues and their corresponding tax concerns are discussed, with an overview of the current state of regulatory flux and a possible path for resolution. We also discuss the government and non-governmental organizations how to manage with this informality and manage its development.

### Key words:

Urban informality; sharing economy; Internet; Airbnb; Uber

## C12.37 Transformation Process in Megacities

### Transformation of Megaurban Economies



Home

#### Oral

1. [Acculturation under Globalization in the World City: Self-Adjustment of Turkish Culinary Culture in Berlin](#)  
Huaikuan Liu; Desheng Xue (Sun Yat-sen University, China); Gengzhi Huang (Guangzhou Institute of Geography, China)
2. [Kolkata's Informal Economy: Processes of Change](#)  
Annapurna Shaw (Indian Institute of Management Calcutta, India)
3. [Labour Market Arrangements in the Organised Garment Industry in India](#)  
Baishali Lahiri (Jawaharlal Nehru University, India)
4. [Spatial Diffusion of China's Mega-Urban Regions—Pattern and Mechanisms](#)  
Zheng Yanting (Beijing Normal University, China)
5. [Urban Informality in the Internet+ Era](#)  
HongHu Deng; ChunShan Zhou (School of Geography and Planning of Sun Yat-sen University, China)

## Acculturation under Globalization in the World City: Self-Adjustment of Turkish

### Culinary Culture in Berlin

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#### Abstract

Acculturation of transnational immigrants is one of the essential topics on human mobility. The conservative pessimistic theory argues that immigration will fall into a negative cumulative causation and receive constant exclusion. The route dependency theory deems that immigrants are unable to acculturate into the host society unless they abandon their initial culture. Nevertheless, globalization erodes local differences and resistance against homogeneity emerges. Inheritance of initial authentic culture gradually becomes an effective acculturation route for immigrants especially from the global South. This study on Turkish ethnic food, Döner, in former Mitte, Berlin, elaborates an acculturation route with a three-stage process. At the first stage, Turkish ethnic food self-adjusts into a simplified package form so as to meet the Turkish labors' requirement for portability and affordability. Then at the second stage, the adjusted Turkish food receives not only Turkish migrants' but the native residents' acceptance. Some transnational immigrants with similar cultural background even perceive Döner restaurants as a social communication space, which contributes to the acculturation into local society. At the final stage, globalization brings growing number of international tourists. Thus Döner obtains more widely favors due to its pure authenticity as it inherits Turkish cuisine style and initially adjusted in Berlin. This empirical study discovers a new type of acculturation through inheritance and self-adjustment. It also confirms that with rational guidance and incentive, the exotic culture from global South could contribute to the formation of a multi-cultural society in world cities through a down-up route of cultural self-adjustment.

#### Key words:

acculturation; self-adjustment; globalization; transnational immigrant; culinary culture

## Kolkata's Informal Economy: Processes of Change

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### Abstract

In the last twenty-five years, the largest cities in India have been undergoing considerable change. Apart from growth both in spatial and demographic terms, they are also experiencing the effects of economic liberalization and globalization as India officially opened up in 1991. While changes in the organized and formal built environment are easily observable, their ramifications on the informal economy of the city remain less noticeable and their specifics less highlighted. Through a re-study, on-going, two decades after the first study in 1995-6, this paper attempts to shed light on this aspect of urban change. Going back to two areas in the city of Kolkata that were studied in 1995-6 for their concentration of small motor vehicle repair workshops and related services, the paper looks at the impact of post liberal economic policies on livelihoods. Early findings reveal that only about half the enterprises are traceable after twenty years and this is no longer a viable occupation. Increasing constriction in the availability of roadside space, the shift from indigenously made cars to foreign brands, growing numbers of formal repair workshops of such brands and the rising price of land on which these informal establishments are located have been some of the reasons. Through interviews of both enterprise owners and workers, the paper examines the pathways by which the 'creative destruction' of livelihoods is unfolding and its impacts both on people and the built environment.

### Key words:

informal economy; Kolkata; livelihoods; motor vehicle repair workshops

## Labour Market Arrangements in the Organised Garment Industry in India

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### Abstract

The effect of globalization on labour market has been debated. Low-income countries often compete through lowering costs which is obtained partially through downward pressure on wages. In India, low costs of production are achieved by utilizing cheap sources of labor such as women, children, people belonging to disadvantaged castes and religious groups. Existing research shows that India's unique social structures of gender, caste and religion creates an uneven plane for these disadvantaged sections in the labour market, especially in terms of wages. However, whether certain enterprise conditions based on the size and nature of firms overcome discriminatory labour practices or takes advantage of existing societal discriminatory labour norms is missing in the literature. Therefore, this paper aims to examine whether such societal effects of wages are overcome by the large globalised export orientated firms or rather do they take advantages of the discrimination to keep low on wages as in case of small and medium domestic market oriented firms. The study is based on a sample of over 300 workers and 20 firms in the garment industry in Delhi National Capital Region which has a global value chain and export processing clusters. Being a global industry it offers an added insight into the effects of global recession on employment. These results have important implications for policy makers in India in terms of increasing educational opportunities for various social groups, reducing social discrimination and increasing post-implementation accountability.

### Key words:

globalization; societal discriminatory labour norms; firm characteristics and worker's conditions; uneven plane



## Spatial Diffusion of China's Mega-Urban Regions—Pattern and Mechanisms

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### Abstract

Since 1978, China's mega-urban regions, especially the Pearl River Delta and Yangtze River Delta, draw people's attention owing to their large scale and scope of rapid urban transformation and development. Based on the latest population census data, it is found that diffusion effects have demonstrated in the prefectures near these two mega-urban regions in a dispersed way. Further analysis shows that the increase of labor prices, decreases of transport cost, and related policies contribute to this dispersed spatial pattern of diffusion.

### Key words:

Mega-urban regions; Urbanization; Diffusion effects; Mechanisms

## Urban Informality in the Internet+ Era

Deng, HH

School of Geography and Planning of Sun Yat-Sen University, Guangzhou, 510000, P. R. China, 378068361@qq.com

### Abstract

Urban informality refers to the informal forms of development in the process of urbanization. As the economy globalizes and the advance of the era of Internet +, urban informality enters the line of sight with new forms. Airbnb and Uber are the typical products of it. The concepts of disruptive innovation are used to consider Airbnb and Uber's business model, which is built around modern internet technologies and sharing economy, and their distinct appeal, which centres on cost-savings and convenience. Despite their growing popularity, many of them are actually illegal. These legality issues and their corresponding tax concerns are discussed, with an overview of the current state of regulatory flux and a possible path for resolution. We also discuss the government and non-governmental organizations how to manage with this informality and manage its development.

### Key words:

Urban informality; sharing economy; Internet; Airbnb; Uber

## C12.38 Transport and Geography

### Comparative Air Transport Geographies: China and Other Places



Home

#### Oral

1. [A Comparative Analysis of Spatial Pattern of Domestic Airline Network: China and Other BRICS Countries](#)  
Han Wang, Jiaoe Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
2. [A Comparative Study between Chinese and American Air Transportation](#)  
Changjoo Kim (University of Cincinnati, United States)
3. [A Comparison of Wave-System Structures in Chinese Hub Airports: 2010 vs. 2015](#)  
Huang Jie; Jiaoe Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
4. [Mapping Intercity Air Transport Networks: Connections, Prices, and Options](#)  
Xingjian Liu (Urban Planning and Design, The University of Hong Kong, HongKong SAR, China); Ben Derudder (Department of Geography, Ghent University, Belgium); Jianghao Wang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
5. [Measuring the Longitudinal Impacts of High Speed Rail Network on the Demand of Airline Passenger Flows in China](#)  
Haoran Yang (Department of Human Geography and Planning, Utrecht University, Netherlands); Jiaoe Wang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Science, China)
6. [Newly Established Airlines developing process and changing patterns of its air route in China](#)  
Wu Chuntao (Sichuan University, China); Peng Lei (Air China, China)
7. [Study on Industrial Structure Adjustment and Spatial Differentiation of Hub-orientation Industry in Airport Economic Zones: An Empirical Study in Yangtze River Delta from 1999 to 2013](#)  
Zhang Lei (JiangSu Second Normal University, Chiina)
8. [The Competitiveness of Chinese and U.S. carriers in Bilateral Air Transport Market](#)  
Zhuo Chen (University of Illinois, United States)
9. [The Geography of Low-Cost Airline Networks: Comparing China and Europe](#)  
Frederic DOBRUSZKES (Free University of Brussels (ULB), Belgium); Jiaoe WANG (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

## A Comparative Analysis of Spatial Pattern of Domestic Airline Network: China and Other BRICS Countries

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### Abstract

BRICS are representatives of the emerging economies and developing countries, whose economy has experienced rapid growth in recent years. Meanwhile, their airline networks are in a rapid development period. However, the studies about the comparison of the structure of BRICS's airline networks are rare. This research aims to analyse the topology properties and spatial patterns of the airline network using the data of the five airline networks with the routes, flights and traffic. We try to explore the difference of the five countries' airline networks throughout the whole paper. Firstly, this paper tries to analysis the evolution of five countries' airline networks combined with their respective national conditions. Secondly, this paper tries to explore the topology properties of the airline network using the methods of complex network theory and graph theory mode. Thirdly, this paper tries to examine the spatial patterns of the airline network.

### Key words:

BRICS; airline network; topology properties; spatial patterns



## A Comparative Study between Chinese and American Air Transportation

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### Abstract

This research compared air transportation between China and America with respect to hub and spoke networks. The development of Chinese air transportation network is analyzed based on the number of air passengers and is compared to American case. In particular, factors that lead to develop hub and spoke network in China such as hierarchy of airports and geographical factors are explored. For an empirical analysis, theoretical optimal hub and spoke networks are constructed and compared to the current hub and spoke networks structure.

### Key words:

air transportation; air passenger; hub-and-spoke

## A Comparison of Wave-System Structures in Chinese Hub Airports: 2010 vs. 2015

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### Abstract

From 2010 to 2015, the number of passengers served by four hub airports in Beijing, Shanghai and Guangzhou experienced a significant increase, for example, the traffic volume at Shanghai Pudong International Airport grew by 48%. To deal with traffic growth, Chinese airlines concentrated their networks by adopting or intensifying wave-system structures in their flight schedules. Following the definition of wave-system structure, we identify the daily flight wave center for every 5 minutes to understand reasons behind the absence or presence of wave center. Meanwhile, as the aviation market has gradually experienced deregulation since 1980s, airline alliances appeared. Hence, we consider the effect of airline alliance in the investigation of wave-system structures and discuss how Chinese airlines can implement wave-system structures better. Through a comparison of Chinese hub airports between 2010 and 2015, the paper examines the correlation between the concentration of traffic volume and flight waves. Moreover, this paper studies top three airlines in Chinese market with features of temporal configuration at four different airports so that we could explain their market positions in different regions. In brief, the wave-system structure identified in Chinese hub airports is not intensive but tends to have high level of peak in flight waves.

### Key words:

Hub airport; flight schedule; wave-system; airlines

## Mapping Intercity Air Transport Networks: Connections, Prices, and Options

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<sup>3</sup>Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China

### Abstract

This paper aims to chart an alternative geography of intercity air transport network with emerging new data sources. While most studies focus on the frequency of scheduled flights, this study characterizes intercity air transport connections with additional measures, including the availability of direct flights, the number of flight service providers, flight time, and (cheapest/media) prices. This new wealth of information about intercity air connections is gathered from online booking website Skyscanner.com. Data are collected for air connections among 175 airports in 138 world cities in 2014. A comparative analysis identifies world cities that are well served by direct flights, enjoy a relatively large selection of service, and/or could be accessed economically. These findings shed additional light on the unevenness in the air connectivity among world cities.

### Key words:

Air transport network; Skyscanner; pricing; travel time

## Measuring the Longitudinal Impacts of High Speed Rail Network on the Demand of Airline Passenger Flows in China

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### Abstract

A great amount of research on competition between HSR and airlines have been conducted in the context of western countries, while the research in China is rather limited. There are three research gaps in the academia: First, the research of HSR's impacts on airlines is rather crude in the application of HSR relevant variables. Variables such as frequency, travel time, fare and access time to/from transport terminals are not taken into account in the econometric model. Second, a few of restricted overlapping routes between HSR and airlines raised the issue of representativeness. Third, focus on the longitudinal impacts of HSR on airlines in China is rather limited.

We explore the relationships between the operation of HSR services and the change on airline passenger flow from 2007-2014 for 277 city pairs. This paper will first carry out a descriptive analysis to find the general pattern between the operation of HSR services and the change trend of the airline passenger flows for three situations: (1). the cancellation of airlines; (2) the reduced demand for air travel; (3) No influence. Then, an econometric analysis will be conducted to identify the extent to which those variables influence the airline passenger flows. Exogenous variables will be input into the econometric model, such as HSR transport variables (frequency, ticket fare, and line haul time), geographic variables (HSR opening time, access/egress time to HSR terminals) and socio-economic variables (GDP, income per capita and population).

### Key words:

High-speed rail; airline; competition; longitudinal impact; China

## Newly Established Airlines Developing Process and Changing Patterns of Its Air

### Route in China

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<sup>2</sup>Air China, China

#### Abstract

In line with the central government's "non-public economy 36" document, the Civil Aviation Administration of China (CAAC) started to open commercial airlines sector to private, collective and foreign capitals in 2004. For various reasons, CAAC suspended to give certification in 2007. From 2004 to 2007, 14 airlines were given approval to operate domestic passenger flights, which brought researchers a vital chance to investigate the performances of various capitals or local state-owned enterprises in aviation sector. The study purposes of this paper are (1) to review the development process of these newly established airlines, and (2) to examine the changes in spatial patterns of its air route networks in term of geographical locations airlines' main hub located respectively. The results show that, over those 10 years, the airlines have been re-constructing its network generally in four trends. CAAC traffic rights and slots allocation policies, and the effects of high-speed rail (HSR) development are two elements used to explain the change patterns. The study results are useful for aviation policy makers, airlines stockholders, and capitals interested in Chinese aviation markets.

#### Key words:

aviation deregulation; new airlines; China; route network; high-speed rail

## **Study on Industrial Structure Adjustment and Spatial Differentiation of Hub-orientation Industry in Airport Economic Zones: An Empirical Study in Yangtze River Delta from 1999 to 2013**

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### **Abstract**

Hub-orientation industry development is the core drive of airport economy. This paper constructs a theoretical framework of its industrial adjustment and spatial differentiation, and follows an empirical study in Yangtze River Delta. Conclusions are as follows: 1) With the development of airport economic zones, both hub-orientation industry and none hub-orientation industry have a rapid growth, while the general hub-orientation industry agglomerates the fastest. Besides, the urbanization level of airport surroundings rather than the airport scale has a stronger influence on the hub-orientation level of industries in the airport economic zone. Compared with mature foreign airport areas, airports in Yangtze River Delta now have set up a relatively comprehensive hub-orientation industrial system primarily. In the meanwhile, the manufacture industry takes a much higher proportion than high-end manufacture and service industry. 2) the comprehensive development level of airport economic zones determines whether the circles' differentiation is clear or not. Furthermore, strong hub-orientation industry often gathers around the airport while the none hub-orientation industry locates with fewer spatial consideration. A deeper industrial analysis shows that it is easier for relatively mature airport economic zone to form an industrial distribution pattern that the manufacturing gathers inward and the service industry expands outward. For the manufacturing industry, there is an obvious gap between the spatial differentiation of hub-orientation and none hub-orientation industry, which may be influenced by the industrial foundation, business soliciting policy and available lands etc. For the service industry, its layout in all the mature airport economic zones is basically same, namely the transportation service locates in the core, the producer services expand outside and the retail service obtains the largest agglomeration space.

### **Key words:**

airport economic zones; hub-orientation industry; spatial differentiation



## The Competitiveness of Chinese and U.S. carriers in Bilateral Air Transport Market

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### Abstract

As a part of the globalization trend, free-trade agreements between countries in air transport industry have big influence on the market. However, carriers from developed countries often benefit the most from the agreement, and carriers from developing countries become disadvantaged at least at the start. In this research, I study the competitiveness of Chinese and U.S. carriers' in bilateral passenger air transport market. I find Chinese carriers are too small to compete with U.S. carriers on the same stage. Besides, domestic network, passenger composition, ticket sales channel, national level industry policy and profit proportion rule of connecting flights all reduce Chinese carriers' competitiveness. This research suggests free-trade in service industries like air transport may harm domestic industry players in developing countries.

### Key words:

air transport; China; U.S.; free-trade

## The Geography of Low-Cost Airline Networks: Comparing China and Europe

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### Abstract

Both China and Europe have experienced the advent of low-cost airlines (LCAs) in the aftermath of more freedom offered the airlines. In Europe, the dramatic development of the LCA networks is the main outcome of the extensive aviation liberalisation process involving the EU28 and some neighbouring countries. LCAs now account for more than one third of intra-European air services. In China, LCAs are emerging as a consequence of progressive aviation market opening. In this context, this paper will compare China's and Europe's LCA networks in terms of volumes supplied and of spatial patterns (that is, network structures). Special attention will be paid to spatial expansion including distance stages; to the kind of airport served (main, regional, secondary), including the choice of bases; to the kind of places served (city size, central vs peripheral areas, regional economic typology); and contribution to competition with incumbent airlines. Beyond these spatial analyses, we will consider the very different political, social and economic frameworks to interpret the results.

### Key words:

Transport geography; air transport geography; low-cost airline network; aviation liberalisation

## C12.38 Transport and Geography

### High-speed Rail: Accessibility and Regional Development



#### Oral

1. [A Review of China's High-speed Rail Study in Perspective of Geography](#)  
Shunying Zeng (South China Normal University, China)
2. [Accessibility Evolution and Impacts on Urban System in Guangdong Province During the Past Decades](#)  
Weiping Hu (South China Normal University, China)
3. [An Ongoing Faster Speed Rail Project - "KMRCL": Effect on Socio-economic Change and Land Use Change; A Case Study of Kolkata City, West Bengal, India](#)  
Biswajeet Saha (Bhairab Ganguly College, India)
4. [Applying a Spatial Planning Approach to Sustainable Transport Planning: Achieving Better Integration of Land Use and Transport Planning in Wuhan '1+8' City Cluster, China](#)  
Nan Li (University College London, United Kingdom)
5. [Economic Impact of High-speed Rail on Household Income in China](#)  
Feiyang Sun (University of Washington, the United States)
6. [Estimating the Effects of High-Speed Railway\(HSR\) Operation on Reducing CO<sub>2</sub> Emission from Aviation Sector in China](#)  
Xi Li (School of tourism, Sichuan University, China); Yi Dou (Nagoya University, Nagoya City 464 8603, Japan, Japan); Chuntao Wu (School of tourism, Sichuan University, China)
7. [Getting Up to Speed: Assessing the Usable Knowledge from Global High-speed Rail Experience for the United States](#)  
Andrew Goetz (University of Denver, United States); Anthony Perl (Simon Fraser University, Canada)
8. [High-speed Rail and Economic Geography: The "Shrinking China" and Agglomeration Economy](#)  
Maoqian LONG (Peking University, China)
9. [High-speed Rail and Land Development in China](#)  
Pengyu Zhu (Masdar institute, USA)
10. [Impact of Guangzhou-Zhuhai Intercity Railway on Accessibility and Economic Development of Cities Along the Railway](#)  
Tu Zhifeng; Mu Fengyun (Chongqing Jiaotong University, China)
11. [Impacts of high speed rail on economic development in China](#)

Jingjuan Jiao; Fengjun Jin (Institute of Geographic Sciences and Natural Resource Research, CAS, China)

12. [MAGLEV – A meaningful transportation system? Impacts of high speed trains on urban and regional development of Japan](#)  
Martina Hekler (University of Vienna, Austria)
13. [Pattern and Efficiency of Railway Transit Network in Metropolitan Area Based on Compare Between China and Western Countries](#)  
Sheng Kuang; Hu Liang; Huang Shengwen (China Architecture Design Group, China)
14. [Railway Stations into The Spanish High-speed Network. Development and Transformation of Urban Areas](#)  
Carlos Hugo Soria (University of Valladolid, Spain)
15. [Route Selection and Accessibility Impact of Chuo Shinkansen Maglev in Japan](#)  
Koichi Tanaka (Ibaraki University, Japan)
16. [Temporal distance map for exploring, analyzing and visualizing china railway system](#)  
Jiale Zeng; Wenling Li (School of Geographical Sciences, Guangzhou University, China)
17. [The Channel Tunnel as a Factor of the Regional Integration in the EU](#)  
Anastasia Lomakina (Dr., research fellow, Laboratory of Geography of World Development, Institute of Geography Russian Academy of Sciences, Moscow, Russia, lomakina.lomakina@ya.ru, Russian Fed)
18. [The Development of High-Speed Rail Station —A Comparison between Tianjin of China and the Randstad of the Netherlands](#)  
Wenxin Zhang (Beijing Normal University, China)
19. [The Spatio-temporal Structure of High-speed Traffic Network and Features of Its Stage-wise Evolution: A Case Study of Expressway Traffic Flow Network in Jiangsu Province of China](#)  
Wenqian KE (Institute of Geography, Fujian Normal University, Fuzhou, China)
20. [Transformation of Transport Accessibility in Ukraine as a Result of the Development of InterCity trains](#)  
Viktor Putrenko (World Data Center for Geoinformatics and Sustainable Development by NTUU “KPI”, Ukraine); Nataliia Pashynska (Institute of Geography NAS of Ukraine, Kyiv, Ukraine, Ukraine)

## POSTER

1. [A Study of the Northeastern China’s Tourism Space Organization Based on the Influences of the High-Speed Railway](#)

Ai-yun Meng (China, The Northeast Normal University)

2. [Accessibility and Regional Interaction Spatial Heterogeneity in Guangdong Province, China](#)

Shaopei Chen (China, School of Public Policy and Management, Guangdong University of Finance and Economics); Christophe Claramunt (France, Naval Academy Research Institute); Yong Li (China, Geography Institute of Guangzhou)

3. [Economic Accessibility of Provincial Capital Cities in China Based on the Presence of High-speed Rail](#)

Jie Huang; Yexi Zhong; Jianxin Li (China, School of Geography and Environment, Jiangxi Normal University)

4. [Impacts of High Speed Rail on Economic Development in China](#)

Li Wang (China, Jiangsu Second Normal University); You-hui Cao (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences); Fangdao Qiu (China, School of Urban and Environmental Sciences, Jiangsu Normal University)

5. [The Evaluation of the High-Speed Rail Sites Area Planning Based on Node-Place Model in Yangtze River Delta Area](#)

Wenjie Song; Yujin Shi; Qing Zhu (China, Beijing Normal University)



## A Review of China's High-speed Rail Study in Perspective of Geography

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### Abstract

The world is changed by transport, and High-speed rail(HSR) as latest technology of transit will have a huge impact of social development. So it is significant to carry out High-speed rail research. 289 papers were collected and arranged under the logic of “accessibility—factor mobility—effects”. Presently, the research contents of China's High-speed Rail study have included passenger transportation, freight transportation, station, tourism, environmental effects, the effects of city and region, and so on. But a large number of studies belong to the macro qualitative analysis and only describe the phenomenon. There are less research on the specific characteristics and differences. Generally, the deficiencies of present literature are lack of mature research framework, theoretical supporting, and regularity summary. Finally, combined with the reality of China, scholars should pay more attention to the impact of high speed rail on Chinese industrial transfer and industrial upgrading, regional and social equity, urbanization and rural development, etc.

### Key words:

High-speed rail; mobility; transport; China

## Accessibility Evolution and Impacts on Urban System in Guangdong Province During the Past Decades

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### Abstract

As one of the leading developed province in China, Guangdong improved its transportation system greatly in the past decades. The accessibility changed quickly during the high-speed transportation facilities construction years. We use four different calculation methods to analyze the accessibility and its evolution of highway and railway network in Guangdong province from 1985 to 2020. Furthermore, we analyze the coupling relationship between accessibility and urban system of Guangdong.

The results show that the highway and railway network have developed rapidly and transportation accessibility has been significantly improved since the opening of the first expressway in Guangdong Province. Overall, the accessibility value is imbalance on county-level, the spatial variation of accessibility value is significant. But the spatial pattern of accessibility keeps stable on macro-level, the "core - periphery" pattern has changed only a little during the past decades. To 2020, the accessibility of Guangdong province will be better. The accessibility will make great progress in some regions.

The coupling relationship between accessibility and urban system is also prominent. A quantitative index called Cd was used to measure relationship between accessibility and urban size. We calculate the Cd values using urban size data surveyed in 1985 and accessibility values before the first expressway of Guangdong opened. We also extracted urban area from ETM remotely sensed images dated in 2013. Most of regions have a high Cd value, but the spatial variation is dominate. The impacts of accessibility on urban system development discussed using normalized data.

### Key words:

Accessibility evolution; Spatial pattern; Coupling relationship; Urban system; Guangdong Province



## **An Ongoing Faster Speed Rail Project - “KMRCL”: Effect on Socio-economic Change and Land Use Change; A Case Study of Kolkata City, West Bengal, India**

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### **Abstract**

In the year of 1969, the Metropolitan Transport Project had initiated in Kolkata City. Almost 97.50 km area consisted of three North-South corridors, which were Dumdum-Tollygunge; Bidhannagar-Ramrajatala and Dakshineswar-Thakurpukur. Over the respective years, more corridors have constructed and finally in the year of late 2010, the corridor extended up to New Garia. After the experience of India's first metro service and the success of Delhi metro network, sanction of East-West Metro corridor connection can be observed, which connects Howrah and Sealdah Station through under Hooghly River. Howrah and Sealdah Station, both are the busiest stations due to lot of local as well as express trains, which connect all over India. In Kolkata, this is the first time when river crossing metro tunnel will be made in the country. After the modification of the project, the length of the route became 14.58 km consisting of the Underground Corridor of length 8.84 km and Elevated Corridor of length 5.74 km. The project cost is about Rs.4874.58 crore, which was approved by Government of India on 20th February 2009. There are several objectives to point out the evolution of KMRCL (Kolkata Metro Rail Corporation Limited), to find out various reasons for extension of East-West corridors, to know the after effect of constructing the project, to state socio-economic change and land use change and to highlight various problems faced by the people of Kolkata followed by recommended suggestions. However, Kolkata has been experiencing the fastest technology of transport connectivity through radical change of development.

### **Key words:**

corridors; success; underground corridor; socio-economic change; fastest technology

## **Applying a Spatial Planning Approach to Sustainable Transport Planning: Achieving Better Integration of Land Use and Transport Planning in Wuhan ‘1+8’ City Cluster, China**

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### **Abstract**

Existing studies and research demonstrate that contiguous relationships between land use planning and transport management positively contribute towards achieving sustainable development goals. Thus, such integration is typically established as a policy goal for sustainable transport planning. In the UK, and the wider EU, spatial planning has been used as an approach to policy making and its delivery, especially at city-region levels; subsequently, this is connected to the delivery of sustainable transport. In China, land use planning and transport planning practices are weakly linked, and there is insufficient research exploring how they can be better integrated. Spatial planning, at the city-region level, has been adopted in China’s recent development plans as an approach towards achieving its development objectives. However, there is no clear guidance on the implementation of this approach. Using the Wuhan ‘1+8’ City Cluster, this research explores contrasting arguments concerning land use and transport planning integration. Additionally, this research uncovers potential methods that apply spatial planning approaches to transport policy making in city regions. Wuhan ‘1+8’ City Cluster is a city-region that includes a group of nine cities, where this term was defined for economic development purposes; the planned construction of the inter-city railway network between these cities partially intends to pilot European spatial planning models in the delivery of practical transport policies. This research explores European models of spatial planning in the delivery of established transport systems, and identifies key strategic approaches applicable to better integrated land use and transport planning practices in Wuhan.

### **Key words:**

land use; transport planning; transport policy; city-region; Wuhan

## Economic Impact of High-speed Rail on Household Income in China

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### Abstract

Though developed only in the last 20 years, Chinese high-speed rail (HSR) has overtaken many of its forerunners in its unprecedented scale. However, such scale raises questions about its implications for regional economic development. Previous studies have discussed the HSR impact on region and city levels, but few have addressed its impact on individual level which is crucial for understanding the distribution of impact. To fill the gap, this study focuses on the economic impact of recent HSR development between 2009 and 2012 on Chinese household income and discusses its significance, magnitude and, most importantly, distribution. The paper utilizes the survey data from China Family Panel Survey and implements a quintile regression approach. Three measurements of inter-region accessibility, namely, weighted average travel time, weighted average travel cost and number of travel options, are tested in the model separately to investigate the direct impacts of HSR on different income groups. Probability of living proximate to HSR stations is also included in the model to examine the spillover impact of HSR. The study shows that the impacts for the low-income and high-income groups are either statistically insignificant or negligible in magnitude. For the impact on the middle-income group, spillover effect or the agglomeration effect contributes the most of the impact and favors more urbanized regions with stronger service sectors. Based on the analyses, the paper suggests that HSR projects need more comprehensive studies for the full spectrum of its impact to ensure both economic growth and regional balance and coordination.

### Key words:

Interregional Accessibility; Regional Income Inequality; Agglomeration Economics; Regional Economic Growth

## Estimating the Effects of High-Speed Railway(HSR) Operation on Reducing CO<sub>2</sub> Emission from Aviation Sector in China

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### Abstract

This study aims to estimate CO<sub>2</sub> emission from domestic passenger aviation sector in China, and assess the effects of high-speed railway (HSR) operation on aviation emissions reduction. Firstly, ICAO method is used to respectively estimate the CO<sub>2</sub> emission from China domestic passenger aviation sector in 2008 and 2014. Secondly, GIS method is used to catch the spatial characteristics and patterns of emission distribution. And thirdly, the driving forces are assessed by LDMI decomposition. Particularly, the effect of HRS on aviation emission reductions is emphasized, and suitable Avoid-Shift-Improve (ASI) policy framework is proposed. 2007-2014 domestic airlines timetable provided by Travel Sky and ICAO database (emission factors by aircraft types) are two kinds of data used. The detailed results will be displayed at the meeting.

### Key Words:

Domestic air services; High-speed train (HSR); Emission reduction; avoid-Shift-Improve (ASI) framework; China

## Getting Up to Speed: Assessing the Usable Knowledge from Global High-speed Rail Experience for the United States

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### Abstract

As the United States has taken steps in recent years to invest significant funds to begin implementing high-speed rail (HSR), it is important to consider how HSR has developed elsewhere since its original deployment between Tokyo and Osaka in 1964. The three models of HSR development that have emerged over the last 50 years are: 1) the exclusive corridor strategy exemplified by Japan, 2) the hybrid corridor strategy found in France and Germany, and 3) the comprehensive national network strategy pioneered by China. The relevance of these three models to HSR development in the United States is conditioned by several factors, including previous attempts to develop HSR in the US, the institutional organization of the existing freight rail industry in the US, and external market dynamics.

While the U.S. railroad industry has evolved differently and moved apart from rail operations in many other countries, external market dynamics such as growing urban populations and increased demand for passenger rail transportation appear to be converging with the rest of the world. Accordingly, we draw several lessons for the U.S. from global HSR experience including: 1) a higher degree of relevance and higher ease in knowledge transfer would occur in following the exclusive corridor model, 2) less difficulty in knowledge transfer but less relevance would arise in adopting the hybrid corridor model, and 3) more relevance but more difficulty of knowledge transfer accompanies pursuit of the comprehensive national network model.

### Key words:

high-speed rail; development

## High-speed Rail and Economic Geography: The “Shrinking China” and Agglomeration Economy

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### Abstract

High-speed rail (HSR) is bringing an unprecedented compression of time-space, which is reshaping the economic geography of the world. The construction and operation of HSR in China has made remarkable achievements, while the evaluation and review of the effect HSR on economic geography of China are still in its infancy. Based on the 2009 and 2015 national railway train schedules, we calculated the rail travel time for each city, and drew the map for railway space-time of China. Through the analysis of the space effect of HSR, we found an interesting and impressive picture of “shrinking China”. Afterwards, we constructed a new market potential function, combining with the calculation model about market potential and agglomeration economic benefits from Department for Transport, and calculated the size of the agglomeration of economic gains for 259 cities in China. Both the hierarchical and spatial differences were analyzed, and had come to an exact and uniform conclusion in the urban clusters scale. We also predicted the effect of the intercity rail network within the urban clusters which are to be finished in 2020. Our results showed that the HSR lines at the present stage and in the future will strengthen the existing urban spatial structure, by means of time-space compression effect, polarization effect and “funnel effect”. The future impact of HSR is worth further research.

### Key words:

High-speed rail; Economic geography; Market potential; Agglomeration economy; Space; China

## High-speed Rail and Land Development in China

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### Abstract

The construction of large-scale high-speed rail (HSR) network in China is altering the time-space relationships between cities. As a result, HSR is changing the traditional hierarchical urban system in China and regions with large-scale networks of cities are forming. At the city level, the construction of HSR new towns could contribute to rapid land use development. In this paper, we focus on the relation between HSR and land development at the city level and study how HSR is transforming cities in China through the land development process. We conduct empirical studies on all cities within the HSR-impact area, which is defined as provinces that are covered by at least one HSR line. Our sample will include cities with a HSR station and those without. The empirical model we apply will be a Difference-in-Difference model. Our first hypothesis to be tested is that HSR will facilitate the rapid land development in cities with HSR stations (i.e., through planned HSR new town surrounding the HSR station), to an extent that is faster than cities without HSR stations. Our second hypothesis is that, among cities with HSR stations, smaller cities tend to experience faster land development compared with larger cities. As evidenced in my forthcoming paper (Zhu et. al. 2015), large cities are able to carefully choose the locations of their HSR stations and thus their planned HSR new towns are often within their existing central cities. For medium to smaller cities, decentralization is often passively driven by HSR as the site selections of HSR stations are beyond their control. The long distance between the HSR new town and the existing urban center often result in leapfrog development.

This research helps to understand the relation between transportation infrastructure investment (i.e. HSR) and land use development in the Chinese context. With high-speed rail networks currently being proposed and designed to extend from Southeast China (the city of Kunming) to Southeast Asian countries such as Thailand, Vietnam, Malaysia, and Singapore, this research project will have important policy implications for the transportation planning and urban development in all countries of mainland Southeast Asia.

### Key words:

High-speed Rail; Land Development



## Impact of Guangzhou-Zhuhai Intercity Railway on Accessibility and Economic Development of Cities along the Railway

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### Abstract

The intercity rail transit between Guangzhou and Zhuhai is an intercity railway for passengers commuting the two cities in Guangdong province, China. In essence, it is a high-speed railway. This paper carried researches on cities along the Guangzhou-Zhuhai railway so as to extract qualified transportation network of these cities through a combination of remote-sensing image and vectorized digital map, analyze attainable changes of these cities through weighted mean traveling time, and figure out the economic linkage among these cities and its influences on the industrial structure of these cities through time-distance gravity model. As the results show, the Guangzhou-Zhuhai railway facilitated the attainable improvements of these cities, strengthened the economic linkage among these cities, reduced the negative influences of distance on the economic closeness among these cities, and lay positive influences on optimization of resource allocation and upgrading of the industrial structure.

### Key words:

high-speed railway; accessibility; urban economic linkage

## Impacts of High Speed Rail on Economic Development in China

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### Abstract

As the largest operating high-speed rail (HSR) network in the world, HSR network in China has largely influenced the accessibility, regional structure and economic development in national, regional and city level. Many scholars have studied the impacts on accessibility and regional structure, but the studies about the impact on economic development are rare. Therefore, this paper tries to explore the impacts of high-speed rail on economic development using the panel data of accessibility and the GDP. Firstly, this paper will examine the accessibility change caused by the development of high-speed rail using both the timetable-based analysis and the network analysis. Secondly, this paper will explore the impacts of high-speed rail on GDP by building the spatial panel regression analysis from the national and regional levels. Lastly, this paper will give some suggestions about the development of high-speed rail and economy in China.

### Key words:

accessibility; high-speed rail; economic development; China

## **MAGLEV – A Meaningful Transportation System? Impacts of High Speed Trains on Urban and Regional Development of Japan**

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### **Abstract**

Agglomerations that strive for success often seek to establish themselves as node points in the global economic system in order to compete against other cities in the strive to attract and allocate human and financial capital.

High speed maglev systems can offer a higher potential through their privileged infrastructure at transport node points in urban centers to promote the creation of valuable spatial structures. The more reliable, accessible and dedicated the systems are, the greater the potential for a positive effect for agglomerations. The utilization of high speed maglev systems could have significant impacts on future urban landscapes and new forms of urban living through creating new global and local spatial networks.

It is expected that improvements of accessibility by high speed trains will further increase, so that agglomerations with unattractive travel systems will lose out in the global competition.

What are eventual impacts of high speed maglev systems on urban and regional development? Who will benefit? And might there also be some limitations eventually – and who would probably suffer most from them?

The first results of some quite revolutionary Japanese Maglev (Tokyo – Nagoya, Osaka) – which will be built by JR-Rail by 2027 – might give some insights into their prospects with regard to agglomerations, which enjoy a significant benefit. In addition, some first impressions of their eventual impacts on urban and regional development will be given.

From a European perspective, the presentation will aim to explore relevant aspects of what might appear to be key issues of future perspectives of high speed maglev systems.

### **Key words:**

high speed transportation systems; urban development; spatial development; Maglev; Japan

## Pattern and Efficiency of Railway Transit Network in Metropolitan Area Based on Compare between China and Western Countries

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### Abstract

The 35 years from 1980 to 2015 witness the urban regional development triggered by network of classified highway and common speed railway. Since the setout of 21st century, the speed upgrade of motor traffic technically has hit the limits. The growth of scale of metropolitan area weakens the motor connection in region. At the meantime, the innovation of rapid mobility, most typically the high speed railway, is likely to take the lead of regional urbanization. Predictably, networked rail transit, including national, rapid, suburban and urban railways, would take over the driving role of in metropolitan development from highways. This essay looks into the feature and operational efficiency of railway traffic of developed metropolis, such as Tokyo and Paris in aspects of network, transfer, station typology and distribution, and compares the outcome with developing metropolis of China (i.e. Beijing-Tianjin-Hebei). Three characters have been sought out. Firstly, application of new technology enriches typology of railway transit, improves accessibility, and then enlarges sprawl of metropolitan area. Secondly, railway patterns, such as stop density, departure frequency and interval speed, have a direct impact on efficiency of operational network. Thirdly, demand and power of public consumption as well as cost of new technological application determine pace of innovation and improvement of rail system.

### Key words:

Pattern and Efficiency; Railway transit network; Metropolitan area

## **Railway Stations into the Spanish High-Speed Network. Development and Transformation of Urban Areas**

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### **Abstract**

The transformation of the territory and landscape in Spain is suffering a high profile since 1992 got underway the first high-speed rail line between Madrid and Seville. From that moment, it has been producing a profound change of space, land use, transport policies and the social vision of the railway. The new railway phenomenon can be seen especially in cities, where the needs rigged to high speed rail require the establishment of new stations with capacity of hosting a dynamic operating radically different to conventional rail. Therefore, one of the land on which the high-speed rail has the highest incidence focuses on urban areas, where in addition to a marked improvement in the accessibility and connectivity of cities, it runs parallel a new model of central concern in around the stations specially designed and equipped to the high-speed rail. This new fact has been particularly eloquent in medium-sized cities within a local visibility phenomenon but a pattern of national development based on the implementation of major urban renewal plans in the affected areas. The complexity and casuistry of these plans has been a recurring topic of study over the past decades, proposing solutions that can help minimize the impact of the railroad in both the city and the suburban.

### **Key words:**

stations; railway; city; high-speed; development; territory; landscape; communication; transportation; Spain

## Route Selection and Accessibility Impact of Chuo Shinkansen Maglev in Japan

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### Abstract

The purpose of the study are to discuss route selection of Chuo maglev Shinkansen in Japan from the viewpoint of geography and to clarify a prospective accessibility impact.

Spatio-temporal accessibility has improved greatly since the beginning of operation of Tokaido Shinkansen bullet train in 1964 in Japan. Tokaido Shinkansen connects Tokyo and Osaka in about 150 minutes with maximum speed of 270km per hour today. Shinkansen network was expanded with the opening new Shinkansen lines, such as Tohoku, Joetsu, Kyushu, and so on. It reached to Hakodate, located in southern end of Hokkaido Island, and Kagoshima, located in southern end of Kyushu Island. Total length of Shinkansen network is approximately 3,000km and while total passenger-kilometer is approximately 86 billion per year.

Shinkansen network will be expanded to Sapporo, Fukui, Nagasaki in near future. Moreover, a Chuo Shinkansen maglev is scheduled to open between Tokyo and Nagoya in 2027 and between Nagoya and Osaka in 2045. Route planning is fixed between Tokyo and Nagoya through southern end of Nagano Prefecture with extra-long tunnel. It will connect Tokyo and Nagoya over a distance of roughly 280 km in only 40 minutes, with a maximum speed of over 500 km/h; in comparison, the existing Shinkansen connects them in about 100 minutes. Four stations will be constructed between the Tokyo and Nagoya terminals.

On the other hand, route planning has not fixed between Nagoya and Osaka yet officially. Actually, the route via Nara has big advantage over it via Kyoto from the aspect of distance and construction cost. Kyoto Prefecture and Kyoto City are trying to entice maglev route under a disadvantageous condition.

The author measures accessibility change from 1960s to 2045 in Japan with simulating the future transport network by using GIS and discusses route selection of maglev between Nagoya and Osaka. Finally, prospective accessibility change by opening of Chuo Shinkansen maglev are clarified quantitatively.

### Key words:

accessibility; maglev; route selection

## Temporal Distance Map for Exploring, Analyzing and Visualizing China Railway

### System

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#### Abstract

According to Tobler's First Law, everything is related to everything else, near things are more related than distant things. In this paper, based on data of China's railway passenger service center, selecting 5 megacities of China: Beijing, Shanghai, Guangzhou, Chongqing and Wuhan as fundamental cities, using model-building, tries to transform spatial distance into temporal distance, calculated travel time from fundamental cities to provincial capitals in Rail and made time-space map of China railway system and map of connection degree of China provincial capitals in Arcgis. The result shows that: (1) The percentage of nonstop train in Beijing and Wuhan achieve 73%, Cities of the top three connection degree are Changsha, Zhengzhou, Wuhan. It benefits from Beijing-Guangzhou HSR line. (2) Yangtze River delta-Beijing-Tianjin-Hebei Region- Changsha-Zhuzhou-Xiangtan city group- city cluster surrounding Poyang Lake; along the Beijing-Guangzhou HSR line; basic pattern of "one day life cycle" have been formed by HSR line. (3) Cities of the last five connection degree are: Lhasa, Urumqi, Yinchuan, Kunming and Haikou. For instance, mean distance from Lhasa and Urumqi to fundamental cities are more than 3700km, mean time for more than 24h. To speed up the western inland region of HSR construction, strengthen the central cities of transfer function, Changsha, Wuhan, Zhengzhou and Shijiazhuang.

#### Key words:

time-space map; travel time; HSR; China railway system; one-day life cycle

## The Channel Tunnel as a Factor of the Regional Integration in the EU

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### Abstract

The objective of the paper is the analysis of influence of Euro-Tunnel on the regional communication and as a result on regional integration. More than twenty years functioning of the Channel Tunnel showed that it serves a factor of consolidation of the integration structure of the EU. The Channel Tunnel has allowed to overcome the separation of the northern part of the European «blue banana» and consolidate the European Megalopolis. On the regional level the Tunnel being the factor of transborder integration united euroregion Kent-Nord-Pas-de-Calais.

Getting closer the global cities such London, Paris and Brussels the “Eurostar” promotes their as central places. At the same time, it gets the territory between these capitals more peripheral and contributes in increasing of the territorial inequality.

The influence of the Tunnel on the passenger traffic is not single-valued. High-speed connection has changed the structure of the passenger flows between the capitals. Firstly, Eurostar has «picked up» a significant part of the air traffic, providing more than 70% of the London-Paris and 60% of the London-Brussels carriage of passengers. As a result, the air traffic between the capitals dramatically decreased (more than 2 times).

At the same time, the structure and the geography of the passenger traffic in the Pas-de-Calais channel have gone through dramatic changes. Closing several ferry lines leads to the concentration of the ferry traffic on the line Dover-Calais. This direction is used by local people crossing the border for shopping and tourism.

### Key words:

regional integration; high-speed rail; regional development

## The Development of High-Speed Rail Station —A Comparison between Tianjin of China and the Randstad of the Netherlands

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### Abstract

The development of high-speed rail stations are becoming an increasingly important strategy to transform urban space. In the West countries, the high-speed rail(HSR) is viewed as a key factor to improve competitiveness, while in China, it is mainly used as a means to redevelop and upgrade urban space. What are the similarities and differences of the development of HSR station areas in countries with different urban conditions and what are the driving forces behind these differences? In this paper, two metropolitan areas were selected for comparison: Tianjin in China and the Randstad in the Netherlands. These two urban regions have some geographic similarities, they are both located near the capital, they also have similarities in terms of spatial structure and urban function, both being polycentric and having an important port function. Starting from these similarities, we focus on the micro scale of the stations and their neighborhood areas to gain more insight into the relationship between HSR and urban development and to explore the reasons behind the emergent differences between the two cases. Based on the stations' node and place characteristics, we have analyzed two HSR stations in these two regions and found that the HSR stations differ in development preferences and development types. Three main driving forces were found to influence the development of stations and also account for the differences among the stations: urban development patterns, urban economic growth, and the decision-making process.

### Key words:

HSR; urban space; node quality; place quality; Tianjin; the Randstad

## The Spatio-temporal Structure of High-speed Traffic Network and Features of Its Stage-wise Evolution: A Case Study of Expressway Traffic Flow Network in Jiangsu Province of China

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### Abstract

High-speed traffic network is a significant force in shaping the spatial structure of regional interaction and hence a key indicator for such spatial structure. In this paper, we constructed a three-dimensional matrix of "Origin-Destination-Time", which consists of time-evolving series network data of expressway traffic flows among 59 counties from January 2004 to December 2012 in Jiangsu, a coastal province in China. Supported by the data, we introduce the Non-Negative Tensor Factorization (NTF) method to analyze the spatio-temporal structure of high-speed traffic network and features of its stage-wise evolution in Jiangsu Province. The conclusions can be drawn as follows: (1) The reconstructed network has a good ability to reproduce and depict the spatio-temporal structure of original network in different evolutionary stages. (2) The temporal structure of Jiangsu expressway traffic flow network can be divided into three obvious evolutionary stages and multiple temporal patterns, namely the essentially immutable pattern in the period of January 2004 to April 2005; the essentially immutable pattern and the gradually rising pattern in the period of May 2005 to June 2008; and the essentially immutable pattern, the gradually rising gradual pattern and the rapidly rising mutational pattern in the period of July 2008 to December 2012. (3) The corresponding spatial structure consists of several local spatial systems with clear geographical connotations in each stage, i.e., the reversed "T" structure is consisting of the expressway network connecting the Shanghai-Nanjing expressway and the Jiangyin Yangtze River Highway Bridge along Beijing-Shanghai expressway in first stage; the reversed "T" structure in the second stage shaped the reversed "T" structure by adding the Runyang Yangtze River Highway Bridge along Yangzhou-Liyang expressway into; and the reversed "T" structure in the third stage further shaped the reversed "T" structure by adding the Sutong Yangtze River Highway Bridge along Shenyang-Haikou expressway into. (4) Each temporal pattern has its own coupling and corresponding spatial pattern respectively, and each system is a local mode of the whole spatio-temporal structure, which reflects the internal organization of spatio-temporal unity of expressway traffic flow network.

### Key words:

spatio-temporal structure; stage-wise evolution; high-speed traffic network; tensor decomposition method; Jiangsu Province of China

## Transformation of Transport Accessibility in Ukraine as a Result of the Development of Intercity Trains

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### Abstract

Rail transport is one of the most important sectors of the transport system of Ukraine.

In the last decades it has undergone significant changes. There are transformation of spatial organization, new structural elements, concentration of traffic, increasing mobility. These processes are largely reflected at the transport accessibility, which is the main product of the transport system and determine the geographic advantages of a region, city or territory from the placement and use of transport infrastructure in their territory.

Dynamics of transport accessibility on the example of changing the transport distance between Kyiv and regional centers of Ukraine during the 1989-2015 was studied. As a result of the introduction of InterCity trains accessibility between Kyiv and major regional centers (Lviv, Kharkiv, Dnipropetrovsk, Odessa) increased 1.6 times. At the same time accessibility between other regional centers almost unchanged. Time-space convergence between the capital and major regional centers was visualized using the time space cube.

The study used network analysis, spatial interaction models and models of transport accessibility, which are implemented using GIS. As a result, increasing the speed of rail traffic and service detected strengthen social and business ties and growth tourist flows.

Perspectives for implementing high-speed rail in Ukraine are analyzed.

### Key words:

InterCity trains; Time-space convergence; Accessibility

## A Study of the Northeastern China's Tourism Space Organization Based on the Influences of the High-Speed Railway

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### Abstract

As an important Element of tourism system, Transportation is an indispensable prerequisite for developing tourism activities and expanding tourism market, every new breakthrough in traffic technology allows the tourists to travel at a faster speed to a remoter destination, also changes the spatial pattern of the tourism destination. High speed rail (HSR) is a significant symbol of the transportation revolution, thereby influencing the development of the regional tourism and the change of the tourism spatial pattern.

This paper tries to analyze the regional tourism spatial pattern under high-speed rail influence. First of all, the paper aims to establish the theoretical framework of high-speed railways' influences from the improvement of accessibility and the change of tourist traffic location, the mobility of tourism industrial factors and reconstruction of regional tourism space. Secondly, this paper analyzes the changes in travel status of city and the radiation effects of the tourism center city. In the end, to build 'core city driving, key scenic clustering, featured circle covering' spatial pattern linked by high-speed railway tourism axis from the integration of regional tourism resources and the restructuring of Tourism space etc.

### Key words:

High-speed railway; Harbin-Dalian high-speed rail; tourism space organization

## Accessibility and Regional Interaction Spatial Heterogeneity in Guangdong Province, China

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### Abstract

The paper studies and models the spatial accessibility and regional development interactions between 98 districts in the province of Guangdong, China. The idea behind this research is to investigate the spatial heterogeneity of regional development and infer some accessibility patterns, and to discuss and qualify the urban accessibility trends among the Guangdong districts, and their potential impact for regional sustainable development. The study first introduces spatial accessibility measures and the spatial interpolation methods within ArcGIS to illustrating the spatial distribution and heterogeneity of accessibility patterns in Guangdong. Furthermore, under the combination of influences derived from spatial impedances, this paper gives a novel potential-based accessibility measure with social and economic factors to discuss and explore the overall spatial pattern of regional accessibility and interactions between the cities in Guangdong. As a result, the potential accessibility patterns highlight substantial differences in the accessibility and regional development level in Guangdong. This study indicates that the key factors related to the emergence of spatial differences in regional accessibility involve geometrical properties, socio-economic factors and transportation opportunities, including high-speed rails. Moreover, this study reveals several issues in the industry restructuring and layout optimization by exploring the spatial patterns characteristics, variations and heterogeneity in the regional accessibility in Guangdong.

### Key words:

accessibility; spatial heterogeneity; gravitational interaction; regional development

## Economic Accessibility of Provincial Capital Cities in China Based on the Presence of High-Speed Rail

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### Abstract

High-speed rail, is improving regional accessibility through time-space compression, and is promoting changes in regional economic patterns and spatial structures. Using traffic times between provincial capital cities, train trip prices derived from train schedule, and resident per capita incomes, this study explored the impact of high-speed rail on the economic accessibility from two important perspectives: rail service price, and rail service consumption capacity. There were three key findings. First, operating high-speed rail increases rail service prices to provincial capitals in different degrees. In addition, there are significant changes in rail service prices. Conventional rail service prices are distributed in approximate alignment with the core-edge model. The second key finding is when considering resident capacities to consume rail service, either conventional or high-speed, provincial capital cities with higher incomes have a higher capacity. Cities with lower incomes have lower rail consumption capacity. As such, the research concludes that urban resident income plays a decisive role in determining consumption capacity. Furthermore, the cost effectiveness of high-speed rail with increasing speed and price mainly depends on hourly economic limit. At the same time, resident income levels shape perceptions about cost effectiveness. Currently, the real cost effectiveness of most provincial capital cities are consistent with their perceptions. The third key finding is that high-speed rail reduces inequalities across all cities in terms of rail service price and consumption capacity, but expands inequalities for 22 cities with high-speed rail. In addition, the inequality of rail service consumption capacity is far higher than rail service price.

### Key words:

high-speed rail network; economic accessibility; provincial capital cities; average price; hourly economic limit

## Impacts of High Speed Rail on Economic Development in China

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### Abstract

Based on the enterprise database, we measure the evolution characteristics and investigate the dynamic mechanism of industry space in regions of HSR station before and after the opening in Nanjing. The research shows that, firstly, industry space has obvious circle structure in regions of HSR station. In the initial stage of the opening, concentric agglomeration as the center of HSR station is not obvious. On the contrary, the development intensity is not decrease from the site to the edge, that is to say, the core area is less than the affected area. Secondly, in addition to circle differentiation, layer agglomeration of industry space turned to be clear. Agglomeration level of business service industry, which is corresponding to the business affairs of passengers, is significantly higher than that of several other types of industry such as science and technology industry. Transportation and accommodation catering industry, as basic service industry in regions of HSR station, are between the above two categories. Lastly, this paper analyzed the dynamic mechanism of spatial structure evolution from both internal and external aspects. Besides traditional location factors such as traffic factor and agglomeration economy, industry property and land value have great influence on the change of industry space in regions of HSR station before and after the opening in Nanjing.

### Key words:

accessibility; high-speed rail; economic development; China

## The Evaluation of the High-Speed Rail Sites Area Planning Based on Node-Place Model in Yangtze River Delta Area

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### Abstract

With the rapid development of high-speed rail construction in China, high-speed rail sites were regarded as the new growth pole of urban development, cities along the rail paid great attention to the planning and construction of high-speed rail sites area. The high-speed rail sites area planning of cities in Yangtze River Delta Area were similar in functions and industries, but the real construction and development of those areas were in huge differences. So it is important to evaluate the planning of high-speed rail sites area effectively. Based on the node-place model, we gave an empirical evaluation of the planning for 26 high-speed rail sites area in Yangtze River Delta Area by measuring node (traffic) value and place (function) value of each site. Results showed that Hangzhou east station, Nanjing south station, Yixing station and other five stations were in the sustainable development position, and most of the high-speed rail sites were in the unsustainable development position. So city governments should be aware of the risk of high-speed rail sites' construction, and in order to achieve a better development, proper strategies in planning should be taken.

### Key words:

node-place model; high-speed rail sites; planning evaluation; Yangtze River Delta Area

## C12.38 Transport and Geography

### Transport and Social Equity



Home

#### Oral

1. [Analysis of Road Traffic Accident in Vhembe District Municipality, South -Africa](#)  
Olujimi Osidele; Nthaduleni Samuel Nethengwe; Farai Dodonfema (University of Venda, Limpopo South Africa, South Africa)
2. [Assessing the Impacts of Large Transport Infrastructure Investment in terms of Transport and Social Justice: The Capabilities Approach Perspective](#)  
Cao Mengqiu; Robin Hickman (Bartlett School of Planning, University College London, United Kingdom)
3. [Bridging Accessibility at the Neighborhood Level and Social Inequalities: The Case of Brussels](#)  
Kevin Lebrun (Saint Louis University (Brussels), Belgium)
4. [Distribution and Ownership of Means of Transport in Rural Kano Region, Nigeria](#)  
Abdulkadir Dambazau Muhammad; Ado Mukhtar Bichi (Kano University of Science and Technology, Wudil, Nigeria)
5. [Efficiency and Spatial Equity Impacts of Trans-Strait Bridges in Pearl River Delta](#)  
Qitao WU (Guangzhou Institute of geography, China)
6. [Examining Job Accessibility of the Affordable Housing Residents a Case Study of Beijing](#)  
Chun Zhang (Beijing Jiaotong University, China), Joyce Man (Indiana University Bloomington, United States)
7. [Exploring Social-spatial Inequity of Commuting with Large-scale Transport and Population Data](#)  
Zhou Meng; Wang Donggen (Hong Kong Baptist University, China), Li Qingquan (Shenzhen University, China)
8. [Impact of Production Factors Mobility on Firm Location Choice: Verification from an Agent-Based Model Approach](#)  
Feiyang Sun (University of Washington, United States)
9. [Investigating Travel Vulnerability in Greater London](#)  
Cao Mengqiu; Robin Hickman (Bartlett School of Planning, University College London, United Kingdom)
10. [Jobs-Housing Balance on Psychological Level and Transportation Social Equity](#)  
Yu Bai; Pengjun Zhao (The Centre for Urban Planning and Transport Studies, College of Urban and

Environmental Sciences, Peking University, China)

11. [Measuring Difference and Equity on Public Transportation Accessibility of Campus in Wuhan](#)  
Cheng Sun; Qian Yang; Aiwen Lin; Yuling Peng (Wuhan University, China)
12. [Public Transit and Social Equity: An Examination of Transit Accessibility to Hospitals in Beijing](#)  
Shengxiao Li; Pengjun Zhao (Peking University, China)
13. [Research on Matching Degree between Parking Space and Path Space](#)  
Wenling Li; Yunshi Liang (School of Geographical Science, Guangzhou University, China)
14. [Spatial Inequity in Public Transport Access and Implication for Urban Sustainability, a Case of Wuhan City](#)  
Jianquan Cheng (Manchester Metropolitan University, United Kingdom)
15. [Sustainable Urban Transport – Does It Promote Social Equity?](#)  
Stig Halvard Jørgensen (Department of Geography, Norwegian University of Science and Technology (NTNU), Norway)
16. [The Areas Potentially Exposed to a Transport-Related Social Exclusion in a Post-Communist Reality: A Case Study of Czechia](#)  
Václav Jaroš; Miroslav Marada (Charles university in Prague, Faculty of Science, Department of Social Geography and regional development, Czech Republic)
17. [The Effect of Built Environment on Spatio-Temporal Pattern of Bikesharing Use](#)  
Kaili Liang; Xiaoyan Huang; Xiaoshu Cao (Shaanxi Normal University, China)
18. [The Effect of Population Growth On Transportation of University of Ilorin Students](#)  
Ogunleye Adetona Comfort Iyabo (University of Cape Coast, Ghana); Banji Onisile, Aderonke Aderonke (Geography and Environmental Management University of Ilorin, Nigeria, Nigeria)
19. [The Social Equity Issues in Subway of China: Socioeconomic Variations in Responses to Subway Fare Increase in Beijing](#)  
Yixue Zhang; Pengjun Zhao (The Centre for Urban Planning and Transport Research, Peking University, China)
20. [Transport Accessibility and Level of Agricultural Development in Himachal Pradesh](#)  
Manjit Singh (Miranda House, University of Delhi, India)
21. [Urban Transport Inequity in Transition China: A Literature Review and Agenda for Future Research](#)  
Pengjun Zhao (Peking University, China)
22. [Urban Transportation Emission and Environmental Inequity in China -evidence from Beijing](#)

Peilin Li; Pengjun Zhao (Peking University, China)

## Poster

1. [Dispersed Settlement Pattern in Slovenia as a Cause of Social Exclusion](#)  
Matej Gabrovec; David Bole; Nika Razpotnik Visković (Slovenia, ZRC SAZU)
2. [Is School Consolidation a Bad Policy in China: Implications from Decomposing Excess School Commuting at Yanqing, Beijing](#)  
Dai Teqi; Wang Liang; Zhang Yuchao (China, Beijing Normal University)
3. [Spatial Characteristics and Dynamic Changes of Daily Communication Area Based on Time Accessibility in the Yangtze River Delta, China, 1985-2020](#)  
Li Zhang (China, NanJing Normal University)
4. [The Regulation Mechanism of Price Leverage's Influence On Residents' Taxi Travel Behavior and Its Spatial Effect Analysis](#)  
Luo Yu; Xin Dong (China, University of Northwest)
5. [Transportation in Udaipur City: Problems and Prospects](#)  
Barkha Chaplot (India, Mohanlal Sukhadia University)

## **Analysis of Road Traffic Accident in Vhembe District Municipality, South -Africa**

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### **Abstract**

Road transport safety is challenging globally, most especially in developing countries where it affects both road users and governments of individual countries. The aim of road traffic safety is to ensure reduction or total eradication of road fatalities and other injuries that are related to road accidents resulting from public road usage. In South Africa, one of the major problems faced by the Department of Roads and Transport is the issue of road traffic accidents. The annual road traffic accidents have increased to over 500,000 and 28,000 or more are fatal which leads to serious injuries between 2004 and 2010 as reported by the Department. The study analysed the patterns and trends of road traffic injuries in Vhembe District from 2011 to 2015 and also mapping of road accident spots using GIS techniques. The research further establish the possibility of correlation/relationship between accidents spots and road geometry. The factors that are responsible for road traffic accidents leading to fatalities, injuries, death and loss of property were also identified. Likewise significant measures that assisted in the reduction of road accident occurrence rate within the last three years in Vhembe District were identified and evaluated since the commencement of World Health Organisation; Decade of Action for Road Safety 2011-2020. Comparative analysis was done to understand and compare road traffic injuries between local municipalities within the Vhembe District Municipalities and recommendation findings were geared towards contributing to road transport safety policy which can be integrated into the national enforced policies of the Department.

### **Key words:**

road accident hotspots; road design; road fatalities; road traffic injuries; safety policy; patterns and trends.

## Assessing the Impacts of Large Transport Infrastructure Investment in terms of Transport and Social Justice: The Capabilities Approach Perspective

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### Abstract

In the transport context, social justice has not previously been treated as a significant issue by most politicians and scholars, partly because the relationship between transport and social justice has not been fully understood. From a starting point of interest in social justice issues related to transport and mobility, researchers began to investigate the relationship between transport and social exclusion issues, focusing on aspects such as freedoms, capabilities, opportunities, income, reduced mobility, class, age, ethnicity, gender, social inclusion and exclusion, travel poverty, and unequal accessibility. According to most transport studies, the wider social and economic impacts of social exclusion in the transport context have primarily centred on the idea of reducing social inequity, and addressing the imbalance in the distributional effects of transport and mobility issues. Therefore, taking the aforementioned point as a basis, this research investigates and explores the relation between transport and social inequity, and its wider impacts on neighbourhoods within a city caused by large transport infrastructure investment projects (e.g. Jubilee Line Extension in London; Fangshan Subway Line in Beijing), particularly in terms of social patterns. It also aims to identify ways of trying to create a fairer society for members of the many different social groups within a city. The capabilities approach is adapted and applied within the transport context to design a travel equity sample questionnaire, as well as to assess reductions in poverty and social injustice, particularly in terms of functionings, capabilities, opportunities, values, freedom and choices.

### Key words:

Transport and social inequity; transport investments; London and Beijing

## **Bridging Accessibility at the Neighborhood Level and Social Inequalities: The Case of Brussels**

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### **Abstract**

The development of public transport networks often combines (1) the need for carrying large number of passengers to city centres and employment districts and (2) social goals that encourage serving almost all areas. However, entrepreneurial urban policies have induced public expenditures in new development areas or in district to be gentrified while neo-liberal policies have restricted public transport's budgets. In several cases, investment in costly, heavy rail infrastructures designed for the middle class have contributed to lower means available for poorer inhabitants. All this suggests to revisit the concept of accessibility by public transport at the neighbourhood level by crossing it with social patterns.

Within this framework, Brussels has been considered as a relevant case study as the city has very contrasted sociospatial patterns.

For this purpose some accessibility indicators were first developed to analyse how easy/difficult it is to travel into the city by using public transport (mainly based on travel time and connections). Results show that accessibility is spatially heterogeneous, which offers the opportunity to measure how this contrast in correlated with social inequalities or not. In a second step, recent changes in the public transport network will be investigated too, so that I can tell to what extent the Brussels's situation is closed to those observed into some other cities.

### **Key words:**

Accessibility; public transport; social equality; spatiotemporal analysis; Brussels

## Distribution and Ownership of Means of Transport in Rural Kano Region, Nigeria

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### Abstract

This paper focused on the impact of accessibility on the ownership of means of transportation in the rural areas of Kano Region. A structured interview schedule was used which covers a total of 413 households selected from 28 survey villages from both Kano and Jigawa States. These villages were classified into three on the basis of their accessibility characteristics as Good, Moderate and Remote. A Chi-square test of independence was used to find out if the type of transportation owned by the rural household is independent of the accessibility characteristics. Also independent sample T- test was used to find out if there is a significant difference between the average transportation means owned by the household among the various villages in the region. The results of the chi square test shows that the type of means of transport owned by households is independent of the accessibility characteristics. While the results of the Independent sample tests shows there is no significant difference in the average transportation means owned by the rural households between Kano and Jigawa States. In all the survey villages, there is the dominance of non-motorized means of transport such as donkey, bicycle and animal cart as they account for more than 9 in 10. The study recommended the need for government and Non Governmental organizations to assist the rural people to acquire means of transport and also upgrade the surface over which transport take place in the rural areas.

### Key words:

Rural; Intermediate Means of Transport; Non-Governmental Organizations; Ownership

## Efficiency and Spatial Equity Impacts of Trans-Strait Bridges in Pearl River Delta

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### Abstract

Cities separated by the strait experience the shrinking regional development advantage. While these areas benefit from significant improvements in accessibility when new trans-strait bridges are built. The improvements in efficiency due to the bridges produce locational advantages and increase the attractiveness of these cities, thereby possibly enhancing their competitiveness and economic growth. However, there may be equity issues at stake. The bridges may contribute to an increase in spatial imbalance and lead to more polarized patterns of spatial development. The main accessibility benefits are primarily concentrated in areas near the trans-strait bridge, whereas other locations obtain only limited benefits. Procedures for assessing the spatial impacts of trans-strait bridge must follow a twofold approach which addresses issues of both efficiency and equity. This analysis can be made by jointly assessing both the magnitude and distribution of the accessibility improvements deriving from multi-trans-strait bridges project in the same region.

This paper describes an assessment methodology for trans-strait bridges projects which follows this twofold approach. The procedure uses spatial impact analysis techniques and is based on the computation of accessibility indicators, supported by a Geographical Information System (GIS). Efficiency impacts are assessed in terms of the improvements in accessibility resulting from the trans-strait bridges project, and spatial equity implications are derived from changes in the distribution of accessibility values among these regions.

### Key words:

accessibility; trans-strait bridges; Pearl River Delta

## Examining Job Accessibility of the Affordable Housing Residents a Case Study of Beijing

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### Abstract

Using data from Beijing, this paper evaluates job accessibility for people living in affordable housing to job centers. Results show an accessibility gap for different modes of transportation as travel by bus takes nearly double the amount of time as travel by car. While commuting time is closely linked to the location of the provided affordable housing, it is also dependent on the quality of local public transit service. Areas with substantial travel time differences between bus and car travel reveal the weaknesses of public transit provision. Furthermore, average commuting time by both bus and car from areas of affordable housing built after 2004 is much longer than that from previously built areas implying that low income groups are being driven to more disadvantaged locations with time changes. In contrast to the classical job housing mismatch hypothesis in Western cities, the mismatch model in Chinese cities is that while major job opportunities are still concentrated in the central city, affordable housing is being moved further afield into distant suburban areas. The paper will provide the implication for affordable housing and transportation planning in Chinese cities in the future. Improving job accessibility for this demographic will reduce car usage, promote the urban economy, and provide social welfare for the disadvantaged.

### Key words:

Accessibility; Job-housing balance; Low-income; Affordable housing; Beijing

## Exploring Social-spatial Inequity of Commuting with Large-scale Transport and Population Data

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### Abstract

Connecting residential areas and workplaces, commuting trips contribute to a dominantly large proportion of urban travels. Issues in daily commuting have great implications to the transport-related equity and have drawn significant attention of scholars and decision makers. Jobs-housing relationship, land-use organization, and other factors might be related to the commuting and its equity or inequity over the urban space. Various studies have been focused on the social inequity of transportation provision and travel cost. This work proposes to explore the spatiality of commuting inequity in urban areas and combine the spatial and social aspects as a measure of the level of equity in daily commuting. Large-scale databases of residential population with detailed socio-demographics and employment information in the city of Shenzhen, China are utilized to extract patterns in the distribution of commuting and cost over different spatial regions and social classes at city-scale. Findings of this study would contribute to a more comprehensive understanding of the transport-related inequity issues in large urban areas and to providing useful supporting information to the planning sectors for the mitigation of the spatial-social inequity at large scale.

### Key words:

Spatial-social inequity; commuting; big data analytics

## Impact of Production Factors Mobility on Firm Location Choice: Verification from an Agent-Based Model Approach

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### Abstract

In classical location theory, two driving forces jointly determine the location choice of firms, namely, local factor input cost and product transport cost to market. However, the theory is based on the assumption of localized factor supply and ignores the cost and benefit of using imported production factors from other region which could have a substantial impact on location choice. To fill the gap, this paper examined the impact of factor mobility on firm location choice in China by using agent-based modeling approach. In particular, this paper seeks to examine the relationship between unbalanced passenger-transport access, which is a crucial determinant for human factor mobility, and regional disparity. We first developed a dynamic production model that introduces a coefficient of factor mobility. We then applied the mathematical model to a simulation model based on the China GIS Map divided by 6 administrative regions to study the impact of factor mobility change on firm allocation in different historical scenarios. In conclusion, we found that factor mobility plays a more significant role in the early stage of economic growth when regional inequality has not been raised yet. On the other hand, with existing regional inequality, enhancing inter-regional factor mobility would rather exacerbate unbalanced growth since it allows the stronger nodes and more developed regions to absorb economic activities from the weaker nodes and under-developed regions in a faster pace.

### Key words:

factor mobility; interregional accessibility; firm location choice; agent-based model

## Investigating Travel Vulnerability in Greater London

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### Abstract

This paper investigates the combined problem of high car dependency and housing affordability – in view of likely continued volatility in oil prices (and hence petrol and diesel prices) and also rising house prices. A travel vulnerability index is developed incorporating measures of car dependence and housing affordability (drawing on Dodson and Sipe, 2007; Lovelace and Philips, 2014; and Dodson et al., 2015). Greater London is used as the case study, with 2011 data analysed at the Lower Super Output Area (LSOA), and presented using Geographic Information System (GIS). The results obtained for Greater London reveal that there are high levels of vulnerability in households located in suburban areas, particularly where there are high levels of car dependence, but also those in the exclusive and, to many people, unaffordable inner urban areas, such as Kensington and Chelsea, and Westminster. If oil prices rise and use of petrol or diesel cars becomes much more expensive, and house prices continue to rise relative to average household incomes, then it can be assumed that many parts of Greater London would become more vulnerable, difficult to access for those on average or even relatively high incomes, and that those areas most affected may become much less popular to live in. The seemingly inexorable rise in London's population is not always guaranteed to continue, and perhaps the affordability issue is one reason mitigating against this. Not considering this possibility represents a major oversight in transport planning in London – there is much too little emphasis in improving public transport accessibility in suburban areas, and alongside housing affordability issues, this is placing quite a stress on household budgets and life in large parts of London – which is only likely to increase in severity in future years.

### Key words:

Travel vulnerability; transport and social inequity; car dependence; London

## Jobs-Housing Balance on Psychological Level and Transportation Social Equity

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### Abstract

Spatial separation of jobs and households in big cities extended individuals' commuting time. The problem of jobs-housing separation converting to jobs-housing balance equals to the problem of shortening individuals' commuting time. Previous studies mostly tried to search for ways of reducing spatial distance to shorten commuting time, however, the potential that improving efficiency and effectiveness of public transport system can shorten commuting time is ignored. In reality, taking factors like house prices and educational facilities into account, many people in big cities cannot avoid long-distance commuting under the influence of market. Neither urban-rural planning nor policies can solve spatial separation of jobs and households completely. Based on that, this paper aims to propose a new concept of jobs-housing balance on psychological level and holds the opinion that government should improve public transport system to shorten commuting time first. The key research question is if the city provides perfect public transport system for individuals of various traffic mode choices and achieves jobs-housing balance on psychological level which stands for traffic society equity to some extent or not. Indicators of accessibility and recent subway card data from Shanghai are used to estimate jobs-housing balance on psychological level empirically. After calculating individuals' jobs-housing balance degree, we discuss the relationships between transportation social equity and jobs-housing balance and put forward suggestions for improving the present transport system. The conclusions drawn in the paper would enhance our existing knowledge of jobs-housing balance, and contribute to public traffic infrastructure construction policies and transportation social equity vision.

### Key words:

jobs-housing balance; psychological level; transportation social equity

## Measuring Difference and Equity on Public Transportation Accessibility of Campus in Wuhan

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### Abstract

Accessibility is affected by status, power and social construction, which leads to equity issues. However, seldom equity studies on a specific group have been investigated in such developing countries as China. Thus, we focus on students in college and university in Wuhan, the biggest city in Central China, measure difference in their trip accessibility by public transportation (PTA), and assess the horizontal equity issue. We constructed a public transportation GIS database by collecting open data. Firstly, combining spatio-temporal behavior and cumulative-opportunity, an accessibility index (AI) was made to measure PTA. Then, features in spatial differentiation of AI was studied by local Moran's I, and horizontal equity was distinguished and measured by Lorenz Curve, Gini Coefficient, Coefficient of Variation, as well as Location Entropy. The result shows that PTA of campus presents as kernel-periphery, and there are four internal types. PTA in the kernel is better than periphery zones, and campuses located in kernel zone could get remarkable advantage from PTA than those in the periphery for their lower cost on trips by public transportation. Furthermore, it indicates that there exists horizontal inequity in the student group, which embodies in 2 types: diverse universities, and different campus owing by one university. To improve the situation, planning and building of public transportation infrastructure in periphery zones has to be enhanced by the decision maker. In addition, student PTA needs to be defined as a right to mobile so that equity can be protected by law.

### Key words:

accessibility; campus; spatial differentiation; horizontal equity; Wuhan

## Public Transit and Social Equity: An Examination of Transit Accessibility to Hospitals in Beijing

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### Abstract

Improving transit accessibility is believed to be an important transportation solution to create a more equitable society. Many empirical studies assess transit accessibility in terms of economic and operating efficiency. However, the impacts of social equity are often neglected in transit assessment criteria. In addition, social inequity issue is often neglected in literature about transport accessibility to hospitals. This study aims to fill up these gaps by looking at transit accessibility to hospitals in Beijing as a case. The key research question is how public transit network and services affect social equity in transit accessibility to hospitals? The spatial and social differences in transit accessibility to hospitals are examined. Firstly, transit accessibility to hospitals is calculated by an improved potential accessibility method, taking into account the public transit elements (travel interval, travel speed and traffic congestion) and different levels of the hospitals (neighborhood centers, municipal general centers and municipal senior centers). The competitiveness among the residents for various levels of hospitals is also considered. Secondly, the factors influencing social inequity in transit accessibility to hospitals are discussed. Institutional barriers to equitable transit accessibility to hospitals are addressed, such as public transit planning and management, housing price and residential segregation, health care system, danwei system and Hukou system. Finally, policy recommendations to improve social equity in transit accessibility to hospitals are introduced.

### Key Words:

accessibility; public transit; hospital; social equity

## Research on Matching Degree between Parking Space and Path Space

### —A Case on the Underground Parking at Tianhe Sports Center in Guangzhou

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#### Abstract

The roads surrounding Tianhe Sports Center is one of the most congested areas in Guangzhou. The parking lots at the shopping malls surrounding are often hard to looking for a parking space. But rarely known by people, it also exist a very high vacancy rate at the underground parking at Tianhe Sports Center. Facing the problems of highly mismatching between the dynamic traffic and static traffic, exploring the origin and creating solutions become the research emphasis in the paper. With the field survey to the underground parking at Tianhe Sports Center, the characteristics of parking space design and parking situation, the behavioral characteristic of parking, and the motor vehicle traffic on surrounding roads were mastered. And then, a matching model was simulated to collocate the optimum parking space based on the path space and the characteristic of parking. Results show that the underground parking need more additional passageways; establish a gallery contact the shopping malls and the underground parking; set a temporary command system for the peripheral roads; build a parking guidance system; and displace the land utilization on parts of parking space; and etc.

#### Key words:

Parking Space; Path Space; Matching Model

## **Spatial Inequity in Public Transport Access and Implication for Urban Sustainability, a Case of Wuhan City**

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### **Abstract**

Long-term rapid urbanization has facilitated and ensured the unprecedented growth of investment in China over the past decades. This process has facilitated massive changes in infrastructure and services, including large-scale metro and light-rail systems, advanced motorways and urban ring-roads, bridges and tunnels. However, the imbalanced investment and development in urban transport network has led to socio-spatial inequities between different groups working, studying and living in urban areas. These socio-spatial inequalities have undoubtedly fully excluded those disadvantaged/vulnerable groups from their participation in the required social, economic, and cultural activities, which contribute to their well-being. These issues have been extensively addressed and studied in the western world such as UK, but not in the global east. As the largest city in central China, Wuhan is characterized by high percentage of lower income residents and more dominant use of public transport systems. However, it is not clear if there is any social exclusion between the disadvantaged groups such as students and elderly people, caused by the spatial inequity in public transport access. In this paper, disaggregate demographic data (age groups) at building level and bus/metro system data are utilized for measuring these groups' access to the public transport systems and then exploring their spatial inequity across the study area. The social exclusion between the students and elderly groups will be examined and its implication for social sustainability will be analysed. The paper ends up with further comparison with those cases in the western world in order to develop unique theories for Chinese cities.

### **Key words:**

socio-spatial inequity; public transport accessibility; social exclusion; GIS; Wuhan; sustainability

## Sustainable Urban Transport – Does It Promote Social Equity?

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### Abstract

A sustainable urban transport strategy implies a modal shift from private motorization to public transport and active transport (cycling and walking). Considerable population growth accompanied by increasing private vehicle use in the cities emphasise the need for individual and structural changes. Social justice issues regarding modal shift consequences regarding road safety (casualties), efficient transport (accessibility) as well as environmental impact (air pollution, noise), have been formulated less explicitly or neglected. The paper aims to study social justice related to gender and age groups, with and sidelong regard to socioeconomic status. The study analyses transport plans and safety program documents (2012-2018) from the four biggest cities in Norway (Oslo, Bergen, Trondheim, Stavanger) and data on serious and killed casualties (1998-2012) with forecasts (towards 2025). There are some clues that a shift towards less private motorisation will reduce vulnerable casualties (younger and elder) and accidents in the inner areas, although cycle accidents may increase. The paper concludes that unequal distribution of health-damaging experiences related to inner parts of the cities will be mitigated by an intensified sustainable transport policy. Unfavourable groups will benefit over-proportionally by efforts to reduce accidents, air pollution and improvements of public transport. However contextual conditions in the cities (size, topography, land use) and profiles of transport strategies and measures matters. Physical private transport restrictions and regulations will have stronger impact, and appear as more inclusive for the total population, than toll road systems and taxes which high-income people may be able to pay and accept.

### Key words:

Sustainable transport social equity; safety; urban; Norway

## The Areas Potentially Exposed to a Transport-Related Social Exclusion in a Post-Communist Reality: A Case Study of Czechia

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### Abstract

This contribution presents a summary of recent studies on a transport-related social equity issue as a specific form of social exclusion. It focuses on the relationship between transport accessibility and social exclusion set in the context of post-communist reality in Central Eastern Europe, specifically in Czechia. Public transportation in this area shows a relatively high level of both accessibility of transport opportunities and people's willingness to use it. This is a consequence of the centrally planned economy and the 'equalizing' regional policy approach used by the former political regime.

Several approaches to delimitating the potentially transport-excluded areas and the basic characteristics of these territories are discussed. The related question is how to measure or define the rate of this exclusion. The criteria defining the potential exposure of transport-related social exclusion are then categorized into three groups - area location, area accessibility and personal need of transportation. This approach to delimitation, based on secondary data, is subsequently applied to a case study of Czechia at the level of individual settlements. It is evident that unfavourable area location indicates higher risks of exclusion.

### Key words:

Transport-related social exclusion; Accessibility; Personal mobility; Regional transport service; post-communist reality

## The Effect of Built Environment on Spatio-Temporal Pattern of Bikesharing Use

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### Abstract

Bikesharing system Program (BSP) as an alternative and complementary mode of transportation has been growing attention worldwide. Despite the rapid rise of this new transport opportunity, there has been limited research on the factors influence bikesharing flows due to lack of detailed data available to researcher. This paper using trip level data from Xi'an bikesharing system, the data provide an opportunity to present the spatio-temporal patterns of bikesharing flows, We examine the influence of built environment, public transport infrastructure, land use and meteorological data attributes on arrival and departure flows at the station level. The results show that bike sharing is principally used for commuting purposes, the factors of influence weekday and weekend usage has a great difference. The combination between bike sharing and bus is important to increase usage. Population density and jobs density are two main explicative factors for the bike sharing usage. The findings allow us to identify factors contributing to increased usage of bicycle-sharing in Xi'an and to provide recommendations pertaining to station size and location decisions. The present findings could be useful for others cities which want to adopt a bikesharing system and also for a better planning and operation of existing systems.

### Key words:

bikeshare; built environment; spatial analysis; sustainable

## The Effect of Population Growth on Transportation of University of Ilorin Students

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### Abstract

Population growth can either be a blessing, a curse/problem if it is not properly managed. This paper attempts to the effect of population increase on transportation among university students using university of Ilorin as a case study. This paper draws attention on various transport challenges the off-campus students of university of Ilorin experience and the coping strategies they employ. Questionnaire and focus group discussion were used to data collected from 270 students selected according to their level/year of study in a week at different occasions. Pearson moment correlation coefficient was used to **explain** the relationship between population growth and transport. From the result larger percentage (71.0%) of the Students agree that population increase affect Transport services because of long queues, long wait, rowdiness at the park and the students push themselves on long queue so as to enter vehicles going to the campus for lectures or other things all because of the inadequacy of the available transport facility. This has a great effect on the Students; falling sick and missing test and exams etc. The coping strategies includes leaving home/hostel early and stay back in school until the population at the park reduces, some go for lift 'tanke sir'. The paper recommends that more buses should be provided and private operators should also be allowed to build more affordable hostels within the school.

### Key words:

off-campus students; transport challenges; coping strategies; population growth

## The Social Equity Issues in Subway of China: Socioeconomic Variations in Responses to Subway Fare Increase in Beijing

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### Abstract

Public transportation plays an important role in promoting social equity and inclusion. To supply affordable transit is one of key issues in relation to sustainable public transport policies. Although the equity issue in public transportation has been widely discussed, the topic was largely overlooked in developing countries. The paper aims to bridge the gap in literature by looking Beijing as a case. In 2014, Beijing Municipal Government used a distance-based fare system to replace its flat fare system. In this paper, we apply before-after approach to investigate the impacts of the change of subway fare on different groups. The key research question is to explore whether the change of pricing policy affects the inequity between one or more groups of passengers over others. Our data is from a survey for Beijing subway, consisting of residents' travel characteristics and their socio-economic status. The results show that the increased subway fare would have larger influence on those are vulnerable to social exclusion, especially young office workers, people who don't have private cars, and people living in suburbs. It is also found that people living in public owned house (usually located in city centre) are better off after the subway fare increase, because of the flexible transportation access provided by city centre. There are many factors influencing socioeconomic variations in responses to subway fare increase. Spatial constraints in relation to the disadvantaged people's choice of job and housing location, and institutional barriers to affordable public transit are two of the most important factors. The study demonstrates that discriminative impacts will change residents' mobility in the future, and calls for policies focusing on social inclusion.

### Key words:

Subway fare; travel behaviour; social equity; transport exclusion; mobility

## Transport Accessibility and Level of Agricultural Development in Himachal Pradesh

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### Abstract

Transportation has long been recognized as a strategic factor in agricultural and rural development. It is a proven fact that improved access to all season roads enhances a positive influence in the development of rural areas. Transportation plays a key role in establishing intimate relationship between consumer and producer through agricultural market centers. Also, transport is regarded as a crucial factor in improving productivity and commercialization of agriculture. Thus, the provision of better transport accessibility is of great significance to overall regional development in general and agricultural sector in particular in rural areas. Different research works have been conducted on transportation and agricultural development, but very limited studies have been done on mountain regions in general and Himachal Pradesh in particular.

This paper is a humble attempt to answers these complex questions related to transport accessibility and agricultural development in Himachal Pradesh. Quantitative methodology has been used in the study and various forms of measurement of transport accessibility, delineation of service area of agricultural market centers and agricultural development has been conducted to derive relationships with sustainable rural economy. Also, various techniques like network analysis, overlay analysis, composite index, correlation and regression have been used with the help of ArcGIS and SPSS. The results highlight high positive correlation between expansion of road transport and agricultural development in Himachal Pradesh. Findings also highlight agricultural development as an important factor for sustainable rural economy in the region.

### Key words:

Graph theory; Road density; Market density; Service area; Sustainable rural economy

## Urban Transport Inequity in Transition China: A Literature Review and Agenda for Future Research

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### Abstract

Urban transport inequity is increasingly attracting interests by researchers and politicians. It has become an important research theme in the field of urban studies or transport studies. However, our existing knowledge of urban transport inequity is mainly based on cases from Western World. Cases in developing countries could contribute to generalization of the knowledge since there are significant differences in transport and socioeconomic contexts between Western World and developing countries. China has been experiencing a transition from a centrally planned system to market system since the 1980s. The transitional socialist-style social equity is being broken by the increasing market power and a changing society. An increasing social inequity has been reported in many fields including transport. Although some studies have been done, findings and conclusions are still fragmented and ambiguous. A complete story of urban transport inequity in China is still missed. The paper aims to conduct a thorough review of literature about urban transport inequity in China. Firstly, a conceptual framework for studying urban transport inequity is proposed according to the theoretical arguments in the field. Secondly, literature about urban transport inequity in China is reviewed in terms of the evidences, determinants and impacts of urban transport inequity in China. Thirdly, critical discussions were conducted on the existing empirical studies in terms of research methods, data and theoretical contributions. Finally, an agenda for future research about urban transport inequity in China is proposed.

### Key words:

urban transport inequity; literature review; transition; China

## Urban Transportation Emission and Environmental Inequity in China -evidence from Beijing

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### Abstract

In recent years, increasing air pollution in Chinese cities raises public concern on its adverse effect on health. Transportation exhaustion is increasingly attributed to urban hazardous air. It was reported that in some developed countries, there is transport-related environmental inequity since disadvantaged residents like minorities or in poverty suffer from higher level of negative environmental externalities due to housing, commuting or working close to detrimental infrastructures like busy road, whilst their opportunities accessing to enhance their health are lower than other groups. Is this a case in China? There is few literatures about transport-related environmental inequity in China's cities. The paper aims to examine the transport-related environmental inequity in China by looking at Beijing as case. This paper, using 11 million traffic congestion monitored data and housing price data in Beijing, analyzes the spatial distribution of traffic air pollution and its effect on city neighbourhoods. It shows similar trend that neighbourhoods with higher proportion of people in poverty and low education have higher proximity to traffic sourced air pollution. Moreover, locations of several infrastructure and public services spots like primary schools, parks, and libraries might leave physical vulnerable users like children or elders to heavily expose to air pollution from traffic. This paper also discusses the reasons and factors influencing transport-related environmental inequity. In particular, the institutional factors are addressed, such as Danwei system, housing policy, Hukou system, etc. Land use policies and transportation demand management are recommended for city governments to mitigate environmental injustice caused by transport sector.

### Key words:

transportation emission; air pollution; environmental inequity; disadvantaged residents; Beijing

## Dispersed Settlement Pattern in Slovenia as a Cause of Social Exclusion

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### Abstract

In Slovenia, as a post-Socialist country, the legislation is still effective that financially provides for school children and employees to commute to the place of their job or school. Monthly tickets for secondary-school and university students are substantially subsidized, and, in compliance with collective agreements, employers are obliged to reimburse their employees for their transport-to-work costs. As a rule, special school buses are organized for elementary-school children, while secondary-school students depend on public transportation. However, due to dispersed settlement pattern, numerous smaller villages are not provided with it, which means that the nearest stop or station of public passenger transportation is often several kilometres away. Thus, their parents or relatives often have to drive them to school or they have to go on their own by moped or bike, which is very inconvenient in winter and in bad weather conditions, especially in hilly areas. To make matters worse, these students cannot attend the extra-curricular activities, which can result in their social exclusion. The extent of this problem has not been studied before. For this purpose, we connected by means of the GIS the data from the Central Population Register with the data of transportation schedules and calculated the number of secondary-school students by individual municipalities who do not have adequate connections with public transportation. Proceeding from the results of these analyses we have proposed the adjustment of standards of accessibility to public transportation in Slovenia.

### Key words:

public transport; social exclusion; settlement pattern; Slovenia

## Is School Consolidation a Bad Policy in China: Implications from Decomposing Excess School Commuting at Yanqing, Beijing

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### Abstract

School removal is a common policy option as a result of the decreasing in education demand and education finance, which tends to increase the distance from home to school, and even causes students dropping out of schools because of the long distance in some area. Thus, school removal encounters frequent criticism. But there's no specialised research suggesting to what degree of distance growth is caused by school removal. Many other reasons can cause the lengthen of the distance to school, only criticizing school removal may mislead policy evaluation. In order to evaluate and analyse the effect of layout adjustment, financial reduction, school planning and school district division change on the distance to school, we use p - media optimization model to make Scenario analysis in county yanqing. Through analysis we draw the following conclusions: (1) The increase of shool distance is also influenced by school layout adjustment, financial reduction and school district division change. Financial reduction has greater influence than school layout adjustment, and so does school layout adjustment compare to school district division change. (2) The influence of school removal has been exaggerated.

### Key Words:

School travel; spatial optimization; sustainability; school consolidation; Yanqing

## **Spatial Characteristics and Dynamic Changes of Daily Communication Area Based on Time Accessibility in the Yangtze River Delta, China, 1985-2020**

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### **Abstract**

With the arrival of economical globalization time, the concept of megalopolis, metropolitan area becomes more and more important. In the rapid development of traffic situation, Daily communication area as a kind of organization of city should be paid more attention to.

This paper develops a comprehensive research of daily communication area based on time accessibility of Yangtze River Delta with the help of GIS. Having reviewed briefly the previous metropolitan area and studies on accessibility, the paper defined the daily communication area and its boundary in the light of China's present situation. Taking the shortest time as indicator of time accessibility, the paper intends to construct overall coverage spatial analysis of regional accessibility based on land transportation network which is composed of highway and railway. Spatial diffusion, spatial interaction and daily communication area of regional spatial structure are studied from the view of spatial analysis of accessibility. Using MapX component and Delphi programming tool, regional accessibility calculation and analysis information system based on minimal seed algorithm is developed, with which mark diffusing figure and daily communication area of city could be generated. The studies focused on the Yangtze River Delta. It chooses the land traffic network of 1985, 1995, 2011 and 2020 and analyzes spatial characteristics and dynamic changes of daily communication area of 16 cities in the Yangtze River Delta. The conclusion was researched on the construction and influence factors and the developing trends of the daily communication area was discussed by the dynamic change analysis.

### **Key words:**

Daily-Communication-Area(DCA), time accessibility, spatial characteristics, dynamic change, Yangtze River Delta, Geography Information System(GIS)

## The Regulation Mechanism of Price Leverage's Influence on Residents' Taxi Travel Behavior and Its Spatial Effect Analysis

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### Abstract

Taxi plays an important role in urban public transport system. It has been a common problem in metropolitan residents' life that it's hard to take taxis. Most cities have carried out multi-round price adjustments. Based on this, taking Xi'an as an example, the author divided the passengers into two classes-"the necessary" and "the nonessential" to do random sampling survey about the influential factors of their taxi travel behaviors, finding that price is the most important among them, then made an empirical analysis to the interaction mechanism of supply and demand with price leverage.

The study shows that the taxi price adjustment has little effect on "the necessary" while means a lot to "the nonessential". Simultaneously, the growth of low speed fee reduces the profit difference apparently.

For verification, the author randomly selected 2000 taxis' trajectory data before and after the price adjustment, used the Arc GIS software to compare the spatial changes of the focus, to overlay the density distributions of taxi and main population, and built function for the profit difference with the MATLAB software.

It proves that the problem can be relieved in fact, and the density distributions of taxis and the main population tend to overlap after the price adjustment.

This thesis provides reference for making policy of taxi price adjustment. Especially the problem of city transportation is prominent in China, using price leverage to optimize the urban traffic definitely has profound value.

### Key words:

price leverage; the nonessential passengers; low speed fee; profit difference; the spatial analytic method

## Transportation in Udaipur City: Problems and Prospects

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### Abstract

Transportation plays a very significant role in determining the patterns of spatial growth and development of city. A well-developed transport infrastructure provides increased accessibility to various parts of a city and opens up remote areas on the periphery of the city, which is necessary from the point of future development and orderly growth of any town. Thus, present paper is an attempt to analyse the transportation system, its problems and prospects in Udaipur city. The entire study is based on primary as well as secondary sources of data, wherein primary data were obtained through the survey carried out during 2014 in the city and secondary data were collected from traffic and transportation master plan and city development plan. The study reveals that with the development transport, traffic related problems also increased in the city. The walled city and major junctions of the city (Surajpole, Delhigate, Udayapole, Hathipole and Pratapnagar) have maximum traffic and parking problems. Udaipur city needs the proper transportation facilities and services.

### Key words:

Transport; Traffic; Parking; Udaipur City

## C12.38 Transport and Geography

### Smart Cities and Transit Oriented Development



Home

#### Oral

1. [An Empirical Analysis of the Relationship between TOD and Rail Transit Station Passenger Volume: A Case Study of Shanghai](#)  
Haixiao Pan; Jing Li (Department of Urban Planning, Tongji University, China); Qing Shen (Tongji University & University of Washington, United States); Cheng Shi (Department of Urban Planning, Tongji University, China)
2. [Correlation Analysis between Spatial Relation and Urban Expansion: An Urban Agglomeration View](#)  
Limin Jiao; Xin Tang (Wuhan University, China)
3. [Exploring User's Route Choice Preferences of Bicycle-Sharing System with the Smart Card Data: Empirical Evidence from Nanjing, China](#)  
Qiuyi Yin; Feng Zhen; Zhaxi Luosang; Suping Guo (School of Architecture and Urban Planning, Nanjing University, China)
4. [How Built Environment Influence Public Bicycle Usage: Evidence from the Bicycle Sharing System in Nanjing, China](#)  
Zhaxi Luosang (Nanjing University, China)
5. [Mapping Mobility Practices through Mobile Phone Data](#)  
KHARCHI Tahar (GRED Lab, France)
6. [Media Cities, Transit Oriented Development and Transport Sustainability](#)  
Richard Knowles (University of Salford, United Kingdom)
7. [New Life for Old Tram Lines? Rehabilitation of Formerly Industrial Tram Lines in the Context of Transit Oriented Development](#)  
Jakub Taczanowski; Arkadiusz Kołós (Jagiellonian University in Cracow, Institute of Geography and Spatial Management, Poland)
8. [Potentials for Smart Transportation and Transit Oriented Development in Metropolitan Manila, Philippines](#)  
Yves BOQUET (Université de Bourgogne, France)
9. [Smart City Songdo Between Ambition and Reality: Aspects from a European Perspective](#)  
Martina Hekler (University of Vienna, Austria)
10. [Study on Impact of ICT on Commuting Behavior in the Era of Internet](#)

Chun Zhang; Luchen Cui (Beijing Jiaotong University, China)

11. [The Potential Demands of Demand Responsive Customized Bus System in Dalian, China](#)

Liu Kai; Zuo Zhi (Dalian University of Technology, China)

12. [The Progress of E-Development in China since 1998](#)

Bo Wang; Becky Loo (The University of Hong Kong, HongKong SAR, China)

13. [Transit-oriented Development in Hong Kong: Opportunities Beyond Public Transit](#)

Becky PY Loo (The University of Hong Kong, HongKong SAR, China); Frederic du Verle (Eco city Planning, Canada)

14. [Transit-Oriented Developments and the Search for a Urban ‘Sustainability Fix’: The Case of Fastracks Rail Transit in Denver](#)

Andrew Jonas (University of Hull, United Kingdom); Andrew Goetz (Denver University, United States)

## Poster

1. [Correlation Analysis Between Road Structure and Intensity of Commercial Land Use Based on Space Syntax](#)

Limin Jiao; Yuyao Han; Gang Xu (China, Wuhan University)

2. [Research of the Urban Periphery Park-And-Ride Facilities Space Organization: A Case Study of Guangzhou Metro Line 3](#)

Jiale Zeng; Wenling Li (China, School of Geographical Sciences, Guangzhou University)

3. [The Supporting Function of Taxi-calling apps’ Data to Travel Demand Management: The Case of Nanjing](#)

Yanhao Gong (China, Nanjing University)

## **An Empirical Analysis of the Relationship between TOD and Rail Transit Station Passenger Volume: A Case Study of Shanghai**

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### **Abstract**

This paper is aimed at empirically examining the effect of rail transit station-based TOD on rail transit ridership. Using IC card data on metro passenger volumes and cellular signaling data on the spatial distribution of human activities in Shanghai, the research identifies variations in ridership among rail transit stations in different locations and with different starting dates. Then, regression analysis is performed using passenger volume in each station as the dependent variable. The numbers of jobs and residents in the station area, the distance between the station and the city centers and urban planning variables, such as the distribution of planned activity centers. The main findings are: (1) stations in different locations have metro ridership catchment areas that differ in geographic scale; (2) passenger volume in a metro station is significantly correlated with employment density nearby, distance from the city center, and distance from the nearest sub-center; (3) passenger volumes in metro stations that are better integrated with nearby developments tend to be higher than those in otherwise comparable stations. Several implications are drawn for TOD planning: (1) the geographic scale of TOD should be adjusted according to the location of the corresponding metro station; (2) more sub-centers should be developed and higher employment density in the metro station area should be encouraged to increase rail transit ridership; and (3) commercial development and rail transit facilities should be more strongly integrated when making TOD plans.

### **Key words:**

TOD; rail transit; passenger volume; integrated rail transit and urban development; Shanghai

## Correlation Analysis between Spatial Relation and Urban Expansion: An Urban Agglomeration View

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### Abstract

Urban expansion displays different characteristics in each period. Studying the spatial and temporal regularity of urban expansion, from the perspective of the urban agglomeration, plays an important role in understanding the complex correlation between urban expansion and network framework of urban agglomeration. We analyze urban expansion in the Yangtze River Delta Urban Agglomeration based on traffic network, gravity model and space syntax model. Construction land expansion was obtained from Landsat remote sensing data in 1980, 1990, 2000, and 2010 and then was used to calculate intensity and velocity of urban expansion. Urban location in traffic network of urban agglomeration is analyzed by accessibility to and spatial interaction intensity from core cities. Space syntax model is used to compute accessibility of urban traffic network and the status of a city in traffic network of urban agglomeration. Results show that, firstly, urban expansion intensity displays a positive relationship with accessibility to core cities, spatial interaction intensity from core cities, and space syntax indicators. Secondly, there is a positive relationship between urban expansion velocity and indicators mentioned above in the first (1980-1990) and second (1990-2000) period. However, it exhibits a negative relationship in the third period (2000-2010). Cities, with a relatively inconvenient traffic network and located in the periphery of urban agglomeration develop more quickly, displaying a trend of spatial convergence. This finding, on the one hand, embodies that accessibility to and spatial interaction intensity from core cities and traffic network link closely with urban expansion; on the other hand, it serves as a reference to the planning of Yangtze River Delta Urban Agglomeration and the regulation of urban expansion of other urban agglomerations.

### Key words:

urban expansion; traffic network; space syntax; spatial interaction

## Exploring User's Route Choice Preferences of Bicycle-Sharing System with the Smart Card Data: Empirical Evidence from Nanjing, China

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### Abstract

Bicycle sharing systems (BSS) are becoming increasingly popular all over the world, lots of research have focused on BSS users. However, most of the existing research focuses on the origin and destination choice preferences through investigation and interview, little is known about how different kinds of users choose cycle routes using real trip information which demonstrably influences not only BSS itself, but also the economical activities and built environment along those routes or even the urban spatial pattern. Using the smart card data (SCD) collected in Nanjing from January to September, 2015, this paper simulates the real route network with SCD. According to the clusters of all the users with the indicators of age, gender, Recency-Frequency segmentation and travel time using Hierarchical Clustering Method, spatial-temporal characteristics of the cycle routes of classified user groups are identified and analyzed. We then find that females and elderly's routes show disperse spatial distribution, those streets offset the main roads, with lower traffic, decent environments and passing through the shopping centers are preferred. Meanwhile, male, young and middle-aged users prefer utilitarian trips with shortest routes which mostly allocated between transit stations and communities. Finally, optimizations concerning the bicycle infrastructure, the built environment along the routes and overall BSS planning and construction are proposed combining the findings and current population composition of research zone.

### Key Words:

bicycle sharing system; route choice preference; smart card data

## How Built Environment Influence Public Bicycle Usage: Evidence from the Bicycle Sharing System in Nanjing, China

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### Abstract

In recent years, there has been growing attention on Bicycle Sharing System(BSS) as an alternative to traditional modes of transport. Most previous studies about BSS focused on station planning layout, demand forecasting and trip characteristics, with small sample survey and simple statistical analysis, few studies focused on quantitatively exploring factors affecting public bicycle flows and usage employing real bicycle usage data. We examine the influence of temporal characteristics, bicycle infrastructure and built environment attributes on arrival and departure flows at station level using real bicycle usage data between April and September 2015 in Pukou and Qiaobei Area of Nanjing with linear regression method. The results show that the density of community and metro station are the most important factors affecting bike sharing flows and usage. Furthermore, during the morning peak period the density of subway station was positively and significantly related with bicycle usage rate, indicating bicycle sharing plays an important role in public transportation systems. While during non-commuting periods the numbers of commercial network, life service facilities, and the density of the bicycle sharing station, were positively related with bicycle sharing usage rate. These findings provide some useful information for city planners and BSS administrators who are designing or optimizing the bicycle sharing system, and also they are helpful for other cities with intentions of planning and developing the BSS.

### Keywords:

bicycle sharing system; built environment; usage rate

## Mapping Mobility Practices through Mobile Phone Data

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### Abstract

Cities that have adopted the Transit Oriented Development – TOD concept mobilize a large amount of people mobility data. This paper proposes an analysis based on a kind of data, not usually used in studying citizens needs of urban transportation. These data come from a French telecommunication company: SFR (*Société Française du radiotéléphonie*).

The use of geographical information systems (GIS) to mapping out mobile phone data, allows us to understand everyday life organization of citizens as well as their routes patterns. A GIS modeling based on people mobility practices can therefore be established.

The results coming from daily activity programs of people will be confronted to the existing transport supply and the existing structures in our study area: Montpellier. This allows us to establish an applied study case and furthermore to analyze the adequacy between urban transport supply and displacement needs of citizens in Montpellier.

### Key words:

Mobility data; mobile phone data; GIS modelling; Montpellier.

## Media Cities, Transit Oriented Development and Transport Sustainability

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### Abstract

Media Cities are an inter-organisational fusion of media, creative and knowledge industries. A contemporary urban development or regeneration strategy is to create new Media Cities of global significance in major regional or national centres, often as part of a transit-oriented development (TOD).

TOD is the process of focussing the development of employment, activities, services and housing around rapid transit stations. It is designed to create high density, compact and mixed urban form accessed by sustainable transport in the form of transit, cycling and walking.

This research explores the development of selected Media Cities which are part of TODs, and analyses the transport sustainability of MediaCityUK Salford and DR Byen (Media City), Copenhagen, Denmark.

### Key words:

Transport Sustainability; Media Cities; Transit Oriented Development; Salford; Copenhagen

## **New Life for Old Tram Lines? Rehabilitation of Formerly Industrial Tram Lines in the Context of Transit Oriented Development**

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### **Abstract**

The aim of the paper is to answer the question whether and to which extent the ‘industrial’ tram lines which have been inherited from the period which was characterised by completely different transport needs are able to play an important role in the present municipal transport networks. It would seem that this tram infrastructure could be a vital factor of urban development and revitalisation of post-industrial city districts as its existence makes zones of this type more attractive and accessible. The development of tram networks in Central and Eastern Europe between 1945 and 1989 was characterised by large-scale investments in new lines – and in some cases even entire networks - which were designed to connect multifamily housing estates with industrial plants. The role of the lines of this type was changed dramatically by the economic and political transformation of 1989 which resulted in scaling down and closures of several factories, in particular heavy industry plants. For this reason, the sense of further existence of these ‘industrial’ tram lines has often been questioned. However, after the EU accession of Central-Eastern European countries a large scale rehabilitation of municipal transport systems – including tram networks - has been started in almost all cities of the region. The potential of the existing infrastructure and EU grants seem to be an opportunity to the transit-oriented development which would enable to achieve synergy between transport and urban development in order to make Central-European cities – including their post-industrial districts – more sustainable and smart.

### **Key words:**

Municipal transport; transit oriented development; light rail; sustainable transport

## Potentials for Smart Transportation and Transit Oriented Development in Metropolitan Manila, Philippines

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### Abstract

The capital city region of the Philippines is widely known as a basketcase of urban transport, combining high levels of congestion, pollution and inefficiency. Despite the the rapid growth of population and motorization, is it possible to adapt “best practices” of other cities to the MetroManila context? We will examine the potential for BRT corridors, urban rail and bicycling, as well as the efforts for greener transportation modes (e-jeepeys, e-tricycles). Several difficulties need to be overcome: the current structure of the transportation system governed by multiple competing operators, the lack of coordination between municipal governments, the high density of population and urban fabric making more difficult a densification or urban space, the lack of funding linked to the apparent lack of interest at the highest political level and the priority given in recent years to road projects. Should TOD be developed first on areas not yet reached by mass transit, on new routes, or should it be attempted in the most heavily traveled corridors? And what can be done to improve intermodality and a smooth connection for travelers?

### Key words:

Manila; green transportation; TOD; jeepneys; BRT

## Smart City Songdo between ambition and reality: Aspects from a European perspective

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### Abstract

For several years already, several urban planning and development approaches have been exploring a new concept: The so-called Smart City. The concept tries to give 'sustainable' answers to the challenges that cities in industrialized countries worldwide seem to face: The number of people living in cities is growing rapidly and the contemporary infrastructure capacities cannot always cope with the needs that result from such growth. Quite often, there now seems to be an urgent demand for new sustainable solutions, in order to create new, modern infrastructures for transport, housing, working, education and urban services. Smart City Proponents are convinced: With Smart City Concepts new urban landscapes, new forms of urban living, new global and local spatial networks could be developed, that as a whole could better cope with the current problems of urban growth.

What makes life in a city in the future worth living? It is the history of cities, their urban identity or their urban perspectives? And to what extent do Smart City concepts appear to be useful for urban planning in the 21st century? Who will benefit? And might there also be some disadvantages eventually – and who would probably suffer most from them?

The first results of some quite revolutionary Smart City Project New Songdo City might give some insights into their real impacts and prospects.

From a European perspective, the presentation will aim to explore relevant aspects of what might appear to be key issues for designing the future of urban living in the 21st century.

### Key words:

smart city; urban planning; urban development; urbanity; vitality; Songdo; South Korea

## Study on Impact of ICT on Commuting Behavior in the Era of Internet

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### Abstract

In the era of the Internet, information and communication technology (ICT) has not only changes the urban space deeply, but also change the commuting behavior fundamentally. Selecting Beijing as case study, this paper explores the influence of ICT on commuting behavior characteristics by small sampling questionnaire. It shows that the young, highly educated, high-income groups access to the internet of higher frequencies. It also finds that high frequently internet user group has longer commuting distance and time; they will use navigation APP more frequently and more likely to adjust their trip plan according to real time traffic. Commuters would like to accept longer commuting time if supported by smart phone and internet. Regression analysis indicates that both weekly frequency to internet and use smart phone would significantly increase their commuting distance. This paper aims to improve commuting quality, and make urban planning and transportation decisions under the trend of informatization and smart city.

### Key words:

Commuting; Information and communication technology; Internet; Fragmentation; smart phone

## The Potential Demands of Demand Responsive Customized Bus System in Dalian, China

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### Abstract

About 30 cities across China have developed successfully an innovative mode of public transport service, the demand responsive customized bus (DRCB) system, which combined the benefits of bus services and taxi services and served mainly for daily commuters in current systems. Unfortunately, while attractive in principle, a large amount of actual demands cannot be satisfied due to the current simple operating pattern and pricing pattern, on the other hand, the potential DRCB demands are not yet known for system operators and therefore impede this system. In order to improve the level of service of this newly developed transit system, it would be better to understand the time-spatial distribution of potential demands.

Dalian DRCB system is organized and operated by local transit agencies, while it was not subsidized by the local governments up to now. With the help of smart phone and booking APP, more and more commuters move from other travel modes to DRCB. The time-spatial distribution of DRCB demands of about 6000 registered DRCB users in Dalian is analyzed. The characteristics of DRCB users are employed to model their behavior choices. A questionnaire survey was conducted recently, which focus on commuters' aspirations of transferring from other travel modes to DRCB. Results will help estimate the potential demands of DRCB system.

### Key words:

Potential demands; demand responsive customized bus (DRCB); time-spatial distribution; behavior choices; mode transfer; aspirations

## The Progress of E-Development in China since 1998

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### Abstract

Despite the increasing attention that e-development has received in the media, there is inadequate scholarly research on the process of e-development in China. Drawn from Loo's framework for tracing the development of an e-society, this paper aims to provide an empirical case study of China's e-development since 1998. Specifically, based on the official biannual survey reports on internet development in China and other related documents and statistics, the progress is analysed systematically by benchmarking various technological advancements in hardware and software, the composition of internet users, and the key dimensions of e-government, e-working, e-commerce, and e-networking. In addition, the questions of whether the geographical digital divide in the country has been reduced is examined. Our findings show that (1) China is on a fast track towards mobile informatization, with increasing number and adoption rates of mobile information and communication devices; (2) the use of the internet has quickly penetrated into the daily life of people from almost all walks of life, with high adaption rates for females, teenagers, and people with lower-level of education; (3) the use of the internet has gradually brought about fundamental changes in the political, commercial, and social spheres of people's daily life; and (4) the digital gaps have dramatically decreased along the mobile informatization and the Go West policy since 2000, while the disparities between urban and rural areas persist even after the implementation of 'Electrical Appliances Entering Rural Households' policy in 2009.

### Key words:

E-development; Information and communication technology; internet users; e-activities; digital divide; government policy; China

## Transit-oriented Development in Hong Kong: Opportunities beyond Public Transit

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### Abstract

Transport fuels and household usage of energy are identified as the main causes of carbon emission and consumption of resources (Brown et al., 2008). This research addresses the issue of comprehensive sustainability through understanding people's travel behaviour. In order to promote more sustainable mobility within Hong Kong, the characteristics of built environment around the metro stations in Hong Kong and the travel behaviour of residents living in these transit-oriented neighbourhoods are studied. Moreover, some key urban forms factors are measured and analysed with an integrated research approach to understand the benefits and opportunities of developing TOD as part of an integrated sustainable city strategy.

### Key words:

Transit-Oriented Development; car dependence; carbon emissions; urban form; travel behaviour; walking

## **Transit-Oriented Developments and the Search for an Urban ‘Sustainability Fix’: The Case of Fastracks Rail Transit in Denver**

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### **Abstract**

Transit-oriented developments (TODs) are central to how many cities engage in the search for an urban ‘sustainability fix’. Investments in mass transit systems, such as light rail and associated TODs, have become crucial components of such a fix and underpin smart-city strategies throughout the USA. Such strategies, in turn, have been associated with a proliferation of local funding arrangements, raising concerns about regional collaboration and equity. The extension of rail transit corridors often requires new and innovative funding arrangements in the form of public-private partnerships (PPPs), which in turn place new demands on local and regional resources. This paper examines the proliferation of TODs and PPPs in Denver associated with FasTracks, a long-term project to expand the Denver Regional Transportation District’s light and commuter rail system. FasTracks represents a regionally coordinated effort to promote more sustainable transportation and smart urban development. However, financing the project has proven problematic, leading to tensions around Denver’s hitherto successful model of regional collaboration.

### **Key words:**

Transit-oriented development; sustainability; mass transit; public-private partnerships; Denver; USA

## Correlation Analysis between Road Structure and Intensity of Commercial Land Use Based on Space Syntax

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### Abstract

Urban road structure is one of the most important factors influencing the spatial distribution of commercial services of which density directly reflects intensity of commercial land use. Taking Wuhan urban area as an example, we explore the effects of urban road network on the intensity of commercial land use based on theories of space syntax combined with GIS. Road network and commercial point of interest (C-POI) of Wuhan in 2014 were collected. Four spatial syntactic variables, namely, connectivity value, control value, global integration value and total depth value, were calculated for each road. Values of each spatial syntactic variable are divided into seven classes using the natural breaks method and then buffers with 500m-radius are established for each class. The average values of four syntactic variables and C-POI density in each buffer are calculated to analyse their correlation. Bivariate correlation analysis between syntactic variables and C-POI density indicates that connectivity value and global integration value are significantly positively correlated with C-POI density. The trend of C-POI density increases at first and then decreases with the increasing of control value. Total depth value shows significant negative correlation with C-POI density. The results indicate that there is a strong correlation between road structure and intensity of commercial land use, which can provide guidance for urban land use planning.

### Key words:

correlation; road structure; intensity of commercial land use; space syntax

## Research of the Urban Periphery Park-And-Ride Facilities Space Organization: A Case Study of Guangzhou Metro Line 3

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### Abstract

Guangzhou Metro Line 3(include two section: Shiqiao Line and Airport Line) in turn connect from south to north, Panyu district, Tianhe district, Baiun District, Huadu District that it is one of the busiest metro line of Guangzhou. We select three park-and-ride facilities along Guangzhou Metro Line 3 as in peripheral area research object, we investigated parking organization, traffic organization, additional space of facilities, space activities and satisfaction of consumers, combined with user of consumer demand and regional overall plan to analyse interior space, exterior space, service condition and managing status of facilities. The survey show that convenient and parking fees for facilities influence is the largest. To establish special transfer channel and preferential transfer instruction can increase convenience of facilities. Supermarkets, convenience stores and other ancillary commercial facilities to meet consumers' daily needs. Lower parking fees or with metro and bus companies establish preferential price mechanism to attract consumers effectively. Finally, establishing evaluation system with comprehensive model for convenient degree, accessibility, ancillary facilities satisfaction, comprehensive satisfaction. According to the usage of different facilities and regional consumers' demand optimize external and internal space. Making park-and-ride facilities multi-functionalization to attract more consumers. We want to find out effective methods for alleviating urban traffic congestion and making park-and-ride facilities with efficient operation.

### Keywords:

peripheral area; park-and-rid facility; Guangzhou Metro Line3; space organization

## The Supporting Function of Taxi-Calling Apps' Data to Travel Demand Management: The Case of Nanjing

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### Abstract

Travel demand management is currently an efficient way to solve urban traffic problems. Recently, many researchers used big data to describe transportation and support demand management policies with some powerful evidence. However, as the taxi-calling app is still an innovation in the Internet Plus era, related research is uncommon. Therefore, this paper uses the data of taxi-calling apps, a new data source, to explore its function to travel demand management. A spatiotemporal analysis method based on kernel density estimation and raster calculation is proposed to study the generation and distribution step of the “four-step model”. Taking Nanjing as an example, this paper first uses visualization method to depict and analyze the spatiotemporal pattern of residents’ taxi-calling demand. Then, select four typical regions, namely “Xinjiekou”, “Confucius Temple”, “Southlake Community” and “Software Avenue”, to explore the relationship between travel demand and built environment. Finally, discover and summarize the data’s supporting function to travel demand management. The study’s result shows that the data of taxi-calling apps play an important role in supporting demand management policies, especially in the following three aspects: revealing the condition and pattern of traffic demand, managing travel demand combined with the built environment, and enhancing service ability in flawed public transportation planning.

### Key words:

travel demand management; taxi-calling app; spatiotemporal analysis; kernel density estimation

## C12.38 Transport and Geography

### Transport, Logistics, and Global Consumption Network



Home

#### Oral

1. [A Case Study on the Land Use and Activity System of an Electronics Trading District, Huaqiangbei in Shenzhen, China](#)  
Tian Lan (China Overseas Huayi Urban Planning & Design Co., Ltd (Beijing). School of Urban Planning and Design, Peking University Shenzhen Graduate School, P. R. China., China)
2. [Consuming Air Transport: The Globalising Logistics of Airline Catering](#)  
Weiqiang Lin (National University of Singapore, Singapore)
3. [Cross-Border E-Commerce \(CBEC\) as a New Means of Global Consumption Networks \(GCN\)](#)  
James Wang (University of Hong Kong, HongKong SAR, China)
4. [Examining the Impacts of E-Retailing on Urban Logistics Parks: The Case of Shenzhen, China](#)  
Zuopeng Xiao; James Jixian Wang (The University of Hong Kong, China)
5. [Express Delivery Service, High Speed Transport, Spatial Friction and the Related Research Progress](#)  
Tao Lin (Shanghai Normal University, China)
6. [Go Beyond Port Regionalization: Co-Evolution of Gateway Ports and Intermediate Hubs](#)  
James Jixian Wang; Li Jinyu (The University of Hong Kong, HongKong SAR, China)
7. [Pan-Eurasian Economic Integration Driven by Cross-Border Transport Infrastructure](#)  
Selina Yau (The Hong Kong University of Science and Technology, HongKong SAR, China), James Wang (The University of Hong Kong, China)
8. [Spatial Accessibility and Heavy Goods Vehicle Traffic vs. Poland's Trade Linkages](#)  
Tomasz Komornicki (Institute of Geography and Spatial Organization, Polish Academy of Sciences, Poland)
9. [The Global Network and The New Logistic System of Creative Fashion Industry on 21th century](#)  
Jeferson Rezende (University of São Paulo USP, Brazil); Alexandre Pires (University of São paulo USP, Mexico); Amália Lemos (University of São Paulo USP, Argentina)
10. [Towards Short Supply Chains in the Global Food Consumption Network: A Comparative Study of China and Europe](#)  
Tiffany Tsui (Wageningen University, Netherlands)
11. [Trade and Low Temperature Logistics between Taiwan and Mainland](#)  
Zhuo Chen (University of Illinois, United States)

12. [Urbanization and access to Basic Amenities in Association with Development of Transport Network in Rajasthan](#)

Anushree Janu; Pallabi Guha (Jawaharlal Nehru University, India)

## Poster

1. [Geography of International Trade, Maritime Transport and Climate Change in XXI Century: A Descriptive Basis for Multilateral Action](#)

Elda Tancredi (Argentina, National University of Lujan)

2. [The Prospects of the Iraqi Railways](#)

Mohanad Hammad (France, Laboratory ENeC UMR 8185 Paris-Sorbonne University)

3. [Under One Belt and One Road, Guangzhou's Development Strategy Analysis of Transport and Logistics Industry](#)

WeiJie Luo (China, Guangzhou university)

## **A Case Study on the Land Use and Activity System of an Electronics Trading District, Huaqiangbei in Shenzhen, China**

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### **Abstract**

The nature of land use relates to activity taking place in its location. The formal land use could be easily identified, yet it fails to provide a comprehension of the city for better transport management or urban planning. Also, few research has seriously considered the functional land use rooted in the activity system. Based on a case study of a commercial district thriving on electronics trade, Huaqiangbei (华强北), a multidisciplinary perspective is employed to analyse the activity system and functional land use of the district in micro geographical scale. With information collecting from actors involved in electronic manufacturing and distribution and field observation for years, we develop a framework dedicated to examine activities and land use imprints within the district. Our study reveals that three type of functional land use in six architectural varieties (described in Fig. X.) have supported a complex activity system which determines the movement of people, good and information. We believe the study could not only illuminate the function or spatial form of a commercial district, but a strategic alternative for next step planning solution concerning liveability, safety and sustainability.

### **Key words:**

land use; activity; commercial district; electronics trade

## Consuming Air Transport: The Globalising Logistics of Airline Catering

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### Abstract

Geographical research has contributed much to understanding air transport as an end-product logistical service—either in ferrying passengers or goods—but seldom are the ancillary services supporting flights acknowledged for their equally important logistical role. I argue that this lacuna has resulted in an obfuscation of particular spaces of production and consumption *within* aviation that are in fact instrumental to enabling contemporary mobility and late-modern capitalism in the first place. The production of airline food is one area that warrants further examination, seeing how the catering industry has recently developed into a highly integral supply chain tethered to all flights. Likening its networks to those assembled in everyday commodities logistics, this paper analyses how the airline catering business has grown to become a highly globalised, and globally coordinated, trade that is organised, set in motion, and rendered efficient through familiar principles in logistical space-making. More specifically, what banally appears as a ‘packed lunch’ onboard an aeroplane is not some conjuration of magic, but the result of a calculated network of technologies, facilities, and managerial procedures, and international human value extractions that have increasingly spread across the globe. Reflecting on the airline catering industry in Singapore, this paper interrogates the diffused cartographies that have produced in-flight meals as an essential item of aerial sustenance, and an indispensable part of passenger air transport. It seeks to extend academic knowledges about the networked nature of airspaces, as well as the logistics of, rather than through, aeromobility.

### Key words:

airline catering; logistics; air transport; aeromobility; globalisation; consumption network

## Cross-Border E-Commerce (CBEC) as a New Means of Global Consumption Networks (GCN)

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### Abstract

Consumption networks have been there for long time. It consists of circulation systems that either 1) send products and goods to the (individual) consumers for (final) consumption, or 2) provide services, or move to or connect with (individual) people to consume services (such as tourism destination, gym) they demand for. GCN therefore are the consumption networks constructed for such processes at the global scale.

This paper elaborates on a new means of GCN - the cross-border e-commerce (CBEC) with focus on its development in and round China. Based on the surveys conducted in a few gateway cities in China, i.e. Tianjin, Guangzhou, Shenzhen, and Hong Kong, we argue that the new format of international trade due to the CBEC is reshaping the GCN substantially. Firms in this sector become more networked with rather than chained along other firms in the GCN. It results in both aspatial and spatial implications. The implications include but not limits to: (1) new business models of CBEC, (2) the reorganization of logistics systems due to the CBEC models, (3) the revitalization of global and local postal systems for a 'flatter' supply-demand pattern, (4) air-sea transport integration, which gives advantages to coastal cities with airport of good intercity connectivity, and (5) development of bonded warehouses at gateway cities.

### Key words:

Cross-border e-commerce; global consumption networks; transportation; logistics; trade; China

## Examining the Impacts of E-Retailing on Urban Logistics Parks: The Case of Shenzhen, China

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### Abstract

With the rise of e-retailing, the role of logistics park has been increasingly recognized as an elementary type of logistics infrastructure. The influx of huge market capitals is significantly changing the geography of logistics parks, which still have not been given sufficient academic attentions. With the case study of Shenzhen, China, the research question here is what changes e-retailing brings about on logistics park in Chinese cities. In reference to international literature, we first propose a conceptual framework about the travelling logistics park, including moving location, transitional function and the regionalism of market coverage. The sprawling distribution of logistics park from 2008 to 2013 are visualized on the basis of the dataset drawn from the Second Economic Census and open street map. Complemented by in-depth interviews with retailer, e-retailer and logistics companies, the underlying location decision of warehouse and logistics space are discerned to understand why logistics parks changes along with the e-retailing. Except for contributing to international compassion, the findings derived from this study would benefit government authorities in making new freight transport and logistics land planning.

### Key words:

Logistics park; online retailing; supply chain reinvention; Shenzhen

## Express Delivery Service, High Speed Transport, Spatial Friction and the Related Research Progress

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### Abstract

With great expansion of the express companies' business volume and revenue growth, the express industry in China's logistics industry rise tremendously and become a new growth point of China's economic development in recent years. The author elaborates the the logistics and express industry development and the existing problems in China and argues that the transportation costs arising from the geographical distance has been still the main topic in the researches on the spatial friction at present. However, distance-related costs have changed across categories of production resource flows and across transport modes and /or media since 1960s. The new economics of distance is about the increasing role played by logistics management and the adjustment processes that are occurring as firms creatively seek to substitute between types of resource and between the transport modes and media for moving those resource. Therefore, the economic geographers have to expand the spatial friction researches to the supply chain complexity, transactional environment, physical environment, except from the traditional topic of transport/logistics costs. These four elements consist of logistical friction. Although the logistics friction elements could not be cut apart each other, but the element "physical environment", which includes infrastructure supply, road bottlenecks and congestion, urban density, urban adjustments, is just the topics for economic geography, transport geography and urban geography. Finally, the author reviews the related researches and put forward some scientific questions on the spatial friction mechanism for the express delivery service based on high-speed transportation network and makes a prospect for such kind of studies.

### Key words:

express delivery; high-speed transportation; spatial friction

## Go Beyond Port Regionalization: Co-Evolution of Gateway Ports and Intermediate Hubs

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### Abstract

The development and changes in port hinterlands significantly influence the global freight distributions and thus reshape development paths of ports in various regions. ‘Port regionalization’ and ‘foreland-based regionalization’, as two concepts describing the evolving role of gateway ports and intermediate hubs respectively, have received considerable attention. They illustrate the emerging port hinterland and maritime hinterland dynamics in light of containerization, supply chain management, cluster of logistics firms and the setting of inland terminals. This paper expands the concepts by focusing on the shifting of intra - functional roles of a multi-gateway port system in an evolving economic and institutional system. It is argued that, going beyond the hinterland-based regionalization and the foreland-based regionalization, there is a multi-gateway ports regionalization where the gateway function and the transshipment function can be spread out among various ports. Key elements are Institutions (eg. free trade agreement, cabotage), industrial and market pattern of the hinterland, global trade and connectivity. Hong Kong, Shenzhen and Guangzhou, three key ports in the Pearl River Delta China, will be studied as an empirical illustration of the multi-gateway ports regionalization.

### Key words:

Port regionalization; multi-gateway ports system; gateway port; intermediate hub

## Pan-Eurasian Economic Integration Driven by Cross-Border Transport Infrastructure

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### Abstract

This paper discusses the prospect of the development framework and strategy of the One Belt One Road (The Silk Road Economic Belt and the 21st-century Maritime Silk Road) Initiatives (“OBOR Initiative”) recently advocated by People’s Republic of China. Against the backdrop of economic globalization, the OBOR Initiative aims at enhancing connectivity and cooperation primarily among Eurasian countries by focusing, inter alia, on cross-border transport infrastructure development. Given the enormous diversity of the Pan-Eurasian countries culturally, economically, politically and religiously, it is necessary and important to identify effective ways of how to push through these cross-border infrastructure-oriented programmes in order to fulfil their proposed catalytic role in boosting trade and economic growth, as well as economic integration of the region. In this paper, the critical success factors and lessons learned from failure stories of different development modes employed in the precedent cases worldwide will be analysed to help assess the opportunities and challenges of the OBOR Initiative.

### Key words:

Cross-border transport infrastructure; regional economic integration

## Spatial Accessibility and Heavy Goods Vehicle Traffic vs. Poland's Trade Linkages

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### Abstract

The presentation will include the results of research in regard to: a) differentiations of territorial accessibility in goods transport across Poland; b) a real and model distribution of heavy goods vehicles traffic. The analysis will be based on a modified methodology of Intermodal Transport Accessibility Index (using GIS), VISUM software, data from the latest General Traffic Census carried out in 2015, as well as data of Polish Border Guard concerning the traffic across the Polish eastern border. The study had a dynamic character, permitting to take into account effects of new infrastructure investments carried out in Poland in 2004-2015 period thanks to EU fund inflows. Against this backdrop, spatial distribution of Polish export activities by countries (trade partners) will be shown at the local level. This should allow for evaluation of relationship between infrastructure development, growth of traffic and intensification of goods exchange. Analysis will concern in the first place the trade exchange with countries located in Eastern Europe (Russia, Ukraine) as well as in Central Asia (e.g. Kazakhstan).

The findings presented above are the result of the study that was carried out within the framework of the project "Monitoring changes in traffic generating potentials and in determinant factors underpinning distribution of traffic of heavy goods vehicles transport in the road network over the 2005-2015 period". The project was financed with funds from the Polish National Science Centre, granted on the basis of decision no. 2014/13/B/HS4/03351.

### Key words:

Goods transport; accessibility; foreign trade; Poland

## The Global Network and The New Logistic System of Creative Fashion Industry on 21th century

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### Abstract

Nowadays the textile sector figure among the top five contemporary industrial activities, and what named creative fashion industry generates billions of euros annually within the global economy (IEMI, 2013).

According Frédéric Godart, from this point of view “Geography plays a crucial role in the fashion industry [currently], specifically when we regarding outsourcing” (2014). The effects of globalization process and technological advances not only decreased the distances as favored greater integration between flows and fixed in a complex network that connects local production realities and distribution to global consumption demands (CASTELLS, 1999; CARRERAS, 2003), which also brings it even closer to a production model based on the cycle “CONSUMPTION → PRODUCTION → CONSUMPTION” (REZENDE, 2014), which among other consequences added new “knots” in the Network of Creative Fashion Industry.

In contemporary times, under the aegis of globalization and influenced by the passage of an industrial economic model for the flexible accumulation (Financial System), we observed that the Creative Industry of Fashion, adherent to the Upper Circuit of the economy (SANTOS, 1979) has readjusted by adapting itself to the new realities and global requirements, inclusive of the logistical point of view and the transport systems required.

Our main objective is to identify and analyze what are the Challenges and impacts of globalization and outsourcing requires and offer the current distribution chain of creative fashion industry in its new productive ways, mapping the new realities of production, transport routes and distribution channels in creative fashion industry in the 21th century.

### Key words:

Creative Fashion Industry; Global Network; Logistical System; Transports; Outsourcing; Consumption

## **Towards Short Supply Chains in the Global Food Consumption Network: A Comparative Study of China and Europe**

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### **Abstract**

With continued economic growth and urbanisation, providing safe and high quality food holds the key to the 'new normal' of the Chinese economy in the coming decades. High quality food supply chain and logistics are the major areas to benefit from increasing global and domestic investments. Globally, the food distribution/consumption network is increasingly spanning greater distances, with higher demand for transport, and hence higher environmental pollution. The rising demand in China will no doubt have further significant impact on the geography of food at the global level. In order to foster sustainability and resilience in the urban food systems worldwide, there is an urgent need to shorten food supply chains. This would include maximizing the production of food in peri-urban areas, by developing green port polycentric systems that ensure innovative and sustainable production as well as developing sustainable trade alliances and policies at national and international level. This study compares the geography of agro-logistics clusters and networks of The Netherlands with China to shed light on how an integrated system of food clusters and transport networks connecting urban clusters can optimize supply chain efficiency, reduce burden on the environment, and foster urban resilience.

### **Key words:**

Geography of logistics networks; Global Consumption Network; Urban Resilience



## Trade and Low Temperature Logistics between Taiwan and Mainland

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### Abstract

International trade is often symbolized by container boxes and giant ships. Trade of tangible goods is an important part of international trade, but is only a primary stage. Trade of services is a higher stage, and trade of ideas is even one stage higher. In this article, I want to demonstrate that low temperature logistics take part in all three stages above. First low temperature logistics increase the trade of agricultural goods from Taiwan to mainland since 2009. Second logistic services themselves become an object of trade, and finally technological and managerial knowledge spreads by means of industrial cooperation. This process is illustrated through a case study of the Tianjin-Taiwan low temperature logistics cooperation plan. I draw a conclusion that all three stages of trade are beneficial to both Taiwan and mainland, and the last two stages are the most nutritious in driving upgrades for mainland logistics providers.

### Key words:

Trade; Low temperature logistics; Taiwan

## Urbanization and Access to Basic Amenities in Association with Development of Transport Network in Rajasthan

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### Abstract

Rajasthan is one of the backward states in terms of development and urbanisation. Ever since independence urbanisation pace has been slow and concentrated in pockets. Development in terms of human as well as economic has closely been associated with urban centres, while most of the rural part remains deprived. Geographical impediments such as isolation from the mainland, arid climate has also contributed to its uneven development.

Development in terms of access to basic amenities such as proper housing, electricity, drinking water, sanitation and cooking fuel are more closely associated with socio economic status and proximity to urban centres. In case of Rajasthan, access to basic amenities is better in large urban centres having good connectivity in comparison to small towns and cities or rural areas with poor connectivity.

In this paper attempt has been made to establish a relationship between transport network and access to basic amenities among the urban centres across various sizes over a period of time. An index of basic amenities is to be computed using indicators such as housing, sanitation, drinking water, electricity and cooking fuel. Another index indicating connectivity of the urban centre is to be computed and used for comparison to see how accesses to basic amenities have differed across the state with respect to connectivity. The spatial variation is to be mapped and compared over last decade. A comparison would be made as to how the relationship between transport network and access to basic amenities has differed across space.

### Key words:

basic amenities; transport network; connectivity; urbanisation; development



## Geography of International Trade, Maritime Transport and Climate Change in XXI Century: A Descriptive Basis for Multilateral Action

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### Abstract

This presentation will describe the relationship among the main tendencies of the international trade of goods, the characteristics of seaborne trade and the challenges of climate change. In this XXI century, three economic characteristics can be pointed out: a significant expansion of global value chains as a new form of disintegration and de-localization of the production of goods and services; the deepening of the regional integration and cooperation South-South; and the resulting exponential growth of commercial exchanges. In this context, 80% of the world trade is carried out by maritime mean; supply places have been diversified due to technological improvements and transport efficiency; and marine routes have been enlarged and new ones opened. In terms of CO<sub>2</sub> emissions/ transported ton, marine transport is the more effective one. Nevertheless, due its enormous scale, it is estimated that ship emissions (especially from oil-tankers and container ships) represent 11,8% of the emissions of the transport sector and 1,6 to 4,1% of the CO<sub>2</sub> world emissions resulting from burning. As world seaborne trade increases, one of main challenges – from the perspective of a social and environmentally sustainable development, as well as from the point of view of the transport and trade facilitation – consist in reducing the GHG (mainly CO<sub>2</sub>) emissions from international shipping and define mitigation and adaptation policies. In summary, the sector of marine transport needs to redefine strategies to adapt not only to the changes of the world economy and rules of the trade, but risks and current environmental uncertainties as well.

### Key words:

Geography of trade; climate change challenges; seaborne trade patterns

## The Prospects of the Iraqi Railways

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### Abstract

The rail transport is one of the most important and vital activities of the transport sector, whether it be for passengers or freight. The rail transport, especially for freight, has a high capacity for transportation over long distances and for relatively appropriate costs, compared to other means of transportation.

In 2015, Iraq had 2370 km of rail lengths, 1922 km (81%) of which are main railway lines, whereas the remaining is all sub-lines.

The Iraqi railways have always had an important role in the Iraqi economy since established by the British army. It has always been a principal means of transport of passengers and freight across Iraq; where it constituted approximately 30% of the volume of traffic in Iraq.

In the nineteen eighties, the rail activity deteriorated as a result of the war with Iran. In the nineties, the usage of railways diminished due to the economic blockade imposed on Iraq, especially for freight transport. After the war had ended, the Iraqi rail authorities attempted to rehabilitate the rail sector. Many problems remained.

Besides, the railway network does not crisscross all the Iraqi regions; it is limited to only some of them. Moreover, it is not connected to the neighboring countries. Thus, this research attempts to highlight all problems and obstacles facing the Iraqi rail sector.

The research aims at discussing the current status of the Iraqi railways and studying the prospects of the rail transport across all the Iraqi regions. Besides, it discusses the usage of high-speed railway lines with the aim of developing the road transport sector for its significant role in realizing the spatial development of the Iraqi economy. Moreover, it studies the means of connecting the Iraqi rail with the neighboring countries and its openness to the rest of the Middle East for its great significance for the future of Iraq.

### Key words:

Transport; Railway; Iraq; Development



## Under "One Belt and One Road", Guangzhou'S Development Strategy Analysis of Transport and Logistics Industry

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### Abstract

Combined with the latest policy "One Belt and One Road ", analysis Guangzhou's background in the development of transportation and logistics industry. Clearly the position and the role of the region of Guangzhou, and also clear its own geographical conditions, "One Belt and One Road "at the national level and the importance of the development potential in the future. Based on the "One Belt and One Road " policy environment and combined with the historical conditions and present situation of Guangzhou, analysis Guangzhou's development opportunities and issues of transport and logistics industry. Based on the above situation, combined with the policy advantages, and the geographical advantages, on the basis of strengthening the "hardware" and "software ", seeking the cooperation with more countries and regions. AS for the idea: "promote status by self-improvement, seek development by cooperation ", to build Guangzhou to become the world first-class transport hub and logistics center.

### Key words:

Guangzhou; transportation and logistics; opportunities; challenges; development strategy

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Complex Urban Systems

#### Oral



Home

1. [Analysis of Spatial Pattern in Central Asia Urban Using GLCNMO Data](#)  
Kasimu Alimujiang (Xinjiang Normal University, China)
2. [Capital Cities Role in Nation-Building: Genesis, Social Constructivism, Typology](#)  
Igor Okunev (Moscow State Institute of International Relations, Russian Fed)
3. [Centrality and Spatial Structure of China's Airline Network](#)  
Xiande Li (Shanghai Normal University, China)
4. [Chinese Urbanization 2050: SD Models for Mechanism and Simulation](#)  
Chaolin GU (Tsinghua University, China)
5. [City Network Structure of Chinese Urban Agglomeration: Perspective of Intro-connection within Top 500 MNCs in China](#)  
Xinzheng Zhao; Mengxue Li; Qiuping Li; Chang'an Feng; Tongsheng Li (College of Urban and Environmental Science, North West University, China)
6. [Development of an Integrated Land-use Transport Model for Urban Activity Distribution](#)  
Fangqu NIU (Institute of Geographical Sciences and Natural Resources Research, China)
7. [Evolution Process of Urban Spatial Pattern in Hubei Province Based on DMSP/OLS Nighttime Light Data](#)  
Zheng Wensheng (Key Laboratory for Geographical Process Analysis & Simulation, Hubei Province, Central China Normal University, China)
8. [Expanding Metropolitan Systems in Southeast Asia: From Primate Cities to Territorial Diffusion](#)  
Tai Chee Wong (Guizhou University of Finance & Economics, China); Charles Goldblum (Ecole Nationale Supérieure d'Architecture de Paris Belleville, France)
9. [Factors of The Choice Behavior of Supporting Model for The Aged Based on The Living Arrangement in Urban China – The Case of Chengdu City](#)  
Yang Yongchun (Lanzhou University, China)
10. [How Are the Neo-Liberalism Urban Policies Affecting the Growth and Shrinkage of China's Cities since 2008?](#)  
TAOFANG YU (Dept. of Urban Planning, Tsinghua University, Beijing, 100084, P. R. China, China)
11. [ITP Urban Systems: Cities' Evolution in The Worldwide Urban System: Combining Demographic and](#)

## Economic Typology

Celine Rozenblat (University of Lausanne, Switzerland)

12. [ITP Urban Systems: The Chinese Urban System](#)

Liao LIAO (Institut des Sciences Politiques d'Aix en Provence, France); Elfie Swerts (University of Lausanne, Switzerland)

13. [ITP Urban Systems: The Indian Urban System](#)

Elfie Swerts (University of Lausanne, Switzerland); Eric Denis (CNRS UMR Géographie cités, France); Venkata Subramanian (French Institute of Pondicherry, India)

14. [\[ITP Urban Systems\] The Sustainability of Urbanization in Africa's Great Lakes Region: Trends and Policies Options](#)

Remy Sietchiping; Claude Ngomsi; Michael Kinyanjui; Omwamba John; Elkin Valesquez (UN Habitat, Kenya)

15. [Dilemma of Ageing in Cities Planning of Elderly Care \(EC\) Facilities Based on Multi-Level Needs of Older Urban Residents in Beijing](#)

Xiaolu Gao; Bingqiu Yan; Zening Xu; Xingchen Liu (Chinese Academy of Sciences, China)

16. [Spatial Diversity and evolutionary character of Urban Logistic Along the "Silk-Road Economic belt" \(China\)](#)

LEI Jun; Qi Shengda (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)

17. [Spatiotemporal Analysis of Land Use Change and Green Spaces Index](#)

poonam sharma (Bhagat Singh College, University of Delhi, Delhi, 110017, India)

18. [Spatiotemporal Analysis of Quality of Life of Urban Residents in Haikou, Hainan Province](#)

lin Mei (College of Geography and Environmental Science, Hainan Normal University, China)

19. [Spatiotemporal Analysis of the relationship between Urbanization and Urban Poverty in India: A New Perspective](#)

Darshan Kumar Jha; Vinod Kumar Tripathi (Banaras Hindu University, Varanasi, India)

20. [The Brazilian Urban System](#)

Cosmo Antonio Ignazzi (University of Paris 1, CNRS Paris France, France); Reinaldo Perez Machado (University of São Paulo, Department of Geography, Brazil)

21. [The Clustering of Cities in China Based on Flows of Aggregated Massive Positioning Data](#)

Dong Li; Menghe WU; Bingruo DUAN (Beijing Tsinghua Tongheng Urban Planning & Design Institute,

China)

22. [The Development and Locational Change of High-grade Supermarkets in Tokyo Metropolitan Area](#)  
Hiroaki KAMMURA (Postdoctoral Research Fellow, the University of Tokyo, Japan)
23. [The Hinterworlds of the Main Cities in China Based on the City Interlocking Network](#)  
Tao Li (Fudan University, China)
24. [The Spatial Distribution and Mechanism of Urban Shrinkage in the Pearl River Delta](#)  
Xun LI; Zhiwei DU; Xianfeng LI (Sun Yat-sen University, China)
25. [Transnational Migration and Spatial Diversification of Koreatowns in Tokyo](#)  
Jiyeon Shin (University of Tokyo, Japan)
26. [Urban Land Use Change, Compactness and Fractal Measurement of Ulaanbaatar City](#)  
Myagmartseren Purevtseren (National University of Mongolia, Mongolia), Myagmarjav Indra (State University of Life Sciences of Mongolia, Mongolia), Zaya Chinbat; Munkhnaran Sugar; Bazarkhand Tsegmid; Gantulga Gombodorj; Bolormaa Batsuuri; Chinbat Badamdorj; Erdenejargal Baljinnyam; Enkhtuya Nergui; Ganpurev Dashlegtseg (National University of Mongolia, Mongolia); Buyandelger Myagmarsuren (Land management department of Ulaanbaatar city, Mongolia)
27. [Urbanization, Urban Poverty, Slum and Sustainable Urban Development in Nigerian Cities: Challenges and Prospects](#)  
Nwekeson Rowland (Queens Science Academy, Nigeria)

## Poster

1. [Mechanism of Oasis Urbanization: A Theoretical Framework Based on Complexity Theory](#)  
Haimeng Liu; Chuanglin Fang; Hanying Mao (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)
2. [Research on Population Performance of Urban Construction Land Expansion Based on Perspective of Structure ---Instance of Shandong Province](#)  
Wang Xiangyu (China, Shandong Normal University); Wang Chengxin (China, Shandong Normal University)
3. [Research on the Spatio-temporal Characteristics of the Influence of Population Urbanization on the Consumption of the Residents in China](#)  
Qiang Li (China, Henan University); Haitao Ma (China, IGSNRR, CAS)
4. [Research on the Structural Relationship of Metro Accessibility, Passenger Flows and Retail Business in Metro Sites: An Empirical Study of Nanchang in Jiangxi Province](#)



Hui Zeng; DingGuo Ma (China, Jiangxi Normal University)

5. [Spatial Agglomeration Characteristics and Location Decision of Small and Medium Technology Based Firms in Beijing: Based on the Investigation of 22046 Samples](#)

Wei Zheng (China, Fujian Normal University)

6. [Spatio-temporal Coupling Relationships among Urbanization, Economic Growth and Electricity Change in Henan Province](#)

Qiang Li; Jingyu Liu (China, Henan University)

7. [The Efficiencies and Their Changes of Jiangxi's Cities Employing DEA and Malmquist Index Models](#)

Lin Zheng; Mengying Hu; Chuanqing Liao (China, School of Geography and Environment, Jiangxi Normal University)

8. [The Spatial Evolution of Urban and Rural Settlements' Hierarchical Size in Eastern Plain of Henan Province](#)

Yang Huimin (China, Henan University)

## Analysis of Spatial Pattern in Central Asia Urban Using GLCNMO Data

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### Abstract

Although there exist numerous urban growth models, most have significant data input requirements, limiting their utility in a developing world context. Yet, it is precisely in developing world where there is an urgent need for urban growth models since most expected urban growth in next two decades will occur in such countries and regions. Central Asia covers an area of 3,994,300 square kilometers which includes some of the most sparsely populated regions in the world. Its population of only 61 million people includes more than 100 different ethnic groups. In this study, urban area in Central Asia was analyzed using remote sensing and GIS. Utilizing binary urban/nonurban maps generated by MODIS and DMSP-OLS. Our model can inform urban planners and policy makers about the most probable locations and periods of future urban land cover change. Urban development was achieving momentum in Central Asia. The MODIS and nighttime light data have many advantages, such as high time resolution, continuity and low cost. It should be very useful to detect larger scale dynamics of environmental changes.

### Key words:

Central Asia; Urban; Spatial pattern; GLCNMO

## Capital Cities Role in Nation-Building: Genesis, Social Constructivism, Typology

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### Abstract

Two major territorial bases of stateness are traditionally singled out: nation-building and threats to security or, in other words, mental boundaries marking of “Us” community and actualization of “Others”. Contemporary political geography is turning to the study of the third mechanism – internal “Other”. Interregional differentiation within a state through establishing and maintaining mental boundaries between center and periphery is the mechanism to detect the territories needing the support for preserving the compliance with national norms and, thereafter, maintaining stateness.

Two strategies are possible to prove that interregional differentiation is a mechanism of nation-building. Analysis of different discursive and institutional practices marginalizing regions would be logical. However, such way leads us to the large number of cases differing from each other in the multitude of variables and, therefore, exclude generalization in the conclusions. Thereupon we consider it possible to address another strategy, such as the search for evidence that center is purposefully opposed to periphery and is given symbolic national and centrifugal functions as well as administrative ones. The existence of one dichotomic pole should confirm the existence of the opposite.

Our research makes an attempt to analyze an institute of capitals at functional as well as symbolic levels. In that case capitals serve not only as a place to dispose the governmental bodies, but their functions include national representation to themselves and the environment. Capitals are the idealized image of nation and national history, a sort of nation in miniature. That should verify the assumption that an additional mechanism of nation-building exists and is demonstrated by the creation of ideal national image and opposing it to peripheral marginality.

### Key words:

capital city; nation-building; critical geopolitics

## Centrality and Spatial Structure of China's Airline Network

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### Abstract

Airline network is one of the cornerstones of urban network. This study uses the weekly flights between China's 156 cities to measure the centrality of China's urban system. The following is the finding of this study. (1) Beijing, Shanghai and Guangzhou are national hub of Chinese airline network. (2) Chengdu, Kunming and Urumqi city are the regional hub of Chinese airline network. (3) Beijing –Tianjin-Tang Region the Pearl River Delta Region and Yangtze River Delta Region have close air links between each other. (4) The administrative level, the level of economic development and the development level of tourism industry are the important factors that affect the structure of China's airline network.

### Key words:

Urban network; Airline network; Spatial Structure; Centrality

## Chinese Urbanization 2050: SD Models for Mechanism and Simulation

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### Abstract

By Mann-Kendall analysis, it is revealed that Chinese urbanization process has undergone two stages, each coinciding with a certain period of China's economic development. In the first stage, the dynamic mechanism of urbanization lay in the surplus labor force in the countryside and the ever-increasing demand of labor force driven by urban economic development in the urban areas; By contrast, the second stage saw some new driving forces, such as FDI, open policies and booming local development initiatives. Aiming to generate further insight into Chinese urbanization mechanism, this paper presents a dynamic framework, and based on it a new system dynamic model simulating Chinese urbanization process from 2015 to 2050. By comparing the simulated results against historical data of Chinese urbanisation, the SD model is proved stable and reliable. Through sensitivity analysis, it is found that Chinese urbanization is sensitive to the change of labor productivity in primary industry, birth rate of rural population, education level and growth rate of tertiary industry. In the scenario analysis section, different combinations of GDP growth rate and family plan are explored. The results show that China's urbanisation rate will reach at least 70% in 2035 and 75% in 2050, regardless of which economic development (6.5%-7.5% GDP growth rate) scheme and family plan (one or two children) policy are to be implemented. Even though the results indicate that population policy has more significant influence upon Chinese urbanization rate, it should not be overlooked that the dynamic mechanism of Chinese urbanization is always multi-dimensional at multiple levels.

### Key words:

Chinese urbanization; Dynamic mechanism; System dynamic model; Simulation

## City Network Structure of Chinese Urban Agglomeration: Perspective of Introduction within Top 500 MNCs in China

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### Abstract

Space of Flows as well as World City Network research attract more and more scholars' attention in City-Region study area, which leads to the shift of research paradigm from urban hierarchy analysis to urban network analysis. It is a frontier and hot research topic to analyze the City-Region spatial organization based on the enterprise network. Based on the Top 500 MNCs in China, we examined the network structure of three Chinese urban agglomerations in Yangtze River Delta region, Pearl River Delta region and Beijing-Tianjin-Hebei region. Finally, three typical network structure were found, including Monocentric and Multiple levels network structure in YRD, Double Centric and Bipolar network structure in BTH, as well as Polycentric and Multiple levels network structure in PRD. Moreover, significant Path Dependence and Domain Lock were concluded after the influence factor analysis of the city network evolution.

### Key words:

City network structure; Urban agglomeration; Path Dependence; Domain Lock

## Development of an Integrated Land-use Transport Model for Urban Activity

### Distribution

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#### Abstract

A land use/transport interaction model (LUTI) is developed for Chinese city regions and used to model the evolution of urban activity distribution, and predict urban spatial development trends in the Beijing metropolitan area. The model consists of a transport sub-model, a residential location model, an employment location model, and an implicit real estate rent adjustment model. The model is used to predict the 2025 distribution of urban activities by type under current land use policies. Urban activities are combined into two groups (households and employment) and the distribution of these two activities is forecasted. The study shows more and more population and businesses are choosing to locate on the outskirts of Beijing, which is consistent with the objective to decentralize activities from the central urban area. The ways in which the model can be developed to provide a richer framework for analyses of the impact of planning strategies on the evolution of the spatial structure of urban areas is also considered, paying particular attention to the modelling of different socio-economic groups, different industries, and a variety of modes of transport. For these reasons this study is the first step in a program of work on the development of LUTI models and other mathematical models for examining urban spatial evolution and supporting the sustainable development of Chinese cities.

#### Key words:

model; Simulation; LUTI; Beijing; Accessibility; Urban Location

## Evolution Process of Urban Spatial Pattern in Hubei Province Based on DMSP/OLS Nighttime Light Data

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### Abstract

This paper intends to investigate the urban spatial patterns of Hubei Province and its evolution from three different perspectives: urban nodes, urban connections and urban clusters. The research adopts nighttime light imagery of cities in Hubei Province, the viewpoint of “point-axis-area” in the “point-axis system” theory, and employs light index model, gravity model and social network analysis. The findings are as follows: 1) In terms of urban nodes, the urbanization process of Hubei has been carried out mainly on the basis of external expansion rather than internal increasing. The polarization trend of urban connection network is strengthening. 2) As for urban connections, the estimation of urban connections using light index model is capable of containing various actual flow, and the connections are getting increasingly closer. 3) In regard to urban groups, seven urban groups of varying sizes have formed. On that basis, three stable and relatively independent urban groups as the centers, namely Wuchang, Yichang and Xiangyang emerge as well. But the structures of “Wuhan metropolitan area”, “Yichang-Jingzhou-Jingmen city group” and “Xiangyang-Shiyen-Suizhou city group”, which are defined by local development strategy in Hubei Province, are different from the above three urban groups.

### Key words:

DMSP/OLS; urban spatial pattern; point-axis-area; Hubei Province, China

## Extended Metropolitan Development in Southeast Asia: From Primate Cities to Territorial Urban Diffusion

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### Abstract

Primate cities in Southeast Asia, primarily a Western colonization product have evolved from port cities to metropolitan development since World War II. Their growth was mainly attributable to high post-war population growth, massive rural-urban migration, and export-led industrialization and agglomeration effects accelerated by global linkages. Spatial effects of globalization impacts used to be more substantial in more internationally integrated market economies (Singapore, Malaysia, Thailand, Indonesia, Indonesia), but they have now penetrated also the transitional economies (Vietnam, Cambodia, Laos and Myanmar). Our aim in this paper is to revisit the theoretical debate whether primate city regions have grown “too big” as well as reassess the question of equilibrium city size in the context of decentralization and regional integration strategies - namely through extensive physical infrastructure networks - in the new ASEAN (Association of Southeast Asian Nations) framework. Other issues such as the characteristics of the Southeast Asian primate cities in the urbanization process, their major development trends in the twenty-first century and the ways in which they have responded to the territorial impacts of globalization are also addressed.

### Key words:

Primate city; metropolitan development; Southeast Asia; urbanization; foreign investment; agglomeration effects

## Factors of The Choice Behavior of Supporting Model for The Aged Based on The Living Arrangement in Urban China – The Case of Chengdu City

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### Abstract

The choice behavior of supporting model for the aged is more complex than Western countries, under the multiple effects of the unique market economy, the traditional distribution system and sociocultural factors, Particular model of “old-age supporting - living arrangement” emerged: ① One family live together; ② Two family but live together; ③ One family but live separately; ④ Two family and live separately, and three old-age supporting models formed on this basis: ① relying on their offspring; ② relying on the elderly house; ③ relying on themselves. Information of choice on supporting mode of the aged are gotten via large depth interview and social investigation are used in this article, the method of discriminant analysis and binary logistic regression are used, attributes of the choice behavior of supporting model for the aged based on the living arrangement in urban China are discussed. The investigating finds that supporting the life after retirement relying on themselves predominates. Researches shows: ① attributes of the choice of relying on themselves are: have a spouse, either they or their spouse have the property of the house, higher education level, like private space, near their relatives and friends. ② attributes of the choice of relying on the elderly house are: only children, age, higher education level, either they or their spouse bear all the cost of living, habits and customs are different from children. ③ attributes of the choice of relying on their offspring are: near from their children, have the willing to live together with their children, help children with caring kids, adapt to their present life, like the big family, near their friends and relatives.

### Key words:

transitional period; the living arrangement; urban elderly residents; supporting model; the chengdu city

## How Are the Neo-Liberalism Urban Policies Affecting the Growth and Shrinkage of China's Cities since 2008?

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### Abstract

Since the late 20th century, China has undergone some called neo-liberalism turn in urban planning policies which deeply influenced the pattern and transformation of national urbanization. In this process, production factors were re-distributed across different regions, different scaled cities, etc, driven by increasing intertwined globalization, regionalization and industrialization. As a result, on the one hand, some areas were experiencing rapid growth as economic motors, which gradually emerging as competitive Mega Cities or Mega City-Regions. On the other hand, some areas have to face the realities of Decline or Shrinkage, with the loss of total population and employment at the same time. Although at the same time, the central government and the local government have adopted some policies for tackling with these issues. Since 2008, the world is undergoing a new round of large-scale economic crisis. As other countries, the Chinese government has also experienced many theoretical and practical attempts to fight with the global economic crisis and domestic economic overheating. How are the different urban planning policies affecting the Growth and Shrinkage of China's Cities since 2008? Based the reviews on urban growth and shrinkage research, this paper analyzes the shrinkage and growth of China's cities at the county-level national wide with the data from the 5th and 6th national census. And then, the changes processes of China's cities are analyzed since 2008, with highlights on typical areas and functional specialization. The final part is about the mechanisms of these new trends from the neo-liberalism urban planning policy models.

### Key words:

Economics Crisis; Neo-liberal urban planning; Urban Growth; Urban Shrinkage

## **ITP Urban Systems: Cities' Evolution in The Worldwide Urban System: Combining Demographic and Economic Typology**

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### **Abstract**

Despite cities' evolutions in the world depend on uneven local contexts rendering difficult to specify a global new 'urban age', some universal urban processes can help to understand, compare and forecast urbanization features in different parts of the world (Scott & Storper, 2015). In fact, identifying dynamic processes in reaction to the globalization trends may situate the evolution of each city in the systems of cities to which it participates.

The paper assumes that the systemic approach of urban systems (Pred, 1977) enables going beyond difficulties in qualifying the 'urban age'. The paper will classify different trends in the contemporary worldwide urbanization processes by identifying the cities' evolution all along the hierarchical organization of their national and continental urban systems. The measurement of cities' similarities will be undertaken by combining two means:

- 1- the 1950-2015 relative trajectories of cities population (UN Urban prospect, 2014);
- 2- the evolution of each city's functions in the worldwide division of labor organized inside the 3,000 worldwide first multinational firms' subsidiaries networks between 2006 and 2016.

The resulting double typology allows qualifying generations of urban systems and evaluating the role of path dependence, economic development and urban policies in the contemporary urban issues that different parts of the world are facing. This approach brings a constructive answer to the large debate on the general theoretical nature of cities initiated by Brenner & Schmidt (2014).

### **Key words:**

Urban systems; World; cities' trajectories; population; world division of labor

## ITP Urban Systems: The Chinese Urban System

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### Abstract

The phenomenal speed of cities growth, their high density and their three-dimensional development characterize the Chinese on going urbanization process. This strong and recent urban growth leads the Chinese urbanization rate to 53.7% in 2013 (National Bureau of Statistics of China, 2013). The strong growth of Chinese small towns and the low trend of the hierarchization process of the system, which is unique in the World, show the weight of the political control on the evolution of the system. This is explained by the profound links between the evolution between the Chinese urban system and the administrative system. Particularly, the successive decentralization reforms have strongly influenced the development of the prefecture level cities and of the smallest ones, the district level cities. Moreover, due to the economic specialization of cities and the advantage of SEZ policies, the eastern and central cities have been steadily developed during the past decades, contrary to the Western and Northern cities, located close to minerals sites.

In this context, the main issue of our paper is to test if 40 years of strong political control has profoundly transformed the Chinese urban system. The approach will compare the theoretical corpus of universal processes and typical historical trajectories of urban systems with the Chinese urbanization processes. It will reveal in which extent some universal dynamic trends combine with specific Chinese features.

### Key words:

Chinese urban system; urbanization

## ITP Urban Systems: The Indian Urban System

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### Abstract

Despite a huge urban population of 380 million inhabitants and a very long urban history, India is still predominantly a rural country characterized by a slow rate of urbanization (31% in 2011) whilst hosting among the biggest metropolises of the World. The country experiments economic transition and political and territorial regionalization since the 1960 independence. In this context, the Indian system of cities questions the trends currently associated to the urban transition, in particular in term of hierarchical and spatial repartition of population and economic growth among the urban localities. We assume that the particular inherited shape of the Indian urban system combined with the regional policies developed since 1960, create some very specific evolutionary features of the cities' system.

The paper will assess how the urban transition impacts the demographic and economic evolution of the Indian urban System. It will show how, in a context of a slow urban transition, the demographic and economic growth is distributed among the Indian cities whatever their size, underlying that the million plus cities are not the only ones driving the Indian urbanization. Some very dynamic small towns appear on the frontline of the transition process as places, which accommodate a higher share of non-regular workers than larger cities. They constitute localities where people create non-farm activities and access to resources. While the cities' demographic trajectories are not very tiered, typologies made on the economic specialization of Indian cities reveal strong regional differentiation.

### Key words:

India; urbanization

## [ITP Urban Systems] The Sustainability of Urbanization in Africa's Great Lakes

### Region: Trends and Policies Options

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#### Abstract

Urban transition from 2014 to 2050 around the world would not be at the same rate and stage if the current situation remain constant. East African Countries, parts of the African Great Lakes region are among the least urbanized and most likely to keep their position in 2050. Their conditions for sustainable urban transition analyzed in this paper indicate inadequate connectivity, negatively affecting living conditions and limiting distribution of goods. Based on literature review and observations of recent urban policy statements and development discourses from governments, the paper attempts to demonstrate that there is need for effective and pragmatic political will at national and city levels and fair engagement of private investors and individuals to create an enabling environment for urbanization that will be beneficial to the current and future generations. The authors argue that to achieve sustainable urbanization in the region there is need for better policy frameworks for efficient corridors transportation network development and formulation of adequate development vision to ensure inclusive urban transition, incremental industrialization of economies with a focus on countries' specialization and management of proactive social and environmental investments for the benefit of all.

#### Key words:

African Great Lakes region; transport corridors; connectivity; migration; urban systems

## Dilemma of Ageing in Cities Planning of Elderly Care (EC) Facilities Based on Multi-Level Needs of Older Urban Residents in Beijing

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### Abstract

How to respond to people's physical, social and emotional needs in the ageing process is the key to planning of elderly care (EC) facilities. At present, the EC facilities in Beijing have an average vacancy rate of 40% due to mismatch of service delivery and the true demand of people. The lack of appropriate knowledge on older people's needs and overlooking the important role of public planning partly correspond to this fact. Based on survey in eight different types of urban communities in Beijing, this study established a conjoint analysis model and investigated the preference of the elderly for EC facilities in terms of public or private operators, service level and environmental qualities, location, and charges. It clarified that, (1) about 40% of the old people preferred public facilities, and that 70% preferred a monthly expenditure of no more than 2000 RMB. Preferably, two-third of the beds at high-end private facilities should be in suburban areas and one-third in inner city areas. (2) In addition, the preference of the elderly significantly differed across communities, depending closely on the social, cultural and institutional context of various communities. Based on these results, we evaluate the spatial distribution of EC facilities in Beijing based on people's multi-level needs. From the perspective of spatial planning and the purpose of ensuring the optimal use of limited social resources, over-facilitated and under-facilitated areas are identified, and policy suggestions to bridge the gap of EC supply and actual needs are proposed, such as controls over the new provision of public and private facilities, appropriate standard, service delivery pattern, and spatial distribution.

### Key words:

elderly care facility; community environment; spatial planning

## Spatial Diversity and evolutionary character of Urban Logistic Along the “Silk Road Economic belt” (China)

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### Abstract

The “Silk Road Economic Belt” is not only a new strategy for China’s opening up to the Western world but also an initiative to the requirement of regional economic integration in Asia and Europe in addition to the globalization of the world economy. The developing level of urban logistics is an important sign to measure the level of regional development. This paper analyses the spatial organization and the evolution process of urban logistics by calculating the Gini coefficient, gravity and location quotient of node cities along the Silk-road Economic Belt (China). Through this research, we can find: ①The comprehensive competitiveness of regional logistics industry between provinces is getting gradually expanding with a pattern of multicenter hierarchical diffusion. ②The characteristics of the spatial distribution of regional logistics industry is significantly in different part of China. There is a positive correlation between the developing level of regional logistics industry and economic. ③The quantity of logistics parks appear gradient relationship, and establish its own system. ④Urban logistics distribution is relatively concentrated and agglomeration trends change from strong to weak. ⑤The one-area and two-group structure of urban logistics industry is further improved. And the differences of agglomeration degree between provinces are expanding. ⑥An integrated network of urban logistics has come into being.

### Key words:

Urban logistics industry; spatial organization; The Silk-road Economic Belt (China)

## Spatiotemporal Analysis of Land Use Change and Green Spaces Index

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### Abstract

Cities are complex and dynamic systems that constitute a significant challenge to urban planning. Urban environmental quality is influenced by several aspects, including its geographical configuration, the scale and nature of human activities occurring and environmental impacts generated. Cities have transformed into complex and dynamic systems that constitute a significant challenge to urban planning. Cities and their sustainability are often discussed together as the cities stand confronted with numerous sustainability issues with the world becoming increasingly urbanized as the cities are situated in the mesh of global networks in multiple senses. The increasing size of the built area up due to growing population pressure and economic growth have caused massive Landuse/Land cover change through encroaching the surrounding area which lead to loss of forest and agricultural land etc. To enhance the decision making process in urban planning, a detailed and real world depiction of these urban spaces is the need of the hour. Monitoring indicators of key processes in land use and economic development is essential for evaluating policy measures. a rapid transformed urban setting plays a crucial role to change the green area of natural habitats. To examine the pattern of urban growth and to measure the Landuse/Landcover change in Gurgoan in Haryana, India through integration of Geo-spatial technique is attempted in the research paper.

### Key words:

Urban environmental quality; economic development; urban planning; green spaces index; geospatial techniques

## Spatiotemporal Analysis of Quality of Life of Urban Residents in Haikou, Hainan

### Province

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### Abstract

To tackle the issues concerning urban-rural areas, the central government of China initiated a new strategy called 'the New-type Urbanization'. As an important indicator to measure the process of new type of urbanization, the quality of life (QOL) of the residents has attracted considerable attention from both the scholars and Chinese government. For better understanding its actual process and effect, this paper taking Haikou as an example, analyzes the spatiotemporal dynamic of the quality of life of the urban residents. Firstly, we establish a comprehensive index system including education, employment and social security to measure the QOL. Finally, we adopt exploratory spatial data analysis and multivariable linear regression model to examine the spatiotemporal dynamic and its driving factors of QOL of the urban residents in Haikou, Hainan province. Aiming at provide scientifically reference for policy made and the construction of new-type urbanization in Haikou, Hainan province.

### Key words:

Haikou; QOL index; multi-linear regression model; driving factors

## Spatiotemporal Analysis of the relationship between Urbanization and Urban Poverty in India: A New Perspective

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### Abstract

This paper is an attempt to present a new perspective on relationship between urbanization and urban poverty using official data. The urban transition places cities and towns at the centre of India's development strategy. It has been argued that high rate of urbanization is closely associated with accelerated urban poverty. During the seventies and early eighties, the percentage of people below the poverty line (as estimated by the planning commission) was less in urban areas than their rural counterpart. The scenario, however, changed in late eighties as quick urbanization started to bring a larger part of the poverty into the cities. This urbanization of poverty is a structural trend embodied in the sprawling urban slums. But the argument is only partially true. Analysis of data presents an interesting result that more urbanized states have less share of urban poverty and vice-versa. The paper reveals that the regional variations in the distribution of urban poverty are significant. It also presents a new perspective that urbanization and urban poverty are inversely related. The paper also analyzes the trend and spatial pattern of urban poverty in India. Discussion starts with urbanization process and its trend in India as well as the trend of urban poverty. The paper also identifies future research scope related to complex relationship between urbanization and urban poverty.

### Key Words:

Urban Poverty; Urbanization; Urban transition; spatiotemporal analysis; India

## The Brazilian Urban System

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### Abstract

Recent trends in Brazilian regional development, particularly in relation to changes in the pattern of regional concentration of production activities and in regional economic specializations, have been the subject of debate among researchers.

This work investigates these trends, seeking to address together the issues of concentration and specialization, based on indicators of formal employment during the period 2000/2010. A large group of selected municipalities is analyzed: those with more than 10,000 inhabitants in 2010, corresponding to 2615 agglomerations between *municípios* and metropolitan areas in Brazil.

The methodology used for the analysis at the city level involves collecting and analyzing data on the number of regular employees in all selected cities. Database used for obtaining this information has been formulated using the Annual Report of Social Information (*RAIS*). The results are analyzed by means of different kinds of software in order to perform robust statistical investigation, mainly Principal Components Analysis and Ascending Hierarchical Clustering in order to give a broad overview of functional specialization of Brazilian agglomerations in five sectors of economic activity revealing the disparities present in an urban system distinguished by a huge territory.

Social and employment issues affecting differently the different parts of the country, have been examined in the light of the current policies adopted to redistribute resources and improve social conditions such as the conditional cash transfer program *Bolsa família* for reducing poverty and inequality and the initiative *minha casa minha vida* aiming to facilitating the access of Brazilian households in purchasing their first home.

### Key words:

Brazilian Urban System; Regional Specialization; PCA; AHC; Social Policies

## The Clustering of Cities in China Based on Flows of Aggregated Massive Positioning Data

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### Abstract

The world is becoming linked more and more. A shift of researching focus can be observed recently, from 'city as a system' to 'systems of cities', given the context of fast changing communicating technologies such as high-speed railways (physical) as well as social medias over internet (non-physical). Flows play essential role within the city network, describing the position and functions of each city and their changing trends. In this study, we adopted a new type of aggregated positioning data of massive internet users in China to explore the spatial patterns of cities measured by people's movements during the Spring Festival in 2015. By introducing new analyzing algorithm on spatially embodied network, models outputted hierarchic results with vary regional zones containing different number of cities. The higher layer of results with less members were not similar to the traditional simple delineation of China regions based on the distance to the eastern coast, nor the lower results with more members to the administrative boundaries like provinces. Nevertheless, the very differences suggested hidden forces driving cities connected intensely across the administrative boundaries such as sharing mutual regional cultures or employment markets. These facts grounded for a general picture for the study on polycentric urban regions over the whole national territory.

### Key words:

LBS data; urban regions; city network

## The Development and Locational Change of High-grade Supermarkets in Tokyo

### Metropolitan Area

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#### Abstract

With the increase of the purchasing power of people through economic growth, the type of retail business has become varied. Among them, supermarket is one of the major retail businesses, and its development process and locational change have been discussed. But, as the customer needs become fragmented, new type of supermarkets, which is middle or small size and more specialized, expanded in recent years. This presentation focuses on the Japanese High-grade supermarkets (HGSs), and would discuss its development process and the locational change of them. Study area of this presentation is Tokyo Metropolitan Area. The HGSs in Tokyo originally operate one or a few stores near high-class residential areas. For corresponding to customer needs, these stores sell specialty food products, especially wines and cheeses, which are more expensive and rarer than that of other supermarkets. But recently, some of the HGSs rapidly expand its stores across Tokyo, not only near high class residential areas, but in commercial buildings near main stations or station buildings, department stores. This expansion is caused by three reasons. One is that Japanese major retail companies have acquired HGSs since 2000s. Second is the recent development of commercial buildings by railway companies. Third is the rise of customer needs that they want to buy specialty products, especially they are particular about its taste. It would be said that HGSs developed its stores along with the change of socio-economic conditions.

#### Key words:

Supermarket; Food Shop; Locational Change; Distribution Channel; Tokyo Metropolitan Area

## The Hinterworlds of the Main Cities in China Based on the City Interlocking

### Network

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#### Abstract

From the perspective of the city interlocking network, this paper uses approaches of the measurement of Connectivity and the measurement of relative Connectivity to examine the hinterworlds of the main cities in mainland China. It is found that the network structure could be revealed through the measurement of Connectivity but the relative weak connections would be omitted. Administrative economy and cross-border connections could be examined deeply through the measurement of relative Connectivity especially to those space units with smaller aggregated connectivity. This paper combines these two methods to reflect the connections between cities and spaciality in mainland China which has a positive practical significance. The conclusions and proposals could help to define the border of influence of the regional center cities. On the basis of hinterworld division, the directions, sectors and added value chain of connections could be involved to analyze the relationships between cities which provides a reference for the development of regional co-development policy. Empirical results enrich our understanding of the hinterworld in which both relatively strong and relatively weak connections both exist. New perspectives and ways are provided to describe and analyze the relationship between center city and its hinterworld.

#### Key words:

city network; hinterworld; China

## The Spatial Distribution and Mechanism of Urban Shrinkage in the Pearl River Delta

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### Abstract

Urban shrinkage emerged in European and American countries as early as the mid-20th century. The Pearl River Delta (PRD) is "miracle growth" area for urbanization, but cities and towns development also face population and economy shrinkage after the financial crisis in 2008. In this paper, we investigate spatial distribution of urban shrinkage in the PRD respectively from district/county level and town/street level, using permanent resident data of Population Census and the Statistical Yearbook. By the case of Chashan Town, an analytical framework is established in this paper for urban shrinkage from the perspective of industrial structure and labor structure. Moreover, we explore shrinkage characteristics and formation mechanism caused by supply and demand changes. The research reveals: 1) the spatial distribution of urban shrinkage displays partial in the core area as well as relative concentrated in the outer circle, developing three major shrinking agglomeration area; 2) economic continual decline and immigrant reduce are typical characteristics of urban shrinkage in the PRD; 3) the mismatching of industrial demand structure and labor supply structure causes urban shrinkage in the PRD together.

### Key words:

Urban Shrinkage; Industrial Demand; Labor Supply; Dongguan; PRD

## Transnational Migration and Spatial Diversification of Koreatowns in Tokyo

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### Abstract

This study aims to show how various types of international migration change migrant spaces in a global city. It particularly focuses on the appearance of highly mobile transmigrants who carry out multidirectional migration and their influence on the change of migrant spaces in the global cities. On-location studies were conducted in Koreatowns in the Tokyo metropolitan area through participant observation, landscape analysis, survey, and in-depth interviews.

The results suggest two conclusions. First, Korean migrants in Tokyo can be classified into three types: old comers, new comers, and new-new comers. While the old comers are the migrants (and their descendants) who settled during the Japanese colonial era (1910~1945), the new comers are permanent residents who arrived after the 1980s pursuing economic interests. The new-new comers are relatively young, well-educated, and high income transmigrants who have migrated recently. Second, Koreatowns in Tokyo are different from those of western global cities in aspects of location and function. Koreatowns for the old comers are invisible ethnic enclaves that are built in old and historical residential areas. On the other hand, the Koreatown in Shinokubo is a former multiethnic town which became Koreatown in the late 1990s with Korean cultural wave. The function of Shinokubo as a residential area or an ethnic community becoming less important is rather characteristic as an ethnic commercial area is specialized because the main visitors to the town are the new-new comers.

### Key words:

Koreatown; Transmigration; Global city; Ethnic enclave; Tokyo

## Urban Land Use Change, Compactness and Fractal Measurement of Ulaanbaatar City

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### Abstract

Through the example of some measurements in urban sprawl of Ulaanbaatar city footprint, this paper will illustrate how urban compactness metrics and new technology of the geographical information systems could be used for more effective visioning on urban planning strategy. Fractal dimension index and compactness ratio were identified, based on GIS map layers with had been extracted from a series of cadastral map, time series land use planning data's in National Land Information Database and Landsat TM imagery over the period from 2000 and 2010. Calculated indices analyzed by combining two terms of urban external shape/ urban morphology to be implicit thematic urban shape and structure changes. Despite the urban planner's effort to limit expansions and promote compact structure, city had been constructed far above irregular shapes. The main findings states here is that Ulaanbaatar is growing none systematically and incompactly, even though the geometrical growth hasn't been strictly planned and became most irregular shape of urban sprawl. Study has demonstrated that the GIS analysis with the compactness metrics have a good assistance to comprehend urban land use evolution study and obviously project future urban development plan.

### Key words:

Sprawl metrics; Mongolian urban planning; urban GIS

## Urbanization, Urban Poverty, Slum and Sustainable Urban Development in Nigerian Cities: Challenges and Prospects.

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### Abstract

Urbanization, Urban Poverty and Slum are often intertwined, and constitute major challenges to developed and developing nations alike, but these challenges are more evident in developing nations among which Nigeria is not left out. Urbanization has been a major demographic trend in Nigeria and most especially in the major cities across the country in last half of twentieth century because of the relative increase in both social and economic development that is presently resulting in population explosion in major Nigerian cities, some of which are manifesting in the unnecessary pressures on available infrastructure, environmental degeneration, traffic congestion, housing shortages and high level of crimes. Urban Poverty equally posed a great challenge to urban sustainability in Nigeria because most of the poor in the cities suffer social exclusion, unemployment, homelessness, lack paid income and vulnerability to environmental risks and poor health, while the end result of these challenges and manifestations are the growth of slums, squatters settlements, shacks, dirty run down housing that are already becoming permanent structures in major cities of Nigeria. This paper embarks on comprehensive literature review on urbanization, urban poverty, slums and available statistical figures and relates these issues to Lagos, Kano, Port-Harcourt, Onitsha and some other cities in Nigeria, because these are the cities that faces these challenges the more, where there exist housing shortage in quantitative form, environmental pollution, traffic problems, huge pressure on existing infrastructure such as water supply, electricity supply, healthcare facilities, bad roads, high level of criminal activities, kidnapping, high level of unemployment among others and while at the same time, examined the factors responsible for these challenges in the urban centres. However, practicable recommendations are proffered as to the interrelation and opportunities that can be harnessed among these challenging issues, so as to ensure sustainable urban development in Nigeria as a nation.

### Key words:

Urbanization; Urban Poverty; Slum Sustainable Development

## Mechanism of Oasis Urbanization: A Theoretical Framework Based on Complexity

### Theory

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### Abstract

Oasis cities are the most concentrated zones of human activity and the most vulnerable places in the arid region of northwest China. Oasis urbanization is a typical complex giant system. Based on complexity theory, we analyzed the generation, evolution and transformation process of oasis urbanization, and built the theoretical framework of oasis urbanization evolution mainly from three dimensions of the emerging generation, coordinated sustenance and critical phase transition innovatively, by using proper concepts like emergence and synergism and the model of basin of attraction, according to which the Northam Curve was reinterpreted. The study indicated that: (1) Oasis city is an entire structural and functional emergence phenomenon of a human-centered oasis region system from the perspective of multiple spatial and time dimensions, and its formation conditions include generating subjects, self-organization and limited formation mechanism and environment policy. (2) Competitive and synergic mechanisms keep the vitality and evolution stability of the oasis urbanization system, which is the basic motive force of the system evolution. (3) Oasis urbanization process is also essentially a self-organized critical phase transition, which is the dialectical unity at the aspects of rheology and mutation, order and chaos, stability and non-stability. (4) The positive and negative feedback mechanisms in space and time improve the complexity and order of oasis urbanization, which approaches to the state of self-organized criticality; meanwhile, the vitality and diversity of urbanization system are reinforced in this process.

### Key words:

oasis urbanization; complexity theory; emergence; synergism; basin of attraction; Northam Curve

## Research on Population Performance of Urban Construction Land Expansion Based on Perspective of Structure---Instance of Shandong Province

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### Abstract

Reviewing the development of rapid urbanization during the last two decades in China, the contradiction between the shortage of land supply and the high demand for urbanization has been sharp. Governments and experts have reached a consensus that land urbanization is faster than population urbanization. However, this is just a superficial phenomenon from the perspective of urban system and we should analyze its differences from the structural level. Taking Shandong Province as an example, from the perspective of regional structure, administrative level structure, land use structure and the city scale structure, this paper analyzes the population performance of expansion of construction land between 2000 and 2013 based on allometric mode. The results indicate that: ① From the perspective of spatial, land urbanization is faster than population urbanization in the whole province, and population performance of urban land is higher in northwest of Shandong, southwest of Shandong and peninsula area. The central and coastal areas become lower. ② From the perspective of land use structure, there are differences among types of construction land in different cities. population performance of urban land is higher in the residential land, industrial land and green land, and the storage land is lower. ③ From the perspective of city scale structure, the city with a population of less than 200,000, the urban population performance is the highest while the city with a population of 200,000-500,000 is lowest. the city with a population beyond 500,000 shows decreasing trend

### Key words:

urban construction land; perspective of structure; population performance; Shandong province

## Research on the Structural Relationship of Metro Accessibility, Passenger Flows and Retail Business in Metro Sites: An Empirical Study of Nanchang in Jiangxi Province

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### Abstract

Traffic network system on a city's economic development and the formation of the spatial structure plays a key role, the urban subway construction has had a profound impact on the development of internal business area, and the formation and evolution of regional structure of urban commercial there is great concern. For nanchang subway stations commercial retail business area of 24, the subway network data such as field investigation, using the grid method to different degree of the subway site accessibility analysis, using regression model for different subway station, passenger and commercial circle retail site accessibility spatial structure correlation analysis; Business center around the nanchang Red Valley beach, microscopic analysis of subway station passenger flow's influence on the business center of space structure. Research shows that: (1)The subway site accessibility of traffic, traffic and retail business area of strong affinity;(2) Metro passenger flow and higher level business bigger relevance, and little correlation with low levels of business and even negative correlation;(3) The increase of passenger flow promotes business evolution from the traditional retail business to a more advanced industry entity.

### Key words:

Accessibility; passenger flows; retail business in metro sites; Nanchang

## Research on the Spatio-Temporal Characteristics of the Influence of Population Urbanization on the Consumption of the Residents in China

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### Abstract

This paper has established the complete decomposition model of population urbanization and living consumption on the 31 provinces population urbanization and living consumption from 2000 to 2014. We measure growth of living consumption and its 8 subsidiaries project. Conclusions are as follows: (1) China's consumption growth is the most main caused by the level of consumption per capita, population urbanization impetus in the secondary position. (2) Population urbanization contributions to the national consumption growth from 20.7% in 2001 to 7% in 2014. And it show that the eastern region of urbanization push for consumption growth more and more small, and the western region in volatility rises. (3) From the point of consumption structure, urbanization play a larger role in promoting consumption of food consumption, cultural, educational and entertainment, transportation, communications and clothing.

### Key words:

Population urbanization; Residents living consumption; Complete decomposition model; China

## **Spatial Agglomeration Characteristics and Location Decision of Small and Medium Technology Based Firms in Beijing: Based on the Investigation of 22046 Samples**

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### **Abstract**

Using 22046 small and medium technology based firms in Beijing, this paper seeks to find the spatial distribution patterns, location decision and its evolution over time. Small and medium technology based firms in Beijing are mostly located between Sanhuan Road and Lihuan Road, especially in these industrial parks. Spatial agglomeration shows obviously in town (sub-district) levels, while it shows relative diversification in some area. The spatial agglomeration is first appeared in basic industry and machinery industry, then turn to metallurgical, mechanical, electronic and chemical industry, finally to electronic industry, textile and clothing and other processing industry. The spatial distribution experienced the stages from centralization mainly in suburb to decentralization to centralization in Haidian, Chaoyang, Daxing and Tongzhou. The centre of economic gravity turns from south by west to south by east, while the imbalance is more obvious in west than east. Pearson correlation coefficient and Moran Index indicate that the small and medium technology based firms preferred to imitate or follow up leading enterprises behavior within the same industry before the 1990s, while they attaches great importance to large concentration of capital and labor which is brought by the construction of types of industrial parks as well as the location decision of related enterprises within the same industry or industry chain which has been entered in after the 1990s.

### **Key words:**

small and medium technology based firms; spatial agglomeration; location decision; industrial network

## Spatio-Temporal Coupling Relationships among Urbanization, Economic Growth and Electricity Change in Henan Province

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### Abstract

In this paper, a complete decomposition model is used to analyze the data of population, economy and power consumption in 18 cities of Henan province. From the provincial and municipal scale to quantitatively reveal the contribution rate of Population Economic Urbanization to the change of power supply for providing the basis for the driving factors and mechanism of change. The conclusions are as follows: (1) population urbanization effects on the total electricity change greatly. (2) economy of urbanization effects on the total electricity change smallly. (3) the total electricity of 18 cities of Henan Province is mainly affected by the size of the economy. (4) in urbanization mature area, the population and economy of urbanization contributes to total power lessly.

### Key words:

urbanization; electricity change; complete decomposition model; Henan Province



## The Efficiencies and Their Changes of Jiangxi's Cities Employing DEA and Malmquist Index Models

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### Abstract

Spatial pattern of cities has a typical effect on the cities' efficiencies. Jiangxi has experienced unprecedented urbanization over the past decades, resulting in a great change of its cities' scale. By employing the models of DEA and Malmquist Index, this paper estimates the efficiencies and their changes of Jiangxi cities from 2001a to 2010a. The conclusions can be drawn as follows: 1) while only three cities' efficiencies prove to be DEA efficient, the overall efficiency of Jiangxi Province proves to be DEA inefficient and moves towards the optimal production efficiency, and there is great room for improvement of urban management and development scale. 2) The city efficiency growth rate of Jiangxi Province slows down and there is still a huge gap between the city and town scale of Jiangxi Province and the optimal production efficiency. 3) Benefited from expansion of the city and town scale, allocation of the city and town development elements by city and town administrators and improvement of the administration level, the city efficiency growth rate in South Jiangxi is faster than that in North Jiangxi. 4) This research divides the 11 cities in Jiangxi Province into three types, namely cities and towns with increasing returns to scale, cities and towns with unchanged returns to scale and cities and towns with varying returns to scale, according to their returns to scale, and puts forward relevant improvement methods.

### Key words:

DEA model; Malmquist Index; urban pattern; urban efficiency; Jiangxi



## The Spatial Evolution of Urban and Rural Settlements' Hierarchical Size in Eastern Plain of Henan Province

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### Abstract

This paper uses the data of urban and rural settlements from 1975 to 2015 of Kaifeng city and Zhoukou city in the eastern plain of Henan province, to analysis the spatial evolution condition of the settlements' hierarchical size with the rapid urbanization and industrial growth. The method used in this paper is the Zipf's index, fractal dimension and the average nearest neighbor ratio, then analysis the characteristics of settlements' spatial distribution.

### Key words:

urban and rural settlements; rank-size; spatial evolution; the eastern plain of Henan province

## C12.39 Urban Commission: Urban Challenges in a Complex World

### New Concepts and Methods in Urban Studies



Home

#### Oral

1. [A New Approach to Analysing Transport CO<sub>2</sub> Emission from People's Daily Urban Travel in China](#)  
Jing Ma (Beijing Normal University, China); Suhong Zhou (Sun Yat-Sen University, China)
2. [A Novel Method for Identifying the Boundary of Urban Built-up Areas with POI Data](#)  
Xu Ze ning Gao Xiao lu (1. Key Laboratory of Regional Sustainable Development Modeling, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101; 2. University of Chinese Academy of Sciences, Beijing 100049, China)
3. [Anomaly](#)  
Manas Ranjan; Nayan Srivastava; Karitikeya Sonker (School of Planning and Architecture, Bhopal, India)
4. [Can Planetary Urbanization Subvert the Jinx of Post-Colonialism?](#)  
Aditya Mohanty (University of Aberdeen, United Kingdom)
5. [Case Study of Urban Renewal in the Jing'an District of Shanghai: From a Small Area Analyses Perspective](#)  
Ren Hai; Sano Mitsuru (Nihon University, Japan)
6. [City and State Relations in the Era of Globalization: The Perspective of the Politics of Scale](#)  
Fulei Zhang (Southwest University, China)
7. [How Spatial Statistics and Multilevel Modelling Benefit Urban Studies—an Illustration of Modelling Neighbourhood Satisfaction in Beijing](#)  
Guanpeng Dong (University of Liverpool, United Kingdom); Jing Ma (Beijing Normal University, China); Yu Chen (University of Sheffield, United Kingdom)
8. [How to Draw a Neighborhood? The Potential of 'Big Data' for Understanding Urban Neighborhoods](#)  
Ate Poorthuis (Singapore University of Technology and Design, Singapore)
9. [Integrated Approach for Smart City Index Development: From Concept to Indicator Weighting](#)  
Xiaolong Zou; Yan Li (Ritsumeikan Asia Pacific University, Japan)
10. [Power and Centrality in a Multiplex Network Perspective](#)  
Bellwald Antoine; Céline Rozenblat; Paul Chapron (University of Lausanne, Switzerland)
11. [Queering Critical Urbanism: A Case Study of Habitat III](#)  
Glen Kuecker (DePauw University, United States)

12. [Revealing Spatial and Temporal Scales in Landscape-based Design Approach for Fast Urbanizing Deltas: Pearl River Delta as a Case](#)  
Liang Xiong (Department of Urbanism, Faculty of Architecture and the Built Environment, Delft University of Technology, Netherlands)
13. [The Evaluations of Vitality of the Commercial Centers in Shanghai Based on Big Data](#)  
Tao Li; Yina Zhang (Fudan University, China)
14. [The Spatiotemporal Pattern of Urban Expansion in the Colombo Metropolitan Area, Sri Lanka](#)  
Shyamantha Subasinghe; Yuji Murayama (The Graduate School of Life and Environmental Sciences, University of Tsukuba, Japan)

## Poster

1. [Evaluate the Three-dimensional Urban Morphology Evolution by Fractal Dimension: A Case Study of Yangzhou City, China.](#)  
Jing Qin (China, IGSNRR, CAS)
2. [Evaluation and Comparative Analysis of New-Type Urbanization Quality: from Chongqing, China's data](#)  
Yin Zhang; Qingyuan Yang (China, Southwest University); Mengyu Yang (China, Renmin University)
3. [Evaluation and its Spatial and Temporal Evolution of Urban Competitiveness: A Case Study of Vice Provincial Cities](#)  
Wu Ying; Wang Chengxin (China, Shandong Normal University)
4. [Green Space Accessibility Evaluation in Shenyang Based on the Gridding Cells Gaussian 2-step Floating Catchment Area Method](#)  
Li Mengtong; Yang Lingbin; Wei Ye (China, Northeast Normal University)
5. [Modeling the Range Anxieties on the EV Mode Choice Behavior](#)  
Liu Kai (China, Dalian University of Technology)
6. [Simulation of the Yellow Sea Urban Pattern Based on BDI Decision MAS-CA Model: A Case Study for Dalian Jinshitan](#)  
Ying Pei (China, Liaoning Normal University)
7. [Study on the Influencing Factors and Spatial Distribution of Electronic Commerce Development Level in China's Cities](#)  
Feilong HAO (China, School of Geographical Sciences, Northeast Normal University); Haoming GUAN (China, Northeast Institute of Geography and Agricultural Ecology, CAS); Shijun WANG



(China, School of Geographical Sciences, Northeast Normal University)

8. [The Construction of Space-behavior Interaction Theory](#)

Yanwei Chai (China, Peking University)

9. [The Formation Mechanism of Urban Spatial Fragmentation](#)

Zhu Peijuan (China, Hunan Normal University)

10. [Urban Space Growth Based on GIS and Cellular Automation](#)

Andong Guo (China, Liaoning Normal University)

## A New Approach to Analysing Transport CO<sub>2</sub> Emission from People's Daily Urban Travel in China

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### Abstract

Developing low carbon cities is a key goal of 21st century planning, and one that can be supported by a better understanding of the factors that shape travel behaviour, and resulting carbon emissions. Understanding travel based carbon emissions in mega-cities is vital, but city size, and often a lack of required data, limits the ability to apply linked land use, transport and tactical transport models to investigate the impact of policy and planning interventions on travel and emissions. Using Guangzhou as a case study, this paper develops a new bottom-up approach to provide improved transport CO<sub>2</sub> emission from people's daily urban travel in China. Drawing on an activity diary survey and demographic data from the 2010 population census, this study employs spatial microsimulation to simulate a realistic synthetic populations' daily travel behaviour and estimate their transport CO<sub>2</sub> emission at a fine geographical resolution (urban sub-district) in 2010 for Guangzhou, China. It combines spatial microsimulation approach from geography and activity travel research from the transport field and applies this in a developing country, where detailed data to undertake fine scale analysis of phenomena such as transport CO<sub>2</sub> emissions generated by travel behaviour is very scarce.

### Key words:

spatial microsimulation; transport CO<sub>2</sub> emission; travel behaviour; population synthesis

## A Novel Method for Identifying the Boundary of Urban Built-up Areas with POI Data

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### Abstract

The boundary of urban built-up area provides foundational information for urban studies which is also essential to implement urban spatial distribution. However, the traditional methods which obtain the boundary information, such as using night-light distribute data, land use or building coverage, are so limited in data and research dimension that they usually fail to provide detailed explanations for urban social economic activities. As a new data source for urban analysis, POI (Point of Interest) data, obtained from online map reflects the agglomeration of urban activities and urban structure under certain conditions effectively and efficiently. Based on relativity of POI data, spatial structure and spatial distribution of city factors, a new method is proposed to identify the actual boundary of urban built-up areas by analyzing POI density distribution data. Therefore a so-called Densi-Graph method is developed based on analysis of the contour lines of the kernel density estimation of POI. On this basis theoretical analysis on how to identify the threshold value of the boundary is made and growth pattern of different urban structures such as mono-centric, poly-centric and linear cities is discussed, whereby the Densi-Graph method using POI data is validated. Compared with other urban built-up area boundary researches, Densi-Graph presents more intuitively and objectivity. Furthermore, the method is used to study the boundaries of urban built-up areas in China's prefecture level cities. The relationships between the Densi-Graph thresholds and the population and location of the cities are revealed, and the corresponding thresholds of urban boundary for different kinds of cities are presented.

### Key words:

boundary; urban built-up areas; POI; Densi-Graph; kernel analysis; urban-rural spatial structure

## Anomaly

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### Abstract

Events happen all around. One of the main reasons we could say that something became an event is because of conflict. Conflict not in its definitive sense but any occurrence that happens because of an intervention that creates an event worth remembering. Unfolding of such events creates Cities and Urban spaces which exhibit their duality of spatial and trans-spatial by behaving as a discrete system. This system through its lawful internal working produces an output in the form of realized spatial order with its social logic and a social order with spatial logic. The components of this system form a collective through a shared a relevance. This shared relevance creates meaning forming a group where all collectives share one identity. This group with its new social order and its spatial logic revives the already existing spatial order. These groups do so having a tendency to expand resulting in production of space in a situation of encounter where they have found relevance. But an encounter without a lawful internal working of discrete system results in anomaly because groups do not find relevance due to absence of collective identity. This paper makes an effort to explore one such event in the case of Babri Mosque and Ramjanmabhumi, Ayodhya to explain the anomaly as transposition of social and spatial. Through the case study it makes an attempt to generate an equation explaining the two different situations of religious encounters, former reviving the social and spatial order and the other resulting in anomaly.

### Key words:

Events; Social; Spatial; Order; Discrete; Anomaly; Collective; Conflict; Babri; Ayodhya

## Can Planetary Urbanization Subvert the Jinx of Post-Colonialism?

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### Abstract

In the contemporary 'urban' condition, liberal democracy and transnational sovereignty offer us numerous avenues for the realization of a global human geography across space and time. But scholars like Ananya Roy (2015) caution us against the adoption of '... a universal grammar of cityness, modified by (exotic) empirical variation' by harping on the celebration of a contingent historicity. Howsoever the 'planetary urbanization' (Brenner 2013) analytic is soon making deep inroads into the postcolonial spatiality. The rise of a caste-class consociation and the growth of a hegemonic middle class (Heller and Fernandes 2006), for instance, seem to have had engendered an ossification of a neoliberal ethic that definitely dares to ruffle up the very ontology of a 'postcolonial aura' (Dirlik 1994) or the very 'ordinariness' (Robinson 2005) of the city. Apart from my current research work on the role of neighborhood associations in shaping the contours of urban politics in Delhi, the paper shall draw upon studies on the evolution and growth of two key themes viz., gentrification and urban renewal, in cities of both the Global North and South. In so doing, it argues that in order to understand subversive modes of representation amidst the growing 'specter of capital' (Chibber 2013), the ontology of a global human geography needs to go beyond the dichotomy of the 'civil' and the 'political' in everyday life. Further, we do need to unabashedly get prepared for capturing the ethos of what, I prefer to term as, 'symbiotic spaces of neo-populist sovereignty'.

### Key words:

Planetary Urbanisation; Civil Society; Neoliberalism; Postcolonialism

## Case Study of Urban Renewal in the Jing'an District of Shanghai:

### From a Small Area Analyses Perspective

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#### Abstract

Urban renewal in Shanghai has been underway since the early 1990s. This study focuses on the effect of urban renewal within Shanghai's central district, Jing'an. The methods used in this study were first, investigations of land use in Jing'an district to map the actual situation in detail, and second, analysis of small area data to discuss the correlation between the change in land use caused by urban renewal and the change in population in the downtown area.

The analyses showed that the urban renewal of Jing'an district is in a process of "scrap and build," that is, condominiums are being built in place of lilong housing (traditional lanes of terraced homes). The downtown area has always been a residential area, and its urban function has not changed along with urban renewal. A number of previous studies of Shanghai's urban renewal, from a macroscopic view on the urban or district level, indicated that the population density has decreased as the number of high-rise buildings has increased. This study using small area data on a Residents' Committee level to analyze population redistribution in Jing'an district with urban renewal demonstrated that a population decline did not occur in all regions, but instead increased in some.

#### Key words:

Lilong housing; condominium; cluster analysis; population distribution; Jing'an district of Shanghai

## City and State Relations in the Era of Globalization: The Perspective of the Politics of Scale

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### Abstract

Since the late 20th century, globalization has accelerated in breadth and depth, and economic, social, cultural and other aspects of the world have been challenged by this process. The nation-state has been encountering the most serious challenges, so that the nation-state is undergoing a profound rescaling of state power and transformation of state governance. The state has rescaled its power upwards towards supra-national levels of regulation as institutions such as the EU, the IMF and the World Bank and rescaled downwards towards sub-national levels of governance such as city-regions and cities, and devolves other power to civil society and individuals. Associated with the process of globalization and the transformation of state governance, cities are rising worldwide, in the process of which there is an unprecedented wave of large-scale global urbanization, the growth of urban economic power and the rise of global cities, global city-region and global city network. However, the awakening of city consciousness in national politics and global governance is an invisible and real "urban revolution." Under the rise of cities' political influence, cities not only obtain greater autonomy in their own governance, but also began extending their power to levels of nation-state and to the process of state governance. The city challenges the dominant position of nation-state and began to establish their own position in multi-levels of governance, so that the adjustment of the city and state relations in different governance processes gradually become one of key mechanisms.

This study aims to investigate city and state relations and its changing process, which is a very valuable view to understand processes of urban governance, national governance and global governance under globalization.

Comparative and historical methods are employed to conduct this study and investigate city and state relations under the processes of globalization. First of all, this study defines concepts of the city and the state, based on which a theoretical framework of city and state relations in the era of globalization is constructed. Secondly, this study employs a multi-scalar theoretical framework to explore the city and state relations in the process of urban governance, state governance and global governance. Finally, the study argues the nature of the city and state relations in the era of globalization, and point out the future of the city and state relations in theory and reality.

In the scale of urban governance, the city and its power system are embedded in the national state system. In the era of globalization, state foundational institutions define basic contents of city and state relations, and state basic institutions regulate the regime of city. The transformation of state institution causes changing roles of city and state, and induces the transition of city and state relations. Due to changes in state governance, the model of city and its governance has transformed to adapt to the process of globalization. And the adjustments of national urban policies are the most direct instruments of nation-state to intervene into urban affairs and regulation city and state relations.

In the scale of nation-state governance, the state is inextricably linked with cities. There is one side of conflicts as well as the other side of interdependences in city and state relations. The massive urbanization and the rise of global cities have brought challenges to nation-state governance, and the growth of city power has formed huge pressures for states. However, cities become increasingly important to state governance, since they provide political space for state governance and support the transformation of state governance and the production of new state space under the process of globalization.

In the scale of global governance, there is not an opposite relationship between city and state. They exist in both conflicts and interdependences. Nation-state could not dispel the roles and functions of global cities in the process of global governance. Global cities could not completely replace the role of nation-state in global governance.

The paper concludes that there is a tension between the city and the state, that is, the city and the state presents not a simple "zero-sum" relationship between life and death, but a dialectical relationship full with conflicts and interdependence. In this dialectical relationship, the city and the state relations will move towards a "politics of scale" in the future. Cities, states and their governance are permeated by much of the strengths from multi scales, while they are also involved in the governance of other scales.

The paper contributes to academic debates on urban governance, urban development and city power in the era of globalization. City/State relations is an important theoretical approach to promote the development of urban politics and urban governance studies, enlarge the view of state theory and state governance research and innovate the studies and theories of global governance.

**Key words:**

City/State Relations; Politics of Scale; Urban Governance

## How Spatial Statistics and Multilevel Modelling Benefit Urban Studies—an Illustration of Modelling Neighbourhood Satisfaction in Beijing

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### Abstract

With the increasing availability of fine-grained geographical data (even geo-coded individual data) and their wide use in urban studies, analytical tools that can properly take into account both the spatial nature (correlations/interactions and heterogeneity across space) and the multiple-scale nature (e.g. individuals nesting into urban local contexts) underlying the data under investigation are in great need. Spatial statistics provides a valuable tool to accommodate spatial effects including correlations and heterogeneities across local contexts where individuals reside while multilevel modelling can suitably capture the multiple-scale structure and the subsequent correlations between individuals amongst the same neighbourhood. However, neither of these two approaches could model spatial effects and group dependence simultaneously. This study develops an innovative and flexible Bayesian spatial multilevel modelling approach by integrating spatial statistics and multilevel modelling, which can simultaneously model spatial correlations, heterogeneous regression coefficients and group dependence. This approach is applied to examining residents' satisfaction with neighbourhood environments, drawing on a large-scale household satisfaction survey in Beijing. In particular, we investigate the impact of a variety of homeownership types on neighbourhood satisfaction, finding that the impacts of homeownership on satisfaction vary significantly in different neighbourhood contexts and spatial locations.

### Key words:

spatial statistics; multilevel modelling; heterogeneity; neighbourhood satisfaction; ownership

## How to Draw a Neighborhood? The Potential of 'Big Data' for Understanding Urban Neighborhoods

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### Abstract

How to draw and define neighborhoods, or spatial regions in general, has been a long-standing focus in the discipline of Geography, both from a more theoretical standpoint ('what is a neighborhood') as well as a methodological perspective ('how do you delineate neighborhoods'). This paper examines the latter perspective, often referred to as regionalization, with an empirical study of (perceived) urban neighborhoods in New York City. It reviews and contextualizes current approaches to regionalization by both tracing its historical foundations as well as assessing parallel-but-related approaches from the field of Social Network Analysis. I argue that methodological advances in both fields, combined with abundant computing resources and the affordances of Big Data (e.g. spatio-temporal granularity; relevance of data to spatial perception and mobility), allow for a less 'naïve' approach to regionalization. Such an approach acknowledges fuzziness, overlapping and nested regions, and the possibility of different sets of neighborhoods existing for different population groups. In short, this provides a quantitative approach to analyzing urban neighborhoods that is in line with social theories of space. This paper applies the map equation framework (Rosvall et al. 2010) to a dataset consisting of all geotagged tweets sent between July 2012 and July 2015 from the New York City metropolitan area. It shows how urban neighborhoods exist at different scales, at different times, and for different groups of people and argues that such an approach might provide more apt analytical units for subsequent spatial analyses than conventional-but-arbitrary administrative regions troubled by, for example, MAUP.

### Key words:

urban geography; neighborhoods; big data; network analysis; GIS

## Integrated Approach for Smart City Index Development: From Concept to Indicator Weighting

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### Abstract

Smart city (SC) initiatives are the new mega-trend in urban developments. Multifold concepts and frameworks have been proposed to interpret what constitutes smart cities, but have not yet reached a universal consensus. This study aims to propose a new conceptual framework for smart cities with an integrated index for better understanding and practical implementation of SC projects. The conceptual framework is proposed after reviewing SC literature under policy analytical method. Based on that, an index consisting of six domains, 18 aspects and 36 supporting indicators is proposed. The analytical hierarchy process (AHP) was applied for indicators weighting for prioritization or KPI selections. This study would contribute to more insights in understanding smart cities and their evaluation for policy makers, academia, urban managers and practitioners.

### Key words:

Smart city index; Smart city concept; Smart city framework; Indicators; Analytical hierarchy process

## Power and Centrality in a Multiplex Network Perspective

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### Abstract

So as to highlight the role of Global cities in global urban system, many previous studies distinguish between power and centrality (Taylor et al., 2001, 2013; Alderson & Beckfield 2004; Wall 2009; Bellwald & Rozenblat, 2016). However, they consider monoplex networks, with a single type of node, relation and spatial dimension. This presentation aims at going further, considering proximities between actors or communities of actors (firms, research institutes) in a three dimensions' network that takes into account three kinds of proximity: geographical, social, and cognitive (Boschma, 2005).

We propose to extend the analysis of centrality and power to this multidimensional network in order to clarify how these three dimensions shape urban networks evolution and redefine the role of cities in globalization.

The empirical analysis had been undertaken at the world scale on the network of the 3,000 first multinational firms and their 800,000 direct and indirect subsidiaries (ORBIS-IGD, 2013), combined with their co-patenting network (OECD-Regpat, 2013). Within this three-dimensional network, geographic distance comes into play via the localisation of firms, institutional and social distance occurs in financial relations and cooperations for patents between firms, whereas cognitive distance occurs at the level of the type of activities the firms develop. The confrontation of the three dimensions allows 1) evaluating the role of spatial proximity against the two other proximities and 2) giving new insights about the capacity of cities to concentrate different communities (social distance) and different knowledges and activities (cognitive distance).

### Key words:

System of cities; network centrality; multidimensional; multinational firms; patent

## Queering Critical Urbanism: A Case Study of Habitat III

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### Abstract

Critical urban theorists have provided a rich framework for analysis of the city, especially the great challenges of 21<sup>st</sup> century urbanism. They have given new insights about slums, sustainability, security, and infrastructure. Critical urbanism also has enabled scholars to consider the power/knowledge frameworks within urban design and planning. The approaches to understanding the urban form provide an opportunity to critique an important moment within urbanism, which is the formation of the “New Urban Agenda” that will be launched in Quito, Ecuador in October 2016 by UN Habitat. The agenda will establish the general plan for world’s cities for a twenty-year period, until 2036. At this point nearly 2/3 of the global population will be urban. Critical urban they allow us to consider how inequities and inequalities are embedded within the New Urban Agenda. However, critical urbanism has a fascinating theoretical silence in that it does not include perspectives from feminist theory and queer theory. While scholars have engaged in queering the city by finding a place for queer actors in the city, it has yet to engage the critical (as in theory) perspectives generated by queer theory in the study of the city. This paper attempts that theory by using queer theory to undertake a critical analysis of the making of Habitat III.

### Key words:

queer theory; critical urbanism; Habitat III; urban planning

## Revealing Spatial and Temporal Scales in Landscape-based Design Approach for Fast Urbanizing Deltas: Pearl River Delta as a Case

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### Abstract

Urbanizing deltas are complex systems that influenced by both natural and artificial forces in various scales of space and time. However, the knowledge of the two dynamics lack a well connection in each scale. This study aimed to understand the mechanism of urbanizing delta with an inter scaler perspective. The study use mapping to illustrate the connection between the natural and human dynamic. It applied the method in the Pearl River Delta to identify spatial problems and potentials. The developed two series of maps indicated an unsustainable phenomenon during the past decades' urbanization process. Despite of the descreas of the flood risk in local scale, the shwift from a water-based landscape oriented pattern towards a land-based trasit oriented urban pattern has increased the flood risk in delta and regional scale. Such development mode would led to a more vulnerable urban pattern in the region from both flood and storm water. This study suggested that the potentials of solving scale disorder could be found across various levels of spatial scale with a focus on synchronizing the balance among the landscape, infrastructure and occupation subsystems. This study provided a graphic temporal- spatial scalar approach to organize, understand, analyse and design the different types of dynamic in urban region and its connected landscape. These insights would provide theoretical and methodological support in landscape based planning and design. It also would help to establish an effective communication for urban and regional planning among decision makers and specialists from different disciplines.

### Key words:

Landscape; urban planning and design; infrastructure; scale; system; research by design; Pearl River Delta

## The Evaluations of Vitality of the Commercial Centers in Shanghai Based on Big

### Data

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### Abstract

Cities in China have transformed from production cities to consumption cities. The prosperity of retail embodies in the vigorous development of the city commercial centers. Based on the Big Data of mobile phones, rail transit, real estate price and pos machine, this paper evaluates the vitality of the city and regional commercial centers in Shanghai from four perspectives: people, real estate, service scope and consumption. It is found that traditional commercial centers are still strong while emerging commercial centers have risen rapid. The commercial centers which have superior geographical condition, good traffic service and higher Fars are more competitive. As many new commercial centers finish construction and are put into operation, the pattern of commercial centers in Shanghai would have new characteristics.

### Key words:

commercial centers; Big Data; Shanghai

## The Spatiotemporal Pattern of Urban Expansion in the Colombo Metropolitan Area, Sri Lanka

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### Abstract

The critical understanding of spatiotemporal pattern of urban expansion has become a key phenomenon to address a wide range of socioeconomic and environmental issues, related to the urban environment. In this study, the spatiotemporal pattern of urban expansion of the Colombo metropolitan area (CMA), the largest and only metropolitan area of Sri Lanka, was examined. A newly developed methodology based on remote sensing and Geographic Information System (GIS) tools and techniques, was employed for the conceptualising and quantification of urban expansion. Specifically, Landsat imageries and available maps were used to produce the urban land use (ULU) maps of three time-points (1992, 2001, and 2014). In doing so, the neighbourhood characteristics based morphological spatial pattern analysis (MSPA) and hybrid (pixel/object-based) image classification methods were integrated. The urban expansion was examined and compared during the initial urban expansion stage (1992-2001) and the secondary urban expansion stage (2001-2014) using the annual ULU change intensity concept. The spatiotemporal pattern of urban expansion was captured using three indicators, namely infill development, urban extension, and leapfrog development. The annual urban expansion intensity was calculated based on these indicators, in order to capture the urban expansion quantitatively. The results revealed that the ULU change intensity and urban expansion intensity of initial stage were lower than the secondary stage while the leapfrog development pattern is significant than the infill development and urban extension. Further, the present study improved the methodological and conceptual aspects of urban studies by expanding our knowledge and understanding of urban dynamics in the CMA.

### Key words:

Colombo metropolitan area; urban expansion; morphological spatial pattern analysis; hybrid classification

## Evaluate the Three-dimensional Urban Morphology Evolution by Fractal Dimension: a case study of Yangzhou City, China

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### Abstract

With rapid urban development in China in the recent two decades, the three-dimensional characteristic has been the essential feature of urban morphology. However, the research of urban fractal dimension still remains focused on the two-dimensional space, few studies have been conducted from a 3D perspective. In this paper, a three-dimensional box-counting method is proposed to estimate fractal dimension of urban form. Moreover, a method based on the second-order derivative of log-log curves is used to automatically identify the fractal scale-free range. The central urban area of Yangzhou city is selected as the case area. Three high resolution remote sensing images of 2003, 2008 and 2012 are used to acquire Yangzhou three-dimensional morphology data. Then based on the data, the detailed process of the three-dimensional box-counting method is described. The experimental results show that: the scaling range is the basis of calculating city fractals, the second-order derivative method can automatically identify fractal scale-free range accurately; The linear regression coefficients of scale-free range  $R^2$  are all over 0.996 in the three years, which demonstrates that Yangzhou three-dimensional morphology is fractal; The fractal dimension of urban morphology has increased significantly in 2012 compared with that in 2003 and 2008, which indicates that the utilization of 3D spaces become more efficient and compact; The three-dimensional box-counting algorithm proposed in this paper not only provides a new methodology in quantifying the measurement of urban spatial structure and the evolution of urban morphology, but also extends the scope of urban studies to higher dimensions.

### Key words:

Fractal Dimension; three-dimensional box counting method; scale-free region; urban morphology

## Evaluation and Comparative Analysis of New-Type Urbanization Quality: from Chongqing, China's data

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### Abstract

Based on the understanding of the essence of new-type urbanization, this paper has proposed an evaluation index system for new-type urbanization quality, which has consisted of development level and efficiency. The index system has contained 9 major primary indexes, including population urbanization, land urbanization, industrial urbanization, economic growth mode, resource utilization rate, social development quality, urban system layout, regional development relationship and ecological environment quality, as well as several secondary indexes. In order to verify the index system, this paper has also made use of the data in statistic yearbook during the past few years. By employing the analytic hierarchy process (AHP) to evaluate the development quality of the urbanization in Chongqing City, this paper has also conducted a horizontal comparison of urbanization development quality between Chongqing and other major cities and found that the new-type urbanization in Chongqing still need to be improved rapidly. Although Chongqing still far lags behind other major cities, it has already achieved a fair level of coordination between development elements of urbanization and resource urbanization mode and ecological environment. In order to further improve the development quality of urbanization in the future, more efforts in the form of constantly transforming development mode, optimizing element layout and urban system as well as promoting the coordination of urban and rural development should be made. On the whole, the path of new-type urbanization that is in line with the actual condition of regional development and featured by the local advantage should be laid down.

### Key words:

Urbanization; New-type urbanization; Urbanization quality; Regional development



## Evaluation and its Spatial and Temporal Evolution of Urban Competitiveness: A Case Study of Vice Provincial Cities

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### Abstract

The research of urban competitiveness has been the focus and hot spot of domestic and foreign scholars and the 21st century is the century of the city. This paper takes 15 vice provincial cities as the research object and sets up the evaluation index system of urban competitiveness in 15 vice provincial cities based on economy, innovation, infrastructure, opening level, and environment. Based on entropy TOPSIS method, this essay analyzes in depth the spatial and temporal characteristics of the 15 vice provincial cities. According to the analysis result, the basic points of view are obtained as follows: From the perspective of the time alignment, the gap between cities has changed all the time and there is a shrinking trend among cities. The spatial distribution of competitiveness level presents the change pattern which descends from southeast coastal cities to the northeast. However, the development of the region gradually tends to be balanced.

### Key words:

Urban competitiveness; spatial and temporal evolution; vice provincial cities

## Green Space Accessibility Evaluation in Shenyang Based on the Gridding Cells Gaussian 2-Step Floating Catchment Area Method

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### Abstract

It is crucial important to configuration of public service facilities on a city's modernization. Space accessibility is one of the methods of reasonable measure of public service facilities configuration. In many research methods, the 2-step floating catchment area (2SFCA) method is relatively straightforward, whilst the greatest strength of the method is it overcomes the restriction of using only pre-defined regional boundaries. In this paper, we use the gridding cells Gaussian based 2-step floating catchment area method for green space accessibility assessment. Meanwhile, it offers an in-depth knowledge of green space of Shenyang. The results showed that: (1) As a whole, high accessibility of the inner city, low accessibility of outer suburbs in green space of Shenyang. (2) High accessibility value area are mainly distributed in the five boroughs meanwhile Low-value area are mainly distributed in the core city and the urban north and south of the country (3) According to the accessibility results, this study puts forward some suggestions about the optimization of spatial. The method of the real, objective reflects the accessibility of green space in Shenyang

### Key words:

2-step floating catchment area method; GIS gridding cell; green space accessibility

## Modeling the Range Anxieties on the EV Mode Choice Behavior

### A field survey in Dalian

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#### Abstract

Although electric vehicles (EVs) should be able to meet most daily travel needs, the perception of limited mobility resources is still a barrier to EVs usage. How travellers trade off the uncertainty due to EV range anxiety and the uncomfortable trip by public transport mode?

How range anxiety prevents travellers from using EVs to various destinations, including workplace, recreation and visiting friends? The goal of this study is to provide a quantitative analysis on the range anxieties, that is, to what extent that travellers will have to give up private EVs under the assumption that only EVs and buses are available for choice. A questionnaire survey was conducted in Dalian, China. The binary logit model was used to examine how the EV conditions and driving environments contribute to travellers' green mode choice through totally 551 questionnaires. In addition, in order to investigate use behavior, remaining capacity, travel distance, range anxiety (theoretical remaining range divided by travel distance), whether vehicle can be charge during the remained trip, travel expenses and travel time are taken into considerations to compare the utility of travel between EVs and buses.

#### Key words:

Range anxieties; EV usage; charging uncertainties; SP survey; binary logit model

## Simulation of the Yellow Sea Urban Pattern Based on BDI Decision MAS-CA Model: A Case Study for Dalian Jinshitan

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### Abstract

Based on BDI decision MAS-CA model to simulate the Jinshitan of Dalian urban landscape pattern simulation forecast in the future. A BDI agent is a particular type of bounded rational software agent, imbued with particular mental attitudes, viz: Beliefs, Desires and Intentions (BDI). BDI decision MAS-CA model Simulation modeling is divided into three steps:(1) the CA part of the model (modeling of land use geographic distribution), (2) in the model of MAS (part of multi-agent and behavior modeling, the BDI decision affects the multi-agent behavior),(3) the combination of models (the agent behavior and the relationship between land use spatial distribution modeling between).MAS-CA model rely on the 1998, 2003, 1998 and 2013, four years of land use data to make predictions. In essence, the belief–desire–intention software model provides a mechanism for separating the activity of selecting a plan (from a plan library or an external planner application) from the execution of currently selection plans. Consequently, BDI agents are able to balance the accuracy spent on deliberating about plans (choosing what to do) and executing those plans (doing it). MAS-CA model in 2020 and 2030, urban area, the results Kappa coefficient reaches 0.635. From the simulation results can clearly show that:

(1) BDI decision making characteristics: guidelines for flexibility, fill the deficiency of MAS model. After joining BDI decision making MAS-CA model framework will be improved. Thus makes the results more accurate and current situation close, precision reaches 89.1%.

(2) The Jinshitan urban landscape pattern simulation results present the attached coastline and the pattern of traffic line. Urban landscape simulation pattern results to the coastline, urban land use and urban area in the central area were concentrated obvious expansion into the surrounding area. Convenient transportation, and so did the human activities, make traffic developed area and coast area gradually become the focus pattern of urban development. In the change pattern of urban where Putaogou village, Hejuzi village, Miaoshang village, Shizijie village, what change of urban transformation is the largest.

(3) From Jinshitan future urban landscape pattern transformation in the process of simulation and found that the coastline factors led urban landscape change of direction. We try not to make sure don't damaged the ecological environment. The government of Jinshitan should take long-term planning in developing economy looking for a point of balance the weight of the development and the environment.

### Key words:

multi-agent; cellular automation; BDI decision; land-use change; simulation

## Study on the Influencing Factors and Spatial Distribution of Electronic Commerce

### Development Level in China's Cities

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#### Abstract

In the last decades, with the improvement of the public's awareness of shopping on line, development of economy, supported by the highly developed logistics and policy environment, the electronic commerce is developing rapidly in China, which is increasingly more and more important for social life and daily consumption of urban residents. Based on the data of E-commerce Development Index of 294 prefecture-level cities in China, which can reflect the level of e-commerce development, provided by AliResearch institute of Alibaba Group, this paper aims to reveal differences in the spatial distribution characteristics of the major cities and the factors influencing their development level, by means of using a comprehensive method of spatial analysis, Zipf theory and multiple regression. According to the research, three highlights are unveiled: (1) Overall the development of China's cities e-commerce is still at a low level, which shows the significant regional differences, with the eastern coastal cities higher than those in the western inlands. (2) The distribution of e-commerce level obeys to the Zipf principle at provincial level, showing obvious equilibrium distribution, while the fractal structure is more complicated at city level. The e-commerce level in provincial cities and municipalities is mostly in either low shopping and less enterprises or high shopping and more enterprises, showing a clear polarized situation. The cities' e-commerce level features significant spatial agglomeration globally and locally. (3) The results of multiple regression show that the e-commerce level is highly relevant to the population size, education, informatization degree and information infrastructure.

#### Key words:

e-commerce level; spatial distribution; influencing factor; China

## The Construction of Space-behavior Interaction Theory

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### Abstract

It is growing to be the significant mission for the behavioral schools of geography to construct a generalized theory explaining the interaction between space and behavior. It is also an urgent realistic demand for current urban development and transformation in China to summarize the conceptual model and explanatory model of space-behavior interaction combined with China's reality. Firstly, this study builds the theoretical foundation of space-behavior interaction research which takes social-space theory as epistemology, behavioral geography and time geography as methodology, activity-based approach as practical theory. Secondly, as for the research paradigm, the study argues the space-behavior interaction research needed to combine the place-based paradigm and people-based paradigm, facing current situation of China's urban development. Then this study makes an innovative attempt to construct a framework for space-behavior interaction theory. It needs to carry out research on spatial effects on behavior and behavioral effects on space to construct a generalized space-behavior interaction theory. On this basis, the diversity and similarity of space-behavior interaction in various cities, the trends and dynamics of spatial-behavioral interaction in different periods of time, the distinctiveness of various population segments, need be testified to improve the theory construction. This study provides foundation to space-behavior interaction theory, indicates directions to the summary and comparison of the space-behavior interaction patterns of different Chinese cities, and promotes the establishment of the Chinese urban space research paradigm based on behavior.

### Key words:

space-behavior interaction theory; time geography; behavioral geography; urban space; space-time behavior

## The Formation Mechanism of Urban Spatial Fragmentation

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### Abstract

The rapid development of China's urban constantly pushes the external expansion and internal restructuring of urban space. The spatial fragmentation of urban about ecology, economy and society has become an important characteristic of transition in big cities' space evolution, and along with it is a series of negative effects. Realizing the effects and formation mechanism of city spatial fragmentation is a critical issue for urban geography. This project aims to exploring the concept and connotation of urban spatial fragmentation with the general thought of "connotation-definition, phenomenon analysis, mechanism-exploration, and regulation-mechanism" with multidisciplinary integrate analysis prospective. With the methods of GIS technology in-depth analysis of Geo-informatic Tupu model and geoscience knowledge, which summed up the scientific laws. By combining the traditional evaluation method with the scenario analysis, the comprehensive evaluation of the fragmentation effect is realized by the fragmentation curve. Taking Changsha as a case study area, based on the empirical study, the level of urban spatial fragmentation and spatial effects are measured, and the formation mechanism is discussed from three aspects: the influence factor, the evolution rule and the driving mechanism.

### Key words:

urban space; urban spatial fragmentation; formation mechanism

## Urban Space Growth Based on GIS and Cellular Automation

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### Abstract

With the rapid progress of urbanization, the urban problems and phenomenon have a profound influence on economic, social and environment. Therefore, the complexity of urban space expansion process has been attached academics and government regulators widespread concern and attention. In this paper, we combined with geospatial data, statistical surveys, cellular automata and geographic information systems technology, take urban three-dimensional system as the research object, explore urban three-dimensional space characteristics and internal spatial effects, and build up a three-dimensional space urban growth model. Finally, we based on the urban growth trend and simulation results to predict the complexity of future urban space expansion and provide the quantitative analysis and suggestions for urban planning.

### Key words:

urban three-dimensional space; expansion features; driving forces; simulation; urbanization

## C12.39 Urban Commission: Urban Challenges in a Complex World

Technological Innovations, Creative Activities in Cities,  
Innovative and Smart Building and Transportation in Cities



Home

### Oral

1. [Advocating the Relevance of Open Source Smartphone GIS as an Emerging Technology in Managing Urban Solid Waste](#)  
Dhritiraj Sengupta; Dr. Arun Das (Department of Geography, University of Mysore, India)
2. [Chrono-Urbanism for Harmonious Cities](#)  
Luc GWIAZDZINSKI (UMR PACTE 5194 CNRS, France)
3. [Combination between Big Data and Small Data: A Case Study on Spatial Development and Influence Factors of Catering Industry in Nanjing Main City](#)  
Xiao Qin; Feng Zhen (Nanjing University, China)
4. [Creative City Strategy: Externalities of Creative Industry Clusters on Urban Redevelopment and Branding in Shanghai](#)  
He Jinliao; Xianjin Huang (Nanjing University, China)
5. [Does Regional Technological Innovation Decrease or Increase Income Inequality? Evidence from China](#)  
Quanen Guo; Bindong Sun (Center for Modern Chinese City Studies, East China Normal University, China)
6. [Evolution of Smart City Concept and Its Economic Performance: A Study of Cities in Telangana State, India](#)  
Ashok Kumar Lonavath; Karunakar Virugu; Sathish kumar V (Osmania University, India)
7. [Related Variety, Global-Local Linkages and Urban Innovation Performance](#)  
Wang Junsong (East China Normal University, China)
8. [Spatial Changes and Reconstruction of Taobao Villages in the Internet age: a case study of Lirendong Village](#)  
Tingting Chen; Si Yang (Sun Yat sen University, China); Zongcai Wei (The University of Hong Kong, HongKong SAR, China)
9. [Temporal-Spatial Pattern Evolution of Knowledge Intensive Business Services in the Inner City: A Case Study of Baoding](#)  
Zhou Lin; Shen Tiyan (Peking University, China)

10. [The “Mobile Banking for Community” — Activation Paths for Neighborhood in Modern Cities](#)  
Ye Yuanyuan (South China University of Technology, China), Liu Yuting (South China University of Technology, China)
11. [Urban Managers’ Smart City Related Technological Innovations’ Adoption and Utilization in Developing Country-Nigeria: An Exploratory Study](#)  
Raimi Asiyabola (Olabisi Onabanjo University, Nigeria)
12. [“Zhongchuang” Space in Urban China: Innovative or Entrepreneurial](#)  
Feng Zhen; Xiao Qin (Nanjing University, China)

## Poster

1. [Future Development of Urban Environment in Russia and Global Trends](#)  
Nina Alekseeva; Julia Greenfeldt; Oxana Klimanova (Russian Fed, Lomonosov Moscow State University)
2. [Internal Spatial Structure of Intercity Scientific Networks in China](#)  
Haitao Ma (China, Institute of Geographical Sciences and Natural Resources Research, CAS)
3. [Research and Practice on Qingdao Offshore Weather Forecast Service Platform](#)  
Sun Yong (China, Geomatics College, Shandong University of Science and Technology); Jin Fengxiang (China, President Office, Shandong Jianzhu University); Ji Min (China, Geomatics College, Shandong University of Science and Technology)
4. [Research on Creative Industry Parks’ Spatial Evolution and Urban Space Reconstruction in Shenzhen](#)  
Jie Duan (China, School of Economics, Shenzhen University)
5. [Research on Entrepreneurship Environment of University Students in Shanghai](#)  
Lu Zhang; Chengyun Wang (China, Shanghai Normal University)
6. [Research on innovation Spillover Distance of Industry University Research Cooperation in Yangtze River Delta](#)  
Lijun Chen; Chengyun Wang (China, Shanghai Normal University)
7. [Spatial Pattern and Locational Model of Shanghai Innovative Industry: An Analysis based on Enterprises and Postcode Areal Data](#)  
Yang Fan (China, East China Normal University)
8. [The Analysis of Spatial Convergence for High-tech Industry Innovation Performance in China](#)  
Zelei Xiao; Xinya Du (China, Hubei Institute of Economic and Social Development)
9. [The Research on the Regional Difference, Evolution and Convergence of Innovation Capability of](#)



## China — Based on the Level of Space and Factor

Zelei Xiao; Shao-hua WANG; Shao-peng ZHANG (China, Hubei Institute of Economic and Social Development)

## Advocating the Relevance of Open Source Smartphone GIS as an Emerging Technology in Managing Urban Solid Waste

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### Abstract

Mounting pressure on urban center with a large population gathering at a point base dwelling has become a serious matter in urban waste management. Especially when this per capita solid waste generated is going through an increasing trend. The city administrative bodies are out of gear to manage the disaggregated waste dumped in the nooks and corners of the urban centers. The issue in such type of urban maintenance is locating the extract point of waste dumps and channelizing the flow of its collection. Lack of data about waste dumping points can be overcome by open source GIS wherein each individual of the society will be a part of the management system without actually involving them directly either by time or physical strain. This paper showcases a systematic approach on why and how to implement mobile based open source mapping through which every citizen can be helpful to manage one such issue of solid waste management.

### Key words:

Open source GIS; community participation; urban maintenance; mobile GIS; solid waste management

## Chrono-Urbanism For Harmonious Cities

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### Abstract

The temporal dimension of the cities has been neglected by planners and town councillors with inversely proportional intensity to its importance. It constitutes an essential aspect of urban activity, yet until now, urban planning has always focused on arranging space to use time better. Counter-efforts that consist of time-based planning with an effect on the occupation of space are few and far between.

Everything can change with the development of information technology and communication. The transformations of everydaylife compel too this development of tools for a chronologically-based urbanism. This paper proposes to integrate the concept of time in thinking about the smart city. From work carried out in several cities in Europe, we will examine the methods of collecting this information and spatio-temporal patterns of developed cartographic representations.

We examine the first design uses space-time. They require reflection on the dynamic character of a “malleable city”, in addition to the versatile nature of space and the built environment in relation to the time of day, the day of the week, or the year. This type of reflection on smart and sustainable cities attempts to limit the consumption of space, reduce energy use, and maintain urban intensity with its attendant social life.

### Key words:

harmonious cities; chrono-urbanism; time-based planning; cartogrammic representations

## Combination between Big Data and Small Data: A Case Study on Spatial Development and Influence Factors of Catering Industry in Nanjing Main City

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### Abstract

The appearance of big data has led to hot topic in urban studies based on residential behaviour and activities and also promoted a reform of traditional methodology based small data in China. However, many faultinesses or limitations of big data (e.g., almost young individuals of Internet data, non-shared data in some critical areas, correlation preference) drive urban scholars to have to reconsider the role of small data. This paper believes that the small data will not lost its value in the big data era, on the contrary, should be fully combined with big data to solve gradually complicated urban problems and meet residential requirements in the future studies. Therefore, we need to explore the specific methods of combination between big data and small data, which are rarely seen in previous studies. Our paper will take Nanjing main city (China) as a case to analyze spatial development and influence factors of catering industry to discuss that combined methods. Firstly, we will collect the big data about restaurant comments of residents and locations from the website of Dianping.com, a third-party platform for restaurant comment. Second, we will build an index system to calculate the popularity of all restaurants to simulate their spatial distribution characteristics by using factor analysis and nuclear density analysis. Thirdly, we will sample a part of restaurants based on above analysis and use regress model to find the relationships between the restaurant popularity and some independent variables (e.g., price, dishes, environment, services, brand, location, transport).

### Key words:

big data; small data; combination; restaurant popularity; Nanjing main city

## Creative City Strategy: Externalities of Creative Industry Clusters on Urban Redevelopment and Branding in Shanghai

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### Abstract

While the creative economy plays an increasingly important role in today's globalized economic system, place-based strategies for attracting creative industries and talents are widely applied by cities within different socioeconomic contexts over the world. Though present creative city policy is more or less inappropriately implemented by such 'entrepreneurial governments', contributing limitedly to stimulating creativity in cultural production, there are significant externalities that creative industry districts have on urban redevelopment and branding. This is particularly applicable for Chinese cities where dramatic urban reconstructing is taking place; local city identities are getting even more indistinct because of a demolition-based urban redevelopment approach in China. This case study suggests that Shanghai's creative industry clusters (CICs) provide a sustainable mode for urban regeneration in China. First, it was found that creative industry clusters in Shanghai tend to reuse old constructions, and thereby reserve the architecture heritages which nearly become extinct in modern urban China. Moreover, creative industry clusters have a great positive impact on urban renewal and place branding by producing abundant unique urban landscapes and landmarks. Finally, it indicates that creative-city-image of Shanghai was generally perceived among external visitors and local residents within these creative industry districts owing to a beautification effect of creative industries.

### Key words:

Creative industry clusters; city image; place-making; urban branding

## Does Regional Technological Innovation Decrease or Increase Income Inequality?

### Evidence from China

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#### Abstract

Literatures on the relationship between innovation and income inequality mainly focused on USA and European regions, but it is also necessary to analyze that in China, which is the largest developing country, whether the innovation should be responsible for the striking income inequality. In this article, the authors examine the link between innovation and income inequality across Chinese city regions within 2004-2012 periods. A nonlinear relationship between innovation and income inequality is observed in our research. Also, these results are robust using the other measurement of income inequality, threshold effect models and investigations across regions. We then conclude that the innovation is one solution to decrease the income inequality. We propose that cultivating the low-skilled labor's innovative capabilities, increasing the inputs of innovation activities and overflowing innovative elements from the eastern region have moderated effects on the income inequality.

#### Key words:

innovation; income inequality; labor; nonlinear relationship; China

## Evolution of Smart City Concept and Its Economic Performance: A Study of Cities in Telangana State, India

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### Abstract

Everyone is aware that modern cities are performing more and more of services necessary to the functioning of society. There is awareness that the vital services are not performed in the same proportions by all cities. Almost every geographer would identify Detroit as a manufacturing city, Glasgow as a port city, Manchester as Industrial city and Beijing as a Trading center there by indicating that one city does more than its share of manufacturing another provides trade and few facilitates the market for the finished goods.

Perhaps this classification is done more by faith or intuition than on the basis of exact knowledge. At what point does an economic activity become more important enough in the city to be of special significance? Can criteria be devised that will determine which city should be labeled manufacturing or trade cities and centers for market?

Telangana is the 29<sup>th</sup> state of Indian union with 3,50,03,674 population and 38.12% urban growth. Around 30% of the urban population is residing in the capital city of Hyderabad. The total number of cities during 2011 census was 160. The economic activity is the main cause for the city growth. Standard deviation procedure applied for city classification. These cities with strong economic potential have great scope for rapid development by using innovative technology and there by rising as creative centers have made them to emerge and transform as smart cities. It is the purpose that this paper presents a methodology that will form a basis for such classification.

### Key words:

Modern Cities; Economic Activity; Smart Cities; Innovative Technology



## Related Variety, Global-Local Linkages and Urban Innovation Performance

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### Abstract

The paper intends to explore how related variety and global-local linkages related variety affect urban innovation abilities in China using prefecture level city-industry data from 2003 to 2010. The results show that urban innovation abilities benefited from spillovers of the related variety or complemented variety; it is related variety rather than unrelated variety that promote the urban innovation performance. The paper also explores the effect of relatedness of global-local linkages on urban innovation abilities, then we found that the city with external linkages, and in which the foreign sectors and local sectors have close linkages but not the totally the same have the best innovation performance, which demonstrates that the extra related knowledge linkages promote regional and collective learning.

### Key Words:

Related variety; Global-local linkages; Innovation; Urban; China

## **Spatial Changes and Reconstruction of Taobao Villages in the Internet age: a case study of Lirendong Village**

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### **Abstract**

In the era of 'Internet+', E-commerce as a new economic activity, has profoundly changed the traditional way of life and production in the rural areas, and created rural e-commerce industry and spatial agglomeration - Taobao Village - with Chinese characteristics. Taobao Village promotes the reconstruction of spatial form and industrial pattern in the rural areas, and provides a possible new alternative of rural urbanization in the Internet age. This paper utilizes Lirendong Village as a case study to explore its spatial changes and restructuring as well as its mechanism for the 'Internet+' age. The findings show that Lirendong Village has experienced three stages of spatial changes: "Industrialization - Business Transformation - E-commerce upgrade". Moreover, the spatial transformation of Lirendong Village has experienced from a "core - periphery" trajectory that is original, single, and chaotic space to a more diversified, agglomerated, multidimensional space with new vertical and horizontal spatial characteristic. Last but not least, given the development of E-commerce, the forces of social network organization of hometown friends and the government-led transformation of spatial transformation have driven the spatial changes and reconstruction in the rural areas. The research provides some suggestions and strategies for realization of the new urbanization of villages.

### **Key words:**

Spatial changes; Spatial reconstruction; Taobao village; Internet age; Lirendong Villag

## Temporal-Spatial Pattern Evolution of Knowledge Intensive Business Services in the Inner City: A Case Study of Baoding

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### Abstract

Full implementation of innovation-driven development strategy has been regarded as the key point of industrial structure upgrading in many cities in China. By using multiple analysis methods such as standard deviational circle, kernel density estimate, nearest neighbor hierarchical spatial clustering and space syntax, this paper examines the spatial and temporal pattern of knowledge intensive business services (KIBS) in Baoding, the first demonstration city of innovation-driven development strategy in China based on the enterprise data of the second (in 2008) or third (in 2013) economic census. The results show that, first of all, as far as the overall development situation is concerned, the KIBS enterprises have become more spatially diffusion and distribute along northwest to southeast orientation from 2008 to 2013. While, the different types of enterprises show some differences in the range in diffusion and change in direction. Second, considering the block structure, the KIBS enterprises have significant characteristics of spatial concentration and remarkable differentiations on both side of Beijing-Guangzhou railway. Among them, financial service and sci-tech service enterprises shows the evolution patterns of fanned extension and fill-up agglomeration. Business service and information service enterprises' evolution patterns is intensive agglomeration. The third one is related to KIBS enterprises' linear structure. The whole KIBS enterprises and different types of them have similar hierarchical systems which are gradually converging from 2008 to 2013. At the same time, the enterprises' location choices are paying more attention to traffic network's "access" ability rather than "through".

### Key words:

knowledge intensive business services; temporal-spatial pattern evolution; inner city; Baoding

## The “Mobile Banking for Community” — Activation Paths for Neighborhood in Modern Cities

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### Abstract

Neighborhood as a community based on geographical relation, has kept on changing to respond the demand of human being. Compared with ancient neighborhood with the characteristics of highly homogeneous, intimacy and stable relations, modern neighborhood turns to be more open, which has less social interaction and further triggers a variety of anti-social behaviors. This paper aims to investigate the nature and attributes of modern neighborhood, and to analyze its endogenous dynamic pattern. The paper advances multidimensional interpretation of implied “neighborhood attributes” by case study of “Mobile Banking for Community”, in which originated from community residents’ daily life, taking financial products as platform and media. The multiple participators from bank, real estate company, property management company, surrounding businesses, and local community form active interaction and a strong interest relationship, which leads to the neighborhood unit regaining its vitality and spirit. Finally, the paper puts forward some paths and measures to activate the neighborhood: 1) improve spatial proximity as the base of neighborhood relationship building, with the aid of modern scientific and technological methods such as internet, to promote neighborhood interaction; 2) multiple participators including local government, enterprises, and residents should be encouraged to join the action; benefits association should be established by combining community business and public services, so that an effective approach would identify to keep neighborhood working well with its social and economic base; 3) sequential goals and action plans should be set up to activate and cultivate the emotion and spirit of neighborhood.

### Key words:

mobile banking; neighborhood nature; neighborhood attributes; activation paths

## Urban Managers' Smart City Related Technological Innovations' Adoption and Utilization in Developing Country-Nigeria: An Exploratory Study

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### Abstract

The aim of the exploratory study is to evaluate smart city related technological innovations – Geographical Information Systems (GIS) and remote sensing - adoption issues among urban managers and examines the relationship between individual urban managers' GIS and remote sensing awareness/adoption and utilization issues. Among the research questions which the study addresses are: Do urban managers aware of GIS and remote sensing benefits and costs? Do urban managers have interest in GIS and remote sensing training/retraining programmes? Do urban managers have constraints in building their knowledge of GIS and remote sensing? Is there any relationship between the working experience and age of urban managers and their (i) interests, (ii) awareness/adoption, and, (iii) utilization of GIS and remote sensing? Is there significant difference in the urban managers (i) awareness, (ii) interests in GIS/Remote sensing training/retraining programmes, and, (iii) utilization of GIS/Remote sensing. The data for the study was obtained through primary and secondary sources. The primary data was collected through administration of questionnaires. A total of one hundred and one (101) questionnaires were administered to urban public servants in five local governments in Ibadan metropolitan area and at the Oyo State Government Secretariat in Ibadan between August and October, 2015. The data was analyzed using both descriptive and inferential statistics which include frequency analysis, Chi-Square test and correlation statistical methods. Policy implications of the findings towards enhancing human capacity building in relation to smart cities viabilities and technological innovations needs in Nigeria are discussed in the paper.

### Key words:

Urban; urban manager; urban public servants; smart city; technological innovation; geographical information system; remote sensing; human capacity building; Nigeria

## “Zhongchuang” Space in Urban China: Innovative or Entrepreneurial

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### Abstract

Recent years, some new kind of physical places in western countries such as co-working spaces, hackerspaces, maker spaces, FAB LAB and so on have got rapid spread all over the world. Although there is no standard definition for these kinds of space, lots of literatures emphasize the importance of innovation and community. As a big manufacturing country, China has also witnessed the growth of co-working/maker space from 2010. The first maker space emerges in Shanghai, and then expands to other Chinese cities. A new word is coined as “Zhongchuang” space which including co-working/maker space has got more and more attention in recent years by scholars, practitioners, enterprises and policy-makers in China. Practices of these spaces in the west countries are relatively mature. However, the theoretical research is still at the initial stage, which covers many fields include economy, management and urban studies. As a new model imported from the west, relevant theoretical research in China is also blank. Taking Beijing, Shanghai, Guangzhou and Nanjing as four cases, the paper discusses the development characteristics of “Zhongchuang” space in Chinese cities, compares the differences with the west. The paper tries to analyze the relationship between different actors, and explore the innovative/entrepreneurial model and the mechanism of collaborative process. Finally, the paper discusses the implication for policy-making in Chinese context, and gives some possible suggestions.

### Key words:

“Zhongchuang” Space; innovative; entrepreneurial; China

## Future Development of Urban Environment in Russia and Global Trends

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### Abstract

The paper reveals key features and the results of long-term foresight of the development of urban environment in Russia. The foresight was undertaken at the moment when major changes occurred in Russian economy associated with transformation of scientific and innovation policy. The foresight represented a wide coverage of issues (global, regional and national challenges, growing markets, new emerging issues and barriers, assessment of urban environment development in Russia versus leading countries of the world, etc.) and methods (surveys, bibliometric and patent analysis, roadmapping, etc.). In total some 300 experts were invited to participate in the research. Windows of opportunity for Russia in the field of urban environment that may open in medium- and long-term perspective are as follows: development of technologies for environmentally safe recycling of waste and disposal of toxic substances; wide-range use of materials with new properties and technologies, development of green construction and green infrastructure; creating super-computing technologies and information infrastructure for smart cities; effective technologies for monitoring and evaluation of urban systems; development of environment-friendly transport. According to the experts, up to 2020 the most rapidly growing markets in the sector of urban environment are as follows: environmentally-friendly materials and products and systems of prediction of natural and man-made emergencies in cities. In the long term (2020-2030) the markets of water treatment and water reuse, environmentally safe waste management, as well as the markets of recycling and finished products based on the processing of waste and wastewater can significantly increase.

### Key words:

urban environment; long-term foresight; waste management; green infrastructure

## Internal Spatial Structure of Intercity Networks of Knowledge Flow in China

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### Abstract

The Chinese urban system is experiencing a fundamental shift from constituting a size-based hierarchy to becoming a network-based system. Most recent research on the Chinese city network has focused on flows of people, material, and information, paying little attention to the significance of flows of knowledge. Using data on co-authored papers and GIS and Ucinet software, this paper visualises and analyses the Chinese city network. Whilst the city network based on scientific collaboration demonstrated an apparent hierarchy, the level of the city's external network connectivity did not maintain a significant correlation with population size and economic strength. Further, the city networks were characterised by different hierarchical clusters, and network linkage intensity was found to be unevenly distributed in China. Aiming to promote inter-city collaborative innovation and the usage efficiency of national scientific and technological resources in the context of the knowledge economy, this study supports the building an innovative country.

### Key words:

City network; knowledge flow; co-authored papers; spatial structure; China

## Research and Practice on Qingdao Offshore Weather Forecast Service Platform

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### Abstract

Qingdao is an important regional economic central city of China. It's one of the first batch of open coastal cities. The gross ocean production of Qingdao was 209.34 billion in 2015, about 22.5 percent of GDP. In order to better serve the development of marine industry, and improve the service ability of offshore weather forecast, the Qingdao marine weather forecast platform was developed to supply accurate weather information to public in time. The platform is based on SOA architecture and WebGIS technology. It implements the unified storage and management of weather data and other information, such as the data of automatic weather station, the buoy station data, Doppler weather radar data, satellite cloud image, the Titan (Thunderstorm Identification Tracking Analysis and Nowcasting) data, the forecasting data, the fishing area and the marine chart data, etc. These data are shared and exchanged with other ocean administration departments. So it can offer the real-time observable data, the weather forecast and warning, the marine traffic navigation information and so on. It can push live weather warning message to the marine departments by analysing observational data and radar echo extrapolation overlay with user location based on GIS, which will help to avoid weather disasters. The platform can provide data support and analysis tools for the forecaster, and help to publish the forecast information rapidly to public and special users.

### Key words:

Offshore Weather Forecast; Weather Warning; WebGIS; Radar Echo Extrapolation; Data Integration



## Research on Creative Industry Parks' Spatial Evolution and Urban Space

### Reconstruction in Shenzhen

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#### Abstract

Since the new century, creative industry has become a new engine for the city development with the wave of globalization and the rapid development of knowledge economy to promote the economic, cultural and social transformation. Creative economy and Urban economy interacts each other, creative space and urban space promotes each other. Creative industry park evolution relevants to the transformation of urban spatial structure; how to optimizing the transformation of urban space with the help of creative industry park evolution and how to use urban spatial reconstruction to promote the development of creative industry have become hotspots in academic. Shenzhen is the first city in China that awarded the title of "the capital of design". The creative industry develops rapidly, the spatial agglomeration of creative industry parks becomes more and more obvious. In this paper, from the breakthrough point of the evolutionary economic geography theory, deeply discusses the interactive relationship between creative industry park evolution and the transformation of urban spatial structure. First of all, this paper describes the current development situation of creative industry in Shenzhen in terms of its development scale, the degree of concentration and environment, qualitatively analyzes the spatial evolution procession of creative industry parks; then with further analysis of the maps, it summarizes the features of space distribution, concludes models of creative industry parks' spatial expansion and organizational models; finally, it qualitatively analyzes the relationship between Shenzhen creative industry park evolution and the urban spatial reconstruction from the view of economic, social, cultural and transportation and offers some suggestions to promote the development of creative industry clusters.

#### Key words:

Creative Industry Park; Urban space; Spatial evolution; Spatial Reconstruction; Shenzhen

## Research on Entrepreneurship Environment of University Students in Shanghai

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### Abstract

The Shanghai government has clearly put forward the construction of the global influence of science and technology innovation center as the future development of the strategic objectives, and further promote the public entrepreneurship, innovation, entrepreneurship and innovation to become the new engine of economic development. At present, compared with developed countries, the United States, the number of college students venture is still too small, entrepreneurial success rate is low, an important reason is entrepreneurship environment in our country are not perfect and sound, entrepreneurial culture didn't get the promotion. Shanghai as an important economic center, science and technology innovation center of China, have an obvious advantages of education resources and financing environment. This paper from the three dimensions of Shanghai government, universities and society as the entry point, making an investigation on College Students' entrepreneurial demand, entrepreneurial psychological, combining the Shanghai university students entrepreneurial situation and environment, further proposed relevant suggestions of Shanghai college students entrepreneurial environment and policies.

### Key words:

Shanghai; entrepreneurship environment; university students



## Research on Innovation Spillover Distance of Industry University Research

### Cooperation in Yangtze River Delta

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#### Abstract

Industry university research is the main way and important source of regional innovation. Based on the invention patent data of the State Intellectual Property Office

for Industry university research cooperation. This paper studied the current situation of the Industry university research in Yangtze River Delta as well as the distance of knowledge spillover, the direction of knowledge flow and its evolution characteristics are compared and analyzed by using the Kernel density estimation and network structure analysis method. The results showed that: ①The number of the patent for Industry university research cooperation Continued growth. ②The patent of Industry university research cooperation is not necessarily a positive correlation with the number of knowledge spillovers. ③The regional spatial distribution of the patent of Industry university research cooperation and the distance of knowledge spillover are different in different industries.

#### Key words:

YRD; IURC; Innovation spillover distance; Invention patent

## Spatial Pattern and Locational Model of Shanghai Innovative Industry: An Analysis Based On Enterprises and Postcode Areal Data

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### Abstract

In the background of innovation-driven and transitional development, it is meaningful to study industrial spaces and development models of postindustrial cities. Based on the data of enterprises, this article investigates spatial pattern from three different perspectives: geographic distribution, regional classification and spatial correlation, and also analyses the mechanism of spatial differentiation through negative binomial regression. The research shows that Shanghai innovative industries present the distribution characteristics of multi-axes and multi-cores, showing radiation and driving function to the whole city. The regional classification of Shanghai innovative industries presents a pyramid-like structure which Zhangjiang and Caohejing are the core areas. As a result, Shanghai develops two industry clusters with intergrowth and interaction. Development zones, universities and research institutes (URIs), old industry areas, traffic accessibility, suburbanization and path dependence have significant positive influence on enterprises location choice. With the mutual effects of factors, Shanghai emerges three different models of innovative industry districts: the first is the “anchor plus” model which is centered around universities and research institutes (URIs), the second is the “re-imagined” old industry areas, the last is development zones construction. There are differences among different types of enterprises including large-scale, small-scale, state-owned, urban industry and start-ups in the spatial pattern and mechanism of Shanghai innovative industries.

### Key words:

Shanghai; Innovation; Industries; Enterprises; Postcode; Spatial pattern; Location

## The Analysis of Spatial Convergence for High-tech Industry Innovation Performance in China

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### Abstract

Nowadays, there exist both regional scale differences and regional performance differences in China's high-tech industry development. Performance difference will directly affect resources allocation in regional high-tech industry and the upgrading of industrial structure. This paper conducts a systematic study on convergence issues about China's high-tech industry development performance by adopting spatial panel econometric method and related approaches.

Firstly, from the perspective of research and development efficiency and economic efficiency, it measures the comprehensive performance of China's high-tech industry development by applying Malmquist index and efficacy coefficient method; and then, by adopting Spatial Autoregressive (SAR) panel data model, it studies the absolute  $\beta$  convergence and convergence mechanism of China's provincial high-tech industry development performance from 2001 to 2013. The result indicates that distinct absolute  $\beta$  convergence exists in China's high-tech industry development performance since 21<sup>st</sup> century, which is mainly due to technology diffusion, and the convergence rate of central China is obviously faster than that of other regions.

### Key words:

high-tech industry; performance; spatial convergence; SAR model

## The Research on the Regional Difference, Evolution and Convergence of Innovation Capability of China — Based on the Level of Space and Factor

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### Abstract

The article analyzes the innovation capability difference of China and its eastern, middle, western, and northeastern regions and their evolution law in the period of 1998-2012 with the Theil index and its decomposition formula from the perspectives of high-tech industries; and explains the main reason that causes the regional innovation capability difference from spatial and factorial level; then analyzes the innovation capability convergence of China and its four regions and the effect that innovation capital input, R&D input and innovation culture have on innovation capability convergence by implying the space panel  $\beta$  convergence model. The conclusion of the research shows that 2007 is the important inflexion point of China's regional innovation capability difference pattern. The convergence speed of regional innovation capability has been accelerated significantly since 2007, which shows a good posture of China's regional collaborative innovation construction and innovation capital and innovation labor is important in driving China's regional collaborative innovation.

### Key words:

innovation capability; regional difference; convergence; high-tech industry

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Polycentrism, Small and Medium Size Cities



Home

#### Oral

1. [Analysis of Effects of Transformation Large Villages into Small Towns in Contemporary Iran \(1991-2015\)](#)  
Hassan Izady (Department of Urban Planning, Shiraz University, Shiraz, Iran, Iran)
2. [Changing Demographic Face of Ukrainian Cities in the XXI Century: Challenges for Polycentric Development](#)  
Leonid Rudenko; Sergyi Lisovskyi; Eugenia (Ievgeniia) Maruniak (Institute of Geography, National Academy of Sciences of Ukraine, Ukraine)
3. [Characteristics and Formation Mechanisms of the Employment Centers in the Beijing Metropolitan Area](#)  
Minghua Lu; Zheng Yin (School of Resource Environment and Tourism, Capital Normal University, China); Tieshan Sun (School of Government, Peking University, China)
4. [Landscapes of Development: The Urban Fringes](#)  
ZHANG WEILIANG (Hangzhou Normal University, China)
5. [MEDIUM | Landscapes of Development: Hangzhou Urban Fringes](#)  
Anzoise Valentina (Ca' Foscari University / Hangzhou Normal University, Italy); Weiliang Zhang (Hangzhou Normal University, China)
6. [MEDIUM: Medium Chinese Cities' Integration to The Global Economy](#)  
Ignazzi CA; Swerts E; Rozenblat C (University of Paris 1, CNRS-Paris France, University of Lausanne, France)
7. ["MEDIUM" Planning the Smart City: Case Study of the "Dream Town" in Hangzhou](#)  
Iraklis Argyriou (UMR Géographie Cités, CNRS, France); Nicolas Douay (Université Paris Diderot, UMR Géographie Cités (CNRS), France)
8. [MEDIUM - Transformation of Governance in Development Zones in China: A Study Case of Hangzhou Future Sci-Tech City](#)  
Liao LIAO (Institut des Sciences Politiques d'Aix en Provence, France)
9. [Planning Polycentric Mega City-Regions in China: Evidence from Guangzhou's Outer Suburbs](#)  
Hui Cheng (University of Liverpool, United Kingdom)
10. [Polycentricity or Dispersal? Testing for the Effects of Polycentric Strategy in Metropolitan Shanghai](#)

Tinglin Zhang (East China Normal university, China)

11. [Spatial Relations and Evolution of Urban System on Central Asia](#)

Yeerken Wuzhati (The Institute of Geographic Sciences and Natural Resources Research, CAS, China)

12. [Territorial Arrangements of Small- And Medium-Sized Towns from a Functional-Spatial Perspective](#)

Ludek Sykora (Charles University in Prague, Czech Republic), Mulicek Ondrej (Masaryk University, Brno, Czech Republic)

13. [The Belval Project: Towards More Polycentrism in Luxembourg?](#)

Antoine DECOVILLE; Olivier Klein (Luxembourg Institute of Socio Economic Research, Luxembourg)

14. [The Role of Capital in China's Urbanization: The Case of a Small City in Yunnan, Qujing](#)

Thierry Theurillat (University of Neuchâtel, Group of research in territorial economy, Switzerland)

15. [Trends of Urbanization and Regional Development in Rajasthan \(India\)](#)

Sawan Kumar Jangid (Dept. of Geography, M.L.V.Govt. College, Bhilwara 311001(Rajasthan India), India)

## Analysis of Effects of Transformation large Villages into Small Towns in Contemporary Iran (1991-2015)

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### Abstract

The rapid growth of small towns has been one of the main features of urbanization during the past decades in Iran, and remains as a major challenge for the managers, policymakers and urban planners. Changes in the regulations and criteria for separating villages from cities have resulted in increasing the number of cities from 520 in late 1991 to 1243 in 2015. Changing the large villages to small towns have variable effects on the economic, social and environmental aspects of people's life at the local, regional and national levels. This paper examines the impact of promoting villages to towns via content analysis method. The results show that there have been some positive effects such as increasing and improving service functions, creating some new job opportunities, especially in administrative and service sectors, improving quality of life, stabilization of population in rural areas and reduction of rural-urban migration. Some of the negative effects include: the loss of fertile agricultural lands around the towns, increasing the level of expectations and growing demands of the people of the state, increasing the price of land and housing and promotion of land speculation. Therefore, due to the rapid growth of small towns in the urban network of Iran, it is necessary to plan and formulate a national development strategy for small towns in order to direct them towards having an effective role in different aspect of development at the regional and national levels. This paper will examine these aspects and presents some solution to these obstacles.

### Key words:

Effects; transformation; large villages; small towns; Iran

## Changing Demographic Face of Ukrainian Cities in the XXI Century: Challenges for Polycentric Development

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### Abstract

After independence, Ukraine faces many challenges in the field of urban development, mostly conditioned by historical events of the twentieth century. Later, among significant factors of influence appeared globalization and complex economic processes, the decline of industrial production, population aging and decline. International and internal labour migrations led to significant polarization of Ukrainian urban space. As a result, in this polarized landscape we may see Kyiv (capital city), which gradually takes a shape of global city, few regional centres as well as rapid degradation of small and medium-sized cities within remote areas. There are also noticeable regional differences in urban space changes. Among main reasons are mentality and scenarios of cities' origination (mono-functional industrial centres, transportation hubs, centres of tourism, etc.). Extra problems are rising from the war in Donbas, Crimea annexation, which brought several million internally displaced people. So that answers on a numerous question are necessary. What are currently Ukrainian cities? What are the trends in demographic structure? How rapidly processes of marginalization are developing? What kind of policy do we need to ensure polycentric development?

In our studies we analysed the situation prevailing in the urban space of several model regions (respectively on the East, West, South, and North). The degree of polarization as well as factors of cities growth and decline was revealed. Special attention was given to changes of demographic structure in cities at the different levels and such important issues as health, education, age, gender and ethnic features of the local population.

### Key words:

Urban development; urban space; cities; demographic changes; polarization; polycentrism

## Characteristics and Formation Mechanisms of the Employment Centers in the Beijing Metropolitan Area

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### Abstract

Based on the first, second and third economic unit census of Beijing, this paper identified the employment centers in the Beijing metropolitan area using spatial analysis methods, investigated the characteristics and formation mechanisms of the employment centers. We found that there existed 16, 13, and 13 employment centers in the Beijing metropolitan area in 2004, 2008 and 2013, which were mostly located in the central areas and the near suburbs. The number of employment centers in the central areas decreased, while the number of employment centers in the suburbs increased. From 2004 to 2013, the industrial specialization of employment centers enhanced and there was obvious industrial specialization division among centers. Through analyzing the determinants of the emergence of the employment centers, we found that agglomeration economies and transportation accessibility were the major explanations for the formation of centers in the Beijing metropolitan area. Meanwhile, the spatial scheme planned in the city's master plan could explain the formation of the centers, but not quite significantly.

### Key words:

Polycentricity; Employment Centers; Urban Spatial Structure; Beijing Metropolitan Area

## Landscapes of Development: The Urban Fringes

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### Abstract

The paper will discuss the hypothesis and first outcomes of the EuropeAid project MEDIUM, focusing in particular on the important changes of Hangzhou city in the last 30 years, due to the implementation of different comprehensive master plans, which could be divided into three versions of 1981 – 2000, 1996 – 2010 and 2015 – 2020, but also to the presence of many non-state-owned industries. It will address the visions, narratives and discourses about urban development and modernization pursued in Hangzhou, and more specifically in Yuhang - presently a district in the urban fringe of Hangzhou in rapid development but planning to become another sub-center of the city - where one of the 4 pilots Future Sci-Tech city in China is been realized. Also, it will discuss the cascading effects - on landscape and environment, social organization and community identity, as well as on energy efficiency and food provisioning - triggered by such rapid changes in the area. Indeed, urban fringes are very dynamic (but critical) social and geographical entities – whether they are subjected to planning or not, where different populations, functions and opportunities (and threats!) might coexist. The urban fringes could link up to the central cities (and to their comprehensive planning) while ensuring that the spatial units have an organic fusion and relative independence. Moreover, the adoption/development of tools and processes pursuing urban sustainable development while ensuring high flexibility to future changes is also a major issue which the partners of MEDIUM project are addressing.

### Key words:

landscapes; urban fringes

## MEDIUM | Landscapes of Development: Hangzhou Urban Fringes

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### Abstract

The paper will focus on the urbanization-related changes faced by the city of Hangzhou, capital of Zhejiang Province and second largest metropolis in the Yangtze River Delta Region, in the last 30 years, due to the implementation of different comprehensive master plans (i.e. 1981 – 2000, 1996 – 2010 and 2015 – 2020) and to the presence of many non-state-owned industries. The visions, narratives and discourses about Hangzhou urban development and modernization will be analysed, focusing in particular on Yuhang district - until few years ago a county constituted mainly by farmlands, annexed to the city in 2001 and now part of Hangzhou urban fringe. Presently Yuhang is experiencing a rapid development, it is willing to become another center of the city and will host one of the 4 pilots Future Sci-Tech city in China (<http://www.zjfuture.gov.cn/english/>). The paper will discuss the cascading effects - on landscape and environment, social organization and community identity, as well as on energy efficiency and food provisioning - triggered by such a massive (and rapidly implemented) planning, dedicating particular attention to the way these transformations are perceived and framed by different stakeholders. Indeed, urban fringes are very dynamic but also critical social and geographical entities where different populations, functions and opportunities (and threats!) might coexist. For this reason, the adoption/development of evaluation and planning tools and approaches to pursue urban sustainable development while ensuring high flexibility to future changes, is another major issue the partners of MEDIUM project, this paper is one of the result of, are addressing.

### Key words:

Urban development; Medium size cities; Sustainability

## **MEDIUM: Medium Chinese Cities' Integration to The Global Economy**

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### **Abstract**

The Chinese urbanization is characterized by its rapid growth, particularly within coastal cities, and large and dense tridimensional cities. These coastal large cities concentrate most of the internationalization of economy, in particular foreign subsidiaries. However, a spatial deconcentration trends could have been encourage by the development of Special Economic Zones since the 1990's outside the coastal zones. On the other hand, the Chinese government promulgated successive decentralization reforms that facilitated the economic development of the prefecture level cities and of the smallest ones, the district level cities.

In the context of the fast integration of China in the global economy, our hypothesis is that policies fostering the development of both non-coastal cities and small and medium size cities, managed to diffuse rapidly the integration to the global economic networks

In the frame of the MEDIUM project our paper question (i) the evolution of the weight of medium size cities in the Chinese integration in global multinational firms' network and (ii) how their role and their position in these networks could transform their economic specialization.

In accordance with the MEDIUM project, we particularly focus on three cities: Hangzhou (Zhenjiang), Datong (Shanxi) and Zhuhai (Guangdong). The empirical analysis is based on the geo-location by Urban Areas of direct and indirect financial linkages between the 800.000 worldwide subsidiaries of the 3,000 largest multinational companies in the world in 2010, 2013 and 2016 (ORBIS database).

### **Key words:**

Medium-size cities; Networks; Big data; Strategic Planning

## “MEDIUM” Planning the Smart City: Case Study of the Dream Town in Hangzhou

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### Abstract

While smart city agendas are increasingly adopted in numerous cities, both in developed and developing countries, as a way of promoting sustainable development, research tends to pay little attention to the planning of the smart city. In order then to better understand the various ways through which this phenomenon is currently pursued there is a need for more empirical research on the types of planning frameworks and practices relevant to smart city development in diversified urban contexts. Aiming to contribute to this emerging scholarly debate, this article examines from a planning perspective how smart city development is designed and applied in the context of China’s urbanization process, a country which puts growing emphasis on the smart city as a mechanism to promote sustainability. In doing so, the article presents an empirical case-study, informed by interviews with diverse actors, for a recent innovation initiative of start-ups entrepreneurialism in the area of the digital economy, the so-called “Dream Town”, undertaken in Hangzhou, a provincial-level city located at the Southeastern part of the country, in the context of a governmental pilot scheme for urban innovation tested in four Chinese cities. By looking then more closely at the design and implementation of the “Dream Town” initiative from an urban perspective the article aims to gain understanding of the types of planning frameworks, institutional settings and actor perspectives central to smart city development in a particular Chinese urban context, as well as to identify issues which could inform broader efforts when planning the smart city.

### Key words:

planning; smart city development; urban China

## **MEDIUM - Transformation of Governance in Development Zones in China: A Study Case of Hangzhou Future Sci-Tech City**

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### **Abstract**

During China's urbanization process, the development zone is an important and special zone, which has gradually experienced in different stages of development: the formation, the rapid growth, the stable development and the transformation, with a transition from the economic zone to the new model of urbanization. With China's economic development and urbanization, the development and governance in development zone has entered a new stage.

In this paper, according to research about Hangzhou Future Sci-Tech City in Zhejiang and its new characteristics, we can refer that the notion of governance or local governance seems to be more developed during the new era of development zones. Besides, the paper will analyze the characters that seem to those of local governance, such as "growth coalition" that excludes the participation of citizens and that "anti-growth" which was developed in an authoritarian country. Finally, we will discuss whether these new trends can be seen as a certain pluralization of public action in China and how the governance in development zones can be defined.

### **Key words:**

development zones; transformation; growth coalition; local governance

## Planning Polycentric Mega City-Regions in China: Evidence from Guangzhou's Outer Suburbs

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### Abstract

Since the 1990s, urban spatial restructuring in China has been driven mainly by price mechanisms induced by land reform. Correspondingly a number of metropolitan regions have been indeed transforming themselves from single centred, centralized structures into more polycentric spatial structures. Towards the end of 20th century, a terminology, *polycentricity*, was introduced as a new planning concept into China. Subsequently a number of mega city-regions began to apply polycentric development spatial planning strategies designed to better facilitate more sustainable and balanced development. This paper seeks to explore the key themes regarding polycentricity application in a Chinese context, and uncover both horizontal and vertical conflicts in effective delivering of polycentric development strategies from city-regional level to local development. The empirical basis of this paper is a case study of Nansha, which is considered as a sub-centre within Guangzhou mega city-region. Based on a detailed review of key planning documents and interviews with key actors from both city-regional and local scales, three key themes are raised including interpretations of the concept of polycentricity, multiple scales in application and multilevel governance under a polycentric framework. Nansha was originally a suburban town at the outer suburbs of Guangzhou, but it has experienced several shifts in repositioning and re-planning. In conclusion it is highlighted the inconsistencies between the emerging polycentric governance within China's mega city-region which leaves local capacity to enable independent actions and state's strong involvement and intervention in its development.

### Key words:

polycentricity; mega city-regions; multilevel governance; Nansha

## **Polycentricity or Dispersal? Testing for the Effects of Polycentric Strategy in**

### **Metropolitan Shanghai**

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#### **Abstract**

The employment suburbanization in western developed countries, especially in North America, has been widely recognized. However, attentions on how and where the employees dispersing in the metropolitan are not enough. In contrast, related empirical studies are much less in China. To achieve the balance of “fundamental trade-off” between agglomeration benefits and agglomeration costs, a number of large cities in China have implemented the polycentric spatial strategy, but it seems not as effective as anticipated. Based on the empirical analysis of the employment spatial structure in Shanghai, this study aims to answer the question: which structure does Shanghai tend to be, polycentricity or dispersal? The conclusion demonstrates that the employment in Shanghai is undergoing the decentralization process and spreading from the city center to the urban periphery. However, the influences of both the main center and sub-centers on the employment density of surrounding areas are decreasing, that means a process of generalized dispersion rather than polycentricity seemed well established for the period 2004 to 2008 in Shanghai. This study also shows that the administrative boundaries matters for the influences of employment centers, the density gradient associated with the distance to the nearest sub-center is steeper if the sample belongs to the same district as its nearest sub-center, although this segmentation effect is weakened as time goes on.

#### **Key words:**

urban spatial structure; polycentricity; dispersal; decentralization; Shanghai



## Spatial Relations and Evolution of Urban System on Central Asia

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### Abstract

Since the dissolution of the Soviet Union, along with economic and social development, spatial framework of urban system in Central Asia has gradually changed. Spatial relations of urban system generally involve the exchange of matter, energy, people and information. But because the data about Central Asia are difficult to obtain and linkages among cities are complexity, this research attempts to use gravity model approach to analyze intensity of spatial relations among cities in Central Asia by quantitative calculations, and accordingly describe states of spatial relations and nodal region structure of urban system in Central Asia. The results show that, since 2000, urban network systems of Central Asia have gradually dispersed, evolving from two urban systems into four urban systems, and featuring with the basic form of "dual-nuclei, four-system, and four pairs of international twin cities".

### Key words:

urban system; spatial structure; evolution; Central Asia

## **Territorial Arrangements of Small- And Medium-Sized Towns from a Functional-Spatial Perspective**

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### **Abstract**

This contribution applies a functional-spatial perspective to the study of small- and medium-sized towns. A methodology for functional analysis is developed and tested to identify towns, distinguish towns from cities, and detect town positionality within urban territorial arrangements, focusing on whether they are autonomous, networked with other towns or agglomerated with large cities. The methodology is used to compare settlement systems in two regions and two countries in Europe by looking at the existence and nature of networks between towns and cities and how towns perform in terms of population and jobs in respect of their belonging to different types of territorial arrangement.

### **Key words:**

small- and medium-sized towns; settlement systems; territorial arrangements

## The Belval Project: Towards More Polycentrism in Luxembourg?

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### Abstract

The small State of Luxembourg faces very strong dynamics of economic and demographic growths, which are concentrated to a large extent in its capital city: Luxembourg-city. This spatial concentration of activities and people within the capital contrasts with the situation of the second-tier cities which face some problems of growing unemployment. This is why the Luxembourg government has put in place a polycentric strategy since 2002 which supports the development of the second-tier cities in the country in order to offset the dominance of the capital city. One of the key aspects of this strategy is to improve spatial equity by improving the accessibility at all places within the country. This spatial strategy finds its most obvious concretisation through the “Belval project”, which is a large-scale State-driven project of urban regeneration at the margins of the medium-city of Esch-sur-Alzette. In this paper, we use an accurate road accessibility model that we combine with a comprehensive database of public facilities at two dates (2005, before the development of the Belval project, and 2015) to assess the impact of the polycentric strategy (and of the development of the new city of Belval) on the general accessibility to public urban facilities. Beyond the case-study, we developed a single accessibility index which can allow to support decision-making concerning the relevance of the location of a new public facility with regards to the objectives of polycentrism.

### Key words:

Polycentrism; small and medium city; accessibility; public facilities

## The Role of Capital in China's Urbanization: The Case of a Small City in Yunnan, Qujing

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### Abstract

This article addresses the issue of the role of capital in urban production in China by putting together three main strands of literature. It first backs on the land-driven literature that highlights the land revenues for local government as the main institutional and fiscal incentive to plan and build the city based on growth objectives. It then shows that this land model goes in hand with significant debt based on land mortgaging since local governments have to finance collective-purposes' projects and urban infrastructures which are the condition to the commodification of urban land. In this, the interrelations between land development and urbanization has been looked in terms of public finance and from the supply side. This article further goes beyond public finance by considering other financing circuits that enable to build housing and non-housing districts from the perspective of the property development industry. Based on a study case in the fourth tier city of Yunnan, Qujing, this article addresses the issue of the financing of urban production by showing the interrelations between land-property development, state and capital that has enabled the capital accumulation since late 1990s in China.

### Key words :

China; capital; urban production; 4th tier city; land-driven model; property development

## Trends of Urbanization and Regional Development in Rajasthan (India)

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### Abstract

Urbanization is a process of transition from a rural to a more urban society. Statistically, urbanization reflects an increasing proportion of the population living in settlement defined as urban, it is a long term process. Urbanization is a dynamic system in which development and changes are prominent features, which implies population growth and changes in primary, secondary and tertiary sectors in the economy. Rajasthan has a long history of urbanization, but dynamic urban system remained only a distant dream due to unstable political economy under the colonial rule. The modern urban system emerged with the new definition of urban centers and urban population in the 1961 census. A much more dynamic urban system is emerging now. Although the urban population constitutes only 33 per cent of the total population. The paper attempts to study various facts of urbanization and regional development in the framework of the present condition and future needs in Rajasthan. Urbanization is an important index of economic growth both at state and national level. V.C. Sinha has pointed out that, urbanization is the process by which villages turn into towns and towns develop into cities. This paper is a brief appraisal of growth and development of urban places in Rajasthan with the set objective to ascertain the patterns and trends in the state urbanization using Rajasthan census data during 1901-2011.

### Key words:

Transition; Statistically; Colonial rule; Dynamic; Urbanization; Framework; Ascertain; Appraisal; Census

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Creating Sustainability

#### Oral



Home

1. [Assessment of Economic Resilience Capacity of Resource-based Cities in Northeast China](#)  
 Juntao Tan; Pingyu Zhang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
2. [Ecological Engineering for the Livability of Urban Projects](#)  
 Delabarre Muriel (Unil, Switzerland)
3. [Examining the Impact of Collaborative Partnerships for Sustainable Outcomes in Urban Areas: The Case of Galway City, Ireland](#)  
 Frances Fahy (NUI Galway, Ireland)
4. [Food Security and Sustainability in Post-Conflict Freetown, Sierra Leone: Examining the Role of Urban and Peri-Urban Agriculture](#)  
 Tony Binns (University of Otago, New Zealand)
5. [Local Environmental Governance and Individual Environmental Concern in Urban China: A Multi-Level Analysis](#)  
 Zhilin Liu; Jie Wang (Tsinghua University, China)
6. [Optimizing Urban Water System Based on “Ecological Rehabilitation” ——The Regulatory Plan of Dali Innovation Industrial Park for Instance](#)  
 He Li; Peifeng Yang (Chongqing university, China)
7. [Peri-Urbanization and Vulnerability to Disasters in Poor Settlements of Mexico City](#)  
 Adrian Aguilar; Flor Lopez (Institute of Geography, UNAM, Mexico)
8. [Preliminary Studies of Urban Wetland Changes in the Areas of Western](#)  
 Zhu Weiping (Institute of Ecological planning design and research; Hangzhou Normal University, China); Zhang Hui; Liu Guang; Tang Yao, Zhu Chaocheng (College of Life and Environmental Sciences, Hangzhou Normal University, China); Ding Yuanyuan (Zhejiang Provincial Key Laboratory of Urban Wetlands and Regional Change, China)
9. [Regional Characteristics of Urban Parks in Dhaka City, Bangladesh](#)  
 Ummeh Saika (Tokyo Metropolitan University, Japan)
10. [Risk Assessment and Preparedness Plan for Earthquakes in Urban Delhi](#)  
 Vishwa Raj Sharma (University of Delhi, India)

11. [Sustainable Transition in Europe. Obstacles and Opportunities of Upscaling Grassroots-Initiatives' Potential](#)  
Federico Martellozzo (University of Rome La Sapienza, Italy); David M. Landholm (Potsdam Institute for Climate Impact Research, Germany); Anne Holsten (Potsdam Institute for Climate Impact Research, Germany)
12. [The Efficient Size of Export-Oriented City Based on the City Network Theory -- A Case of Qingdao](#)  
Aihua Ji (Qingdao Technological University, China)
13. [What Is to Be Sustained? A Comparative Perspective on Generations, Consumption and Sustainability](#)  
Chen Liu; Kristina Diprose (the University of Sheffield, United Kingdom); Katie McQuaid (University of Leeds, United Kingdom); Gill Valentine (the University of Sheffield, United Kingdom); Robert Vanderbeck (University of Leeds, United Kingdom)
14. [Which Kind of Urban Spatial Structure Benefits Sustainable Economic Development: Monocentric or Polycentric? Evidence from China](#)  
Bindong Sun; Wan Li; Tinglin Zhang; Jieyuan Hua; Zhou He; Hao Chen (East China Normal University, China)

## Poster

1. [Examining the Feasibility of Applying PV in a Community in Northern China](#)  
Tao Wang; Xin Tong; Wei Wang (China, Peking University)
2. [Research on the Development Process and Dynamic Mechanisms of Suburbanization in Guangzhou](#)  
Chunshan Zhou; Juan Wang (China, School of Geography and Planning, Sun Yat-sen University)

## Assessment of Economic Resilience Capacity of Resource-based Cities in Northeast China

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### Abstract

Based on the theory of evolution resilience, the article presents the analytical framework of economic resilience of resource-based cities. Then building the economic resilience capacity evaluation index system according to persistence, adaptation and transformation aspects, using the method of principal component analysis, the article analyzes the economic resilience of 19 resource-based cities and its change characteristic. The results show that the economic resilience capacity of resource-based cities in Liaoning and Jilin province was higher than that in Heilongjiang province. Panjin, Benxi and Anshan in Jilin province were ranked as the top 3, but Shuangyashan and other coal cities in Heilongjiang province ranked last. The economic resilience of metal cities and petroleum cities were significantly higher than coal cities. Comparing with the rank of economic resilience, the economic persistence of Panjin, Dading and other petroleum cities were lower, but the adaptability was much higher. Heihe, Mudanjiang and other forestry cities have higher economic persistence but lower adaptability. The differences of economic persistence, adaptability, transformation and resilience among the resource-based cities have decreased since 2003. Comparing with the beginning of the Strategy of the Revitalization of Northeast China and Other Old Industrial Bases implement, the increment of economic resilience in Heihe, Fuxin and Liaoyuan were ranked as the top 3, and Daqing, Qitaihe, Shuangyashan and Huludao had the biggest drop. The forestry cities have the biggest increment of economic resilience, and then were metal cities and multi-resource cities; the coal cities decreased and the petroleum cities have the biggest drop.

### Key words:

resource-based cities; economic resilience; old industrial base in Northeast China

## Ecological Engineering for the Livability of Urban Projects

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### Abstract

Some urban environmental conflicts and mobilizations express a new strategy to try to transform the public space. Beyond the purely aesthetic dimension, they also reflect an evolution of representations of habitability. Also a request for reconnection to the natural world, these conflicts and requests depict a growing awareness of environmental issues in the public arena and among those, that of nature in urban areas.

Sustainable city is an opportunity to bring out new compositions reflecting these urban environmental sensitivities and experiment with methods of work and urban project design in line with the renewed urban ecology. How, nature in urban projects participating in the definition and draw the contours of the contemporary urban livability? This paper launches a discussion about the implementation of a ecological engineering tool to support urban projects whose nature is an integral part. The development of this tool contains both elements of specific interventions in urban areas based on valuable choices from urban ecology and plural expertise (ecology, botany, hydrology, landscape, etc.) as well as normative thoughts extended to civil and decision-making spheres. A reference table has been developed to operationalize urban ecology and to objectify the minimum criteria to register a project in a transversal vision of habitability of urban spaces.

The development of the practice of original development of the metropolis of Lyon allows to approach these various knowledges and understand what directions in making public spaces were favored.

### Key words:

urban habitability; urban nature; ecological engineering; assessment; urban project

## Examining the Impact of Collaborative Partnerships for Sustainable Outcomes in Urban Areas: The Case of Galway City, Ireland

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### Abstract

At the international scale difficulties associated with giving practical effect to the abstract concept of sustainable development have stimulated a good deal of research on the challenging task of assessing progress towards that goal. However, in the Irish context a number of urgent key challenges have been identified in trying to develop local processes for sustainability including the need for more wide ranging public participation, the need for practical tools to assess progress towards sustainability, as well as the need to collapse down the 'silos' produced by institutional divides within local government.

Focusing on Galway City and its municipal (local) authority, this paper presents the findings of a project conducted between 2005 and 2008 that engaged a range of actors, including community groups, local and national practitioners and academic researchers, in the design of a number of collaborative tools to progress a local process for sustainability. The paper initially reflects on the development of two locally derived sustainable development tools, community-derived quality of life indicators and a community map for Galway City, an urban centre of approximately 80,000 inhabitants on the west coast of Ireland. The paper then maps the trajectories of these two tools over the past decade, focussing specifically on (i) the integration of the tools within the case study local authority, (ii) the transferability of the tools and (iii) the relative 'impact' of the tools.

## **Food Security and Sustainability in Post-Conflict Freetown, Sierra Leone: Examining the Role of Urban and Peri-Urban Agriculture**

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### **Abstract**

Sierra Leone is one of the world's poorest countries and in the last two decades has suffered from both a brutal civil war and an Ebola epidemic. An estimated 45% of the country's 6 million people are food insecure and 34% of children under 5 years old are stunted. Freetown, the capital city, grew rapidly during the civil war (1991-2002) and is now approaching 2 million people. Urban agriculture plays a vital role in feeding the urban population but, as in many African cities, the scale and significance of urban agriculture in Freetown is not fully appreciated by urban authorities and planners. The paper presents the results of recent field-based research among urban farmers in Freetown, and reveals the significance of the practice in providing food, income and employment for urban households. It is suggested that future urban planning and development strategies should incorporate provision for urban agriculture as a key element in moving towards creating sustainable cities.

### **Key words:**

Food security; Sustainability; Sierra Leone

## Local Environmental Governance and Individual Environmental Concern in Urban China: A Multi-Level Analysis

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### Abstract

As environmental sustainability becomes the biggest challenge for China's urbanization, profound institutional changes have taken place in China's environmental governance practices. Whereas existing literature has widely documented the local implementation gap in China's environmental policy, scholars also have observed regional disparity in local policy actions. Some cities have become the pioneers in pursuing more environmental-friendly urbanization while others have lagged behind. It is even less understood whether such pioneering actions by local government resonate with the rising environmental concern among urban citizens, which has been recognized as an important component of the changing environmental governance regime in China.

This paper seeks to answer two research questions. First, to what extent do cities vary in local sustainability actions – such as being designated by central government agencies as experimentation sites for various sustainability policy actions? Second, to what extent does local government's sustainability action resonates with the level of environmental concerns among urban citizens? We use data from the 2010 China General Social Survey (CGSS) and adopt a multi-level statistical model to empirically test whether citizens' level of environmental concern is higher in cities that have been more progressive in local sustainability actions – e.g. investing more public finance in environmental protection, and have been recognized by the central government as experimentation sites for sustainable development. Included control variables are individual socio-demographic variables – e.g. age, gender, education, household income, employment, and hukou status, as well as city-level variables that capture the level of economic development and citizens' exposure to environmental degradation.

### Key words:

Environmental concern; environmental governance; urban governance; multi-level analysis; China

## Optimizing Urban Water System Based on “Ecological Rehabilitation”

### ——The Regulatory Plan of Dali Innovation Industrial Park for Instance

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#### Abstract

The health of urban water system is the important index of urban sustainable development, before urban is developed, the water system is natural ecologic water system, after developed, the system present natural system join together with engineering system coexistence state. At present, the problem of urban water system mainly reflects the degradation of the original natural water system, and the natural water system and water engineering system are separated and contrasted during the planning and construction process. Furthermore, Sorts of water problems appear. So the paper intends to use the “Rehabilitation” theory of restoration ecology during the whole process of planning, to optimize and adjust the original state of natural hydrological system, and using the positive stimulation of Engineering water system to reconstruct the whole water system and keep the function’s stability and efficiency. At the same time promoting transformation of hydrologic performance and making positive promotion to urban space. This paper uses the regulatory plan of Dali innovation industrial park for instance. At the early stage of the planning, this research adopts the regional water environment to evaluate and analyse the whole water system, after that applying the palnning methods to adjust and optimize the natural water system, then by the real-time evaluation to determine the most effective water system optimization way. At last, comparing the performance of the before and after water system during planning, to evaluate and further discuss the whole water system (Natural water system and Engineering water system) which takes a positive role in promoting the urban space structure. Conclusion summarizes the best way to adjust and optimize the original urban water system, and guides the construction of urban sustainability of the water system optimization.

#### Key words:

Water System Optimization; Rehabilitation; Restoration Ecology; Reconstruct the Whole Water System

## Peri-Urbanization and Vulnerability to Disasters in Poor Settlements of Mexico City

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### Abstract

The peri-urbanization process has emerged as a new and extended form of urban occupation in peripheral areas of big cities in Mexico. In these urban-rural fringes city advances transforming land uses and socio-economic realities of the nearest rural areas. In Mexico City this process has created a discontinuous, dispersed and low density urban model that has become predominant in recent decades and continues to develop without a strict control. This is an important preoccupation as the peripheral fringes register the highest population growth rates.

One important dimension of urban expansion in peripheral zones is the presence of irregular settlements associated to poor population located in sites no suitable for urban occupation like slopes, ravines or old river beds that constitute zones of high ecological value. This situation not only contributes to the deterioration of local environment but also affects health and security of local population as they live in a high vulnerability condition exposed to events like flooding or land sliding.

Poor settlements have increased disasters potential in peri-urban zones. The more severe impacts on this population not necessarily respond to an increase in the intensity of events, but most importantly to low investment on infrastructure and rapid growth of irregular settlements in zones unsuitable for urbanization. There is a high association between high socio-economic vulnerability, frequency of disasters and high levels of poverty. Urban policy has to implement adaptation strategies that can highly contribute to urban sustainability, improve population quality of life and reduce disasters vulnerability.

### Key words:

Peri-urbanization; Mexico City; vulnerability; urban poverty; disasters; sustainable development

## Preliminary Studies of Urban Wetland Changes in the Areas of Western

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### Abstract

Hangzhou West wetland, the largest wetland group of Hangzhou, is located in the Hang Jiahhu plain. It mainly includes XiXi Wetland, Wuchang wetland and Hemu wetland as the core area. And it has very important geographical location and ecological system service function, for the healthy development of Hangzhou urban environment. Supported by GIS and RS Technology, the study extracts the data from 1955 and 1972 aerial images, 1984 topographic map and 2010 ALOS Image. By using qualitative and quantitative analysis method, deriving analysis of Hangzhou West wetland from 1955 to 2010 the temporal and spatial evolution and driving factors from the time gradient and spatial gradient angle. Research shows that the area, types and distribution of wetlands in the west of the city of Hangzhou has undergone tremendous changes. The general trend of West wetland change is: the total area of wetlands reduces 69.37km<sup>2</sup>, river reduced 8.14km<sup>2</sup>, marsh reduced 3.08km<sup>2</sup>, pond reduced 8.23 km<sup>2</sup>, artificial wetland change is particularly significant, the total reduction 53.89km<sup>2</sup>, lakes and wetlands increased 3.96km<sup>2</sup>. Compared to 1955, the main type of Hangzhou West wetland is still artificial wetland, but its types reduced largely. River network intensive degree not as before, large wetland is divided, forming small clear border, serious internal landscape fragmentation. But Nanhu Lake area increased. Spatially, Xihu and Yuhang district change is particularly evident. Artificial wetlands in Yuhang area reduced, leaving only a large area of paddy fields in the western region. The main driving factors of change include two aspects: natural and artificial, the interference of human activities is enhanced, and the influence of natural factors is weakened.

### Key words:

the areas of western Hangzhou; Urban wetland; Wetland changes; Driving forces

## Regional Characteristics of Urban Parks in Dhaka City, Bangladesh

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### Abstract

Dhaka, which is one of the fastest growing mega cities in the world, already unplanned urbanization has caused serious ecological imbalances in the city. The case study site covers urban parks of Dhaka metropolitan area of Bangladesh. This study investigates the typology and uses of urban parks and also identify regional differentiate of parks of Dhaka city. Two aspects (Social and Living) were applied for this study. For social aspect methods were used questionnaire survey, observation, photographs, sketch and previous information about parks. And for living aspect used check table format, interview and case study. After calculated all data result showed by maps using GIS. According to physical size, parks of Dhaka city classified into four types: Small, Medium, Large and Extra Large parks. Small parks of Dhaka city situated beside the residential area and use as daily purpose. Medium parks located beside commercial area and its use for daily and weekly. Large parks placed at city center and only one extra large park found outer range of city area. In large parks people mainly visited monthly or occasionally. Again based on regional differentiation, in old Dhaka parks are well vegetated but have maintenance problem. Intersection zone of old and new Dhaka parks are used in national occasion more than daily recreation purpose. In New Dhaka parks are well organized and maintenance than other part of the city. The significance of the study to reveal that the utilization of park control by various factors and regional differentiation influence city parks.

### Key words:

Urban Parks; Typology; Regional Differentiation; Old and New Dhaka

## Risk Assessment and Preparedness Plan for Earthquakes in Urban Delhi

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### Abstract

An earthquake is a sudden shaking of the earth caused by the breaking and shifting of rock beneath the earth's surface and followed by a series of vibrations. Earthquakes can cause buildings and bridges to collapse, telephone and power lines to fall, and result in fires, explosions and landslides. Earthquakes are among the most devastating natural hazards and have tremendous damage potential in terms of casualty and destruction. Recent major urban earthquakes such as that in Nepal (2015) Haiti (2010), China (2008) and Iran (2003) have alarmed us that even moderate level of earthquakes can lead to large scale damage to structures and human casualties in a city like Delhi. In a mathematical form, this can be expressed as: Risk = Hazard x Vulnerability X Exposure. Consultations with government, city development authorities, ULBs, NGOs, training institutions, practicing engineers, architects, real estate firms, builders, contractors, etc. for city specific earthquake risk management and mitigation strategies. Identification and networking of nodal agencies and partners at different levels for implementation of the programme. Orientation for policy makers to enforce legislation for registration and regulation of builders, promoters, and real estate developers for creation of safe habitat. Orientation of officials in Urban Local Bodies - Development Authorities/ Municipalities/Town Planning Departments/Housing Societies/Housing Boards, etc. towards the earthquake hazard, risk evaluation and possible mitigation measures.

### Key Words:

Assessment; Preparedness; mitigation; Vulnerability; Hazards

## Sustainable Transition in Europe. Obstacles and Opportunities of Upscaling Grassroots-Initiatives' Potential

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### Abstract

This research was developed within the EU-FP7 project TESS (Towards European Societal Sustainability). Its aim is to “illustrate the role of community based initiatives in creating a sustainable, low-carbon Europe”. In recent time societies’ interest for sustainability-oriented activism increased, fuelling the emergence of numerous Community Based Initiatives (CBI). Consequently, grassroots movements and associations dealing with socio-ecological issues have multiplied. These cultural hubs (very often) rely predominantly on participatory activism. However, thus far most empirical research grounds mainly on anecdotal evidence and little work has been done to quantitatively assess CBIs’ “environmental impacts” (EI). Furthermore, to the best of our knowledge, no research has attempted to investigate aggregate impacts and upscaling potential of CBIs’ activities. This research contributes to fill these gaps through an empirical analysis based on TESS database by exploring the potential aggregate impacts of upscaling CBIs’ activities in order to contribute to climate change mitigation. This research aims at discussing whether CBIs upscaling may not be in the realm of utopic visions but a viable and not-negligible possibility for policy makers. Secondly, results show that CBIs’ upscaling implies a change in their operational structure, which they may be reluctant in adopting, hence favouring other sort of diffusion of their practices. Third, this work debates about potential harmful and viable consequences of fostering global climate change mitigation through CBIs’ activity. Furthermore, an attempt to identify which activities/practices show the most promising potential in complementing sustainable top down policies is also given. While we are aware that several caveats still need to be further explored, this novel application and the discussion of the upscaling potential offer much to the existing literature on CBIs’ impact assessment.

### Key words:

Sustainable transition; community based initiative; Europe; climate change mitigation

## The Efficient Size of Export-Oriented City Based on the City Network Theory -- A Case of Qingdao

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### Abstract

In view of the current city with a moderate scale of a single isolated though city static theory research more mature, but lack of regional contact or the world in the city of contact moderate scale of dynamic theory research of reality, this project is based on the theory of urban network, and urban as city in a node network system, this paper discusses the function of the city and network connection degree of the influence of the moderate scale, and with export-oriented city (Qingdao city) as an example case studies.

Through this topic research that can get the urban function and city network connection degree of city of moderate scale of export-oriented mechanism of the effect of law and a more comprehensive and thorough understanding, reveals the urban network factors on the influence of export-oriented city moderate scale of regularity, and has important theoretical significance and academic significance.

This topic is based on the function of the city and urban network connection degree of building up the city of moderate scale of export-oriented theoretical model for analysis and evaluation to the reality of export-oriented city scale whether reasonable provide scientific basis, to guide the further development of export-oriented city. Therefore, the research results to export-oriented city modest scale analysis and evaluation of important theoretical guidance function, and has a broad prospect of application.

### Key words:

City size; social network analysis; econometric model; spatial analysis model

## What Is to Be Sustained? A Comparative Perspective on Generations, Consumption and Sustainability

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### Abstract

This paper, based on multi-method research ongoing in three mid-sized cities in China, Uganda and the UK, explores the relationship between consumer cultures of different generations, everyday experiences and ordinary people's understanding of urban sustainable development. In particular, it is concerned with thinking comparatively about both environmental and socio-cultural sustainability across the Global North and South and de-centering debates about consumer culture and sustainable development, which has overwhelmingly been researched from the Western, in particular Anglophone, perspective. The paper will consider how changing consumption values and practices relate to and/or impede the production of intergenerational solidarities, and how generational discourses on consumption and sustainability are intersected by race, class, gender and other forms of socio-cultural difference. This research employs cross-disciplinary techniques including intergenerational theatre, discourse analysis and narrative and family interviews, to explore generational views on entitlement to consumption, how people in different socio-cultural contexts understand obligations to contemporary and future generations, how daily consumption is shaped and changed by people's concerns of sustainability, and how generational and lifestyle groupings influence attitudes towards both environmental and socio-cultural sustainability.

### Key words:

generation; consumer culture; sustainability; China; Uganda; UK

## Which Kind of Urban Spatial Structure Benefits Sustainable Economic Development: Monocentric or Polycentric? Evidence from China

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### Abstract

Aiming at relieving congestion and promoting economic growth the megacities in China have implemented polycentric spatial strategy and developed new towns and new zones. The effects are far from satisfactory, however. The central cities of most megacities continue to spread out and the monocentric urban form stays as before. Has the lower economic efficiency of polycentric urban structure than a mono-centric one hindered the progress of the polycentric strategy? This study explores the relationship between urban spatial structure and economic performance and compares the economic efficiency between polycentric and monocentric structure. In light of the scale sensitivity of spatial structure the study is conducted on two scales. The result on metropolitan scale indicates that a polycentric urban spatial structure has a better economic performance than a monocentric one probably due to lower diseconomy resulting from commute time and land price. The study on regional scale shows much higher productivity of monocentric urban spatial structure however. Further analysis on regional scale reveals the dependence of the economic performance of urban structure on city population size. The economic advantage of monocentric structure exists mainly in cities under one million. For those between one to three millions polycentric structure is a more efficient urban form. Nevertheless, when city size exceeds three millions monocentric structure is more productive again possibly due to the overcoming of diseconomy through those cities' strong economic and administrative power.

### Key words:

urban spatial structure; economic development; monocentric; polycentric; China

## Examining the Feasibility of Applying PV in a Community in Northern China

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### Abstract

This study analyzes a plan to apply photovoltaics in Zhenggezhuang, a community in north suburb Beijing. We compared the electricity generation potential calculated by the NASA solar irradiance data and the real data collected from our demonstration system for c-silicon and thin-film modules. We provided LCA analysis for these two different technology regarding their contribution for CO<sub>2</sub> emissions reduction. A scenario analysis on the balance of electricity generation and consumption was conducted at the community level to address the potential of mixed land use to ensure reliability of the electric power grids.

The results show that, (1) theoretically, the PV electricity generation can satisfy the demand on electricity of the community at peak time by both thin-film and polysilicon PV technology. However, fluctuation exists due to weather conditions. (2) Significant reduction of carbon emission can be achieved by both technologies. (3) Potential could be explored for balancing the energy generation and consumption between the residential area and the workspace. The demand for coal-fired electricity reduces when we balance the supply and demand in the community level, comparing the case in which two areas are independent.

### Key words:

low-carbon community; PV application; renewable energy; scenario analysis; LCA analysis

## Research on the Development Process and Dynamic Mechanisms of

### Suburbanization in Guangzhou

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#### Abstract

The research indicates that, Guangzhou has basically contained a series of preconditions that suburbanization occurs since 2000, including the improvement of urbanization level, the rise of residents' income level, the development of traffic, the progress of communication technology, the improvement of people's ability to choose house as well as the growth of middle classes. The population suburbanization in Guangzhou has been in process since 2000, and the industrial suburbanization has been in process since 1990s. The commercial suburbanization in Guangzhou has not been in process yet, but the commerce has appeared to spread to the suburbs since 2000. The development of suburbanization in Guangzhou has experienced two stages in general yet. It's in the propulsion to suburbs stage before suburbanization from 1980s to 1990s, when the population mainly concentrated on the city central, and the industrial suburbanization began. Then it's in the stage when the suburbanization started and has been developing rapidly. In this stage, population suburbanization has started, residential suburbanization has quickened its step and brought the development of seasonal suburbanization, industry shows a trend of 'decentralization', and the phenomenon of commercial suburbanization is emerging. There are many factors combined to effect the occurring and developing of suburbanization in Guangzhou, including economic development, institutional change, urban sprawl and administrative division adjustment, the guide of urban planning and policies, the improvement of traffic, the development of real estate industry, more and more serious urban problems, social class differentiation and the change of people's living concept.

#### Key words:

Suburbanization, Guangzhou, Development Process, Dynamic Mechanisms

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Dilemmas of Aging Cities



Home

#### Oral

1. [A Study on Living Environment and Life Satisfaction of Aged Population in Beijing](#)  
Jingqiu ZHANG (College of Applied Arts and Science of Beijing Union University, Beijing 100191, China, China); Huan LIU; Yingxi QI (College of Resource, Environment and Tourism of Capital University, Beijing 100048, China, China); LI Xueyan (College of Applied Arts and Science of Beijing Union University, Beijing 100191, China, China)
2. [Ageing in and of the city: the cases of Barcelona, Milan and Turin](#)  
Dolores Sanchez Aguilera (University of Barcelona, Spain); Petros Petsimeris (University Paris 1, Sorbonne, France); Stefania Rimoldi (University of Milan Bicocca, Italy); Jaume Font Garolera (University of Barcelona, Spain)
3. [An Increase in Housing Vacancies in Cities: The Case of Japanese Cities](#)  
Tomoko Kubo (Gifu University, Japan)
4. [Informal Path: Spatial and Temporal Evolution Characteristics and Spatial Analysis of Illegal Construction in Guangzhou](#)  
Li Xun; Yang Jinkun (Sun Yat-sen University, China)
5. [Gender Differentials in Social Isolation and Self-Reported Health Status among Elderly in Low and Middle Income Countries](#)  
Niharika Tripathi (International Institute for Population Sciences, Mumbai, India)
6. [Identification and Spatial Assessments of Brownfield Regeneration](#)  
SONG Yang (School of Geographical Science, Northeast Normal University, P.R. China, China); LIN Huiying (Jilin University, P.R. China, China); WANG Shijun (School of Geographical Science, Northeast Normal University, P.R. China, China)
7. [Nursing Care and Survival Show Regional Differences in Germany](#)  
Yvonne Queisser Schlade; Janet Junqing Chu; Alexander Kraemer (University of Bielefeld)
8. [Parks and Open Green Spaces and the Elderly Men: A Study of Delhi](#)  
selim jahangir (University of Delhi, India)
9. [Plight of Aged Women in Modern Cities--Some Insights into their Living Arrangements from Kolkata, India](#)  
Chandreyi Banerjee (Department of College Education, Government of Rajasthan (India), India)

10. [Research on Facilities and Services for Age-Friendly Neighbourhoods, Case Study in Suzhou, China](#)  
Yu Liu; Lin Yi (Xi'an Jiaotong Liverpool University, China)
11. [Shrinking Cities: Huge Challenges of Revitalization of Northeast China during Transformation Period](#)  
Fengbao Liu; Xigang Zhu; Jie Sun; Jiao Chen (School of Architecture and Urban Planning, Nanjing University, China)
12. [Spatial Analysis of the Supply and Demand of Affordable and Accessible Senior Housing Services in Beijing](#)  
Xiaoping Shen (Central Connecticut State University, United States); Shangyi Zhou (Beijing Normal University, China)
13. [The Comparison Study on the Elderly Care Systems in Japan and China: From the Viewpoint of the Individual Dynamic Demands](#)  
Shan SONG (Nagoya University, Japan)
14. [The Unbalanced Growth of Residential Care in Beijing City, China — Causes and Prospects](#)  
Min Jia; Yanmin Zhou; Jingyi Lin (Tsinghua University, China)

## Poster

1. [Assessment of Urban Transition Performance of Resource-based Cities and Influential Factors in Northeast China](#)  
Juntao Tan; Pingyu Zhang (China, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences)
2. [Demographic and Economic Features of Small Towns in Romania](#)  
Daniela Zamfir; Ilinca-Valentina Stoica; Cristian Tălângă (Romania, University of Bucharest, Faculty of Geography, Interdisciplinary centre for advanced researches on territorial dynamics (CICADIT))
3. [Research of Farmhouse Pension Mode in the View of Urban-rural Mutual Assistance—The Example of the Pension Villages in Hangzhou](#)  
Fang Yuan; Li Wangming; Zhu Lixiong (China, College of Civil Engineering and Architecture, Zhejiang University)

## A Study on Living Environment and Life Satisfaction of Aged Population in Beijing

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### Abstract

Taking the 60 years or older population in Beijing as the main research object and based on data from the sixth census and a sampling survey, this study analyzes the spatial characteristics of the living environment and life satisfaction of elderly in Beijing using statistical and spatial analysis methods. The results show that: (1) the distribution of aged population in Beijing concentrate in the inner city and the western suburbs, where the percentage of the aged population is generally greater than 10%; (2) the living form of the elderly respondents is mainly two person's households, followed by four and five person's households. Those living alone and empty-nesters often aged over 70 years. Housing of the respondents is often purchased from the work units and this is the key factor affecting the elderly choice of residential location; (3) overall life satisfaction of the elderly respondents is relatively high. Among the income, health, living conditions and happiness factors, happiness is slightly higher than the other three factors; relatively, satisfaction of income is low; (4) using Dichotomous Logistic Models to analyze the form of living , relationship with neighbours, surrounding service facilities and community environmental conditions, found that the large scale shopping facilities, community sports activities, community identity and relationship of neighbours result in a positive impact on life satisfaction of the elderly respondents, while the empty-nest situation, medical facilities and property management result in a negative impact on the life satisfaction of the elderly respondents.

### Key words:

Aging; satisfaction; living environment; sampling data; Beijing City

## Ageing on and of the City: The Cases of Barcelona, Milan and Turin

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### Abstract

This paper addresses ageing as a factor in the social structuration of southern European cities. Early studies undertaken in the 1960s from a human ecology perspective presented the lifecycle of households as one of the three most important factors for describing the structure of the city. At the time this analysis was undertaken the populations of southern European cities were relatively young. Half a century later we examine how both the population and the urban form have aged. By means of focussing on Barcelona, Milan and Turin, we analyse how cities pass through different stages of their lifecycles, characterised by urbanization, suburbanization, de-urbanization and re-urbanisation. This analysis is conducted in parallel with a demographic analysis of the ageing of these cities' populations, undertaken at different spatial scales. Special emphasis is given to the relationship between ageing and social structure, and residential mobility and segregation of the cities' elderly populations. This analysis points to the importance of considering ageing along and across a number of social variables, thereby helping to further emphasise the complexity of urban change and its importance in the redesign of urban policy.

### Key words:

urban ageing; urban policies

## An Increase in Housing Vacancies in Cities: The Case of Japanese Cities

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### Abstract

Housing vacancies play significant roles in improving the circulation of population within cities. Their permanency, however, is regarded as a problem. According to their generative processes and condition, urban housing vacancies are classified into the following categories: (1) speculative over buildings which typically caused during housing construction, (2) seasonal housing, such as student housing, corporative housing units, resort housing, and second homes, (3) vacancies caused by financial loss during an economic crisis or poverty in the outer suburbs, foreclosure in North American, for example, (4) decay of housing structure with limited repair and obsolescence, (5) houses without demand become vacant, and (6) housing vacancies are caused in shrinking settlements where economy and population have declined and ageing and low fertility have also progressed. Most of the categories are regarded as temporary vacancies, but a large proportion designated as “no demand” and “shrinking settlement” vacancies, and the latter is typically found in Japanese cities, tends to be permanent and therefore problematic. This study examines a generative process and the geographical patterns of housing vacancies in Japanese cities. Japanese housing vacancies are generated by visible and invisible regional forces within the city. In addition, factors such as ageing, housing policy, taxation systems, and behavior of the residents directly affect the generative processes, and background factors such as the residential structure, social and economic structure, housing development, and location and site of the city also play crucial roles.

### Key words:

housing vacancies; Japanese cities; ageing

## **Informal Path: Spatial and Temporal Evolution Characteristics and Spatial Analysis of Illegal Construction in Guangzhou**

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### **Abstract**

Existing research on illegal construction is more focused on the social and economic characteristics of the informal settlements and illegal construction space, the formation of the reasons, policy evaluation, governance measures in foreign countries. Nevertheless, its spatial analysis is less concerned.

In China, the problem of illegal construction is the result of rapid urbanization in the transition period of the economy and the social system, which has been widely concerned by the academic circle and the government.

Taking Guangzhou as an example, this paper attempts to interpret correlation analysis of illegal construction space distribution and urban spatial structure, the goal is to forecast illegal construction outbreak area and different types of illegal construction probability space location. Combined with the theory of property rights and land rent surplus value theory, the space and time evolution mechanism of illegal construction in Guangzhou is explained through the establishment of the opportunity space and the constraint space.

### **Key words:**

informal path; illegal construction; Guangzhou; space

## Gender Differentials in Social Isolation and Self-Reported Health Status among Elderly in Low and Middle Income Countries

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### Abstract

Population ageing is often accompanied by lack of social connectedness or social isolation. However, there is a lack of clear understanding about: i) extent of gender differentials in social isolation and, ii) plausible association between social isolation and self-reported health status of elderly in low and middle income countries. This study attempt to examine the gender differentials in social isolation and its association with self-reported health status among elderly in low and middle income countries. The data for the present study is drawn from the first wave of Multicounty Study on Ageing and Adult Health (SAGE) conducted by the World Health Organization (WHO) for the following six countries- China, India, South Africa, Russian Federation, Mexico and Ghana during 2007 to 2010. Multivariate logistic regression analyses using nested models were conducted separately for male and females. Data indicates rising social isolation with age among elderly, and elderly men were less socially connected than older females. Adjusted regression result indicates that elderly with lesser social connectedness were more likely to report poor health status than others. Poor self-rated health was also related with age, education, economics status, functional status and cognitive status among both men and women.

### Key words:

Population ageing; Social Isolation; Self-reported health; WHO-SAGE

## Identification and Spatial Assessments of Brownfield Regeneration

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### Abstract

The rapid urbanization and de-industrialization process has produced many under-utilized or abandoned industrial and commercial properties, commonly referred to "brownfield". A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. The importance of sustainable brownfield regeneration has recently been heightened by factors. However, this is a complex and multifaceted issue because much existing brownfield land not only presents environmental challenges, but also raises issues of environmental justice and social equity, since it often occurs in close proximity to disadvantaged communities. Relatively little research has systematically focuses on brownfield from the spatial view. In order to meet the needs of urban sustainable development and brownfield regeneration, the paper chooses the old industrial city Changchun as the sample areas, identifying brownfield sites and building a brownfield GIS database. Based on the this, we use the space analysis models to measure the spatial characteristics of each brownfield site, spatial concentration degree, spacial accessibility, spacial association, to evaluate the general spacial characteristics and do the accessment of location of brownfield.

### Key words:

identification; spatial assessment; brownfield regeneration; Changchun

## Nursing Care and Survival Show Regional Differences in Germany

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### Abstract

Regional differences in demographic change, prevalence of chronic diseases, care needs and health care provision were found in Germany. However, so far aspects in nursing care development or survival time of older people in need of care were not researched at the regional level. The aim of this study is to 1) indicate regional variation in nursing care development, and 2) identify factors associated with it among older people in need of care in the eastern part of North Rhine-Westphalia, Germany.

Accounting data of a health and long-term care insurance in Westphalia-Lippe between 2012 to 2014 (N = 17, 210) were used for the analyses. Firstly, in order to find out the regionally-specific influence on the survival time of older people in need of care, the associations between the survival time of the persons in need of care, their place of residence, and their demographic-, socio-economic characteristics were examined. Secondly, the inpatient and outpatient diagnoses of the persons were considered to discover the regional patterns and the influence of individual morbidity on nursing care development and survival time.

The log-rank test shows significant differences in 1-year survival rate of persons aged 65+ at the regional level ( $p < 0.001$ ). Cox-Regression indicates that gender ( $p < 0.001$ ), place of residence ( $p < 0.001$ ), and the diagnoses ( $p < 0.001$ ) of the older people in need of care have influence on their survival rate.

For future nursing care planning, demographic and morbidity related indicators should be considered at the regional level.

### Key words:

Survival time; Nursing care; Older people in need of care; Regional difference; Morbidity

## Parks and Open Green Spaces and the Elderly Men: A Study of Delhi

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### Abstract

Parks and open green spaces within urban landscapes provide opportunities to older adults to experience nature, engage in light physical activity, relax and sometimes escape. Such public spaces bring older men together in the neighbourhood and provide meeting opportunities; and also thus raise the potential for developing social ties among this demographic. These public parks also bring older men from different backgrounds and engage them in shared activities and develop social relations which are significant for their care and well-being. How parks are being used and perceived by the older adults is therefore essential to understand the roles of such urban spaces in social care and well-being.

Based on 12 in- depth interviews this paper explores the different meanings that the parks as social spaces hold for these older men. This paper argues that being isolated and sometimes neglected the older men engage and involve in their daily activities in the parks with their fellow elderly. The older men perceive that due to intergenerational relation changes and rise of dual career families they are not getting proper attention from the family members. Perceiving this changing family dynamics as lacking emotional care in home, the older men find local parks as alternative spaces for their care and well-being. In this context the character of these cities, especially their infrastructures and levels of social provision should be taken into consideration while planning for the age friendly cities. Moreover proper policies have become essential to address this emerging issue in the city.

### Key words:

Parks; Older men; Social care; Well-being; Everyday lives and Alternative Space

## Plight of Aged Women in Modern Cities--Some Insights into their Living

### Arrangements from Kolkata, India.

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#### Abstract

Urbanisation today is regarded as analogous to development. Societies of the developing countries are getting constantly restructured by the forces of urbanisation. At the same time, the developing countries are experiencing rapid tempo of population ageing with *feminization of ageing* being a universal phenomenon. On one hand, while the big cities and metropolises of developing world are the centres of fulfilment for the younger generations; on the other hand, they are witnessing the erosion of traditional values and culture.

In the Indian scenario, the disintegration of the traditional joint family system is a manifestation of the forces of urbanisation. Growing aspirations and individualism of the young people as an outcome of modernisation, characteristic of the urban world, coupled with increasing urban rents and dearth of space greatly discourages generations to stay together. In this context, the aged communities specially women of urban India is progressively getting marginalized and vulnerable, ending up either staying alone or relocating themselves in old age institutions.

With this background and the city of Kolkata as the study area, this study attempts to provide an insight into the living arrangements of the aged women on the basis of data collected through field survey. The city is divided into two zones---North and South---as two distinct spatio-cultural entities; the North with a traditional flair and South as much modern, developed after independence in 1947. Accordingly, the family structures in these two zones are expected to vary.

#### Key words:

Urbanization; aged women; living arrangements; North and South Kolkata; spatio-cultural zones

## Research on Facilities and Services for Age-Friendly Neighbourhoods

### Case Study in Suzhou, China

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#### Abstract

Population aging is becoming a global priority, and China is not an exception. There are already 15.6% of population over 60 years old in China in 2015, and till 2050 the number would be increased to 25.3% (Source: global AgeWatch index 2015). Under this condition, Chinese Central Government has issued a range of policies, plans and programmes to facilitate ageing-in-place. However, since ageing issue has not been fully taken into account in traditional neighbourhood planning, the existing facilities and services can hardly satisfy the arising needs of the elderly. This paper aims to provide an insight on how to plan facilities and services for age-friendly neighbourhoods based on case study in Suzhou. It combines successful international experiences and local case study and attempts to increase the age-friendliness of Chinese neighbourhoods. The results illustrate that on one hand, several necessary facilities for the elderly are missing in neighbourhoods in Suzhou, and the existing ones have not been fully appreciated by the local elderly due to the poor quality; on the other hand, the needs of the elderly are rarely revealed in current neighbourhood planning guidance or standards. At the end, it propose strategies to optimize age-friendly facilities and services, as well as implications to update the existing planning guidance, standards and instrument. It is hoped that the paper could provide some useful reference for planning age-friendly neighborhoods.

#### Key Words:

age-friendly neighbourhood; facilities; services

## Shrinking Cities: Huge Challenges of Revitalization of Northeast China during Transformation Period

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### Abstract

Shrinking cities are emerging around the world beneath the wave of globalization, which has been a global phenomenon. The phenomenon actually has appeared in many cities in China, especially in the old industrial base in Northeast China, during transformation period, thus the strategy of Revitalization of Northeast China faces huge challenges. However, existing urbanization research in China mainly focuses on urbanization of growth supremacism to cater to urban development strategy of urban growth, so research results about urban shrinkage are seldom. First, this paper analyses qualitatively the logic rationality of shrinking cities appearing based on the life cycle of cities theory. Secondly, taking Northeast China for example, this paper analyses quantitatively urban shrinkage from the perspective of region based on the statistical yearbook data of 2010-2014. The study shows: ① Population economic pressure index increases, and a terrific amount of population, especially the young and highly-educated, and enterprises frequently outflow from the region. ② Both birth rate and natural population growth rate in the region are much lower than in other regions of China. ③ Urban population density decreases as a whole in the region. ④ GDP index sharply falls and economic activity gradually declines. The results indicate that currently urban shrinkage is appearing in Northeast China. Finally, this paper outlines four main aspects including "exhaustion of resources", "aging population", "aging industrial structure" "ecological environment deterioration" causing urban shrinkage. Research suggests that future research should focus on how to accomplish the sustainable development and revitalization of shrinking cities.

### Key words:

shrinking cities; life-cycle theory of cities; transformation period; Northeast China

## Spatial Analysis of the Supply and Demand of Affordable and Accessible Senior Housing Services in Beijing

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### Abstract

China's population has been rapidly aging, especially in major cities. As of 2013, nearly 1 in 4 people are age 60 or above in Beijing and other major cities, far above the national average of 13%. Although the government has set up programs to encourage people to live at home, Beijing's elderly, especially those who do not live with their adult children, are increasingly interested in moving to a senior housing facility (SHF). Given their severe shortage, many people have been on waitlists for years with some passing away before they are able to move into a facility. As such, building new and affordable SHFs has become necessary in Beijing and surrounding areas. Although the high price of urban land has been and still is a main obstacle for building SHFs in Beijing, new opportunities for development are becoming available through the implementation of the Cooperative Development Strategy of Beijing, Tianjin, and Hebei province (*Jing-Jin-Ji xietiao fazhan zhanliu*) in China's Thirteenth Five Year Plan (2016-2020) which will connect the Jing-Jin-Ji region via fast transportation networks to create a cohesive super-metropolitan region. Since this is a novel challenge in China, very few in-depth studies on the needs of SHFs especially in regards to affordable SHF in different locations have been conducted. Using statistical and survey data, this study reveals the spatial patterns of the supply and demand of SHFs on services, price range, affordability, and accessibility in Beijing and attempts to provide a better understanding of senior housing services in an aging but not affluent society.

### Key words:

Senior housing services; supply-demand; spatial analysis; affordability; accessibility; Beijing

## The Comparison Study on the Elderly Care Systems in Japan and China: From the Viewpoint of the Individual Dynamic Demands

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### Abstract

China is undergoing a rapid aging process which brings the great influence on the families and society. The contemporary care system and planning is usually designed according to the macro-static-sectional statistical materials, lacking the consideration on the individual difference and temporal changing of the elderly demands. Thus, the care provision does not satisfy the elderly demands well. Japan, as the most aged society in the world, accumulates the abundant experience of responding to the aging challenge. Furthermore, Japan shares with China a similar traditional cultural and familial values, which makes significant effect on their care consciousness. Therefore, compared with other aging or aged societies, the experience of Japan suits the Chinese social environment better and is worthy of being referenced. This paper reviews the demands-provision system of the elderly care facility and service in Japan, and makes a comparison with that of China. It puts a special eye on the demand assessment of the Japanese Long-term care system. Based on the personal life course and condition, this system evaluates and divides the care demands into several statuses, helps the elderly make their own care plans, then regularly reassesses the demands and adjusts the plan. It expresses the consideration on the individual difference and the dynamic changing of the demands. This paper suggests that a new demands-provision framework, concerning the individual difference and dynamic changing during the life course, should be made to let the Chinese care system and planning more suitable for the elderly demands.

### Key words:

the elderly; individual dynamic demands; life course; Long term care system; Japan; China

## The Unbalanced Growth of Residential Care in Beijing City, China— Causes and Prospects

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### Abstract

By focusing on the development of residential care facilities for the elderly (RCFEs) in China's capital city of Beijing between 1950s and 2010s, this study examines the policy orientation and local consequences of the 1980s' marketisation of the Chinese social welfare system. Data includes 362 RCFsE projects' GIS data and program information; multi-disciplinary issues among social, policy, urban planning and statutory aspects were also examined. Results shows that, within the broader context of fast population ageing in China, the growth of residential care in Beijing was shifting from a central-planned pattern to a market-dominated expansion, featured with the neo-liberalism style of development. Due to the indecisive governmental efforts in the new partnership with private sectors, reflected by the absence of master-planning and legislation of private development, the projects growth in Beijing was under trends of avoiding the market-unfavoured (less profitable) areas, such as the inner urban areas (with a very high elderly population) and rural areas, and toward the suburbanization and developing higher end and over-sized residential care facilities. These were discordant with the government's defined new role as retreating from centralised controlling to regulating and guiding the residential care development for the wide elderly public. The study therefore suggests that more ideological expounds, rules and master planning regarding to the establishment of the 'supporting' function of residential care are needed, for contributing to the deepen reform of social welfare service that toward equalised provision of residential care beds locally in the future.

### Key words:

residential care facilities for the elderly; marketisation; uneven spatial distribution; China; Beijing; residential care; social welfare institutions

## Assessment of Urban Transition Performance of Resource-based Cities and Influential Factors in Northeast China

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### Abstract

This article presents a sustainable development capability evaluation index system of resource-based cities according to economic, social and eco-environmental aspects using the increment of sustainable development indicators to represent urban transition performance and analyzing the transition performance of 19 resource-based cities in Northeast China from 2003 to 2012. The results show that the resource-based cities in Jilin and Liaoning province performed better than those in Heilongjiang province. Liaoyuan, Songyuan and Baishan were ranked as the top 3 resource-based cities; and Jixi, Yichun and Heihe were ranked last. Multi-resource and petroleum resource cities performed better than coal and forestry resource-based cities. Selecting 8 indicators from exploitable resource, traffic location, factor input, state policy support and urban development basis, and using the method of geographic detector, we analyzed the influential factors of urban transition performance. We determined that capital input, road density and location advantage had the greatest effects on urban transition followed by urban scale, remaining resources and the sustainable development level and that supporting policies and labor input had the least effect. In addition, the mechanism and strength of influential factors are different among the different levels studied.

### Key words:

Resource-based cities; Economic transition; Assessment of performance; Old industrial base in Northeast China

## Demographic and Economic Features of Small Towns in Romania

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### Abstract

In Romania, after 1990, the role of many small towns has diminished in the context of deindustrialization and economic restructuring. As a result, there has gradually installed a demographic decline, under the conditions of a decrease in birth rate and a high emigration rate. The sharpest population declines of over 35% occur in cities that have registered a strong decline in the economic activities (part of these being monoindustrial). Simultaneously, in some of these cities, there is an emerging aging process that, over time, is getting stronger. There has also registered a decreased influence of small towns with their adjacent rural area, turning into real "repulsive" areas for the surrounding spaces, being unable to maintain or attract population. In this context, the first part is focused on identifying and prioritizing small towns which have registered a sharp decline in population (associated with aging), after 1990, identifying the causes and the "breaches". At the same time, the prevailing activities and the economic prospects of small towns are being analyzed. Further on, there are presented the consequences of manifesting these demographic and economic processes. Subsequently, it is investigated the way the small towns work, their role in the national system of settlements, the attractiveness degree for potential investors etc. There are also critically examined policies/strategies proposed for the readjustment of these settlements and their medium and long term development prospects.

### Key words:

Small towns; Romania; demographic decline; economic processes; causes

## Research of Farmhouse Pension Mode in the View of Urban-rural Mutual Assistance——The Example of the Pension Villages in Hangzhou

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### Abstract

As a healthy elder-centered proactive pension mode, farmhouse pension could efficiently meet the physical and spiritual demand of the elders. As a pension mode that sharing both the urban and the rural resources, farmhouse pension also plays an important part in breaking down the urban-rural dualistic barrier and promoting the urban-rural mutual assistance. The research is carried out based on spot investigation in some distinctive health pension villages of Hangzhou and questionnaire survey in aged people of Hangzhou City. The results show that the farmhouse pension mode is beneficial to both the urban and the rural areas. For the urban area, it could provide space for the elders, lower carbon, save energy and reduce the pension cost; for the rural area, it could accelerate the penetration of urban civilization, promote the deagriculturalization of rural workforce and the back-nurture from the urban area. However, it is also noticed that there exist some problems of the farmhouse pension mode, such as the low political support, the segmentation of the urban and rural medical insurance, the overdraft of rural resources, the inequality between facility demand and usage and the backwardness of management service. Accordingly, the strategies and suggestions to these problems are also put forward in this paper.

### Key words:

urban-rural mutual assistance; farmhouse pension mode; distinctive pension villages

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Urban Governance, Planning and Participative Democracy



Home

#### Oral

1. [Assemblage, Entrepreneurial Suburbanism and the Restless \(Re\)Making of Suburbia in China](#)  
Li Zhigang (Wuhan University, China)
2. [Community Involvement in Urban Development in Kano Metropolis, Nigeria: The Imperative for The Creation of Sustainable City](#)  
Ibrahim Mustapha Dankani (Usmanu Danfodiyo University, Sokoto Nigeria, Nigeria)
3. [Consequence of Compulsory Land Acquisition on the Livelihoods of the Urban Poor in Sokoto Metropolis Nigeria](#)  
Ibrahim Mustapha Dankani (Usmanu Danfodiyo University, Sokoto Nigeria, Nigeria); Halidu Mahmud Raliya (Federal College of Education Zaria, Nigeria)
4. [Développement Urbain Durable et grands évènements sportifs: mythes et défis contemporaines](#)  
Gilmar Mascarenhas (Rio de Janeiro State University, Brazil)
5. [Does Good Local Institutional Environment Enhance Firm Survival and Growth?](#)  
Zhiji HUANG (Central University of Finance and Economics, China); Canfei HE (Peking University, China)
6. [Is the Gap in the Provision of Basic Amenities between Slum and Non-slum Settlements in the Cities of West Bengal, India Really Declining?](#)  
Mehebab Rahaman; Dipendra Nath Das (Jawaharlal Nehru University, India)
7. [Linking the Politico-Administrative Fragmentation of Urban Areas to Emerging Metropolitan Authorities. The Case of European Intermediate Cities](#)  
Christophe Breuer; Jean Marie Halleux (University of Liège, Belgium)
8. [Megaregions: Foundations, Frailties, Futures](#)  
John Harrison; Michael Hoyler (Loughborough University, United Kingdom)
9. [Models of Urban Governance in the Post-Crisis Spain: From the Indignados to the New Municipal Governments in Madrid and Barcelona](#)  
María José Piñeira Mantiñán; Rubén Camilo Lois González; Jesus Manuel González Pérez (University of Balearic Islands, Spain)
10. [Private Property Owners and Urban Regeneration. Policy Experience from a German Case](#)  
Adam Radzimski (Gran Sasso Science Institute & Adam Mickiewicz University, Italy & Poland)

11. [The Influence of the Evolution of Employment Center on the Price of Residential Land in Beijing](#)  
Huang Daquan; Yang Xiaoqing (Beijing Normal University, China)
12. [The Politics of Urban Social Innovation](#)  
Joe Painter; Paul Langley; Sue Lewis; Colin McFarlane; Antonis Vradis (Durham University, United Kingdom)
13. [The Redevelopment of Peri-Urban Villages in the Context of Path-Dependent Land Institution Change and Its Impact on Chinese Inclusive Urbanization: The Case of Nanhai, China](#)  
Yan Guo (Wuhan University, China)
14. [The Transactional Places of the Territorial Planning Process: Example of the Inter-Scot of the Lyon Metropolitan Area](#)  
Benoît Dugua (University of Lausanne, Switzerland)
15. [Transition of Self-Awareness of Sendai City, Japan, Through Its Comprehensive Plans](#)  
Masateru Hino (Tohoku University, Japan)
16. [Urban Water Supply and Sanitation in Uttar Pradesh: A Case Study of Basti City](#)  
katyayni Mishra; Arun K. Singh (Banaras Hindu University, India, India)
17. [Utility, Satisfaction and Necessity of Urban Parks: An Empirical Study of Two Suburban Parks of Kolkata Urban Agglomeration, India](#)  
Jaydip De (Department of Geography, University of Calcutta, India)

## Poster

1. [Reorganization of Urban Old Industrial Area's Functions: A Case of Tiexi Old Industrial Area in Shenyang, China](#)  
Liming Zhang (China, College of Economics, Qingdao University)
2. [Research on Coal Resource-exhausted Cities Low-carbon Alternative Industry Development Illustrated by the Example of Zaozhuang](#)  
Yuke Yuan (China, Shandong Normal University)

## Assemblage, Entrepreneurial Suburbanism and the Restless (Re)Making of Suburbia in China

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### Abstract

This study examines the transformation of suburban communities in the last three decades in Pearl River Delta (PRD), a key laboratory for the market-led and open-door experiments of the People's Republic of China. It links the governance of suburbs in post-reform China with the issue of socio-spatial transformation, spatial production, everyday practices, and put it as a significant assemblage to integrate various types of suburban space. In this vein, this paper contributes to urban theory in general by assembling the perspectives of migration/territorialization, suburbanization, and entrepreneurial governance, and put them together against the context of post-reform China's recent greater transformation, i.e. urbanization. Through a long-term ethnographic examination, and building upon the macro-historical perspective, this study explores the diverse outcome of different types of suburbanism for the case PRD. As a world factory, PRD attracted billions of foreign capitals, millions of migrants, and hundred thousands of factories that reshaped its landscape. Now it is marked by the heterogeneity of social space, i.e. urbanized villages, factory blocks, commodity/social housing estates, university/science towns, cultural, ethnic, or economic enclaves clustering e-commerce traders, and so on. I argue that the restless (re)making of this assemblage is indicative of dynamic entrepreneurial suburbanism, i.e. the accumulation of capital, the financialization of land, and the bottom-up practices of local states, collectives or individuals, together with its resultant empowerment of property rights, political awareness, and (re)configuring identity. It contributes to the literature by presenting entrepreneurial suburbanism as a way of life and spatial production, especially against the context of developing or transitional economy.

### Key words :

employment subcenters; residential land price; beijing

## Community Involvement in Urban Development in Kano Metropolis, Nigeria: The Imperative for the Creation of Sustainable City

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### Abstract

Cities in the developing world are experiencing massive expansion. This growth necessitates urban managers to enact policies/legislations to address the ever increasing urban population and guide the smooth growth/development of the municipalities. Sadly, the various policies/legislation put in place fails to achieve the desired result due to non involvement of stakeholders in decisions that are vital to the growth and development of the cities. The aim of this study is to examine the benefits community involvement might bring to sustainable growth and development of cities using Kano metropolis as a study area. Data for the study were sought via primary and secondary sources. Respondents (238) were sampled using a combination of purposive and snowballing sampling techniques. The respondents comprises of all categories of stakeholders such as individuals, religious/traditional leaders, urban managers, security agents and pressure groups. Issues critical to urban planning particularly access to land, affordable housing, infrastructural provisions, security issues were extensively discussed using focus group discussion. Major findings of the study reveal that governments do not involve community members in any decision relating to urban development. Similarly, decisions were imposed on the community without due consideration to the effect it could have on the livelihoods of the community. The study concludes by recommending involvement of the community in decisions concerning the growth and development of the study area as this will serve as the imperative for the creation of sustainable city.

### Key words:

Community involvement; Urban Development; Kano; Sustainable City

## Consequence of Compulsory Land Acquisition on the Livelihoods of the Urban Poor in Sokoto Metropolis Nigeria:

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### Abstract

Access to land in Nigeria, has been clearly explained by the 1978 Land Use Decree. Land can be allocated to an individual or corporate body by the Government either through statutory or customary allocation of right of occupancy. Similarly, the Decree empowers the Government via Section 28(1) to acquire land compulsorily from individuals and corporate bodies for provision of public services by invoking the Overriding Public Interest clause of the Decree. The Decree stipulated that compensation should be given to victims of Compulsory Acquisition in order to alleviate their ordeals and sufferings. This paper examines the consequence of compulsory land acquisition on the livelihood of the urban poor in Sokoto State, Nigeria. Five areas that experienced these acquisitions were selected purposively namely, Sokoto State University complex, Bado quarters Housing Estate, Arkilla Housing Estate, Mana Housing Estate and Gidan Man Ada Housing Estate. Respondents for the study were selected via systematic sampling technique and a total of 460 were arrived at. Major findings of the study reveal that Respondents were not adequately compensated and were provided with no livelihood alternative having taken away their houses and farmlands thereby exacerbating their situation of poverty. The study concludes by recommending proper compensation to the victims as well as implementing the recommendations of the Presidential Committee on Land Reforms during the Late president Yar'adua administration which suggested compensating landowners on the basis of the market value of the land.

### Key words:

Compulsory Land Acquisition; Livelihood; Urban Poor; Sokoto

## Développement Urbain Durable et grands évènements sportifs : mythes et défis contemporains

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### Résumé

L'olympisme de l'ère moderne canalise et articule de puissantes corporations et souvent compris d'opéreuses installations monumentales (avec une utilité future contestable), d'immenses dépenses publiques, la gentrification et le retrait des populations vulnérables, en faveur du processus d'intense valorisation du sol urbain. Devant ce cadre, toute une nouvelle démarche de résistance collective a acquis de la force et s'est opposé radicalement au scénario dominant des méga-évènements (LENSKYJ, 2008; BOYKOFF, 2014). Comme réponse à ces manifestations, le système olympique a officialisé la notion « d'héritage » comme objectif de chaque édition des jeux.

C'est ainsi que le «développement durable » tant acclamé a intégré le mouvement olympique pour combler la quête de légitimation. Dès lors, les candidatures aux jeux olympiques ont commencé à édifier des projets plus « verts » ou « durables » : contrôle de l'émission des gaz polluants, structures de recyclage des eaux, utilisation de l'énergie alternative et de nombreuses autres ressources à disposition des technologies contemporaines.

Cela revient donc à réfléchir sur les conditions actuelles de production de les villes olympiques : comment et en quelles circonstances et limites se réalise l'application des principes écologiques lors de chaque événement ? Comment cela peut être une source d'inégalités socio-spatiales dans le contexte de l'organisation des jeux olympique ? Notre objectif est justement de vérifier la « voie olympique » des engagements dans la cause environnementale en considérant certains projets paradigmatiques comme Londres 2012 et surtout le projet olympique de Rio de Janeiro 2016.

### Mot-clés :

Villes Olympiques ; Limites du developpement durable ; Jeux « verts » ; Rio de Janeiro 2016 ; Londres 2012

## Does Good Local Institutional Environment Enhance Firm Survival and Growth?

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### Abstract

An intensive literature have produced the knowledge to understand the factors, such as related variety, path dependence, influencing firm survival and growth following the scope of evolutionary economic geography. However, research on whether local institutional environment enhances firm survival and growth remains blank. In this paper, we combine local institutional environment with regional industrial evolution to establish a novel analytic framework to explore the spatiotemporal performance of firm survival and its mechanisms. Using the firm-level data from the Annual Survey of Industrial Firms during 1998-2012, China, we explore the spatiotemporal heterogeneity of firm survival and growth. The econometric results primarily illustrate that local institutional environment has significantly positive relationship with firm survival, and it could also condition regional industrial evolution. We propose that better institutional environment should be built in order to enhance firm survival and regional industrial evolution for local governments.

### Key words:

Local institutional environment; Firm survival; Evolutionary economic geography

## Is the Gap in the Provision of Basic Amenities between Slum and Non-slum Settlements in the Cities of West Bengal, India Really Declining?

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### Abstract

As advocated by various international and national agencies, access to basic amenities such as drinking water, sanitation, electricity and drainage is indispensable for a decent quality of life. Over the last two decades, the government of India has launched a gamut of programmes and schemes to improve and ensure access to basic amenities in urban areas with special provision for marginalised groups and these efforts are also supported by 'inclusive growth approach' of Twelfth Five-Year Plan (2012-2017). Keeping in view these efforts, present study analyse the level of basic amenities in slum households in comparison to non-slum households in the cities of West Bengal- a state of India. The analysis is based on the census 2011, which for the first time has provided separate data on amenities in slum areas. To understand the level of basic amenities, Household Amenity Index has been constructed using principal component analysis. Surprisingly, the results indicate that the access to basic amenities in slum and non-slum settlement is more or less equal or in some cases higher in the former. But the pertinent question is whether phenomenal increase of access to basic amenities mitigates the problems related to quality or not. Unfortunately, the answer is no. There are plenty of micro level evidences which suggest that the problems related to basic amenities are very perilous in slum areas. The findings suggest that though the access to basic amenities is quite high, quality of amenities is questionable and it needs urgent attention to enhance the overall quality of life and well-being.

### Key words:

Basic amenities; Slums; Household Amenity Index; Quality of life

## Linking the Politico-Administrative Fragmentation of Urban Areas to Emerging Metropolitan Authorities. The Case of European Intermediate Cities

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### Abstract

The local politico-administrative fragmentation of urban areas is a major feature of metropolitan governance. It has a strong influence on urban issues such as spatial planning, public services delivery, economic development and interactions with citizens and upper levels of government. These communities, municipalities and local authorities are subject to many reforms to adapt themselves to new urban realities and challenges, as evidenced by decentralization processes, municipality merging, inter-municipal association and new supra-communal solutions.

In our research, we hypothesized that features of local politico-administrative fragmentation give useful information on and are linked to the type of emerging metropolitan governance structures.

In order to test this hypothesis, we have developed four indicators to characterize politico-administrative fragmentation within urban regions: a fragmentation index for population and area (average by local unit), a Gini index (population distribution between local units) and a primacy index (share of the central local unit).

We have focused our research on European intermediate cities. These cities are home of a significant part of the European population and know new forms of metropolitan governance in various national contexts in response to pressure on local authorities. We created a database including 124 intermediate urban regions delineated by the new OECD – Eurostat methodology (2015 version). Our methodology gives harmonized data for the whole EU.

On the basis of this database, we created a new typology of urban fragmentation and compared them to metropolitan governance structures. Our results validated our hypothesis on the link between features of local politico-administrative fragmentation and emerging metropolitan governance structures.

### Key words:

urban governance; European cities; intermediate cities; governance indicators; metropolitan authorities

## Megaregions: Foundations, Frailties, Futures

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### Abstract

Megaregions have emerged to become one of the most powerful, persuasive, and dominant spatial imaginaries for explaining globalization's new urban form. Nevertheless, we argue that the rhetoric and can-do bravado surrounding megaregions has raced too far ahead of the sustained theoretical and rigorous empirical work needed to support some of the assertions, assumptions, claims and investments made in the belief that megaregions do constitute globalization's new urban form. Reflecting on the foundations, frailties and futures of megaregional research, we endeavour to demonstrate the need to move megaregional debate forward from questions of definition, identification and delimitation to questions of agency (who or what is constructing megaregions), process (how are megaregions being constructed) and specific interests (why are megaregions being constructed); something which, we argue, requires a more political and more historical – as well as economic – perspective on megaregions. The latest in a long line of spatial orthodoxies associated with 'new regionalist' approaches to urban-regional planning and governance, our work reveals opportunities and barriers to adopting megaregions as a discursive policy frame for planning and governing large urban agglomerations.

### Key words:

New regionalism; megaregion; urban governance; globalization; spatial planning

## Models of Urban Governance in the Post-Crisis Spain: From the *Indignados* to the New Municipal Governments in Madrid and Barcelona

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### Abstract

The economic crisis in Spain erupted with force in 2007-2008 and presented a clear urban dimension. Along with the problems of the financial system and contagion from US and other European countries, Spain had created a housing bubble of extraordinary dimensions. Therefore, when the crisis was accompanied by closures of financial institutions, rising unemployment and an uncontrolled public deficit, its effects had a particular impact on large cities. Many families could not cope with their mortgages; they lost their jobs or suffered a drastic worsening of working conditions. The result was an increase of urban poverty and social exclusion as well as the emergence of protests on the street since 2011. Among them, the 15M movement, the *indignados* –who occupied squares and streets demanding a fair system - and anti-eviction movement became the emblems of popular response. From these movements have emerged new political parties and coalitions at the municipal level. Among the latter, those of Madrid and Barcelona have won the elections and govern the two most important cities in Spain since May 2015. The aim of this contribution is to analyze the main changes in urban governance in Madrid and Barcelona since then and to study how urban activists and social movements seek to manage differently urban crisis with its strengths and contradictions.

### Key words:

Urban crisis; municipal governance; social movements; Spain

## Private Property Owners and Urban Regeneration. Policy Experience from a German Case

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### Abstract

This paper addresses the involvement of private property owners in the process of urban regeneration using the Glaucha neighbourhood in Halle (Saale) as a case study. Glaucha, a disadvantaged 19<sup>th</sup> century neighbourhood, has undergone a notable change in the last years. Until the 1980s the district was a typical working class quarter, where many workers from the largest chemical industry complex in the former German Democratic Republic had lived. In the years following the German reunification, which brought a large part of industry in the Halle region to collapse, Glaucha came to be perceived as one of city's least desirable addresses, as it experienced relatively little renovation and strong outmigration. After the year 2000 a new policy initiative was started with the objective of bringing vacant residential properties back to the market. Due to dispersed ownership structure with a dominant share of small private landlords, an external consultancy was hired by the city administration to coordinate the process of neighbourhood change. Within this context, the paper takes Glaucha as an illustrative case to discuss the opportunities and risks related to this innovative approach to urban policy. The analysis is based on documents, field research and expert interviews.

### Key words:

private property owners; urban regeneration; Eastern Germany

## The Influence of the Evolution of Employment Center on the Price of Residential Land in Beijing

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### Abstract

After the reform and opening up of China, the market oriented reform of China's urban land market is deepening, Beijing's economic development and population grew quickly. The excessive agglomeration of population and employment to the single center of Beijing—Tian a man, brings a series of urban problems. Then, three times of the overall urban planning is formulated, intended to ease heart city's functions and population, to solve the problems of cities and to accelerate the transformation of the urban spatial structure from single center to multi center struction. In recent years, the number and scale of employment centers in Beijing has increased, and the spatial structure of the multi—center city has changed. Thoughing identifying the 1996, 2001 and 2010 year's employment centers, the paper analysis the evolution of the Beijing's employment subcentres; and through constructing hedonic price model, the paper analysis the influence on residential land price of the Beijing's evolution of employment sub centers.

### Key words:

employment subcenters; residential land price; beijing

## The Politics of Urban Social Innovation

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### Abstract

Social innovation involves new ideas for products, services and ways of working that meet unmet social needs and create new social relationships or collaborations. Austerity can accelerate social innovation in cities, but may also push it in particular directions, with significant, but little understood, implications for urban politics and governance. This paper focuses on three essential components of urban social innovation: generating financial resources, harnessing social energy, and meeting social needs. It examines the relationship between social innovation and urban politics and governance in European cities, Athens, Berlin and Newcastle, cities with contrasting experiences of austerity since the 2008 global financial. In each city we consider how alternative finance, grassroots mobilisation and community provisioning are contributing to social innovation in austerity. We examine how such social innovations affect urban politics and governance by disrupting existing power relations and channels of legitimacy and accountability, creating new urban publics and forms of citizenship, challenging traditional institutions and ways of working, and generating competition for public services. It is important to understand the impact of social innovation on urban politics and governance to ensure the effective contribution of social innovation to future urban transformation. The research is funded by the UK Economic and Social Research Council (grant reference ES/N005988/1).

### Key words:

social innovation; urban politics; urban governance

## The Redevelopment of Peri-Urban Villages in the Context of Path-Dependent Land Institution Change and Its Impact on Chinese Inclusive Urbanization: The Case of Nanhai, China

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### Abstract

Following nearly three decades of urban sprawl, China's urbanization has entered a new era of land redevelopment that encompasses built-up land in villages in a manner that is unprecedented. Village redevelopment involves both dramatic institutional change and governance restructuring. The extant literature on this redevelopment focuses primarily on top-down initiatives launched by urban governments, paying little attention to villages' responses as actual landholders. Through a case study of village redevelopment in Nanhai, this paper examines villages' behaviour during periods of institutional change and their interactions with urban governments to shape final outcomes. Institutional uncertainty emerges during path-dependent institutional change, as revealed through the absence of effectively executed planning control and unclearly defined profit sharing. As a result of this institutional uncertainty, villages and urban governments sign incomplete contracts for entire redevelopment plans. Such agreements result in disordered competition for land rents that takes the form of villages 'holding up' the government that has previously made a commitment to the village pursuant to the incomplete contract. Villages maximize their profits and attenuate the government's role in ensuring public profits, whereas government compromises related to development control challenge the capacity of limited public facilities. The government's concessions related to profit distribution result in increased inequality between more prosperous villages and other groups, such as migrant populations and remote rural villages. Research findings contribute to a comprehensive understanding of newly created governance in redevelopment and call for a critical evaluation of existing urban-renewal policies to ensure that urbanization is an inclusive process.

### Key words:

China; land institution change; peri-urban villages; redevelopment; hold-up problem; inclusive urbanization

## The Transactional Places of the Territorial Planning Process: Example of the *Inter-Scot* of the Lyon Metropolitan Area

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### Abstract

As part of the International Geographical Congress, the paper presents the main research results based on my thesis, which was defended in January 2015. The thesis deals with the challenges of territorial planning in France analysed within a European context. The Solidarity and Urban Renewal Act (2000) creates the *Scot* (« *Schéma de cohérence territoriale* ») as territorial planning tools. These require the planning of territorial organisation in the light of sustainable goals over the long term. The *Scot* are a kind of master plan for the large scale territory. My primary case study is the construction of the territorial planning process regarding the Lyon metropolitan area. Between 2009 and 2012, the research-action project was the result of an industrial research agreement (*cifre*) within the Lyon Urban Planning Agency. The Lyon metropolitan area is comprised of not less than thirteen *Scots*. Since its creation at the beginning of the 2000s, the *inter-Scot* of the Lyon metropolitan area is a collaborative organisation which must assure an articulation between all the territorial planning exercises. My thesis addresses four main problems: the relation between plans et projects (1) ; the temporality of multiple level planning (2) ; categorizing the places of the projects (3); the interactions between the stakeholders responsible for planning (4). Finally, my thesis proposes the concept of *transactional places* to explain the new *places of projects to be prioritized* today. Those would assure the interactions required between territorial scales, stakeholders, tools, fields of intervention and temporality.

### Key words:

territorial planning; Lyon metropolitan area; inter-Scot; transactional places

## Transition of Self-Awareness of Sendai City, Japan, Through Its Comprehensive Plans

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### Abstract

All Japanese municipalities have formulated their own comprehensive plans every ten or twenty years since the late 1960s in order to carry out their planned and efficient government. These plans illustrate visions based on their functional positions in the national and regional system, their future population forecast and their identities. This study examined changes in the self-awareness of Sendai through the transition of comprehensive city plans. Sendai is the regional capital of Tohoku Region. Sendai has also been called a forest city and a university city. The fundamental direction of its comprehensive plan changed from growth-orientation to the post-growth one in the 2000s. According to the comprehensive city plan in 2011, the ability of citizens and civil society organizations which resolves various problems appearing with social changes is recognized as the most important factor keeping the vitality of the city. Moreover, the cooperation between the local government and various civil society groups became to be requested. In the spatial plan, the controlling of expansion of built-up area in the suburb and the promotion of intensive land use along the subway and railway lines were drawn. This comprehensive plan of Sendai suggests that Japanese cities began to think their own future on the recognition of post growth society.

### Key words:

comprehensive city plan; city identity; post-growth city; civil society group; Sendai

## Urban Water Supply and Sanitation in Uttar Pradesh: A Case Study of Basti City

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### Abstract

Availability of adequate amount of water and the proper disposal of liquid and solid waste is a basic human need and critical in determining the quality of life. The Govt. of India has included the issue of water supply along with sanitation in national agenda since 1st Five Year Plan but still a large proportion of population is devoid of this basic amenity. Indian cities witness water supply for a few hours, pressure is irregular, and the quality is questionable. Substantive amount (20 to 40 per cent) is lost through leakages and illegal connections. This has brought into focus the need for planned action to manage water resources effectively by involving different groups of stakeholders. There are several issues like reliability, sustainability and affordability which affect water supply and sanitation and could be addressed by identifying alternative sources of water supply, adjusting existing policies, making institutional arrangement, strengthening operation and maintenance system, providing financial incentives, capacity building for improved service delivery and ensuring involvement of communities at various stages of planning, implementation, operation and maintenance. The paper highlights the norms set by different agencies, institutional arrangement and the status of water supply and sanitation in Basti City. Data for this work have been directly collected through a set of questionnaire from the different wings of respective urban local bodies and have been substantiated by secondary data sources which include published articles and reports.

### Key words:

Basic human need; Quality of Life; Reliability; Sustainability; Affordability; Capacity Building

## Utility, Satisfaction and Necessity of Urban Parks: An Empirical Study of Two Suburban Parks of Kolkata Urban Agglomeration, India

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### Abstract

Urban parks are the open places, green fields and riverside gardens usually maintained by public or private authorities or eventually by both jointly; and utilized for a multidimensional purpose by the citizens. Practically these parks serve as the lung of urban centers. In the urban environments, these are the locus of social integration, community building and physical development. Usually they perform as the panacea of congested, complex and stressful urban life. In the cities of developing countries, increasing population and resultant congestion of high-rises are making life wearisome. Citizen always quest for open space and fresh air. In such a circumstance trivial existence of parks is not capable of satisfying the aspirations. Here, an attempt is so made to empirically identify the utility, visitors' satisfaction and future needs through the cases of two urban parks of Kolkata conurbation, India. In the contemporaneous study, primary information is collected through visitors' perception survey conducted at Chinsurah ground and Chandernagore strand; identified and analyzed the correlation between different utility categories. At the same time, indices like Weighted Satisfaction Score (WSS), Facility wise Satisfaction Index (FSI), Urban Park Satisfaction Index (UPSI) and Urban Park Necessity Index (UPNI) are advocated to quantify the visitors' satisfaction and future necessities. It is explored that most important utilities are passive in nature. Simultaneously, satisfaction levels of visitors are average and they need parks for children most. Further, considering the visitors' opinion planning measures are promulgated for holistic development of urban parks to revitalize sustainability of citified life.

### Key words:

Urban parks; Park utility; Visitors' satisfaction; Future needs; Citified life

## Reorganization of Urban Old Industrial Area's Functions: A Case of Tiexi Old Industrial Area in Shenyang, China

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### Abstract

Urban old industrial areas exist widely around the world. Substantial social, economic and environmental issues occurred with the recession of old industrial areas, impeding the sustainable development of the host cities. The transformation and reconstruction of urban old industrial areas is an important and critical issue for city's renovation. Urban functions reflect the fundamental characteristics of one city. City's renovation refers to the reconfiguration and redevelopment of urban functions. Based on a comprehensive review of the reconstruction of urban old industrial areas, this study employs a case study approach in Tiexi old industrial area of Shenyang city, a typical brownfield redevelopment project in China.

The reconstruction process of Tiexi old industrial area was analysed from the perspective of reorganizing urban functions, including the reconstruction targets, driving mechanism, reconstruction pathways and key patterns. The reorganization of Tiexi old industrial area's urban functions coupled with land use changes, leading to spatial structure reconfiguration. During the study period, the industrial land use reduced by 644.30ha, while the residential land increased by 374.68ha. The area of land use change had been 1075.62ha, accounting for 25.40% of the total area.

Several policy recommendations on better reorganizing old industrial area's functions are proposed, such as adjusting industrial structure and optimizing special planning, improving land-use efficiency by integrated land use planning, energy saving and circular economy.

### Key words:

Old industrial area; Urban function reorganization; Land use

## Research on Coal Resource-exhausted Cities Low-carbon Alternative Industry Development Illustrated by the Example of Zaozhuang

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### Abstract

The coal resources city sustainable development and the transformation has been the important and difficult problem in the process of Chinese modernization. This paper is illustrated by the example of Zaozhuang to get insight into the problems of coal and other leading industries and new low-carbon substitute industries' guidance to the choice of industry leading role in its huge economy. Using Delphi method to score the various industrial competitiveness of Zaozhuang and select high-tech industries, tourism and other industries. Meanwhile, this paper researches for the development of its new model to provide a typical case for the transformation of other resource-exhausted cities.

### Key words:

resource-exhausted cities; low-carbon alternative industry; transformation of industrial structure

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Contested Social Spaces

#### Oral



Home

1. [Agency and Social Construction of Space under Top-Down Planning: Resettled Rural Communities in China](#)  
Min Zhang (Nanjing University, China); Weiping Wu (Tufts University, United States)
2. [Debordering and Rebordering processes in Suburban Guangzhou](#)  
Kaihuai Liao (Guangzhou institute of Geography; University of Kiel, China); Werner Breitung (Xi'an Jiaotong Liverpool University, China); Rainer Wehrhahn (Department of Geography, University of Kiel, Germany)
3. [Discriminated Urban Spaces: A Study of Spatial Segregation in Urban West Bengal, India](#)  
Ismail Haque (Jawaharlal Nehru University (JNU), India)
4. [Does the New 'Planetary Urban' Order Let Civil Society Go off the Hook in the Postcolony?](#)  
Aditya Mohanty (University of Aberdeen, United Kingdom)
5. [Identity Assertion and Contested urban space: An Odyssey of Lower Castes Spatialities in an Indian City, Jammu](#)  
Devinder Singh (Associate Professor, Department of Geography, University of Jammu, Jammu 180006, Jammu & Kashmir, India, India)
6. [Limited Property Housing vs. Commodity Housing in Beijing: An Empirical Study on Resident Structures and Residential Satisfaction](#)  
Peiwei Xu; Xiuyu Hao; Yan Lei (College of Resources Science and Technology, Beijing Normal University, China)
7. [Post-Crisis Spanish Cities. Slumification and Gentrification in a Leading Mediterranean Island Tourist City, Palma de Mallorca](#)  
Jesús Manuel González Pérez (University of the Balearic Islands, Spain)
8. [Quality of Life of Foreigners in an Industrial City from Geographical Perspective: Case of Hamamatsu City, Japan](#)  
Jun NISHIHARA (Faculty of Informatics, Shizuoka University, Japan)
9. [Residential Satisfaction of Public Rental Housing in Chongqing City and its Influential Factors](#)  
Huiming Zong; Jielin Dai (Southwest university, China)
10. [Small Property Right Housing Development in China: Towards a renewed understanding of urban](#)

## villages

Shenjing He (The University of Hong Kong, China)

11. [Socio-environmental Conflicts and Poverty: The Case of the Metropolitan Area of Mexico City](#)  
Rolando Espinosa (Doctorate in Geography National Autonomous University of Mexico, Mexico)
12. [Socio-Spatial Differentiation and the Social Construction of Resident'S Opinion about Refugees and Immigrants in Mytilene \(Greece\)](#)  
Chryssanthi (Christy) Petropoulou; Anna Micheli; Elena Katseniou (Department of Geography, University of the Aegean, Greece)
13. [Sprawling Informality versus Upgrading Technological Business District of Changping, Beijing](#)  
Ran Liu (College of Resource Environment and Tourism, Capital Normal University, China)
14. [Survival Mechanism of the Urban Street Vendors under Large Urban Projects during Transitional Period——A Case Study of Wuhan Optics Valley Square](#)  
Wanzhen Tang (Hubei University, China)
15. [The Interaction between Urban Space and Graffiti in Japan, Taiwan and Hong Kong](#)  
Yoshihisa Matsumura (Hannan University, Japan)
16. [The Occidental Isn't Accidental: Life Among Baku's Steel Metaphors and Black Gold](#)  
jeremy tasch (Towson University, United States)
17. [The Pop-Up World of Adolescents: Peri-Urban Spaces Transformed](#)  
Margaret Robertson (La Trobe University, Australia)
18. [The Role of Social Capital in Community Recreation and Informal Settlements \(Case Study: Neighborhood Saadi, Shiraz\)](#)  
Ali Movahed (Kharazmi university, Iran); pegah Izadi (Sistan and Bluchestan university, Iran)
19. [The Social Spacial Factors in the Areas of Creative Industry Clusters—An Empirical Research Based on the Areas in Tokyo](#)  
Gan Xinyue (Tsinghua University, China)
20. [The Spatial Difference Study of Hainan'S Urbanization Development in the Post-Crisis Era](#)  
Ting Chen; Zhongnuan Chen (South China Normal University, China), Liang Tian (Hainan University, China)
21. [The Vision of the Neighborhood and its Impact on Norms and Behaviors](#)  
Anna Cieslik (New Jersey City University, United States)
22. [Urban Adaptive Governance of Marginal Social Environments](#)



Mirela Paraschiv; Ioan Ianoş; Irina Saghin (CICADIT, University of Bucharest, Romania)

23. [Village Autonomous Non-Agricultural Development and Social Inequality during Rapid Urbanization: The Case of Nanhai, China](#)

Yan Guo (Wuhan University, China)

## Poster

1. [Community Attachment among Guangzhou Public Housing Residents](#)

Dixiang Xie; Jiang Chang (China, Guangdong University of Technology)

## Agency and Social Construction of Space under Top-Down Planning: Resettled Rural Communities in China

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### Abstract

Resettled rural communities are a product of China's rapid urbanization and associated top-down planning. For local governments, relocating farmers from natural villages into new, concentrated residential neighborhoods serves the dual purpose of implementing national directives on farmland conservation and integrated urban-rural planning. For resettled residents, however, the process is akin to involuntary urbanization. This paper explores how such residents in Zhenjiang, exercise agency to reconstruct community and residential space in their new neighborhoods. Using the concept of habitus, in this case the pattern and practice of thoughts acquired during their rural lives, we show that even under top-down planning, micro resistance allows residents to continue some forms of traditional lifestyle and smooth the transition to urbanism.

### Key words:

resettled rural communities; agency; habitus; top-down planning

## Debordering and Rebordering processes in Suburban Guangzhou

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### Abstract

The dynamics of bordering processes have been examined substantially on national borders, however, not much attention has been paid to how exactly borders work on the scale of neighbourhood. This paper explores the performance of the dynamics processes occurring at the border between two different but contiguous enclaves: a gated community and an (urban) village. This paper adopts a multiple-dimensional approach that scrutinizes the functional, symbolic and social-network aspects of the neighbourhood debordering and rebordering processes. The empirical study comes from three residential borderlands in suburban Guangzhou by using the methods of semi-structural interview and observation by following. The empirical results demonstrate that residential border is becoming more permeable as a result of flows of people from the gated community to the neighbouring village area. At the same time, however, the border also becomes more rigid through processes of seeking a sense of security, of ordering and othering. Residential borderland is a transitional space in which the inclusion and exclusion of people take place. This paper also demonstrates how the processes of debordering and rebordering are embedded in the urban spatial reconfiguration of Guangzhou.

### Key words:

Residential borderland; Debordering; Rebordering; enclaves; Guangzhou

## Discriminated Urban Spaces: A Study of Spatial Segregation in Urban West Bengal, India

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### Abstract

Given the present developments reshaping the social and spatial coherence in urban areas, a more inclusive understanding of segregation is required. Analysing latest ward-level data from 2011 Census database, this detailed study solicits to understand the magnitude of spatial segregation in the 10 most populated cities of West Bengal, India. Applying Gorard Segregation Index (2000), we attempt to examine empirically the extent and magnitude of spatial segregation in each of the cities by gender, caste, socio-economic status and access to Households-public, private and aspirational goods and we would also like to see whether degree of spatial segregation by caste is higher than segregation by socio-economic status or other select aspects. This paper surmises high degree of spatial segregation by caste in these cities. In each of the cities, caste-based spatial segregation is much pronounced than the degree of segregation by socio-economic status and gender. Level of spatial segregation by access to Households essential public goods- treated tap water and drinking water facility within premises and essential private goods-latrines within premises seems to be considerably higher as well. This paper further finds a higher correlation between wards having proportion of SC/STs population and access to Households' essential public, private and aspirational goods in most of the studied cities. This study concludes with a discussion of the key lacunas of our analysis and underscores some avenues for future research.

### Key words:

Urban Space; discrimination; spatial segregation; caste; West Bengal

## Does the New 'Planetary Urban' Order Let Civil Society Go off the Hook in the Postcolony?

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### Abstract

In the contemporary 'urban' condition, liberal democracy and transnational sovereignty offer us numerous avenues for cognizing the cross-cultural undertones of human geography. But scholars like Ananya Roy (2015) caution us against the adoption of '... a universal grammar of cityness, modified by (exotic) empirical variation' by harping on the celebration of a contingent historicity. Howsoever the 'planetary urbanization' (Brenner 2013) analytic precariously tinkers with our understanding of claim-making in postcolonial urban spaces. The rise of a caste-class consociation and the growth of a hegemonic middle class (Heller and Fernandes 2006), for instance, seem to have had engendered an ossification of a neoliberal ethic that definitely dares to ruffle up the very ontology of a 'postcolonial aura' (Dirlik 1994) or the very 'ordinariness' (Robinson 2005) of the city. Under such a moment of spatio-temporal catharsis, one tends to feel as if civil society is let off the hook. This paper shall use data retrieved from my current research work on neighborhood associations in Delhi and studies on gentrification and urban renewal, in cities of both the Global North and South, to prod in. In fact it argues that in order to understand subversive modes of representation amidst the growing 'specter of capital' (Chibber 2013), the ontology of a comparative urban geography needs to go beyond the dichotomy of the 'civil' and the 'political' in everyday life. Further, we do need to unabashedly get prepared for capturing the ethos of what, I prefer to term as, 'symbiotic spaces of neo-populist sovereignty'.

### Key words:

Planetary Urbanisation; Civil Society; Neoliberalism; Postcolonialism

## Identity Assertion and Contested urban space: An Odyssey of Lower Castes

### Spatialities in an Indian City, Jammu

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#### Abstract

The socio-economic and socio-cultural look of India has experienced significant changes since Independence. The manifestations of these changes induced by economic, social and political processes are tangible in the Indian urban socio-spatial reality. A large dynamic urban centre appears to be a microcosm of the contemporary Indian reality. Taking a case study of Jammu, a multi-religious and multi-caste historic regional centre and the winter capital of the State of Jammu & Kashmir, the paper aims to describe and explain the traditional and contemporary socio-spatial patterns and socio-spatial dynamics of lower castes. It unravels processes generating distinct identities among lower castes. The study brings to light their struggle to produce symbolic spaces to enhance their respective visibility and strength, thereby, both enriching city's cultural life and giving new meaning to its social space. In the sense, urban space has become more contested, fragmented and attained more complexity. The research is largely based on data collected through personal interviews, schedules and participatory observations. The discussion is also based on census data from 1901-2011. In addition, maps and photographs are used to illuminate the reality.

#### Key words:

Lower Castes; Socio-spatial pattern; Socio-spatial dynamics; and urban social space

## Limited Property Housing vs. Commodity Housing in Beijing: An Empirical Study on Resident Structures and Residential Satisfaction

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### Abstract

Due to the urban-rural dual structure within China's land administration system, Limited Property Housing (LPH) - homes built on collectively-owned rural land and sold to the public - has become a unique phenomenon in China. Approaching the LPH issue from the viewpoint of demand, the research focuses on resident structure, residential situation and satisfaction of LPH, and surveys typical LPH and Commodity Housing (CH) quarters in Beijing's metropolitan area. Based on statistical analysis, a comparative study between LPH and CH residents is conducted.

Four major differences are found between LPH and CH residents: previous places of residence, family structures, educational levels, and extent to which they can afford on housing. On the flip side, some undeniable similarities between the two groups are discovered, such as household income, household status (rural or urban), occupations of and workplaces of breadwinners.

On a scale of 1 to 7, with 7 being "very satisfied", LPH residents are rated 4.09 on housing prices satisfaction, while CH residents are rated 2.84; LPH has a 4.44 on comprehensive residential satisfaction, and CH a 3.96.

By the AHP approach, the price factor is weighed 51% in this model, and therefore the difference in housing prices plays a decisive role in this evaluation of comprehensive residential satisfaction level. The difference in prices between CH and LPH is also a determining factor of LPH purchase, yet the collected data does not support the claims that LPH purchasers are a low-income, vulnerable group with low levels of education.

### Key words:

limited property housing; commodity housing; resident structure; satisfaction level; survey; Beijing

## Post-Crisis Spanish Cities. Slumification and Gentrification in a Leading

### Mediterranean Island Tourist City, Palma de Mallorca

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#### Abstract

The bursting of the housing bubble in Spain, the world economic crisis (2008) and subsequent neoliberal austerity policies have led to profound social and urban changes in Spanish cities. The main consequence is growing inequality in post-crisis cities. The city of Palma, the capital of one of the Mediterranean's leading tourist destinations (Mallorca), is a good example and case study. In times of crisis, there is an increase in the price of housing and tourism in strongly promoted central areas, and increased austerity in outlying, more cut-off urban areas where marginalized members of the population live. An increase in the number of homeless people and the introduction of austerity policies are two consequences of the crisis. The objective of this paper is to study the city's social fragmentation through an analysis of social and urban processes put into practice during the years of the economic crisis. The main hypothesis is that post-crisis cities are more fragmented and imbalanced, with a widening gap between the richest and poorest neighbourhoods. The paper is divided into two main sections. First a study is made of gentrification processes, increases in the price of real estate, and the touristification of the old quarter. Second, urban vulnerability indicators are analysed on an intra-urban scale, with particular attention to slum areas, the homeless population and evictions. In order to compare these processes, the analyses focused on two moments in time: the housing bubble (the first decade of the 21<sup>st</sup> century) and the economic crisis (the second decade).

#### Key words:

post-crisis city; urban vulnerability; urban fragmentation; gentrification; evictions; housing bubble; homeless; tourist city; Palma de Mallorca

## Quality of Life of Foreigners in an Industrial City from Geographical Perspective: Case of Hamamatsu City, Japan

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### Abstract

Immigrants generally experience poorer living conditions and quality of life in European and US cities. In Japan, after revising the Immigration Control Act in 1990, many foreigners immigrated to Japan and found employment in various non-skilled jobs. Consequently, the social geography of Japan's cities has changed drastically regarding the nationality of residents whose living conditions are expected to resemble migrant workers in western cities. This paper examines the quality of life of foreigners in Japan's cities from a geographical perspective.

This study focuses on Hamamatsu City, an industrial city, whose foreign population in 2010 was 28,000, about 3.4% of its 820,000 citizens. Brazilians account for half of the foreigners. I analyze the geographical distribution of accessibility to such daily-life facilities as grocery stores, large-scale retail stores, banks, hospitals, and child-care centers using GIS and discuss the differences in the accessibility levels between foreigners and Japanese nationals.

First, the people living in the built-up areas of Hamamatsu have achieved good overall accessibility levels, but the suburban and peripheral areas are less convenient. Second, even foreign workers with low incomes and unstable employment conditions are not greatly constrained as to where they can live. Most reside in built-up areas where they have secured slightly more convenient lifestyles for employment and shopping, supported by their strong ethnic networks, than Japanese nationals. Third, the Japanese people living in these peripheral areas, almost half of whom are seniors, are forced to live under inconvenient daily situations.

### Key words:

Immigrant; Accessibility to Daily Life Facility; GIS; Quality of Life

## Residential Satisfaction of Public Rental Housing in Chongqing City and its Influential Factors

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### Abstract

In the context of rapid urbanization, public rental housing has become one of the important ways to solve the housing difficulties of urban population in metropolitan area in China. Previous studies, however, have overwhelmingly focused on residential satisfaction in transitional urban community particularly. Little attention has been paid to residential preferences and realization in public rental housing. Therefore, based on the statistical analysis of 500 valid questionnaires, we use multivariate linear regression model methods to examine the impacts of objective factors (such as demographics, housing conditions, and commuting) on residential satisfaction. We find that single groups, the elderly and permanent immigrants have high satisfaction. Specifically, location factors have significant impact on residential satisfaction. Meanwhile, commuting time and cost also as explanatory variables produces somewhat different economic correlates of residential satisfaction. Findings from this study suggest that improving reasonable space layout programs and transportation facilitiesWánshàn de jiāotōng pèitào shèshī is important to enhance residential satisfaction of existing residents.

### Key Words:

Public Rental Housing; Residential Satisfaction; Influential Factors; Chongqing

## Small Property Right Housing Development in China: Towards a renewed understanding of urban villages

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### Abstract

In China, skyrocketing housing prices in large cities make homeownership an unachievable dream for many. Despite a large quantity of affordable housing having been built or being built by governments, accessibility remains as a major problem in terms of the remote location of this new state-supplied housing and its stringent criteria, which exclude the large majority of rural migrants in the city, cumulating to more than 260 million in recent years. Against this backdrop, one peculiar informal housing strategy known as “Small Property Right Housing (SPRH)” is thriving on collective land owned by villagers, which has accounted for about 20% of total housing stock in the whole country. SPRH can therefore be seen as an informal countermeasure responding on the one hand, to the deficit of formal sector affordable housing supply and on the other, to towering housing demand from low-income groups and rural migrants. Constrained by their limited property rights, SPRHs are inalienable by law. Being well aware of the risks and uncertainty of SPRH, a large number of rural migrants still participate in the SPRH market. In this research I delve into an important question: What are the socio-spatial implications of SPRH (as an alternative form of homeownership) for migrants in terms of social mobility and social integration? Based on a pilot study conducted in Guangzhou, 2015, which involved 9 in-depth interviews and 394 questionnaires, this study aims to contribute to a renewed understanding of urban villages by pinpointing several new findings: 1) urban villages are more than a spring board for migrants, in which SPRH provides a counterforce for precariousness and insecurity and serve as a breeding ground for upward social mobility; 2) yet, SPRH also emerges as “clubs” for better-off migrants, which raises a new question: whether SPRH promotes social integration or creates new dynamics of segregation?

### Key words:

Small Property Right Housing; Urban Villages

## **Socio-environmental Conflicts and Poverty: The Case of the Metropolitan Area of Mexico City**

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### **Abstract**

The process of urbanization of contemporary society has been accompanied by two disturbing phenomena: the urbanization of poverty and the environmental degradation of both urban and rural areas. These last two issues have a complex relationship among each other and with the process of urbanization itself.

This paper discusses the link between social and environmental precarization processes and the emergence of socio-environmental conflicts in urban areas. On the basis of the classic geographical scale problem, it debates the misleading antinomy opposing “anti-environmentalism” and “environmentalism” of the poor people.

The argument concludes with an example, the case of Mexico City, in order to formulate the relevance of the concept of socio-environmental conflict for the development of a critical geography of conflict. It highlights that what has emerged in large cities is a form of popular environmentalism, in the broad sense of the word, that tends to involve all kinds of social strata and classes, mobilized as a result of the undermining of their living conditions and the deterioration of their relationship with the environment.

### **Key words:**

Socioenvironmental conflict; environmental degradation; environmentalism of the poor; Mexico City

## **Socio-Spatial Differentiation and the Social Construction of Resident'S Opinion about Refugees and Immigrants in Mytilene (Greece)**

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### **Abstract**

During the summer of 2015 a noticeable flood of refugees and migrants arrived on the coast of Lesvos and particularly in the city of Mytilene (Greece). Since then, the daily number of refugees and migrants arriving on city of Mytilene (Greece) is fixed to 1500 people. For this reason the island of Lesvos has developed a great humanitarian and solidarity action in order to help them. Furthermore, this migratory flow has affected not only the change of certain land uses in the city center but also influenced on the economic and social activities of the city and on the creation of contested social spaces in the city. This study focus on the social construction of different viewpoints of residents about refugees, the ways resident's opinions are formed and affecting by the daily life experiences, the urban socio-spatial differentiation and all those socio-spatial dynamics developed in the city of Mytilene (Greece) during this time. The social data was carried out during the summer period of 2015 in four urban districts of the city approached from both qualitative and quantitative methodological tools which was applied for the determination of these dynamic characteristics approved by questionnaires, interviews, collection of articles of local press and formal discussions among residents.

### **Key words:**

migration; socio-spatial differentiation; urban geography; contested spaces

## **Sprawling Informality versus Upgrading Technological Business District of Changping, Beijing**

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### **Abstract**

Suburban Beijing is increasingly becoming a contested space witnessing the enhanced sectoral and spatial mobility of capital and people, following a series of city upgrading actions and migration control measures. Taking the Changping District as case study, this paper investigates the drives of the latest socio-spatial changes there, including the joint efforts of investors and local states in branding the Technological Business District, and the labourer's endeavors to settle down in this 'unaffordable' city. The 'urban villages' have also sprawled along the Beijing-Tibet Expressway following mass demolitions, just booming neighboring the TBD area. The surveys on 'informalities' tell a floating life story of migrant tenants, and demonstrate the housing inequality that is deeply embedded in power matrix and fiscal relations of Beijing city. Besides the above pair of 'formalities' and 'informalities', Beijing's giant welfare housing clusters, namely Huilongguan, have been also built along the Beijing-Tibet Expressway. The 'group-renting' of young college graduates has emerged in Huilongguan, for its high vacancy rate as a result of welfare housing misallocation towards free-riders. The 'group-renting' mode has settled down thousands of young IT workers, and proved the housing difficulties among these well-educated employees of new economies. In implementing the 'local developmentalism', the housing unaffordability and inaccessibility of the capital city are 'decriminalized' to be 'leverage' to force out the low-wage migrants. Apart from the tightened *hukou* controls in Beijing, more focus should be put on obstacles to financing the 'New Styled Urbanization', including its impending 'residency card' system.

### **Key words:**

Sprawling informality; Group-renting; Technological Business District; Changping; *Hukou* reforms

## Survival Mechanism of the Urban Street Vendors under Large Urban Projects during Transitional Period

### —A Case Study of Wuhan Optics Valley Square

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#### Abstract

In recent years, the researches on informal economy from the spatial view have attracted a lot of attention in urban geography. Meanwhile various informal economy phenomena appeared during the fast urbanization in China. Wuhan Optics Valley Square street vendors were selected as our study case. The related appeal and attitude of different subjects was obtained by in-depth interviews, the characteristics of spatial distribution and the social and economic of the Optics Valley Square informal activity were analyzed by the plotting of field survey. We found that there exists some special status for the street vendors. Firstly, the street where vendors are selling is strongly affected by large-scale urban development projects. Specific performances of its influence are in temporary scope of operation, failure of internal space control and local concentration distribution characteristics of commodity. Secondly, vendors normally mobile and their stalls are relatively stable. Vendors' business hours and stalls in and around my study area have changed with the project's process, while vendors within study area have fixed business hours and stalls. Thirdly, vendors' identities are different and complex, such as diversification of sources, trend of young and highly educated and the participation of minority groups and even they control the street and so on. The forming mechanism is closely related to spatial reconstruction of large urban projects, the regional politics under particular location and vendors' coping abilities and aspirations.

#### Key words:

transitional period; large urban development projects; informal economy; street vendors

## The Interaction between Urban Space and Graffiti in Japan, Taiwan and Hong Kong

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### Abstract

The Hip-hop culture consisting of rap, DJ, break dance and graffiti emerged in New York in the 1970's and has continuously flowed into East Asia's big cities since the mid 1980's. With the exception of graffiti as a form of vandalism against the urban function, this culture has become widely accepted and established in East Asia from the 1990's through until the 2000s, without any considerable frictions. At the same time, some graffiti artists, while maintaining a tense relation with public authorities, have developed their own style into a fine art that focuses on urban public spaces and streets. From the mid-2000s, as a result of the discussions on the "creative city," creative activities and artists increasingly received attention as a new way of encouraging urban regeneration. Within this, graffiti and wall art have also been recognized as important contributions to move beyond the stubborn "broken windows theory".

In this presentation, through comparative study, I examine the various connections between graffiti, artists, private companies, governments and local communities by focusing on particular characteristics of urban space. "Nishinari Wall Art Nippon" in Osaka, the activities of "CITYMARX" near Taipei Cinema Park and "The Pier-2 Art Center" in Taiwan and "Hong Kong Walls" in Hong Kong etc. are used as case studies. It is widely claimed that graffiti may trigger gentrification and social exclusion. However, this paper shows that graffiti also has great potential to encourage local communities, engrave urban memories for facing the future and attract a lot of visitors.

### Key words:

urban space; art; graffiti; community; government

## The Occidental Isn't Accidental: Life among Baku's Steel Metaphors and Black Gold

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### Abstract

Reminiscent of Lenin's 1916 observation that Baku "had transformed from a contemptible town into a first-rate industrial center of Russia," the contemporary capital of Azerbaijan has become a planned stage-set of modernity. Largely liberated from budgetary constraints by oil, and notwithstanding its pre-existing 19th century masonry cityscape, Baku has become an experimental urban center where designers' imagination and plasticity of form now dominate the skyline. But modern Baku, with its newly constructed hotels and imported London taxicabs, is the seat of a central governmental apparatus that imposes a social contract that offers futuristic wonders in exchange for civil obedience. While contemporary Baku is heralded by its central government as the economic, cultural, and social hub of the Caucasus, for Baku's residents this rapid cosmopolitan transformation is, by turns, inspiring, threatening, alienating and confusing. Inside the crucible of Azerbaijan's post-Soviet modernity, residents debate and deliberate what it means to be Azerbaijani, in a city that claims "European Charm of the Orient." This paper reflects on the importation of "European" features the powerful feel will maintain their authority, in complement with the ways that diverse, nostalgic, and hopeful residents are negotiating the parameters by which the city—and nation—is run.

### Key words:

Urban; Modernity; Baku; Eurasia; Culture; Oil

## The Pop-Up World of Adolescents: Peri-Urban Spaces Transformed

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### Abstract

It's been a long dry summer. School is back for the start of another year. Students report: 'Nothing much has changed – the classrooms look the same and the teachers seem nice but time will tell. We have exams looming. I know I need to knuckle down and start studying. The problem is my mind wanders off to beaches and cinemas, and the local cafés and park and the new pop-up clothing shop in the local shopping mall'. It's October 2014. Asked about their views and visions of the spaces and places where they live young people aged 12-15 years report in focus groups (N~240) their first concern is terrorism. 'Sending our people to conflict places will not help'. 'Planes link people'. People are mobile. 'My Mum got married in Bali'. 'Racism is pretty bad'. 'People say things but laugh it off. It's bullying'. 'Self-harm is kind of bullying. Then there is suicide'. Such are perceptions of life in the peri-urban zone of metropolitan Melbourne (Australia). Multi-ethnic communities bring together families from diverse socio-cultural backgrounds. Mostly bilingual, these young people live in complex worlds. They are imaginative and resourceful – they merge the hyperreal of their online and everyday lives with seamless ease. Supportive of one another, adolescents explain their hopes and dreams for the future. The school and local community agencies are part of the developmental 'glue' that enable young people to learn how to manage their spaces – provided they make the time to listen.

### Key words:

Young people; advocacy; e-worlds; urban futures; the earth

## The Role of Social Capital in Community Recreation and Informal Settlements

### (Case Study: Neighborhood Saadi, Shiraz)

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#### Abstract

Needs of low-income urban housing market, increasing demand for housing and informal settlements in the city has created a sort of informal settlements. Because Informal settlements causes poverty, and also endangering the environment and impose heavy costs to resolve problems is a serious threat to the stability and cohesion of the urban population, so these problems cause city managers to think about changes in this kind of settlement. Social regeneration of these settlements due to social capital as assets in the communities in these settlements is the perfect solution for organizing these neighborhoods. The purpose of this study is to evaluate the role of social capital on social regeneration of an informal neighborhood in order to sustainable development. The method of study is descriptive-analytic and using field study and Questionnaire. The results show that there is a significant direct relationship between social regeneration and indicators of social capital in the Saadi neighborhood. The level of Social capital at this neighborhood is moderate and the use of these assets (social capital) can lead to facilitate social regeneration in this informal neighborhood.

#### Key words:

Social capital; participation; informal settlements; social recreation; Shiraz

## The Social Spatial Factors in the Areas of Creative Industry Clusters—An Empirical Research Based on the Areas in Tokyo

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### Abstract

The rise of the creative industry has provided the new driving force for those post-industrial cities. Even though the good results of urban regeneration because of creative industry are mostly mentioned, it is important to analyze objectively the negative results of urban regeneration based on the creative industry clustered. This paper is trying to describe the relationship between creative industry clustered and the result of urban regeneration—the change of social spatial factors. Two variables were firstly constructed to describe the cluster degree of creative industry and the social spatial factors. Taking the 127 administrative units in the inner city of Tokyo as the study samples, the creative industry clustered of which were most obvious in the city. And then, by means of regression analysis, the paper found that there was a significant correlation between cultural creative industry clustered and the cluster of high income society. And in these areas, with a lot of low income society who lived in the areas more than 20 years moved out from 2005 to 2010, the Homogenization of social class was increasingly obvious. Finally, by means of cluster analysis and spatial analysis, the paper found that the areas, which the cluster degree of cultural creative industry and high income society were both high, were highly intensive in the space, the polarization of social space was obvious. The result showed that the social justice and social class diversity should not be ignored when in the process of the cultural creative industry-oriented urban regeneration.

### Key words:

Creative Industry; Socio-spatial Factors; urban regeneration; Tokyo

## The Spatial Difference Study of Hainan'S Urbanization Development in the Post-Crisis Era

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### Abstract

Economic crisis has brought great impact to the world, Hainan Province which as China's largest special economic zone will inevitably suffer, and urbanization is an important engine of economic and social development, in the post-crisis era, clear status and trends of urbanization development in Hainan Province has great significance for the choice of urbanization route and economic development strategy. Therefore, Article based on entropy method, from the demographic, social, economic, geographical landscape to build four dimensions of urbanization comprehensive evaluation index system, to evaluate the 18 counties of Hainan 2011-2013 urbanization level, and with the ARCGIS software and spatial auto-correlation analysis, the sample standard deviation of the method, In order to explore the spatial variation of urbanization development in Hainan Province in post-crisis era, the results showed that: (1) The comprehensive level of urbanization in Hainan province in recent years in the small amplitude increase year by year, but the regional difference is great, form "the bipolar structure", and the eastern city of urbanization level is high; (2) The spatial auto-correlation analysis shows that the regional urbanization level of Hainan province does not appear in the spatial distribution of the characteristics of similar value agglomeration, and there is a negative correlation relationship. (3) The regional differences in the types of urbanization are obvious, where coexistence of serious lag, lag, lead, lead, lead-based cities, and the "dual-core" cities of urbanization is advance of economic development level, city are positive type at a low level at urbanization and economic development.

### Key words:

urbanization comprehensive level; Spatial Difference; spatial auto-correlation; urbanization type; Hainan province

## The Vision of the Neighborhood and its Impact on Norms and Behaviors

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### Abstract

This paper argues that unpacking the meaning of “neighborhood” for different groups can shed light on the course and significance of everyday encounters in public space. I argue that the modes of interaction and conviviality are shaped not only by ideas about the “other” but also by ideas about places/neighborhoods. Geographers have shown that neighborhood is a contentious concept. It is contentious not only because its boundaries are often fluid and not formally codified, but also because the ideas about what constitutes a neighborhood are shaped by individual experiences. In this paper I am less interested in the drawing and redrawing of boundaries and definitions, and more interested in the socially and culturally created visions of the neighborhood.

The paper is based on two years of ethnographic research in the superdiverse neighborhood of Astoria (NY), including participant observation, photography, video recordings and semi-structured interviews. It presents a section of a larger research project, Global DiverCities, ran by the Max Planck Institute for the Study of Religious and Ethnic Diversity. In this analysis I focus on people’s motivations behind moving to the neighborhood, their experiences of living there, and their understandings of the neighborhood. I distinguish three “neighborhood orientations”: the gentrifier, the working-class local, and the recent immigrant. They are not meant to be an exhaustive list of possible neighborhood orientations, but rather examples of how the different ways of thinking about Astoria are impacting the way people act and interact in public spaces.

### Key words:

superdiversity; immigration; urban; neighborhood; encounter

## Urban Adaptive Governance of Marginal Social Environments

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### Abstract

Urban organisms are continuously challenged by territorial processes and phenomena that impose concerted strategies, policies and actions. Homelessness, as the extreme expression of urban poverty, impacts the urban environment resulting in social and environmental issues and the creation of contested spaces. Among other European countries, Romania gathers massive rates of homelessness while Bucharest attracts extensive shares of the national poorest population. The study conducts a qualitative assessment of the social environment in Bucharest with a focus on the required governance approach to deal with the territorial implications resulted from the interaction between homelessness and the general population in the framework of marginal urban spaces as product of social conflict. Based on surveys and interviews carried out with different actors of the urban space, the analysis involved: the identification of potential areas of conflict based on the areas of homelessness concentration inside the urban environment; and the assessment of the present homelessness managing policies and actions in the light of adaptive governance as a tool of sustainable territorial planning. The main findings evidence that current public and private management of marginal social environments in Bucharest involves dispersed, inconsistent and impulsive actions. The constructed model of adaptive governance in the context of extreme urban poverty-generated conflicts aims at managing social issues and avoiding the creation of spaces of crisis. The analysis' conclusions ensure helpful knowledge for the urban planners and policy makers to develop efficient planning processes that increase the quality of urban social environments and support the sustainable development of cities.

### Key words:

homelessness; contested spaces; social conflict; adaptive governance

## Village Autonomous Non-Agricultural Development and Social Inequality during Rapid Urbanization: The Case of Nanhai, China

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### Abstract

Social inequality and spatial differentiation are not uncommon in the China's cities where discrimination against rural-urban migrants is institutionalized by the urban household registration. In the dynamically growing regions where industrialization and urbanization are driven by both the urban state and rural villages, rural non-agricultural development has attracted an influx of migrants to villages to work in their non-agricultural sectors. Through an in-depth case study of Nanhai, this paper reveals unexpectedly serious social inequality and segregation between the local villagers and migrant workers in the villages that are effectively urbanizing. Traditional rural egalitarianism serves village community members exclusively because of the institution of villages as autonomous and exclusive social and economic organizations. It is the land rent driven by urbanization as village entitlements that institutionalize the inequality between the two peoples, and inequality has been deteriorating along with the progressive urbanization as villages rely on land rent and land rent increases much more than wages do. In conclusion, we suggest that place-specific exclusive provision and entitlement should be reconsidered in the context of urbanization and migration, and land rent should be taxed and used for the provision of social and public goods in the land-scarce regions, so as to make urbanization inclusive.

### Key words:

Rural non-agricultural development; social equality; autonomous and exclusive villages; land rent; inclusive urbanization; China

## Community Attachment among Guangzhou Public Housing Residents

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### Abstract

Since China's housing reform in 1998, housing conditions of low-income residents have partially improved. Besides the quantity of public housing, the quality of community attachment of residents should get more attention. Following a literature review, our study examined community attachment among three samples of Guangzhou public housing residents using surveys. The multiple linear regression model (MLRM) was utilized. Results showed that (1) the physical predictors, such as housing conditions, community environment and public service facilities, had an effect on community attachment. Among these physical predictors, community environment played the most important role. (2) Social predictors, such as community ties and sense of security, had a significantly positive effect on community attachment. (3) Social predictors were mediator variables between physical predictors and community attachment. Therefore, during the process of public housing construction, local governments and developers should create a favorable landscape environment, hygienic conditions and public security conditions. In addition, they also need to provide sufficient public space such as squares and green space to facilitate communication. Furthermore, a new community governance structure should be created, self-management of residents should be guided and community organizations should be set up to cultivate community assets and further improve community attachment of public housing residents.

### Key words:

public housing; community attachment; sense of belonging; sentiment

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Increasing Insecurity

#### Oral



Home

1. [A Comparison between Impacts of Social and Physical Environment on Theft Rate in Day-time and Night-time](#)  
Guangwen Song; Lin Liu; Luzi Xiao (Sun Yat sen University, China)
2. [Advancing the ‘Criminology of Place’: Situating Causal Mechanisms in Space and Time](#)  
Jon Bannister (Manchester Metropolitan University, United Kingdom); Anthony O'Sullivan (University of Glasgow, United Kingdom); Ellie Bates (University of Edinburgh, United Kingdom)
3. [Can Gated Communities Increase Security? An Innovative Analysis of Burglary Record and Victimization Survey Data in Urban China](#)  
Chao Jiang; Lin Liu; Suhong Zhou (Center of Integrated Geographic Information Analysis, School of Geography and Planning, Sun Yat sen University, China)
4. [Comparisons of the Community Environment Effects on Burglary and Outdoor-Theft: A Case Study of ZH Peninsula in ZG City](#)  
LONG Dongping; LIU Lin; ZHOU Suhong (Center of Integrated Geographic Information Analysis (CIGNA) School of Geography and Planning, Sun Yat sen University, China)
5. [Crime and Public Transportation: A Case Study of Delhi for Crime Prevention through Place Design and Planning](#)  
Rabindra Nath Dubey (University of Delhi, India)
6. [Does Rainfall Affect All the Areas of Larceny? - A Case Study in a Beltway Area of ZG City, China](#)  
Hongjie Yu; Guangwen Song; Lin Liu (Sun Yat Sen University, China)
7. [Enlightenments on Antiterrorism Strikes from Europe’s “New Normal”](#)  
Li Yijing; Li Min (China Executive Leadership Academy Pudong, China)
8. [Examining the Impact of both Burglars' Home Area and Target Area on Journey to Crime](#)  
Luzi XIAO; Lin LIU; Suhong Zhou; Guangwen SONG; Jiaxin FENG; Chao JIANG (Center of Integrated Geographic Information Analysis, School of Geography and Planning, Sun Yat sen University, China)
9. [Examining the Impact of Road Types on Larceny Rates: An Empirical Analysis of ZG City, China](#)  
Fangye DU (Sun Yat-Sen University, China)
10. [Northeast Students Facing Insecure Environment in India](#)

Ronald Thounoujam (University of Mumbai, India)

11. [Open-plan Suburb to Fortified Suburb: Home Fortification in Soneike, Cape Town](#)  
Christian Cronje; Manfred Spocter (Stellenbosch University, South Africa)
12. [Proximity Factor and Risk Perception of Urban Terror](#)  
Husnul Fitri Sundoko; Roos Akbar; Denny Zulkaidi; Teti Armiati Argo (Institut Teknologi Bandung, Indonesia)
13. [Risk Risks Terrain of the Central Area of Wuhan City](#)  
Zheng Wensheng (Key Laboratory for Geographical Process Analysis & Simulation, Hubei Province, Central China Normal University, China)
14. [Seeking for Solidarity and Security in Queer\(ed\) Circles in Istanbul](#)  
Neyir Zerey (Middle East Technical University, Turkey)
15. [Spatial Pattern and Formation Mechanism of Distribution of Burglars in ZG City, China](#)  
Jiaxin Feng; Luzi Xiao; Lin Liu; Guangwen Song (Sun Yat-sen University, China)
16. [Spatial Pattern of Crimes and Contextual Neighborhood Characteristics in Changchun, China](#)  
Daqian Liu; Wei Song (Department of Geography and Geosciences, University of Louisville, United States); Chunliang Xiu (School of Geographical Sciences, Northeast Normal University, China)
17. [State of Security in Urban Nigeria and Responses of Urban Actors](#)  
Olusegun Ogunleye (University of Witwatersrand, South Africa); Andrea Rigon (Development Planning Unit, University College London, United Kingdom)
18. [The Effect of Land Use on Street Robbery Based on GWPR Model](#)  
Wei Han Xie; Suhong Zhou; Guangwen Song (Sun Yat-sen University, China)
19. [The Feeling of Insecurity and Social Space](#)  
Vivek Tripathi (Department of Geography, Delhi School of Economics, University of Delhi, India)
20. [Urban Security and Citizenship Practices: Insights from Lagos and Johannesburg](#)  
Olusegun Ogunleye (University of Witwatersrand, South Africa)

## A Comparison between Impacts of Social and Physical Environment on Theft Rate in Day-time and Night-time

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### Abstract

An integration of social and physical environment (social disorganization and routine activity theory) can help understand crime more comprehensively, but the question that the discrepancy of effects of integrated theory in analyzing crime in day-time and night-time is under discovered. To fill this gap, using data of theft reports to police, social factors from the principal component analysis of census data (social disorganization theory) and land use variables (daily routine activity theory), spatial lagged negative binominal regression models are built for day-time (7:00-18:59) and night-time (19:00-6:59) separately.

Results show that subway stations, daily shops density and net-bars density are positively related to theft rate and bars and entertainment facilities density is non-significant in both models, whereas bus stations and convenience stores density are only significant in day-time model and restaurants density is only significant in night time. With regard to social environment factors, aging factor and suburb factor serve to the decrease of theft rate in day and night model. No other social factors are significant in day-time model, while high educated factor and commodity house factor are positively related to theft rate in night-time model. Theft rate in night-time has stronger relationship with social factors than that in day-time.

Moreover, daily routine activity theory works better than social disorganization theory in analyzing theft rates and a combination of routine activity theory and social disorganization theory can help understand crime better in this empirical study. Effects of models in the night-time are better than that in the daytime. Policy implication is also discussed in the passage.

### Key words:

Theft rate; Day-time; Night-time; Daily routine activity; Social disorganization

## Advancing the 'Criminology of Place': Situating Causal Mechanisms in Space and Time

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### Abstract

There is a non-random intra-urban distribution of crime, with distinct patterns typically manifest at macro, meso and micro scales. Moreover, the smaller the spatial unit of analysis interrogated the greater the contrast found in the distribution of crime between these units, with crime tending to cluster and persist at a small number of locations. Theoretical account of this patterning has been dominated (particularly at the micro scale) by a set of opportunity theories, with more limited endeavour being made to engage accounts rooted in social disorganisation theories. Against this backdrop, this paper develops a holistic theoretical framework to interrogate the criminology of place and, specifically, seeks to situate the causal mechanisms underpinning the criminology of place in space and time. The paper then progresses to outline the methodological and data challenges that underpin operationalization of this framework. Ultimately, the paper identifies the value and limitations of a multi-scalar and time sensitive theoretical and empirical model of the criminology of place to crime control agencies seeking to develop effective, efficient and legitimate crime reduction strategies.

### Key words:

Environmental criminology; social disorganisation theories; opportunity theories; space; time

## Can Gated Communities Increase Security? An Innovative Analysis of Burglary Record and Victimization Survey Data in Urban China

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### Abstract

Although gated communities develop rapidly around the world as they are supposed to provide secure environment through the creation of exclusive areas, great theoretical debates arise on their practical effects on crime prevention, which has received global attentions from various fields of urban planning, community management, and criminology. However, due to some conceptual or methodological limitations such as the disintegration of gated communities, the “small number” problem, and the over-reliance on single crime data sources, most of the previous empirical research fail to resolve these debates. In addition, while the context-specific relationship between crime and environment is widely recognized, no empirical case studies have been carried out in Chinese urban context. Under these backgrounds, this study proposes an innovative method with Monte Carlo simulation to analyze both the burglary record and victimization survey data in gated and non-gated communities in China with an aim to empirically validate these theoretical concerns. With DP peninsula as a research case, this study shows that gated communities do not have statistically significantly less burglaries than non-gated communities, indicating that gated communities cannot necessarily increase security, and providing partial support for crime pattern theory. It is the location, not the community type, that matters in inducing statistically significantly more burglaries. These results have great implications on the elaboration of effective crime prevention strategies through environmental planning and design.

### Key words:

Gated Community; Security; Calls for Service; Victimization Survey; Monte Carlo Simulation; Burglary; China

## Comparisons of the Community Environment Effects on Burglary and Outdoor-Theft: A Case Study of ZH Peninsula in ZG City

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### Abstract

Burglary and outdoor-theft, just like twin brothers, happen in different places whilst share similar characteristics when it comes to spatial distribution. As we all know, the essential attributes of community conditions are significant factors that affect urban crime, but it hasn't been explored and tested that what factors of community conditions influence the analogous spatial pattern of burglary and outdoor-theft, not to mention the mechanism that how community conditions act on them. Therefore, drawing on routine activities theory, crime prevention through environmental design (CPTED) and defensible space, utilizing multi-source heterogeneous spatio-temporal data of ZH peninsula, ZG city in southern China, the purposes of this study are to examine how the built environment and social environment of neighborhoods affect burglary and outdoor-theft as well we carry out a comparative analysis with partial least squares method. Results suggest that there are some regularities in ZH peninsula, which means under the background of built environment, the influences of burglary are relatively concentrated, while the influences of outdoor-theft are more dispersed. There exist some relative commonalities and differences in the fact that the social environment and built environment influence and act on burglary and outdoor-theft. On the one hand, the population density, the proportion of juvenile, the density of bus stops and the distance to the city center what show significant impact on the occurrence of burglary and outdoor-theft. What's more, their directions of forces are consistent. On the other hand, the density of road network, the density of retail business, and the density of catering and accommodation are the dominant factor of outdoor-theft. Meanwhile, the education level of residents is the significant factor of burglary. The extension of the results may well provide references for associated prevention and control specific to burglary and outdoor-theft in the communities.

### Key words:

community environment; burglary; outdoor-theft; comparisons; partial least square method

## **Crime and Public Transportation: A Case Study of Delhi for Crime Prevention through Place Design and Planning**

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### **Abstract**

The occurrence of crime on the public transportation system is an important issue particularly in the metro-cities. Fear of personal safety may cause changes in habits of using mode of transportation. People may stay away from high crime places. Walking to a bus, rail/metro rail station, waiting for the vehicles to arrive, and traveling on the public transportation system are situation where a person may become victim of crime. Although crime can occur anywhere in a city but it happens mostly at the places on transit routes. Transit stations are public spaces that mix a wide range of constantly interchanging visitors together. National Capital Territory, Delhi has more than 16 million population with varied nature. It has large fleet of bus, metro-train system along with railways and auto-taxi services. Here crime rate is very high and growing rapidly despite all efforts by Delhi police. Occurrence of crimes on transportation system affect people's particularly women decisions to use public transport leading to more use of private vehicles. The study suggests that in the study area, along with policing and the crime justice system, place design and planning play an important role in minimizing the occurrence of crimes. The study is useful for urban planning and management along with framing policies for the crime prevention in metropolitan cities.

### **Key words:**

Crimes; transit place; crime prevention; place design

## Does Rainfall Affect All the Areas of Larceny? -A Case Study in a Beltway Area of ZG City, China

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### Abstract

As an important indicator of the weather changes, rainfall can influence urban crime by interfering people's travel activities, such as larceny. But the research about whether the rainfall can affect all the areas of larceny and how the influential mechanism operates is a void. Based on the routine activity theory, this study firstly divides all the police districts in the beltway area of ZG city into two group according to whether rainfall affect local larceny, then chooses independent variables reflecting social property and activities, finally builds a binary logistic regression equation as interpretation model. The result shows that nearly 1/5 of the police districts show the conspicuous correlation of rainfall on larceny when the rainfall is greater than 10mm/m<sup>2</sup>. The police districts where concentrating young migrant workers, midscale and upscale apartments, bars, terminal markets, banks, small shopping malls, community parks, subway stations can be more likely to get the influence of rainfall on larceny, because these places are easier to attract non-essential activities which can be cancelled when raining heavily (such as entertainment), and the supervision can be enhanced with people decreasing. In contrast, higher bank density may bring local larceny less possible to be influenced, because there are mainly essential activities which can't be changed because of raining (such as work) nearby, and the supervision can keep high level no matter how many people there.

### Key words:

Rainfall; larceny; influential mechanism; routine activity

## Enlightenments on Antiterrorism Strikes from Europe's "New Normal"

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### Abstract

The geography of crime theory emphasizes the effects of place, time and environment in shaping crimes, and proposes to take the criminogenic and crime-mediating environmental conditions into consideration when analyzing crime issues. In the previous 15 years, Western Europe has seen more than 60 terrorist attacks with more than 600 citizens dead from the Islamic State murders, inducing the regions into a "new normal" state of combating terrorism jointly. Terrorist attack is one of the most serious organized crimes globally, and researchers in fields of politics, diplomacy, international relations, criminology and geopolitics tend to conduct lots of analyses, especially after the murders in Paris on 13th, Nov. 2015, and the bombings in Brussels on 22nd, March, 2016. However, besides of the qualitative analyses, quantitative studies so far are mainly focusing on the description of temporal trend, leaving an eager requirement for a more intuitive illustration of the spatial pattern change, as well as the rationale (if there is) for location selection.

This study overlaid the terrorist attacks spatial-temporal data in Western Europe in previous 15 years, with corresponding demographic, socio-economic conditions in ArcGIS 10. It is designed to build up spatio-temporal models on identifying the criminogenic and crime mediating conditions to terrorist attacks; in another word, the underlying objective environmental rationale for choosing specific region, or place, to conduct the crimes. It aims to provide suggestions and references for antiterrorism strikes from a geographer view, through inhibiting the effects of criminogenic conditions and promoting crime-mediating conditions' influences, to reduce the environmental opportunities for committing terrorist crimes, and further to bring us some enlightenments for local antiterrorism in metropolises.

### Key words:

Antiterrorism strikes; geography of crime; GIS; spatio-temporal pattern

## Examining the Impact of both Burglars' Home Area and Target Area on Journey to Crime

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### Abstract

Following the considerable studies of journey to crime, this study tries to explain the distance-decay pattern of burglars based on the rational choice theory. It extends the current literature by taking the characteristics of both the burglars' home area and target area into account, in addition to the burglars' individual factors. Using data on 3138 burglary trips in ZG City, one of the bustling metropolises in China, we apply a zero-inflated negative binomial regression model of journey-to-crime distance to gain insight into the mechanism of burglars' target selection. The model contains two parts—the regular negative binomial regression which describes the relationship between the distance and factors when the burglar's living area and target area are not in the same police district, and the zero-inflated model that tries to shed light on the reason why some offenders tend to commit crime in their living area. Results reveal that when controlling the individual-level factors, burglars living in a deprived area with more old houses and transient populations may travel longer distance to commit; to the contrary, those living in a more affluent home area may shorten their travel distance. As for the target area selection, a deprived target area tends to attract burglars from nearby areas, and conversely, an affluent target area may attract burglars from distant areas. In addition, the convenience of taking a metro or bus may expand the travel distance. The salience of these findings may help improve the understanding of journey to crime studies.

### Key words:

rational choice theory; journey to crime; burglary; China

## Examining the Impact of Road Types on Larceny Rates:

### An Empirical Analysis of ZG City, China

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#### Abstract

It has been widely accepted that the road density influences the spatial distribution of crime. However, the impact of various kinds of road network on crime risk remains hotly debated. Based on the routine activity theory, this paper takes the socio-economic environment of ZG city into account and focuses on the role of different road types on the location of larceny. For the analysis, 75,113 cases of larceny in 2013 are extracted from the 110 alarm data of ZG city. The regression model results show that the densities of secondary roads, branch roads, other vehicle-available roads and vehicle-unavailable roads are significantly related to larceny rates when the model is controlled for the other environmental factors. The findings indicate that vehicle-available roads and vehicle-unavailable roads have different effects on the larceny rates. Increasing the density of vehicle-available roads has an adverse effect on larceny rates while increasing the density of vehicle-unavailable roads has a positive effect on larceny rates. The mechanism of this phenomenon may be related to the interaction of suitable targets, motivated offenders and incapable guardian in space and time. In contrast to many of the prior researches, here we make a quantitative analysis on the influence of the density of different types of road on the larceny rates.

#### Key words:

larceny rate; road types; vehicle-available roads; vehicle-unavailable roads

## Northeast Students Facing Insecure Environment in India

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### Abstract

Rapid pace of urbanization in the Country is bringing migrants from all over the country. Cosmopolitan cities are becoming more and more heterogeneous drawing people from different ethnic background so called Cosmopolitanism when gets express into everyday social cultural practices it often comes in the form of complete heterogeneity, the same situation is aggravated with the constant conflicts of various socio- cultural and economic groups over urban space. The narrow politics of place, space and identity becomes very prominent in everyday life specifically of migrants. The notion of “WE and THEY” create insecure environment for migrants. Migrants find a huge difference between what they expected and what they experience. The insecurity that is felt right from eating habits, faiths and social systems, customs and costumes to norms of social behavior and discriminatory practices threatens the everyday life of migrants. Insecurity felt by north-eastern migrants becomes grave with their Mongoloid features and fair skin that often makes them distinct in public spaces. The language barrier becomes most significant with the difference and wrongly pronounced “HINDI” by them. Viewing North east as terrorists and anti-nationalists. Use of obscene languages by local people is one of the most prominent form of INSULT faced, and several times they were addressed publically as “CHINKY CHINKY-MONKEYS, CHINI MALAI” by the local people and even by Officials and Authorities, and also many times addressed as Nepali, all this leads to increased insecurity in urbanized place that faced.

### Key words:

Northeast; Insecure Environment

## Open-plan Suburb to Fortified Suburb: Home Fortification in Soneike, Cape Town

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### Abstract

The management of crime and violence finds expression in the built environment. Citizen-driven home fortification has changed the character of established residential suburbs as the populace attempts to mitigate unacceptably high crimes rates in South Africa. The crime prevention through environmental design (CPTED) thesis brings together a range of interventions, including target hardening and territoriality to protect against criminal activity in the residential environment. The addition of walls and fences and an assortment of security paraphernalia to existing houses is an attempt by citizens to fortify themselves against residential burglaries and robberies. This study uses a mixed-methods approach to track how a suburb in Cape Town, South Africa, initially developed as an open-plan suburb, has undergone transformation into a suburb which has become increasingly fortified. The reasons for citizen-driven home fortification are explored as well as the spatial dimensions of residential securedness in the suburb. Most houses display at least one type of security feature, with signage of private armed-response companies and walls and/or fences predominating. Residents maintain that fortification not only reduces the possibility of crime victimisation, but that it also insulates them from contact with people deemed to be 'out of place' in the suburb. It was found that while home fortification does shut out criminals, it also impacts negatively on neighbourhood interactions between residents. The lack of neighbourhood cohesion is especially acute as the suburb has desegregated from being previously whites-only to a racially- and culturally-mixed suburb.

### Key words:

Cape Town; crime; environmental design; fortification; neighbourhood; residential; target hardening; territoriality; victimisation

## Proximity Factor and Risk Perception of Urban Terror

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### Abstract

Urban terrorism has widely spread as common threat in many large and important cities around the globe. The existence of this issues has interfered public sense of security as it evolves to reach softer target to maximize the effect in public spaces. In contrast to the western society, study covering risk perception toward terror threat is not commonly discussing in Southeast Asia especially in Indonesia where terrorist attack hit its capital cities several times. There is wide gap of knowledge in non-western countries regarding risk perception of terror in urban context. In line with that, proximate attribute in which people works to primary and high profile of potential terror target assumed play significant factor to the feeling of security. This study tries to analyze risk perception of terror threat and its relationship with the proximity factor in urban area. Previous empirical research conducted in western society context will be referred to lead discussion about the similarities and differences within security culture.

### Key words:

risk perception; urban terror; proximity; security

## Risk Risks Terrain of the Central Area of Wuhan City

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### Abstract

Risk Terrain Modeling is an emerging approach to identify crime risks that come from features of a landscape and model how they co-relate to create unique behavior settings for crime. This article firstly construct a hierarchy of crime space composed of base space, joint space, agglomeration space and space of places based on the theories of geography of crime, then select ten crime risk factors including population density, office buildings, residence districts, configuration of urban road network, crime near repeats, commercial facilities, automated teller machines, internet bars, hospitals, and bus and subway stations to be their concrete manifestation. Taking the central area of Wuhan City as case study area, the court verdicts involving robbery, snatch and theft crime as crime data resources, we explore the correlation between crime risk factors and distribution of crime using Geographically Weighted Regression model. The above crime risk factors, except the factor of residence districts that turned out to has no significant correlation with the spatial distribution of crime in study area, are used as the variables and assigned different weights to model the crime risk terrain of the central area of Wuhan City. Not only articulating vulnerable areas in city, our study can also make scientific and accurate forecasts of where the crime will more likely to occur.

### Key words:

Risk risks terrain; Crime risk factors; Distribution of crime; Wuhan City

## Seeking for Solidarity and Security in Queer(ed) Circles in Istanbul

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### Abstract

Creation of gay ghettos has occupied substantial place in the examination of LGBTIQ's safe places. These crafted spaces, with no high walls or niche security systems, have created zones of safety to many. Gay ghettos do not necessarily exist in every metropolitan city and Istanbul is no different.

The fieldwork I conducted to better understand geographical positioning and the everyday life practices of LGBTIQ identified individuals in Istanbul has shown that seeking for security and solidarity and socio-economical status are some of the dynamics for moving to relatively more mixed (with multiple ethnic, religious minorities and students), more tolerant neighbourhoods. In this geographical context, the feeling of security is not attained by turning these places into gay ghettos but rather by 'queering' them. As a result of this securitization, the feeling of "being stuck into 'closed circles'" arises.

Insecurity in urban spaces is largely boosted by state policies too. Even though my research results show that respondents of this study are more inclined to think that their life in the city has not changed or even become easier compared to the past five years, once they mentally map their daily activities, they realize how limited their space usage is and how insecure they feel once they step away from the safe circles they created. The mental mapping technique I applied in this research is supported with in-depth interviews adding up to the mental recreation of safety notion, which will eventually contribute to the existing knowledge on compartmentalized spaces.

### Key words:

Urban; LGBTIQ; Ghetto; Queer; Neighbourhood; Security; Solidarity

## Spatial Pattern and Formation Mechanism of Distribution of Burglars in ZG City, China

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### Abstract

Residential burglary is one of the most common crimes in ZG City, China, which draws great attention of local police. Theoretically, combining burglars' spatial distribution with journey to crime will contribute to crime prevention and control. However, the spatial pattern and formation mechanism of burglars' distribution have not yet been fully explored in the prior research. To address this, the paper uses a data set on 2709 burglars in 2055 neighbourhoods in ZG to analyse the living space of burglars. When it comes to spatial pattern, there exists a significant spatial autocorrelation, revealing that most burglars live at the edge of the main urban area and in the vice city, turning urban area into high kernel density value zones. In terms of formation mechanism, the paper estimates a zero-inflated negative binomial regression model to explore the impact of community environment, including social environment and physical environment, on burglars' spatial distribution. Results strongly support the social disorganization theory and can be concluded as follows. Low social status, poor economic condition, high residential mobility, high proportion of exotic population and young adults, high transportation accessibility and proportion of low-level residential land tremendously appeal to more burglars living in the same community. Additionally, the higher the proportion of young adults, residential mobility, transportation accessibility and the proportion of low-level residential land the community have, the more likely burglars are to appear for the first time in the community. The results provide helpful information for the police, facilitating the prevention and control of burglary.

### Key words:

burglar; spatial pattern; formation mechanism; social disorganization; zero-inflated negative binomial regression

## Spatial Pattern of Crimes and Contextual Neighborhood Characteristics in Changchun, China

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### Abstract

Although crime is one of the major challenges facing Chinese cities, limited empirical research has been done about crime patterns in China, especially when it comes to the spatial pattern of urban crimes. Spatial analysis of crime is still in its infant stage in China. Based on data collected at police precincts level from the Public Security Bureau of Changchun, we examined spatial patterns of leading crimes in Changchun using spatial statistics and Geographic Information Systems (GIS). Specifically, we explored the spatial distribution of crimes and detected crime hotspots, or statistically significant locales of high crime rates in Changchun. Further, we conducted multiple linear regression analysis to assess the impacts of contextual neighborhood characteristics on crimes across the city. The results show that the risk of crimes varies noticeably in Changchun, with high crime rates significantly concentrated in the central area where the CBD and the main commercial areas are located. Our analyses also reveal that spatial variations in crime rates are socially and economically structured. Variables representing the neighborhood socioeconomic, demographic, especially land use characteristics proved to be strongly associated with the spatial distribution of crimes across the city of Changchun. These results are largely in line with the routine activities theory, social disorganization theory, and the framework of crime prevention through environmental design, which emphasize the importance of opportunities, local social context and environmental design in shaping the spatial pattern of urban crimes.

### Key words:

Crimes; spatial pattern; crime hotspots; neighborhood characteristics; China

## State of Security in Urban Nigeria and Responses of Urban Actors

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### Abstract

The explicit goal of the Nigerian government is to improve the standard of living and wellbeing of citizens. Although, the conceptualisation of wellbeing has been a source of debate which is reflective in an extensive academic literature, what various authors agree on is the multidimensional character of well-being and the fact that different dimensions are deeply intertwined. The broad notion of security was amongst the different notion through which well-being was conceptualised by the interviewees in this research. This conceptualisation fits within the conceptualisation of wellbeing proposed by Sarah White (2010), which sees (in)security has been an integral part of wellbeing. This research revealed how the limited availability of public goods such as safety and security, as well as infrastructure and services, may affect urban well-being even in the presence of growing income levels. The research also highlighted a range of very important citizenship practices, at different scale, aimed at ensuring security of lives and properties in five cities in Nigeria.

### Key words:

Wellbeing; security; citizen practices

## The Effect of Land Use on Street Robbery Based on GWPR Model

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### Abstract

According to environmental criminology, built environment, especially land use may have some effects on the occurrence of criminal behaviors. The research to the relationship between crime and the land use can provide a new perspective of crime prevention from the angle of urban planning. However, most of the existing researches used the global model, less to consider the factor of spatial differences, which can be improved by the Geographical Weighted Poisson Regression (GWPR). Therefore, this article studies the effect of land use on the distribution of robbery cases happened in the urban area of H city by GWPR model. The results show that the correlation between residential land use and street robbery cases appears to be negative; how the commercial and business land use affect the cases distribution depends on their spatial form, the individual high-rise commercial complex building attracts less street robberies while the street-side mode of commercial land use attracts more; the positive correlation between industrial land and cases only appears in the old city; tourism scenic spot has negative effect on street robberies; besides, relationship between the street and transportation land use is affected by the transport-facilities, road-grades and road-network pattern. In addition, there are some spatial differences on the relationship between primary land use and street robbery, and the summarize of spatial pattern may help to urban planning and police prevention.

### Key words:

land use; street robbery; GWPR; the urban area of H city

## The Feeling of Insecurity and Social Space

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### Abstract

Insecurity is a socially constructed feeling (Glassner 1999). There are several factors working at different hierarchical level in shaping and reproducing the modern social space. The modern social space is amalgamation of accumulated interaction of feelings, communication, ideology and behavior of human (Schelling 1971). This social space is manifested at actual and virtual space and media plays an important role in shaping and re-shaping it. This paper attempts to explore the process of insecure space creation; analyse how do these insecure spaces contribute to the feeling of insecurity and reduced mobility? This paper adopts qualitative semi structured interview method and a case study of Delhi to conceptualize the increasing fear of crime and insecurity in urban spaces of India. This paper examines the factors working in making the city less liveable and threatening.

The status of Delhi as the capital city of India makes it the center of attraction for all significant and non-significant happenings. Despite of improved infrastructure and better services available, this attention has invariably taken its toll on this brimming capital in the form of increased feeling of insecurity in Delhi. This feeling of insecurity and fear of crime in Delhi has further limited inter-city and intra-city mobility of the Indian people (Tuan 1979). The reduced mobility accentuates the feeling of insecurity, segregation and seclusion (Low 2001; Wehrheim 2003). This paper helps in providing solution to the problem of insecurity and explains the process of construction of unsafe social space.

### Key words:

Insecurity; Social Space; Virtual Space; Fear of Crime; Crime; Violence; Urban; Mobility; Delhi; India

## Urban Security and Citizenship Practices: Insights from Lagos and Johannesburg

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### Abstract

Sarah White (2010) conceptualisation of well-being revealed in (security) to be integral to the wellbeing of individuals. Also, the broad notion of security has been amongst the different notion through which well-being has been conceptualised in existing research. Furthermore, existing research have revealed how the limited availability of public goods such as safety and security, as well as, infrastructure and services may affect urban well-being even in the presence of growing income levels.

The issues underpinning Africa's security crisis has been linked to the continent's severe developmental failure, which can be traced to larger issues such as: civil war and conflict, poverty, bad policy and poor governance, endemic financial and debt crisis, crumbling of physical infrastructure and breakdown of public service, escalation of unemployment, corruption, disinvesting of private capital and transfer of substantial amounts of private wealth overseas. This has led to a situation where economic and social conditions have steadily worsened and insecurity and instability have increased. Due to this state of (in)security, urbanites have had to resort to innovative means of ensuring life and properties in urban areas.

This works builds on a previous study by the researcher, which highlighted a range of very important citizenship practices, at different scale, aimed at ensuring security of lives and properties in five cities in Nigeria. However, this work goes a step further by exploration the practices of citizens and actors in Lagos and Johannesburg aimed at ensuring security of lives and properties in these two cities.

### Key words:

Wellbeing, security; citizen practices

## C12.39 Urban Commission: Urban Challenges in a Complex World

### Urban Heritage and Conservation

#### Oral



Home

1. [A Study of the Remaining Traditional Landscapes in Urbanized Regions](#)  
Mariko Sugitani (Graduate student, Hiroshima University, Japan)
2. [Aesthetic Experience as Urban Heritage](#)  
Jonathan Bratt (Arizona State University, United States)
3. [Comparative Study on the Change of Block Vitality in Beijing Shichahai Historic District](#)  
Jing Yu Zhang (Beijing Union University, China)
4. [Cultural Heritage: The Past Influences the Present----Case Study on the House Influenced by Timber-Framed House in Selly Oak, Birmingham, UK](#)  
Weimin Que (College of Urban & Environmental Sciences, Peking University, China)
5. [Globalization and Locality of Zhongshan Almond Cake: Comparative Study of Time-honored Brands of Huizan and Juxiangyuan](#)  
Ding Shaolian (South China Agricultural University, China)
6. [Historical Geographical Reconstruction of a Few Disappeared Islands of Hangang River, Seoul](#)  
Bo Kyung Yang (Sungshin Women's University/ The Korean Geographical Society, South Korea)
7. [Ruined Place, Collective Memory and Place Identity in Post-2008 Earthquake Beichuan, China](#)  
Lili Qian (Nanjing University, China)
8. [Russian-Chinese Common Historical Heritage: Phenomenon and Research](#)  
Yuri Mazurov (Lomonosov Moscow State University, Russian Fed)
9. [The Emotional Memory and Perceptions of Urban Industrial Heritage](#)  
Xiaojun Fan (School of hospitality and tourism management, Shenyang Normal University, China)
10. [Urban Heritage Conservation and Management: A Geographical Analysis of Udaipur City of Rajasthan, India](#)  
Prof. Prahlad Rai Vyas; Vishnu Shankar Paliwal (Mohanlal sukhadia University, Udaipur, Rajasthan, India, 313001, India)
11. [Yawata Ironworks as Transnational Geoheritage: Looking behind the Scenes of a late 19th Century Japanese/German Investment Project](#)  
Dietrich Soyeyz (Inst. of Geography, University of Cologne, Germany)



## Poster

1. [Study on the Spatial Pattern of Capital in the Perspective of Human Settlements](#)

Shenzhen Tian (China, Liaoning Normal University); Xueming Li (China, Liaoning Normal University)

## A Study of the Remaining Traditional Landscapes in Urbanized Regions

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### Abstract

With the progress of urbanization, modern landscapes have become more common. The housing landscape has also similarly changed. Advances in construction technology and a drive to reduce costs have caused this change in landscapes. Now, homogeneous housing landscapes designed and built by construction companies exist everywhere in Japan. Traditional-style houses have been rapidly disappearing save for 'important preservation district with historic buildings'. I chose Higashi-Hiroshima city as a subject for this study. For the last several decades, the city landscape has changed, mainly because Hiroshima University moved into the area. In particular, the transformation of the townscape in the city center of the Saijo basin is a noticeable example. Saijo basin has a unique landscape of traditional Japanese houses with reddish-brown roof shingles and white walls scattered in rural paddy-field districts. This area is recognized by residents and visitors for its individual landscape, but this area is not officially protected as a historic landscape. There are few traditional landscapes left in the area aside from those in urbanization control areas near the city center. Paddy-field and traditional houses are currently left intact in urbanization control areas, but changing lifestyles in the neighborhood and the replacement of run-down buildings will bring about the loss of the historic landscape in the future. In this study, I interviewed residents living in urbanization control areas and housing estates to clarify their concerns about changing landscapes. I asked questions about the exterior of their houses, how they feel about traditional landscapes.

### Key words:

housing landscapes; traditional houses; urbanization control areas; residents mind

## Aesthetic Experience as Urban Heritage

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### Abstract

The materiality of place has long been central to concepts of urban heritage, with built environments often comprising the objects of conservation discourse and practice. UNESCO, meanwhile, has countered such emphasis on materiality in heritage conservation with calls for the safeguarding of social practices and rituals as ‘intangible heritage’. Definitions of intangible heritage, however, restrict it to well-defined ‘traditions’ associated with particular identity groups. For both the tangible and the intangible, a bias toward the symbolic and the extraordinary continues to affect what gets counted as heritage. The distinction between tangible and intangible, moreover, reinforces a distinction between place and practice; “the richness of place as a lived and meaningful location gets reduced to a landscape function – a coherent, largely visual, material topography,” while “more fluid meanings associated with historic practice are, for the most part, lost” (Cresswell and Hoskins 2008: 393). In cities, such ‘fluid meanings’ are those of everyday activities and ambiances that, while ephemeral and ordinary, are bound up with built environments as historical and cultural sites and are key to their significance. In this paper, I consider place in terms of its “experiential fluidity” (Cresswell and Hoskins 2008: 395), the more-than-tangible social interaction and sensory immersion that helps give any site its meaning, and explore the possibility of an urban heritage concept that reflects this meaning.

### Key Words:

urban heritage; conservation; place; aesthetics

## Comparative Study on the Change of Block Vitality in Beijing Shichahai Historic District

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### Abstract

Using geographic information technology and space syntax theory, this paper is comparatively analysed the changing types of land use and the change of alleys texture of Beijing Shichahai Historical District between 1948 and 2015. The data and information of urban space is extracted by the history maps, Google map and historical literatures. The research shows that (1) The types of land use have been transformed from single function to multiple functions, mainly from residential type to residential, commercial, educational and other types; (2) In the last 70 years after the foundation of New China, the degree of spatial integration of Shichahai Historical District has been increased and the difference of spatial integration is reduced; (3) With the gradual improvement of transport system, including the construction of Ping'an Street, the alleys' rectification and increasing the number of roads, the block connectivity of Shichahai Historic District is upgraded obviously. Due to the mixed land use and the transport improvement, the block vitality of Shichahai Historic District changes effectively.

### Key words:

Shichahai historic district; mixed land use; spatial integration; the vitality of block; space syntax

## Cultural Heritage: The Past Influences the Present—Case Study on the House Influenced by Timber-Framed House in Selly Oak, Birmingham, UK

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### Abstract

In the heritage system, timber-framed house is typed into architecture heritage, urban heritage and Cultural heritage. This essay discusses the cultural heritage-the past influences the present and future, case study on the house influenced by timber-framed house in Selly Oak, Birmingham, UK.

The geographical area of this paper is Ward of Selly Oak, Birmingham, UK, with 4.5 square km (length is 3000 meters in west-east and width is 1500 meters in north-south). within the area, there are 69 main streets (61 roads, 2 avenues, 5 lanes and 1 Blvd), 59 branch streets (2 walks, 3 ways, 7 roads, 2 mews, 6 groves, 2 gardens, 1 end, 6 Drives, 9 closes, 3 crofts 1 crescent, 10 aves and 2 nuns). The total length of the street is over 42,000 meters. (Plate I)

There are 246 houses influenced by traditional timber-frame (reflected on the outside of the house) among about 10,000 house (detached, semi-detached, terrace), they are distributed separately, but around Selly Park and Oaktree Place are two concentrate distribution places. (Plate III)

The aspects for evaluating the timber-framed architecture includes location (in downtown of the city, suburb or countryside), function (manor, cottage, castle, garden, church-God's house, priest's house, town house, farmhouse etc.), inner space (huge, small), outside shape (types of H, T, L, I, C, etc.; stories of 1, 1.5, 2, 2.5, 3, etc.), outside timber-frame (numbers of gable, gate, window, dormer, porch, etc. or sides of wall), color painted on the timber (black, white, red, blue, green, yellow, pink, brown etc.).

After searching each house in Selly Oak, the essay concludes as follows: A. During the construction of house since the end of 19<sup>th</sup> century, traditional timber-frame deeply influenced the designer who designed the house in Selly Oak; B. During 1900-1920, timber-frame used in the house construction as both real function and decoration, after 1950, timber-frame reflected outside of the house are mainly decorated. C. The house construction and timber-framed house in Selly Oak had contributed to the Movement of City Garden: (1) The principal clause of the covenants for residential development around Selly Pack reflects the main spirit of Garden City, but it proposed about 40 years earlier than the later; (2) Selly Oak become the green suburb or green belt which provided the high quality environment for human living, especially near the black country, since late of 19<sup>th</sup> century; (3) Selly Manor House had been moved into the heart of Bournville, became the landmark house in the model of Garden Village.

### Key words:

cultural heritage; House influenced by traditional timber-frame; timber-framed architecture; Selly Oak

## Globalization and Locality of Zhongshan Almond Cake: Comparative Study of Time-honored Brands of Huizan and Juxiangyuan

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### Abstract

At the end of 1970s, China began to implement the reform and opening-up policy to cope with the globalization, which accelerated the progress of urbanization and modernization in China. Except economic growth and efficiency improvement, urbanization also reshapes China's urban space. That is to say, the urban historic elements are replaced by the mainstream modern landscape, which has posed an increasingly severe challenge for the continuation of sense of place in the city. As such, time-honored brands tend to have a sort of inextricable connection with the place and their inheritances plays an important role in the maintenance of the sense of place within urban areas due to their deep historical origins with the region.

From the sense of place perspective, this study takes two time-honored almond cake brands—Huizan and Juxiangyuan as examples to reveal how the two brands address the globalization and participate in the local construction through data analyzing collected by observation, interview and literature study. The research finds that, in the globalization, Huizan, under the pressure of land rent, finally settled in its own real estate outside of Historical Landscape Conservation Area and insisted its traditional operation mode of small manual workshop, but the brand won more popularity of the locals. On the contrary, Juxiangyuan take a different strategy to cope with the globalization by transforming the production mode from traditional manual workshop to standard production. The later has applied the reputation of "Century-old Time-honored Brand" in China successfully and thus it has become the symbol of Zhongshan for foreigners. However, the locals refused to buy Juxiangyuan's standard products and turn to Huizan who insists the traditional manual workshop mode to buy the cakes to realize their identity and satisfy their pride as the locals of Zhongshan. The different performances of the two time-honored almond cake brands in the globalization demonstrate a progressive sense of place as Massey said in 1993. The locality and the globalization of the Cake promoted by two deferent motive force could develop simultaneously. It seems that the sense of place and the globalization are two interdependent powers if the local place could bring people the dignity and satisfy the communication space of acquaintances who are experiencing transition period from the local acquaintance society to the globalized stranger society.

### Key words:

locality; globalization; Sense of place; Time-honored Brands, Zhongshan City

## Historical Geographical Reconstruction of a Few Islands of Hangang River, Seoul

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### Abstract

Hangang river is the major river flowing through the center of Seoul which is the capital and heart of Korea. Also it is located in the middle of the Korean peninsula and has the largest river basin area that the people can live in the Korean peninsula. Seoul's cultural identity as a two-thousand-year old city started from the capital of the ancient kingdom Baekje (18BC~660AD). Hanseong, the early capital of Baekje (18BC~475AD) was located just south of the Han River. However, there has been a number of opinions as to the location of Hanseong. In recent years, Pungnaptoseong Fortress is recognized as Hanseong.

This study examined the location and history of a few of islands such as Mudongdo Islands, Burido islands that had existed in the Han River near the Pungnaptoseong. Since the 1970s with the development of Gangnam area of southern part of Seoul, these islands had buried away. The old documents, old gazetteers, and old maps, modern and contemporary maps, cadastral maps, aerial photos, field survey and interviews with the residents are used to investigate.

Historical geographical restoration of these disappeared islands is an important indicator to trace the flow changes of the Hangang river and the rapid regional change of the human environment associated with the development of the new town development of Seoul.

### Key words:

Hangang river; Seoul; historical geographical reconstruction; Gangnam area of Seoul; Mudongdo islands; Burido islands; new town development

## Ruined Place, Collective Memory and Place Identity in Post-2008 Earthquake

### Beichuan, China

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#### Abstract

Place is a core concept in human geography and environmental studies, place related bonds, especially the affective bonds between people and place, attracts extensive attentions. A ruined town and its former residents are suggestive of people's negative experiences within this area, and as such serve to illustrate people's other side of sense of place. This paper explores the county town of Beichuan, which was badly destroyed in the 2008 earthquake, and subsequently protected as a ruined heritage, as an example of the complex relationship between people and place. Place based memory and identity are choose as two indicators to reflect the special sense of place. Both qualitative and quantitative methods were used to reveal locals' collective memory of each ruined places and place identity toward whole town. Through comparisons and discussions, we came to know locals' special sense of place that Beichuan is a complex and mnemonic place that post-quake memories of negative experiences with cognitions of loss and tragedy are interwoven with pre-quake memories of the positive, nostalgic feelings of home, work place. It is a place many want to forget, but cannot easily avoided, and an abstract place that most people loved and feel a deep attached. Hopefully this research can apply lessons from place perception after such a catastrophic loss and embrace the relief practice of post-disaster reconstruction.

#### Key words:

ruined place; collective memory; place identity; earthquake heritage; China; Beichuan

## Russian-Chinese Common Historical Heritage: Phenomenon and Research

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### Abstract

Modern human society becomes increasingly aware of heritage as an indispensable condition for its development. Heritage implies both the values of our natural environment and those of – people’s culture as commonly represented in both tangible and intangible historic and cultural monuments. Heritage is the memory of our past and present that may have an impact on our future. Heritage is what people select from a world of values and put into a special category that needs to be passed from one generation to another. In some cases heritage properties could be valuable not for one nation but for two or even more peoples. Such objects may be caused by close historical contacts in cases of joint struggle for the triumph of the humanistic ideals or joint participation in important historical events. Such properties should be considered as the common historical heritage of the peoples concerned. Iconic and recognized the property of the common heritage is, in particular, the obelisk of Sino-Soviet friendship in front of the Museum of History in Lushun. The list of such examples can be continued, which already allows us to speak about the Russian-Chinese heritage as a phenomenon of particular importance for both countries. There is no doubt that this phenomenon needs to be studied, including - with geographical positions. Russia and China have a common historical heritage and its inclusion in the scope of cultural policy can actively contribute to further strengthening of relations between the two countries in the interests of their peoples.

### Key words:

Common historical heritage; cultural monuments; national interests

## The Emotional Memory and Perceptions of Urban Industrial Heritage

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### Abstract

Industrial heritage is the witness of industrialization and modernization, also a true portrayal of the people's life and social changes. The process of industrialization in China is closely related to urban development, and industrial heritage has become an important issue in urban renewal. A large number of Industrial relics and intangible heritage is rapidly disappearing and industrial civilization in some areas has become a historical fracture. Among many reasons of these problems, the role of emotional factors can not be ignored. In this study, the meaning and interpretation of industrial space are explored through the analysis of the tourists' perceptions from the perspective of emotional memory. It was found that as a production space with a distance to everyday life, the emotional dependence in the industrial heritage space is less than living space. On the other hand, the obviously absence of working class as the main body of space in the protection and reuse process, affect the emotion expression in the space practice further. Industrial heritage space is understood as a cultural and artistic place of consumption and leisure, rather than a memory space of industrial civilization. The question is how to deliver the industrial memory to future generations?

### Key words:

industrial heritage; interpretation; creative park; reuse

## Urban Heritage Conservation and Management: A Geographical Analysis of Udaipur City of Rajasthan, India

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### Abstract

Urban heritage one area that always considered as humane, socio- cultural and economic asset observed by various historic layering of values that have been produced by successive and existing cultures and an accumulation of traditions and experiences, recognized as such in their diversity. Considering the dynamic nature of living cities reflecting that urbanization is rapid and frequently uncontrolled process of development is transforming urban areas and their settings specially changes in historical heritage. That may cause fragmentation and deterioration to urban heritage with deep impacts on community values. However, the paper explores how the changes are taking place over time and space on historic heritage of medieval age Udaipur city of Rajasthan state in India. It deals the study of policies, issues and challenges for conservation of urban heritage. For this purpose, two major indicators have been taken into consideration for study which is tangible heritage like historical buildings, physical structures etc. and Intangible heritage including socio – cultural traditions. Further quantitative analysis of correlation techniques is applied to understand the interrelationship between explained variable that is historical heritage and explanatory variables such as tourism, cultural traditions, social composition etc. Finally, Regression analysis is also applied to understand the trends over time among variables for future planning. Finally, future strategies have been proposed towards conservation and management of historical heritage through implementation of policies and landscape approach supporting urban sustainability.

### Key words:

Urban heritage; transforming; fragmentation; deterioration; architecture; Infrastructural Development; landscape approach

## Yawata Ironworks as Transnational Geoheritage: Looking behind the Scenes of a late 19th Century Japanese/German Investment Project

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### Abstract

Yawata Iron and Steel Works was the first modern, coke-based integrated iron and steel plant in Japan. Construction of the plant by the renowned German iron, steel and machinery manufacturer Gutehoffnungshütte (GHH) as the primary contractor began in 1897 and was completed in 1901.

Arguably, Yawata represents both the first step toward, and the main symbol of, the country's late 19th/early 20th century industrialization during the so-called Meiji Industrial Revolution. It was recently awarded UNESCO World Cultural Heritage status together with 22 other sites dating from this period. Yawata can be regarded as a true fusion of Japanese-German competence, as exemplified by the pervasive tangible and intangible legacies both in Japan and Germany. These find expression not only in particular sites and buildings in both countries, but also in archival resources, in Germany mainly at Rhineland-Westphalia Economic Archives/RWWA, Cologne, housing the GHH documents. Thus, the Yawata project can serve as a model for demonstrating both the importance of and potential for a new, decidedly transnational perspective on heritage endeavours.

The main objective of the presentation will be a specific look behind the scenes, based on the archive in Cologne, in order to take stock of specific planning problems, blunders and intercultural collisions, i.e. elements of an almost adventurous investment project normally not addressed or even deliberately concealed in heritage valorizations. The main idea behind this is to, hopefully, enrich future interpretation strategies by adding decidedly real life flavours to run-of-the-mill narratives about inventive engineers, diligent workers, creative architects or visionary entrepreneurs, thus adhering to Tilden's well-known dictum that the chief aim of interpretation is not instruction but provocation.

## Study on the Spatial Pattern of Capital in the Perspective of Human Settlements

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### Abstract

Relying on the science of human settlements, from the Chinese prehistoric to Ming Qing Dynasties are elected as a time axis, to study on the spatial structure, the combination pattern and the spatial pattern of human settlements in the capital city. The evolution law of urban spatial structure:(1) From the Qin Han to the Ming Qing, the axis law always dominates the spatial structure of the capital of China;(2) From pre Qin to Ming and Qing Dynasties, the decentralized "mass structure" gradually evolved into a centralized "nested structure";(3) From the prehistoric to the Ming Qing, the capital (settlement) of the flat form evolved from irregular form to regular form and then to the irregular form. The Evolution law of combination pattern(1)Node element, the quantity is more abundant and the space distribution is more reasonable;(2)Path system, evolved from a single to multi layer; The spatial pattern of human settlements:(1) Prehistoric and the pre Qin, river human settlements civilization and Center characteristics of human settlements are formed;(2)Qin Han Dynasty ,the axis law is used in the construction of human settlements;(3)Wei Jin Nan Bei Chao, The emergence of "planning map" indicates that the construction of urban human settlements has reached a new level;(4)Sui Tang , city layout is Central symmetry;(5)The Song Yuan, the street system replaced the "Lifang";(6) The Ming Qing , siheyuan unit ,the lane system , Street system, axes city together constitute the most perfect human settlement construction system of Chinese feudal society.

### Key words:

spatial structure; combination pattern; Human settlements spatial pattern; ancient capital

## C12.39 Urban Commission: Urban Challenges in a Complex World

### China's Great Urban Transformation: Multidisciplinary Research on Urban China



Home

#### Oral

1. [A Comparison between Urban Native Children and Rural-to-urban Migrant Children in Beijing Using Structural Equation Model](#)  
Yan Guo (Sun Yat-sen University, China)
2. [Assessment of Livelihood Vulnerability of Land-Lost Farmers in Urban Fringe: A Case Study of Xi'an, China](#)  
Xiaojun Huang (Northwest University, China)
3. [Borders in a City under Transformation: Research from Guangzhou](#)  
Werner Breitung (XJTLU, China)
4. [Capitalization of Urban Land and Multiplicities of Governance Regimes in Lanzhou, China: Toward an Alliance-Based Space Development](#)  
Jie Guo (Institute of Geography, Heidelberg University, Germany)
5. [China's Urbanisation from Below: A Tale of Two Villages](#)  
Ya Ping WANG (a. Professor and Chair in Global City Futures, Urban Studies, School of Social and Political Sciences, University of Glasgow, Glasgow, G12 8RS, UK., United Kingdom); Yanglin Wang (b. Professor in College of Urban and Environmental Sciences, Beijing University, Beijing China)
6. [Deliberating Environment into Planning: Perspectives from Politics of Scale](#)  
Yanyan Chen; Jiang Xu (The Chinese University of Hong Kong, HongKong SAR, China)
7. [Development of a New City Centre and Functional Changes of Urban Villages in Guangzhou, China](#)  
Jun Onodera (Yokohama City University, Japan)
8. [Development of State Capitalism and Cities of Special Economic Zones in Xinjiang, China](#)  
Yuhui Li (Rowan University, USA)
9. [Do Professional Exhibitions Make the Emerging 'Capital of Design' More Creative? —A Case Study of Beijing, China](#)  
Xue Huang; Kebi Chen; Huasheng Zhu (Beijing Normal University, China)
10. [Domestic Investment-Induced Urbanization in Inland China in the Era of Globalization: Case Study of the Changzhutan \(CZT\) Region](#)  
Lizhu Dai (Guangzhou University, China)

11. [Economic Crisis, Neo-liberalism and China's Urban Planning Policies in Transition](#)  
Taofang Yu (Dept. of Urban Planning, Tsinghua University, Beijing, 100084, P. R. China, China); Na Li (Chinese Society for Urban Studies, Beijing, 100084, P. R. China, China)
12. [Empirical Test on the Relationship between Urban Basic-Nonbasic Economic Activities in China Based on the Theory of Economic Base](#)  
Haoming Guan (Northeast Institute of Geography and Agroecology, Chinese Academy Sciences, China)
13. [Land Expropriation, Demolition and Displacement in China's Rapid Urbanization Process](#)  
Max Lu (Kansas State University, United States)
14. [Manufacturing Decentralization and Local Government Policy in Intra-Metropolis: The Case of Guangzhou, China](#)  
Jiang Li (Geography Department of HongKong Baptist University, HongKong SAR, China), Yang Chun (Geography Department of HongKong Baptist University, HongKong SAR, China)
15. [Location, Geographical Relationship and Choice of Migration Destination of Floating Population in China](#)  
Yingying Wang; Yufen Tong (Capital University of Economics and Business, China)
16. [Making the Urban Public in Post-Reform China](#)  
Junxi Qian (South China Normal University, China)
17. [MEDIUM PANEL- The Transformation of Urban Lifestyles in a Medium-Size City: The Case of Datong at the Beginning of the 21st Century](#)  
Judith AUDIN (SCIENCES PO AIX, France)
18. [Migrant Integration in Peri-urban Beijing -- Is Neighbourhood a Device?](#)  
Siyao Liu; Fulong Wu; Fangzhu Zhang (University College London, United Kingdom)
19. [Migrant's Subjective Well-being in Urban China: A Case Study from Guangzhou](#)  
Yuqi Liu; Fulong Wu; Fangzhu Zhang (University College London, United Kingdom), Zhigang Li (Wuhan University, China)
20. [Paving the Way for Growth: Rail Transit Development and Suburbanization in Shanghai](#)  
Jie Shen (Fudan University, China)
21. [Positive Youth Development of Urban Native Children and Rural-to-Urban Migrant Children in Beijing](#)  
Ming Wen (University of Utah, United States); Lin Danhua (Beijing Normal University, China); Weidong Wang (Renmin University, China)

22. [Practical Features of Affordable Housing Policies at Local Level in Urban China: Lessons from Guangzhou and Chongqing](#)  
Junli Qiu; Yuting Liu (Architecture School, South China University of Technology, China)
23. [Proposed Cultural Quotient with its Quantitative Empirical Application to Chinese Cities](#)  
Jing Lin; Jianming Cai (IGSNRR, CAS, China)
24. [Regulating Urban Belonging: China's Hukou System and Processes of Intra-National Bordering](#)  
Leif Johnson (University of Kentucky, United States)
25. [Review and Reflection on the Renewal and Reconstruction of Shenyang Tiexi Industrial Zone](#)  
Haoming Guan (Northeast Institute of Geography and Agroecology, Chinese Academy Sciences, China)
26. [Saving Beijing \(China\). A Perspective of Political Ecology](#)  
Guillaume GIROIR (University of Orléans, Department of Geography (France), France)
27. [Scenario-based Analysis: How Many Human Settlements Need to Be Designated as Cities in China?](#)  
Jianming Cai; Jing Lin (IGSNRR, CAS, China)
28. [Territory and Identity in Globalizing Chinese Cities in the Views of Foreigners — the Case of Guangzhou City](#)  
Lei Feng (Sun Yat-sen University, School of Geography and Planning, China)
29. [The Production of Space and Sustainability of the "Ghost City": A Case Study of Ordos, Inner Mongolia](#)  
Guanwen Yin (Shandong Normal University, China)
30. [The Spatial Agglomeration of Modern Service Industry in Consular District with Urban Globalization: The Case of Shanghai](#)  
Lin MEI (Key Laboratory for Geographical Process Analysis & Simulation of Hubei province, Central China Normal University, China); Fang LYU (Sustainable Development Research Institute, Central China Normal University, China)
31. [The Vanishing Rurality: Restructuring and Changes in Guangdong “Urban Villages”](#)  
Hong Chen (South China Normal University, China)
32. [Transformation of China’s old industrial city: the example of regenerating Shenyang Tiexi area](#)  
Pingyu Zhang (Northeast Institute of Geography and Agroecology, CAS, China)
33. [Understanding the Formation of China’s Property « Bubbles » from the Perspective of the Developmental State](#)  
Natacha Aveline Dubach (Géographie cités, CNRS, university Paris 1 Panthéon Sorbonne, France)
34. [Urban Living Space Evolution and Spatial Mechanisms Analysis in Metropolitan Fringe—— a Case](#)

[Study of the Area along Chaoyang Road and Chaoyang North Road in Beijing](#)

Yuanxi Li; Kaiyong Wang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)

35. [Urban Village Redevelopment in China: A Case Study of Guangzhou](#)

Weilong Zhang (University College London, United Kingdom)

## Poster

1. [A Coffeehouse Neo-tribe in the making? Exploring a Fluid Cultural Turf in Post-Reform Chinese Urbanism](#)

Junxi Qian (China, Centre for Cultural Industry and Cultural Geography, School of Geography, South China Normal University); Zuyi Lv (China, School of Geography and Planning, Sun Yat-sen University)

2. [Economic Transition and Restructuring of Manufacturing Spaces in Urban China: The Evidence from Nanjing](#)

Jinlong Gao (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences); Yehua Dennis Wei (United States, Department of Geography, University of Utah); Feng Yuan (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences)

3. [Innovation and Urbanization Capacity in small, Unevenly Developed Economies: A Case Study of 17 Cities in a Coastal Province](#)

Lei Liu (China, Beijing Normal University)

4. [Spatial Hierarchy Inside the World City Network and Emerging Pathways of Chinese World Cities](#)

Ilya Chubarov (Russian Fed, Institute of Geography, RAS); Rejep Kurbanov (Turkmenistan, Institute of Geography, RAS)

5. [Spatial Reconstruction of city Museum in China during the Period of Institutional Transformation: A Case Study of Chengdu city](#)

Liu Run (China, Hubei University)

6. [Study on Establishing Unified Urban and Rural Construction Land Market](#)

Min Jiang (China, Institute of Geographic Science and Natural Resource Research, CAS); Xiaoting Xu (China, Shaanxi Tian Zheng Land surveying and Planning Co., Ltd.); Qinfang Li (China, School of Earth Science and Resources, Chang'an University)

7. [The Effect of Legal Title on Housing Tenure Choice——Taking Changping in Beijing as a Case](#)

Daquan Huang; Mengyuan Liu; Hua Zhang (China, School of Geography, Beijing Normal University)

8. [The Structure Characteristics and Evolution Mechanism of APS Enterprises Network in Northeast](#)



## [China](#)

Zhangxian Feng (China, School of Geographical Sciences, Northeast Normal University)

9. [Unintentional Segregation: The prevailing Gated Communities in China](#)

Weixuan Song (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences)

## A Comparison between Urban Native Children and Rural-to-urban Migrant Children in Beijing Using Structural Equation Model

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### Abstract

China's massive rural-to-urban migration has increasingly drawn domestic and international attention in research and policy making. Literature has shown negative effects of migration on children's development, especially among rural-to-urban migrant children in China. However, to what extent migration affects children's development and how children's own personality and the family, school, and community contexts mediate the effect of migration on children's development are rarely examined. Based on a newly collected dataset from 775 children in the fall of 2015 in Beijing, the current study will: 1) examine migration and perceived stigma among rural-to-urban migrant children; 2) compare personality and the family, school, and community contexts, and development outcomes between urban native children and rural-to-urban migrant children; and 3) conduct a structural equation model to explore the relationships between migration and children's development, mediated by perceived stigma, personality, and the family, school, and community contexts. We are currently in the process of cleaning data and analyzing data. We will have finished a draft manuscript before the conference.

### Key words:

SEM; China; migration; development

## Assessment of Livelihood Vulnerability of Land-Lost Farmers in Urban Fringe: A Case Study of Xi'an, China

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### Abstract

Many researches of rural household livelihood vulnerability to climate change and extreme weather events such as drought, flood and typhoon has received broad attention, but with relatively few attempts to involve livelihood vulnerability to the effects of social, economic or spatial variation. With rapid urban spatial expansion in China, many farmers lived in urban fringe face a great risk of livelihoods because of losing farmland. The livelihood of land-lost farmers has become a very important social issue in China. This article applies the livelihood vulnerability analytical framework to the case of lost-land farmers of urban fringe in Xi'an that are exposed to land use change. In this paper, we construct livelihood vulnerability evaluating indicators and assess livelihood vulnerability of lost-land farmers from sensitivity and response capacity. The study is based on mixed qualitative and quantitative analysis, combining data from in-person interviews and household surveys in 2015. Four types of livelihood vulnerability are found including high sensitivity and high response capacity, low sensitivity and high response capacity, low sensitivity and low response capacity, high sensitivity and low response capacity. The different crop types before losing land is the most important factor to impact on the sensitivity of lost-land farmers, but no significant impact on response capacity. Rentable house, income diversity, education level, social connection and land compensation are major obstacles to limit response capability of land-lost farmers. This study highlights the need for lost-land farmers to improve their education level and occupational skill and enhance their capacity for sustainable and diversified livelihood. Simultaneously, local government also need to provide livelihood assistance by employment training, improving social welfare and avoiding excessive urban spatial expansion.

### Key words:

livelihood vulnerability; urbanization; lost-land farmers; land use; urban fringe

## **Borders in a City under Transformation: Research from Guangzhou**

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### **Abstract**

Contemporary Chinese cities have been described with the term "enclave urbanism" as a patchwork of bounded spaces such as gated commodity housing estates and urbanised villages. This term implies separation, segregation and fragmentation. As border geographers, the authors of this paper have done many years of fieldwork in Guangzhou to better understand the dynamics of the actual borders between these enclaves and the role of these borders in the context of urban transformation. They can now present a much more differentiated picture, which also includes accounts of connectivity and permeability. Beyond analysing especially, the social and cultural dimensions of urban space in Guangzhou, the paper aims at bridging the gap between border studies and urban geography. It argues that border researchers can with their methods and concepts significantly contribute to the understanding of urban space, which in turn helps them to overcome their often implicit nation-centric concept of borders.

### **Key words:**

Borders; enclave urbanism; urban borderlands; gated communities; transforming cities; Guangzhou; China

## Capitalization of Urban Land and Multiplicities of Governance Regimes in Lanzhou, China: Toward an Alliance-Based Space Development

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### Abstract

Urban renewal and land redevelopment in China has recently become one of the topics receiving much attention from researchers. However, understanding of the multiplicities of local governance in producing urban space, beyond the analytical framework in relation to urban governance regimes as singular and mutually exclusive, is still insufficient.

By examining the process of large-scale urban renewal with capital-led land development in Lanzhou traditional industrial areas, in this paper, we discuss a kind of alliance-based governance emerged at urban scale in the context of China's neoliberal turning, and the underlying mechanism that shapes, while is in turn reshaped by the interactions as well as power relations among multiple stakeholders (i.e. governments at all level, relocated enterprises, employees, property developers, etc.).

This study finally draws the following conclusions. With the competitive bargaining and strength gambling of stakeholders, an interest-distribution mechanism dominated by Lanzhou municipal government comes on the scene. Through the mechanism, all stakeholders have eventually voluntarily or involuntarily got involved in such speculative redevelopment processes, and reached various alliances for common interests. However, due to the inherent instability of this mechanism, the partnerships of government's conception are rather fragile and unstable, and are easily to be broken. As a result, accompanied with series of explicit and implicit competition and resistance, as well as repeated and complex negotiations within the alliance, the established interest relationships are constantly shaped and reshaped, which thereby affects the ways and consequences of the production of urban space.

### Key words:

Neoliberal urbanism; urban renewal; alliance-based governance; industrial land redevelopment

## China's Urbanisation from Below: A Tale of Two Villages

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### Abstract

Research on China's urbanisation focuses mainly on large-scale project based developments in large cities. Urbanisation is however a very complex process which happens at many different levels and places, and involves very different players and communities. Apart from the government and plan led changes in cities, China is also undergoing a process of bottom up urbanisation which is organised and led by villagers, especially in the suburban areas of large cities. This bottom up development has affected a significant proportion of rural residents and contributed enormously to the overall social and economic transformation in China. Different from the homogenous top down urban planning and development approach, village led urbanisation follows very different, sometime innovative approaches that reflect different local socio-economic and cultural values. This study examines land development and residential changes in two suburban villages which have achieved some forms of urbanisation. It gives particular attentions to the differences of bottom up urbanisation emerged in the North and the South regions; and aims to highlight the benefits and problems from such development. The paper helps to identify alternative approaches and policy options to land development for China's urban future.

### Key words:

Urbanisation in China; village redevelopment; urban villages; Beijing; Shenzhen

## Deliberating Environment into Planning: Perspectives from Politics of Scale

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### Abstract

Over the past 20 years, environmental issues have been at the center of public debate all round the world. Confronting with mounting environmental pressure, Chinese governments have realized the importance of sustainable city and started to incorporate such green considerations in the urban plans. Yet, the meaning of environment in the planning field is always problematic, and the ways that environmental principles translated into planning practices relied heavily on the interpretation by different scales of state. This study attempts to examine how the Chinese governments have adapted to the changing environmental problems through urban planning. The specific focus is on various institutional response and planning practices at different scales of state. Through an engagement with the debates on the politics of scale, the argument is made that a new interpretation of environmental planning must be sensitive to the politics of scale. This study provides an overview of planning interpretation and practices of both central and local governments, and seeks to illustrate how planning the environment involves the political process of scaling objects and constraints caused by environment among different scales of governments. Guangzhou is taken as a case study for further empirical examination. It is found that the failure of spatial regulation on environment has resulted in an enforcement of environmental assessment in urban planning, through which the central government attempts to internalize the environment regulation into the planning system.

### Key words:

Urban planning system; politics of scale

## Development of a New City Centre and Functional Changes of Urban Villages in Guangzhou, China

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### Abstract

This research aims at explaining the functional changes of 'urban villages' in Guangzhou through a case study of Liede Village near Zhujiang New City Centre. Liede Village was a typical urban village accommodating a large number of migrant workers in the 1990s, while land owned collectively was gradually expropriated. The original village was eventually destroyed in 2007 and became a new community of 37 high-rise apartments in 2010. Almost all the native residents returned to the village, while the migrant workers were replaced by white-collar workers, who worked in the city centre. Many of these are young, unmarried and highly-educated, including managers, professionals and foreigners. Liede Village, as a collectively-owned entity, established the Liede Economic Development Company, which capitalized the compensation from the land expropriation. The villagers receive quite a dividend as shareholders, as well as considerable rental income from the apartments they acquired as part of the compensation. Since these buildings and land are still collectively owned, the villagers are not allowed to sell the houses and have no choice but to let them out, to utilize the properties effectively. In fact, the area is popular among white-collar workers because it provides accommodation at bargain rents near the CBD. Furthermore, collective ownership means that a shareholder's stake is inherited by family members, so that the village framework is firmly maintained. It can thus be concluded that such non-market spaces as urban villages do contribute to the economic development of a city at different stages.

### Key words:

central business district; urban village; functional change; Guangzhou; China

## Development of State Capitalism and Cities of Special Economic Zones in Xinjiang, China

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### Abstract

Horgos and Kashgar are cities in Xinjiang of northwestern China. Both of them have recently been promoted to cities of Special Economic Zones (SEZs), a status enjoyed by only a handful of cities in China. Except for Horgos and Kashgar, all other SEZs in China are located in the coastal region. This paper studies the background and processes of the change of status of Horgos and Kashgar. I argue that the main reason for China to promote these two cities is to enhance the country's state building capacity and facilitate China's ambitious plans to expand its geopolitical and economic influence in the world. The construction and development of Horgos in northern Xinjiang and Kashgar in southern Xinjiang are part of China's efforts to revitalize the ancient silk-road campaign, also known as One Belt, One Road (OBOR), launched by the current administration of China. I demonstrate that the mechanism and process of promoting these two cities is very similar to China's developmental approaches in its western region, e.g., the Great Western Development Strategy that started at the end of the last century. These campaigns follow a top-down and authoritarian approach, which is very different from the developmental strategies of the coastal area of China. In addition, I argue that the rapid development of Horgos and Kashgar will help with China's modernization plans domestically and internationally. But it may also have a negative impact on the already tense racial relations in China.

### Key words:

Xinjiang; Racial Relations; Cities of Economic Zones; Urban Expansion

## Do Professional Exhibitions Make the Emerging 'Capital of Design' More Creative?

### —A Case Study of Beijing, China

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#### Abstract

The role of trade fairs and professional exhibitions, termed as 'temporary clusters', in the knowledge transmission and creation has been highlighted in the innovation literature. It is believed that those activities can temporarily facilitate face-to-face communications and bring about new ideas. The scholars focus their interest on the manufacturing world, but pay little attention to cultural and creative sectors. Actually, holding international professional exhibitions is taken as one of important factors in the membership application to the global creative cities network (GCTN). In such field that novelty, creation and innovation are emphasized as the essential, do professional exhibitions provide knowledge channels for local creative firms to get access to the freshness outside? This paper takes Beijing, an emerging capital of design in the GCTN as an example to find the answer. The authors made questionnaire survey and interviewed with 47 local firms attending Beijing Design Week, an international design faire from October 2015 to March 2016. Through qualitative and quantitative analyse, this paper will explain what, why, and how 'temporary clusters' change the creative cities in terms of knowledge innovation.

#### Key words:

creative industries; professional exhibitions; temporary cluster; Knowledge innovation; creative cities; Beijing

## **Domestic Investment-Induced Urbanization in Inland China in the Era of Globalization: Case Study of the Changzhutan (CZT) Region**

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### **Abstract**

As a response to the Global Economic Crisis of 2008, the Chinese government has started to take domestic demand as one of the key national development strategies. Thus new Extended Metropolitan Regions (EMRs) in Inland China are being designated as major platforms to promote domestic demand. Under such new global economic environment and Chinese national policy context, these EMRs might not share the same spatial characteristics and mechanisms in the course of their growth and development as those in the coastal areas. Using the Changzhutan (CZT) region as an example and its comparison with EMRs in Coastal China, the paper argues that a new subset of urbanization in China is under way since 2000, i.e. a new region-based urbanization driven by the combined forces of domestic demand and globalisation has been unfolding in Central China. Classified as a new category of EMR, i.e. EMR II, these newly emerging EMRs in Inland China feature domestic investment and demand as key drivers, as well as being characterized by the 'backflow' of local people and 'low-carbon' trends of its manufacturing sectors.

### **Key words:**

urbanization; Extended Metropolitan Regions; Changzhutan; China



## Economic Crisis, Neo-liberalism and China's Urban Planning Policies in Transition

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### Abstract

Since 2008, the world is undergoing a new round of large-scale economic crisis. For tackling with the global economic crisis and domestic economic overheating, the Chinese government has also experienced many theoretical and practical attempts, which are deeply influencing the change directions of long-term urban strategic planning and short-term actions. In this paper, urban planning policies responding to mitigating and adapting the economic crisis are summarized based on Neo-liberalism model from different countries and areas of the world. And then, the urban planning policies in China since 2008 are analyzed, focusing on spatial differences of marginal benefits of the investments, such as to different sized cities. The final part is the strategic suggestions on China's Urban Planning from adapting to the New Normal trends. Firstly, urban planning policy should respect more the urban development (including the current situations judgment) laws, which in China's context are most multi-disciplinary mixed; secondly, in the long-term, the China's urban planning policy in transition should correctly handle the market optimal roles and the government equilibrium functions; Thirdly, in the short-term, the 13<sup>th</sup> five year Period is most important for China both from the global economic crisis and from the domestic overheating economy adjustment, besides the Supply side policies, the Urban planning and investment policies should not ignore the necessities of new Keynesian liberalism strategies from the "demand side", such as focusing more on East China, more on Core Central Areas of the Cities, and more on Mega Cities/ Mega City-regions as well.

### Key words:

Economics Crisis; Neo-liberal urban planning; Marginal Benefit Analysis

## Empirical Test on the Relationship between Urban Basic-Nonbasic Economic Activities in China Based on the Theory of Economic Base

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### Abstract

Economic base theory is one of the classical theories of urban economic activities, but the theory is not fully recognized and has not been completely denied. Based on the improved location quotient method, linear regression model and VAR model, the small and medium-sized cities of Jilin Province, Sanya City, Haikou City, Shenzhen city and Guangzhou city are selected as the empirical test objects. The results of the study can draw the three main findings. First, for a city with considerable scale and a certain level, the proportion of basic-nonbasic economic activities gradually decreased with the expansion of the scale of the city. Second, using the marginal multiplier method to estimate the "multiplier effects" is effective, the average multiplier method to estimate the "multiplier effects" is obviously insufficient. Third, the "multiplier effects" caused by the basic economic activities of the larger cities is weakened, and the urban economic activities are not in line with the basic economic model, which is shown as the interdependent model of basic-nonbasic economic activities. Based on the empirical results, two hypotheses are put forward. First, for a small size city, the basic economic activities could have a "multiplier effects" which is related to the size of the basic economic activities and the growth rate of the basic economic activities. Second, for a small city and small cities in a region as a whole, the driving force of development could be evaluated by comparing the value of "marginal multiplier" with 1.

### Key words

Economic base theory; Multiplier effects; VAR model; Urban size

## Land Expropriation, Demolition and Displacement in China's Rapid Urbanization

### Process

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### Abstract

In China's post-reform rush toward industrialization and urbanization, a large amount of rural land has been expropriated for non-agricultural purposes and many urban areas have been redeveloped. "Chaiqian" (拆迁, demolition and displacement) has been a ubiquitous phenomenon in China that has not only displaced millions of people but also given rise to numerous protests and petitions stemmed from unfair compensations or farmers' unwillingness to give up their land. The tensions are especially high on the exurban fringes of Chinese cities. This study examines this issue based on media reports and the author's field work in East China's Zhejiang province. The compensation policy for land expropriation and residential demolition appears to vary significantly, as do local reactions to "chaiqian." The paper compares Chinese practices concerning land expropriation, demolition and displacement with those of developed countries and offers lessons for China to address this inevitable issue in the urbanization process.

### Key words:

urbanization; land expropriation; displacement; China



## Manufacturing Decentralization and Local Government Policy in Intra-Metropolis: The Case of Guangzhou, China

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### Abstract

Understanding manufacturing decentralization at the intra-metropolitan level is of great interest to urban planners and geographers. However, there is a gap in the research with respect to data related to manufacturing decentralization and the role of local government policy after 2000. With the aid of Geographic Information System (GIS) techniques, this paper examines employment census data from 2004, 2008 and 2013 to better understand the influence of local government policy on this decentralization in the Chinese intra-metropolis of Guangzhou. We also use brief telephone interviews and in-depth personal interviews to gain additional insight. The results suggest that manufacturing activities decentralized from the city center to the suburbs more rapidly during the period from 2008 to 2013 than from 2004 to 2008. This situation holds for both heavy and light manufacturing. However, heavy manufacturing decentralized even more rapidly than light manufacturing, which leads us to examine the theory of Christaller's urban spatial structure model and Alonso's urban land use model. In sum, we find that this decentralization in Guangzhou is due to the local government formulating plans, implementing policies, and providing incentives to manufacturing firms.

### Key Words:

local government policy; decentralization; manufacturing activities; Guangzhou intra-metropolis

## Location, Geographical Relationship and Choice of Migration Destination of Floating Population in China

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### Abstract

Based on the analytical framework of the new economic geography theory, this paper uses binary logit model to analyze the impact of location and geographical relationship on the choices of inflows by migrants in consideration of individual heterogeneity and inflows' heterogeneity, in order to explain the reasons for the formation of the distribution pattern of the floating population in China from microscopic perspective. Studies have shown that: the location and geographical relationship significantly affect floating population's inflows option. Specifically, the positive impact of traffic access degree and non-farm employment density far exceeded the negative effect of geographic distance, due to the traffic access degree of megacities such as Beijing, Shanghai, Guangzhou and Shenzhen and so on is far ahead of other inflows, and non-agricultural employment density is also higher than other cities, which appeal a large number of floating population flow into large cities by overcoming the obstruction of geographical distance; and the influence of geographical relationship on the choice of inflows by migrants is more about economic links and dependencies, rather than pure geographic close. In addition, the heterogeneity within megacities and between individual migrants is significant, which cannot be ignored.

### Key words:

Location; Geographical Relationship; Choice of Migration Destination; Megacities

## Making the Urban Public in Post-Reform China

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### Abstract

The post-reform Chinese urban society and polity are characterised by a limited extent of social and political liberalisation, and unprecedented diversification of social identities, value orientations and interests. As a result, it is possible for individuals and social groups to appropriate multifarious spatial-temporal affordances to accommodate diverse needs and appeals. Against this backdrop, this presentation interrogates the post-reform Chinese urbanism by focusing on urban public sphere. While acknowledging the Anglo-European root of the notion of urban public, this presentation asks the following questions: (1) did the modern Chinese urbanism, inherently susceptible to Western notions of modernity and rational organization, witness the emergence of an urban public sphere where various actors articulate and negotiate views, interests and identities by partaking in a “world of strangers”; (2) if so, how do various urban publics unfold in the post-reform context, and what implications do they have for the entangled relations between state, society and the market? To do so, this presentation engages three strands of analyses. First, it traces the emergence of nascent public cultures and public consciousness following the early modernisation of Chinese cities during the late Qing and Republican eras, and how urban publics came under state control in the Maoist period. Second, it reviews various practices of public spaces in post-reform urban China. Finally, it thinks theoretically and conceptually, albeit tentatively, the usefulness of the idea of urban public to the analysis of post-reform Chinese urbanism, while comparing Chinese experiences to the literature on urban publics in the West.

### Key words:

urban public; public space; urbanism; post-reform China

## **MEDIUM PANEL- The Transformation of Urban Lifestyles in a Medium-Size City: The Case of Datong at the Beginning of the 21<sup>st</sup> Century**

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### **Abstract**

While research in urban studies in China becomes more developed on major cities (Beijing, Shanghai, Chongqing, Guangzhou), it is still less the case for medium-sized cities. Based on multi-sited ethnographic research within the MEDIUM project, this paper offers to analyse the evolution and configurations of urban lifestyles in a medium-sized city with an industrial background, Datong, located in the northern part of Shanxi province. Studying residential practices and housing issues allows to understand the power networks and social practices in medium-sized cities in China

This paper will present the context and social consequences of a major urban renewal (*chaiqian*) policy carried out on a large scale both in the city center (城区 *chengqu*) and in the mine district (矿区 *kuangqu*) by the former Mayor Geng Yanbo from 2005 to 2012. We will study physical consequences such as the way the urban space get transformed along with the evolution of city politics. But we will also study social consequences on the urban ways of life. What are the normative effects of this policy ? What image of « the good life » is promoted by the state authorities through this process? The paper will then raise the issue of the transformation of urban lifestyles in Penghuqu, a new residential district of Datong. How do the inhabitants reinvent their daily life practices within this new environment ?

This neighbourhood study is based on ethnographic research in the city of Datong where the author studied everyday life practices in the city.

### **Key words:**

Datong (Shanxi) local context; demolition-relocation (*chaiqian*); housing issues; urban lifestyles; multi-sited ethnographic research; social norms; power networks

## Migrant Integration in Peri-urban Beijing -- Is Neighbourhood a Device?

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### Abstract

Studies on ethno-cultural enclaves and mixed neighbourhoods show a highly complicated relationship and a vague connection between integration into mainstream society and neighbourhood characteristics. Segmented assimilation theory and empirical study in ethno-cultural enclaves and mixed residential communities provide an insight that neighbourhoods may play either positive or negative roles in Chinese internal migrants' integration. This research aims to interrogate the potential correlation between the migrant integration and neighbourhood types. Via an anthropological approach--participant observation, qualitative data of migrant households' daily life in four neighbourhoods are collected and analysed. Then through ethnographic narrative, the processes of their different integration approaches are unfolded and the dynamics behind are clarified. The results illustrate that firstly neighbourhood type is significantly related to the outcomes of migrant integration; secondly different neighbourhoods provide various approaches for migrant to integrate into receiving city. The reason is that neighbourhood is an important space in which economic integration and acculturation happens or social networks are knitted. The existence or absence of above upward mobility in different neighbourhoods either provides pathways for the adaptation into a new urban society or the hindering of integration. However, insufficient interaction with neighbours may not necessarily mean unsuccessful integration into city as neighbourhood is not the only place for migrants to integrate, their upward mobility might be achieved outside the residential communities that they live in. As migrant integration is found significantly influenced by neighbourhood types, the finding develops segmented assimilation theory that spatial distribution is another determinant of integration. This detailed empirical investigation also fills the gap of Wu, F. and Logan, J.R.'s research which mainly focuses on the statistics without detailed neighbourhood level observation.

### Key words:

migrant integration; segmented assimilation; Chinese migrants; neighbourhood governance; urban anthropology

## Migrant's Subjective Well-being in Urban China: A Case Study from Guangzhou

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### Abstract

There has been a surge of migration in China within the process of rapid urbanization. Although ten millions of migrants work and live in the city, most of them are denied urban citizenship and regarded as outsiders in the city. Such predicaments undermine migrant's subjective well-being and their willing to settle down in the city, which causes the stagnation of urbanization in China. By using the method of multi-level modelling, this research aims to investigate the patterns and determinants of migrant's subjective well-being in Urban China, particularly the impacts from neighbourhood. Based on the data collected from questionnaire surveys and in-depth interviews, this research explored the patterns and determinants of migrant's subjective well-being. We found that the extent of migrant's subjective well-being is much lower than that of local civilians. Migrant's subjective well-being is determined by his/her livelihood in the city, social support, family organization strategy and neighbourly interaction. In particular, migrants who reside in a well-equipped and socially harmonious neighbourhood have higher extent of subjective well-being than those who do not. This research contributes to our understanding of migrant's livelihood in Urban China by examining the impacts of neighbourhood and the cohort effects on migrant's subjective well-being.

### Key words:

migrants; subjective well-being; neighbourhood; multi-level modelling; Urban China

## Paving the Way for Growth: Rail Transit Development and Suburbanization in Shanghai

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### Abstract

Transportation infrastructure is key catalysts for suburbanization. The prevalence of the automobile and the creation of the freeway systems triggered post-war mass suburbanization in many western cities. The adaptation to this mode of transportation further induced a distinct suburban morphology, which is characterised by low density and strict land-use specialisation. In Chinese cities, however, rail transit systems and high density development is particularly salient in suburbanization. While existing literature frames the mode with the concept of Transit-Oriented Development (TOD) and treats it a solution to car-dependent sprawl, this paper investigates the development of metropolitan rail transit systems and its role in suburbanization from a critical perspective. Research findings are based on a detailed case study based on Shanghai and one of its rail line connecting downtown Shanghai to the suburban district Songjiang. By linking land sales, residential development and infrastructure funding, the construction of metro lines actually opens up the suburban space for capital accumulation and functions as a key tool for state interventions. The development of metropolitan rail transit systems also illustrates the changing modalities of suburban governance in China, which breaks the conventional topdown city-suburb\centre-periphery relationships and reflects increased horizontal negotiation and cooperation.

### Key words:

suburbanization; rail transit development; suburban governance; Shanghai

## Positive Youth Development of Urban Native Children and Rural-to-Urban Migrant Children in Beijing

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### Abstract

Issues on the causes and consequences of large-scale rural-to-urban migration in China have drawn increasing research and policy attention in the recent years. Most studies have focused on describing and explaining life circumstances and outcomes of rural left-behind children and rural-to-urban migrant workers in this massive population movement. Less work has been done to examine how rural-to-urban migrant children fare compared to their urban native counterparts. In addition, most studies have focused on negative child outcomes such as loneliness and depression with more positive sides of youth development less addressed. Given this background, this study has three purposes: 1) conceptualize and operationalize a positive youth development concept, a comprehensive measure of intra-personal assets a child possesses, based on the child development literature developed in the USA; 2) examine whether rural-to-urban migrant children differ than their urban native counterpart in Beijing in positive youth development; and 3) explore whether family and school contexts offer some explanations for these differences (if observed). Data used in this study were collected in the fall of 2015 in Beijing. We are currently in the process of cleaning data and running data analysis. We will have finished a draft manuscript before the conference.

### Key words:

Rural-to-urban migration; child development; positive youth development; family; school

## Practical Features of Affordable Housing Policies at Local Level in Urban China: Lessons from Guangzhou and Chongqing

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### Abstract

In the past decades, drastic transformation from a welfare-state housing system to a market-oriented one has helped to shape a new affordable housing system in China. Local government has replaced the central government to become the main provider of affordable housing. Although affordable housing policies and its various implications have received extensive attention, practical feature of policy implementation at local level is a less touched area. Based on the empirical studies of the practices in Guangzhou and Chongqing, this paper aims to provide an in-depth analysis of local authorities' practical characteristics of affordable housing policies in the context of Socialist marketization, and then tries to identify the main influencing factors contributed to this. We argue that practices in Guangzhou and Chongqing represent two typical models in China - local authority with multiple interested groups commonly acted as providers and local government as the only provider respectively. However, significant differences between historical periods of affordable housing provision, mismatch between supply and demand, and clustered distributions of large-scale affordable housing estates with disadvantaged locations are main features at local level. Further analysis illustrates that strong policy constraints from the central government, and local authorities' inclination to responsible for higher government instead of low-incomers are dominant factors to municipal practices; while real estate-oriented urban growth, land leasing system, and social-economic conditions exacerbate this situation. In general, inappropriate division of responsibilities and rights of affordable housing provision between the central and local governments basically leads to municipalities' underpower to implement affordable housing policies.

### Key words:

affordable housing policy; practical features; influencing factors; Guangzhou; Chongqing

## Proposed Cultural Quotient with its Quantitative Empirical Application to Chinese Cities

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### Abstract

It has long been recognized that culture is a significant driving force for urban development. Nowadays, it appears that culture is playing an increasingly important role in promoting urban sustainable development when innovation becomes the main driver of economic growth and urban competitiveness. Yet there's few proof of cultural importance in quantitative way in this regard. This paper therefore is trying to quantify the cultural importance to urban development by proposing an index system consisting the 6 dimensions identified by literature review dubbed as the Cultural Quotient (CQ). Based on the created CQ index system, an integrated database of 263 prefectural-level cities in China is established. Then CQ value for each city is measured by applying factor analysis using SPSS. Following that, correlation and regression analysis are made between CQ values and City Economic Performance (CEP) as well as Urban Comprehensive Competitiveness (UCC) imported from other official data sources, to explore the relationship between CQ and CEP as well as CQ and UCC in quantitative way. The result shows there's a high positive relationship between the two, especially between CQ and city performance in innovative economy. It implies that as a driver with the most durable influencing power, culture is critic to innovative urban sustainable development and needs to be carefully studied in details. This paper makes its contribution in establishing a measuring index and the empirical application in China. Yet more cases for other countries need to be included for more concrete proof of the statement.

### Keywords:

Cultural Quotient; urban competitiveness; innovative economy; Chinese cities

## Regulating Urban Belonging: China's *Hukou* System and Processes of Intra-national Bordering

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### Abstract

As members of history's largest rural-urban migration, the migrants who make up a great portion of urban China's low-wage labor force and burgeoning population face unique challenges. Although the trajectories of their movements do not cross international boundaries, most are legally prevented from ever gaining full status within China's *hukou* system of household registration. This system parallels national citizenship policies in important ways, providing an alternative to standard understandings of how the legal boundaries around communities are drawn. While scholars studying international migration have noted that the regulations governing internal migration in China are closely related to policies regulating international migration, empirical work bringing the *hukou* system into relation with theoretical developments in (international) migration studies is scarce. Based on a series of qualitative interviews conducted in Shanghai and rural Anhui province, I argue that the structure and effects of the *hukou* system demonstrate clearly that the boundaries of national territory cannot be considered as the exclusive site from which bordering processes emanate. Bridging the gap between scholarship of Chinese migration and international boundary-making, I position this argument as an extension of the recent trend in border studies to understand bordering processes as taking place beyond the territorial boundaries of the nation state.

### Key words:

bordering; internal migration; China; hukou; floating population; urban citizenship

## Review and Reflection on the Renewal and Reconstruction of Shenyang Tiexi

### Industrial Zone

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#### Abstract

Shenyang Tiexi Industrial Zone (STIZ) was a famous old industrial zone, which was formed under the planned economy system. Prior to 2002, the strategy of the technical transformation did not make STIZ to get rid of dilemma. In 2002, STIZ creatively solved the problem of "where the money come from, where people go", was a strong typical zone in the last 10 years of the Northeast China's revitalization process. This paper firstly briefly reviews the development process of STIZ since the implementation of the industrial relocation plan. Secondly, the author generalizes the "Tiexi Model" that mainly includes three aspects: 1) Shenyang Municipal Government merged STIZ with Shenyang Economic and Technological Development Zone (SETDZ), the merger of STIZ with SETDZ broke through the restriction of the institution; 2) The funds of renewal and reconstruction mainly came from the differential land rent; 3) Urban spatial restructuring promote industrial transformation. Thirdly, the paper points out a series of new problems arising from the rapid urban renewal in the urban functional space structure, industrial structure, economic growth pattern, employment and so on. Finally, the author reflects on the existing problems from the theoretical framework of resilient city in order to provide a new way of thinking for the development of STIZ in the context of a new round of Northeast China's revitalization.

#### Key words:

Urban reconstruction; Spatial restructuring; Institutional transition; Resilient city; Shenyang Tiexi Industrial Zone

## Saving Beijing (China). A Perspective of Political Ecology

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### Abstract

The major fact of the XXIst century is probably represented by the rise of so-called emerging countries. The rapid emergence of these often very populated countries with a high growth rate represents a major and specific challenge in terms of sustainability. How to reconcile emergence process and paradigm of sustainability?

This issue involves theoretical but also practical aspects, especially important in the megacities of emerging countries. Powerful demographic and economic concentrations, the megacities are considered as anti-models in matter of sustainability, but also laboratories of ecological transition.

In this context, the case of Beijing, megacity of over 21 million inhabitants, the capital of a country of nearly 1.4 billion people and 2nd world GDP, therefore a symbol of the emerging countries, offers a privileged field of both observation and reflection.

In the 1950s, some researchers suggested to separate the old town from the new town. Bumping into a real taboo, they were not followed by Mao. The best known of them, Liang Sicheng (1901-1972), considered as the father of modern architecture in China, advocated to keep Beijing as a political and cultural center, not an economic center. He wanted to keep the walls and gates of the old Beijing, creating a new city to the West, at some distance from the existing urban center. Its considered conservative stance earned him severe criticism in the 1950s, especially during the Cultural Revolution, where he was persecuted.

Over fifty years later, Beijing is experiencing a multifaceted environmental disaster, including sometimes extreme air pollution (cf. "airpocalypse", 空气 末日, *kongqi mori*) is only the most visible part. For the period between 2008 and 2015, only 20% of days have a good air quality.

In the first part, it will therefore be to present the unsustainability forms characterizing the urban anti-model of Beijing. A second part will show the counter-measures against the urban crisis of the capital by the Chinese government. In a third and final part, we develop a set of prospective thoughts, particularly on the issue of the transfer of the capital outside of Beijing and the need for China to introduce decentralization.

### Key words :

sustainable development ; political ecology ; China ; Beijing

## Scenario-based Analysis: How Many Human Settlements Need to Be Designated as Cities in China?

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### Abstract

China now is in the transition period moving from a kick-off urban society towards a saturated society with a high urbanization level, probably to reach 70% with the added urban population approximately 300 million. It requires us to carefully reconsider how to optimize the urban population distribution in China for the coming 20 years. This paper thus tries to apply the scenario-based approach to analyze how many human settlements need to be designated as cities in China through elaboration on official criteria for city designation and its evolution first, and then various scenarios for city designation, urban distribution and spatial reorganization are projected and discussed. Based on this, some policy suggestions are put forward accordingly.

### Keywords:

scenario analysis; human settlements; city designation; newly designated cities; China

## **Territory and Identity in Globalizing Chinese Cities in the Views of Foreigners – the case of Guangzhou city**

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### **Abstract**

With the comprehensive development of China's opening to the outside world, more and more foreigners come to China. The Pearl River Delta region is recognized as a window of the mainland, also as one of the most popular destinations for foreigners to travel, work or study. So how do foreigners view their life in Chinese cities? What kinds of images are Chinese cities showing the world? And what are the differences between foreigners and Chinese people in thinking about the regional identity? These questions are meaningful which are related to the establishment of international image of China and Chinese cities, also related to the major issue of the development of cities as well as the whole country. This study takes Guangzhou City as an example, one of the most populated city in the Pearl River Delta, aims to clarify the identity of foreigners individually, and the regional identity of Guangzhou city collectively. The research was mainly conducted among the foreigner students in colleges and universities in Guangzhou City, and immigrant workers and travelers living in Guangzhou. In-depth interviews were conducted to obtain the first-hand data, combined with domestic and foreign media reports, social network service site and other information sources to analyze the formation and transformation of Guangzhou's regional identity.

### **Key words:**

foreigner; identity; territory; Guangzhou

## The Production of Space and Sustainability of the "Ghost City":

### A Case Study of Ordos, Inner Mongolia

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#### Abstract

Since the 2000s, urban space has expanded rapidly along with the construction of new cities in China. Also, a large number of "ghost cities" with empty housing and inadequate economic activities are emerging in this urban transformation process. Taking Kangbashi New City of Ordos as a case study, this research aims to solve the myth of the "ghost city" from the perspective of "production of space". Through intensive interviews and fieldwork conducted during 2010~2015, it is found that the local government has played a dominant role through a series of administrative measures, including avoidance of central state regulations, land leasing, high standard infrastructure construction, relocation policies and industrial attraction in the production of the new city. Moreover, the enterprises and citizens have involved actively in the new city production through residential quarter construction and real estate speculation. Furthermore, this research estimates the sustainability of the new city, and it is found that underdeveloped industrialization, slow population agglomeration and real estate bubbles are the primary threats to the new city development.

#### Key words:

ghost city; production of space; sustainability; Ordos; China

## The Spatial Agglomeration of Modern Service Industry in Consular District with Urban Globalization: The Case of Shanghai

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### Abstract

Consular district is a area that the landscape carrier of political functions in global city and the interaction between diverse actors in the process of urban globalization, which embodies the level of urban globalization and has a comprehensive effect on urban development. Economic factors in the consular district include modern service industry clusters elements, such as commercial, financial, leasing, real estate, hotels and leisure industry generated in the consular district and its adjacent areas which are driven and supported the construction of the consular district in the city. Due to the obvious location characteristic of the economic elements, the consular district has become the most active areas of the export-oriented economy in the process of urban globalization. In this paper, spatial Gini coefficient, location index and EG index are being used comprehensively to construct the spatial intensity model of economic elements in the consular district, through quantitative analysis and comparative methods to examine data from Shanghai city, we found that the economic elements of the consular district have formed a circular layer structure, including the kernel ring, the industrial agglomeration circle and the living circle, among which the economic elements interact closely. Based on this analysis, this paper discusses the spatial characteristics and formation mechanism of the economic elements in the consular district. The economic development of Shanghai's consular district shows that the agglomeration of economic elements in the consular district can activate and promote development of urban globalization, bring a good multiplier effect, and form a new growth pole within the city.

### Key words:

consular district; economic elements; industrial cluster; spatial characteristics

## The Vanishing Rurality: Restructuring and Changes in Guangdong “Urban Villages”

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### Abstract

China has been urbanizing rapidly since the late 1980s with tremendous economic growth and social changes. The new-type urbanization and “three rural issues” have gained their popularity in academics. This project chooses several villages located in different Guangdong municipalities as case study areas, tells the stories of two contradictions induced by the “rural-urban dichotomy”, and sheds light on the interaction and relationship between the process of urbanization and the persistence of rurality in China, as well as to discuss the questions that how urbanization vanish peasants and villages, how the rural traditional patterns have been revived, and why there are two completely opposite results of Chinese urbanization. Research methods is mixed through combining quantitative and qualitative analyses including statistical analysis, field observation, interviews and questionnaires, personal life history and discourse analysis. It tends to enrich the existing literature focus on the new-type urbanization and rural restructuring in China from the highlight of qualitative analysis and adoption of institutional analytic framework.

### Key words:

rurality; rural restructuring; “urban villages”; new-type urbanization; China

## Transformation of China's Old Industrial City: The Example of Regenerating Shenyang Tiexi Area

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### Abstract

China has experienced fast urbanization over three decades since the reform and opening up, a considerable studies have been focused on the transformation of the large cities such as Beijing, Shanghai and Guangzhou in the coastal area, however, how a large number of the inner-land old industrial cities developed and transformed still remains a less touched topic. This research takes one of typical old industrial city Shenyang, the provincial capital city of Liaoning as example, to demonstrate its transformation by exploring the regenerating process of Tiexi industrial area in the city. The research reveals that strong intervention of central and local government, gradual marketization reform and involvement in globalization have played key roles in achieving Tiexi's regeneration up to date. What could sustain on-going transformation of Tiexi area in face of the new normal economy and society? How to adapt to new circumstance? The author attempts to discuss this issues from urban resilience approach. In conclusion, to regenerate old industrial area is inevitable for the transformation of traditional industrial city, Shenyang Tiexi example give us some experiences and implications with Chinese characteristics, and for continuing the regeneration process, we need to understand and utilize the resilient character of city to cope with new challenges. (NSFC:41571152)

### Key words:

urban transformation; urban regeneration; urban resilience; old industrial city; Shenyang city

## Understanding the Formation of China's Property « Bubbles » from the Perspective of the Developmental State

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### Abstract

Over the past decade, China's urban property markets have undergone skyrocketing prices. Scholars have debated about the way to interpret these mechanisms. This paper does not take part in the discussion regarding the bubble hypothesis but rather outlines the politico-institutional drivers of these property booms. Following Wu's argument on the centrality of property development in China's macroeconomic policy (Wu, 2015), the paper mobilizes the Developmental State framework (Johnson, 1985, Zhu, 2004). It highlights the productivist strategy of the state at both central and local levels, the financial repression driven by the need to control the allocation of banking credit, and the subsequent use of housing as an investment vehicle against a background of residual welfare. This perspective also provides insight into the surprisingly weak involvement of foreign capital in China's property markets, another commonality with neighboring developmental states that relativizes the uniqueness of China's real estate dynamics.

### Key words:

Development state; property markets; housing markets; grey finance; foreign investment in real estate; property bubble

## Urban Living Space Evolution and Spatial Mechanisms Analysis in Metropolitan Fringe

### — a Case Study of the Area along Chaoyang Road and Chaoyang North Road in Beijing

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#### Abstract

The area along Chaoyang Road and Chaoyang North Road in Beijing is in typical metropolitan fringe, so this paper take this area as a case study. With RS data, GIS techniques and field work, the study achieves the urban living space classification maps of 2005 and 2014. Using the area calculate, buffer and overlay functions of ArcGIS 10.1, the study analyzes the spatial evolution patterns and mechanisms. It is found that great changes have taken place in the last ten years, which showed that the scale of urban living space evolution is massive and its forms are various. Constructing modern residence and reconstructing urban village are two themes of urban living space evolution. Different evolution forms occurred at different distance along the transport artery. From the near the distant, they are constructing modern residence with consumption space and public service space, then constructing recreation space on underdeveloped land, then relocating work space. The expansion speed index decreases from north to south of the research area. The distribution of consumption space, parks, green space, kindergartens, primary schools and high schools is not even in the spatial distribution. Eastern area, southern and northern marginal area is need to strengthen these spaces especially, which can optimize the spatial structure and improve the living environment.

#### Key words:

urban fringe; urban living space; evolution; along transport artery; Beijing

## Urban Village Redevelopment in China: A Case Study of Guangzhou

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### Abstract

There is a plenty of existing researches on China's urbanisation revealing the process of urban expansion of cities and towns, but little touch on the modality of redevelopment in China's cities. From late 2000s, China's economy enters a new stage of 'new normal', so-called 'Xinchangtai' in Chinese. Against the context, a remarkable change has been noted within the field of urbanisation in China, as the role of planning as a major tool for growth has come to end. The growth-oriented ideology underlying China's planning is ending. The golden age of China's spatial production as well as planning is gradually disappearing. Now the focus of urban China's spatial production turns and moves into a new stage of pro-redevelopment, so to improve the efficiency of land use, place making, promote various types of consumptions, and sustain a high speed economic growth. This research examines the practices of urban village redevelopment in Guangzhou. On the one hand, it discusses the policy evolution of village redevelopment of government in different levels from central, provincial and to local, to explain the governance change in village redevelopment. On the other hand, it intends to demonstrate the evolving power of villages' collectives and villagers, as well as the contestation and negotiations between villagers and local government within the processes of redevelopment, in order to shed light on the impact of collective power on the evolution of governance of urban redevelopment.

### Key words:

Urban Redevelopment; Urban Village; Governance; Guangzhou; China

## A Coffeehouse Neo-Tribe in the Making? Exploring a Fluid Cultural Turf in Post-Reform Chinese Urbanism

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### Abstract

Since the implementation of the Opening and Reform Policy, Chinese urbanism has witnessed the rise of a consumer society. Consumers, as mindful and reflective social agents, are engaged in the re-fashioning of collective values and identities through activities and practices of consumption. This paper examines the zeal of young, wealthy and educated urbanites in the post-reform urban China for the coffeehouse. With an empirical study based on Guangzhou, this paper takes the coffeehouse as a locus of meeting between globalized meanings and locally mediated practices. Above all, the paper asks whether coffeehouses, as lived habitus constituted by situated rituals, customs, codes and cultural meanings, contribute to the formation of collective values and identities of coffeehouse consumers. The empirical findings suggest a positive answer, since the multiple, and often ritualized, routines of socialities and activities clearly break away with the identity of unreflective consumer that dominant social discourses appear to reify. Coffeehouse consumers not only reproduce cultural experiences of consumption-empowered cosmopolitans of the global age; they also negotiate, and sometimes even resist recent cultural changes in urban China. First, coffeehouses are defined as heterotopic “retreat” from fast-paced urban life that encourages self-reflection and spiritual comfort in a society dominated by instrumental rationality. Second, coffeehouses are social settings conducive to more “authentic” socialities not distorted by the impersonal logic of “office culture”. Finally, early-career entrepreneurs frequently use coffeehouses for the exchange of ideas and information; and trust established in such social milieus facilitate both innovation and self-actualization.

### Key words:

coffeehouse; neo-tribe; cultural turf; urbanism; post-reform China

## Economic Transition and Restructuring of Manufacturing Spaces in Urban China:

### The Evidence from Nanjing

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#### Abstract

China has undergone substantial industrial and spatial restructuring since the economic transition. The triple process of globalization, marketization and decentralization has a significant influence on the restructuring of manufacturing spaces in urban China. Using the data from the basic unit survey and second economic census conducted in 2001 and 2008 respectively, we investigated the restructuring process of the manufacturing spaces in Nanjing. The result implies that with the suburbanization of the manufactures, multiple specialized areas emerged in the outskirts of Nanjing. In particular, the development zones gradually became the major base of those manufacturing firms. And a hub-and-spoke pattern has also been detected with the development of traffic infrastructures and the construction of the development zones in Nanjing. Employing the Binary Logistic model and spatial autocorrelation models (SLM/SEM), we also found that the global factors of foreign investment and the export degree of industries, the market factors encompassing the urban land price and the development of non-state/collective enterprises, as well as two dummy variables of development zones and city center indicating the force of decentralization have highly significant impact on the failure/migration and re-agglomeration of manufacturing firms in Nanjing, together with other location, industrial, and regional factors including the distance to the highway, distance to the airport, pollution intensive, hi-tech intensive, land supply, and density of roads.

#### Key words:

manufacturing space; spatial restructuring; suburbanization; economic transition; Nanjing, China

## Innovation and Urbanization Capacity in Small, Unevenly Developed Economies: A Case Study of 17 Cities in a Coastal Province

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### Abstract

The city is an agent of innovation, and sustainable economic and social development depend on this innovation to maintain a city's education, human resources, science and technology. Innovation also allows for strategic choices that can lead to new models of urbanization. This study analyzed the correlation between urban innovation and levels of urbanization for 17 cities in Shandong Province. Overall, a significant correlation between a city's capacity for innovation and its level of urbanization was found for the cities. The a significantly improvement over time, most of the cities are in moderate or high level of coupling degree. Coupling degree shows a significantly spatially "center-periphery" distribution, indicating the radiation and leading role of key cities. The overall coordination degree of city's capacity for innovation and urbanization of cities in Shandong Province is low, but presents a significant improvement over time. Most of the cities with high degree of coordination distribute along Jiao-Ji Railway with Jinan City and Qingdao City are the core and endpoints. The coordination of the northern region of Jiao-Ji Railway significantly higher than the southern region.

### Key words:

City's capacity for innovation; Urbanization; Coupling coordination analysis

## Spatial Hierarchy inside the World City Network and Emerging Pathways of Chinese World Cities

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### Abstract

The first part of research provides a new approach to measuring a spatial structure of world city network (WCN). Based upon the results of media-popular 'global city rankings' produced by several international think tanks (PWC, Mori Foundation, The Economist and A.T. Kearney), and inspired from the broader context of global interactions, our calculation allowed to reveal global urban hierarchy and divide it in several subnetworks of world cities. The second part of the paper contains more detailed analysis of Chinese situation with special attention on emerging pathways of those Chinese world cities, identified earlier as part of WCN. Analysis shows that Hong Kong clearly stands out as 'global gateway city' (well-positioned as center of commerce and meditation services), Beijing is very typical 'global capital' (with prominent positions inside international political, media, cultural fields and national control and political center), while Shanghai, Guangzhou and Shenzhen shares the common features of 'global industrial city' (manufacturing and logistics are fields of specialization).

### Key words:

China; Hong Kong; Beijing; Shanghai; Guangzhou; Shenzhen; hierarchy; global city; world city; networks; globalization

## **Spatial Reconstruction of City Museum in China during the Period of Institutional Transformation: A Case Study of Chengdu City**

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### **Abstract**

In the context of globalization, museum as an important spatial carrier to enhance the city's international cultural competitiveness, is increasingly integrated into urban development strategies at home and abroad in the most recent decades. In China, museum, as it has come to be known, once was an administrative organ relying heavily on government subsidies to survive in the planned economy period, so its spatial construction (include site selection, function configuration, archthitecture style, spatial combination and so on) was mainly to meet political demands at that time. However, such spatial construction has hindered the effective play of museum's social and economic function at present. Thus spatial reconstruction is extremely necessary for museum to release its economic and cultural vitality, more and more city governments, museum creators has taken a series of measures of spatial reconstruction to build the museum as an important urban cultural and commercial space. In order to understand better the museum why and how to be carried out spatial reconstruction, this paper takes Chengdu city as a case study, adopts qualitative research methods such as depth interviews, participant observation and text carding, analyzes the background and situation of museum reconstruction, discusses in-depth the spatial (re)construction of museum in the planned economy period and in the market economy period, and finally provides a reflection about spatial reconstruction based on museum as a social public goods.

### **Key words:**

Spatial reconstruction; museum; institutional transformation; Chengdu

## Study on Establishing Unified Urban and Rural Construction Land Market

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### Abstract

Urban-rural dual structure is the major character of construction land market in China, which impedes the fast, fair, efficient transfer of land resources. Land market reform is always the research hotspots of land use policy in China. However, current studies focus on single aspects mostly, such as land expropriation system, collective owned land transfer, but rarely propose systemically reform measures. In this paper, we combine literature analysis, summarizing method and system analysis method to analyse the institutional obstacles to establish unified urban and rural construction land market in China. Then we propose a series of systemically reform measures to build the unified land market: 1) Taking the improvement of land expropriation institution and direct transaction of rural collective construction land as a breakthrough, the unified construction land market can be established via three aspects, including expanding rights, reform land expropriation system, and systematically supporting measures. In the new institution, urban and rural construction land have the same rights and government only inspects and controls the market; 2) The systematically supporting measures, such as perfecting land laws and regulation, rural land property system, tax system, transaction platform, and changing government function, are needed to ensure the establishment of unified urban and rural construction market comes true. The results have guiding significance and application value of solving problems resulted by the dual structure of rural and urban construction land.

**Key words:** dural structure; construction land market; reform measure

## The Effect of Legal Title on Housing Tenure Choice

### —Taking Changping in Beijing as a Case

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#### Abstract

Small-property-rights house is a kind of informal housing in china. Because of the high price of house and property purchase limits, there are not enough available houses in big cities, so lower-cost small-property-rights house in suburb is another choice for many people. While lacking the legal title, and some infrastructure, households' housing tenure choice for small-property-rights house may not be same as commodity house. We examine the effect of legal title on housing tenure choice in Changping, Beijing, choosing household characteristic and house feature two aspects control variables. The results find that residents of small-property-rights house enjoy a fairly high degree of de facto security of their properties, while the legal title does decrease their willing to purchase the house. In this case, government could combine small-property-rights house with low-rent house to help alleviate the pressure of housing shortage.

#### Key words:

Small-property-rights house; legal title; tenure choice; China

## The Structure Characteristics and Evolution Mechanism of APS Enterprises Network in Northeast China

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### Abstract

Northeast China is a typical economic region which has an advanced enterprises network. The enterprises network has more obvious regional characteristics. It has experienced a long evolution process and has been developed relatively mature. Those characteristics make the region be suitable to launch a regional research.

Advanced producer service (APS) is an important carrier of global production networks, to the northeast region economic geography the basis of system theory research has important significance. Division of labor and the contact is an important theory, regional economic system theory and production network in northeast China both in concept and operation mechanism is part of the regional economic system, with the regional general attributes. Of the northeast regional financial services, insurance, logistics and other related industry network research has shown that APS in northeast China network dynamic characteristics, level and scale difference, envelops heterogeneity and diversity of characteristics, overlapping and nested characteristics, the agglomeration characteristics again.

From the point of evolution mechanism, the APS enterprises network in northeast China with the complexity of the regional economy system, under the condition changes, can present a network overlap, nested, center, transition and other space level change characteristic, and stage of development, management pattern, policy and local culture are more profound influence on production network.

### Key words:

APS enterprises network; structure characteristics; evolution mechanism; Northeast China

## Unintentional Segregation: The Prevailing Gated Communities in China

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### Abstract

With the large-scale urban renewal at the turn of last century, gated communities sprung up and spread rapidly across almost all cities in China. The empirical research on Nanjing finds that: (1) gated community is the main development model of newly built community in China, emerging under the background of social stratification and housing supply market reform in the transition period. It is popular for catering to the high grade and modern residential demand by the group with relatively high economic and social status. Simultaneously, (2) The high-grade gated communities in Nanjing are mainly distributed over city center and the areas in a region of mountains and streams outside the Ming City Wall, as collages in the traditional space of the city in the form of mosaic. The residential space shows that being mixed by all parts of society in large scale and inhabited by homogeneous population in small scale, presenting the core-edge structure. (3) Gated community in China is quite different from member or “club” oriented community in western countries. While, gated community in China is only a community in exterior form and the community cultural characteristics, collective consciousness and sense of belonging is not strong. (4) Gated community is a relatively ideal mode of living space for individuals. However, it has brought negative effects including the collapse of traditional neighbourhood relations, privatization of public space of waterfront, and intensifying of social exclusion and residential segregation, which challenges social fairness and space justice.

### Key words:

Gated communities; residential differentiation; urban renewal; Nanjing

## C12.40 Water Sustainability

### Water Pollution and Health Impacts



Home

#### Oral

1. [A Landsat 8 OLI-based, Robust Model for Estimating the Diffuse Attenuation Coefficient in Dynamic, Turbid Dongting Lake](#)  
Zhubin Zheng; Yummei Li; Jingli Ren (Nanjing Normal University, China)
2. [A Spatial Study of Access to Safe Water and Sanitation Condition and its Implication on Health in the Dhalai District Of Tripura, India](#)  
Jimmi Debbarma; Nibedita Das Pan (Tripura University, India)
3. [Characteristics and Sources Analysis of Riverine Chromophoric Dissolved Organic Matter in Liaohe River, China](#)  
Tiantian Shao (Henan University, China); Kaishan Song (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
4. [Continental-Scale Controls on Pathogen Concentrations across the Ganges Watershed](#)  
Patrice Carbonneau; David Milledge (Durham University, United Kingdom); Suresh Gurjar; Rajiv Sinha; Vinod Tare (IIT Kanpur, India)
5. [Effects of Habitat Loss and Fragmentation on Surface Water Quality: A Case of the Shenzhen River Cross-border Watershed](#)  
XIE Yu Jing; Wang Xiang Rong (Fudan University, China); Ng Cho Nam (The University of Hong Kong, China); Fan Zheng Qiu (Fudan University, China )
6. [Globalization of Water Resources through Virtual Water Trade](#)  
Hong Yang (Swiss Federal Institute for Aquatic Science and Technology, Switzerland)
7. [Heavy Metal Flows in Mouth Areas of the Volga, Don and Kuban River](#)  
Anna Tkachenko; Oleg Tkachenko; Mikhael Lychagin; Nikolay Kasimov (Lomonosov Moscow State University, Russia)
8. [How Extent Does Rainfall Intensity Affect the Enrichment of Nitrogen and Phosphorus in the Dry and Paddy Fields?](#)  
Xiaolin Liu; Changsen Zhao; Shengtian Yang (Beijing Normal University, China)
9. [Impact of Water Quality on Human Health in Arid and Semi-Arid Regions of Rajasthan \(India\)](#)  
Alpana Kateja (University of Rajasthan, India)
10. [Impacts of Rural Clusters and Urban Slum areas on the River Haora, Tripura](#)

Shreya Bandyopadhyay (Department Of Geography, Adamas University, Barasat Barrackpore Road, Kolkata 700126, India); Sunil Kumar De (Department Of Geography, North Eastern Hill University, Shillong 793022, India)

11. [Investigating Human Health Implications of Surface and Ground Water Consumption in the Sokoto-Rima Floodplain, Sokoto, North-west Nigeria](#)  
Sheikh Abubakar (Ibrahim Badamasi Babangida, University, Lapai, Nigeria); Bala Gaddafi (Usmanu Danfodiyo University, Nigeria)
12. [Retrieval of Chlorophyll-a Concentration of the Nine Plateau Lakes in Yunnan Province Based on MODIS Data](#)  
Dan Chong; Haojie Li; Shuo Fan; Jiaojiao Li (Northwest University, China); Jie Wang (Institute of Water Resources and Hydropower Research of Yunnan Province, China),
13. [Sanitization of Aqua-environment Contaminated with Arsenic by Bio- fabricated Nanoparticles](#)  
Tapan Kumar Das; Triparna Mukherjee (University of Kalyani, India)
14. [Source Vulnerability Mapping in Karst Aquifers by COP and Paprika Methods in Aleshtar Basin \(West of Iran\)](#)  
Saffari Amir (Associate Professor, Department of Geographical Sci, Kharazmi University, Iran); Ramin Hatamifard (Ph.D. Student in Geomorphology, Kharazmi University, Iran)
15. [Spatio-Temporal Pattern of Microbiological Drinking Water Contamination in Germany: The Roles of Climate and Sociodemographic Change](#)  
Daniel Karthe (Helmholtz Centre for Environmental Research, Germany)
16. [The Role of Safe Water Management in Diverting the Risk of Adverse Pregnancy Outcome: A Study Focusing the Rural India](#)  
Kabir Pal; Nidhi Jain (International Institute for Population Sciences, India)
17. [The Study of Monitoring Total Suspended Substance in Donghu Lake in Wuhan Based on HJ-1A/1B Remote Sensing CCD Data](#)  
Lv Jianjun; Zhiwen Dong (China University of Geosciences, China)
18. [The Value of Forest Recovery for Water Quality and Health](#)  
Javier Arce Nazario (UPR Cayey, United States)
19. [Water Related Health Issues Study In Upper Catchment of Maha Oya River Basin- Sri Lanka](#)  
Ranjana Piyadasa; D.S. Matharaarachchi (Colombo University of Sri Lanka, Sri Lanka)
20. [Water Resource Management in Chhattisgarh State of India: Strategies for Sustainable Development](#)

Preeti Soni (Govt. G.N.A. P.G.College, Bhatapara, Chhattisgarh, India, India)

## Poster

1. [A Methodology Study of Water Sensitive Urban Design Based on the Polder Buffering System](#)  
Zhu Jiawei (China, Southeast University); Zhu Yingying (China, Tongji University)
2. [Case Study on Water Contamination in Some Bigger Depression of South Gobi Region of Mongolia](#)  
Erdenechimeg Badamgarav (Mongolia, Institute of Geography and Geoecology, MAS)
3. [Evaluation of Rural Water Resources System Vulnerability in Hengyang Basin based on the GIS&RS](#)  
Zou Jun; Yang Qin (China, Hengyang Normal University)
4. [Groundwater Quality Influenced by Spatial Planning in a Rural Area](#)  
Elfrida M. Carstea (Romania, National Institute of Research and Development for Optoelectronics INOE 2000); Cristian I. Ioja (Romania, University of Bucharest, Centre for Environmental Research and Impact Studies); Dan Savastru (Romania, National Institute of Research and Development for Optoelectronics INOE 2000)
5. [Heavy Metals in Aquatic Systems of the Don River Delta](#)  
Oleg Tkachenko; Anna Tkachenko; Mikhael Lychagin (Russian Fed, Lomonosov Moscow State University)
6. [Optical Absorption Properties of Chromophoric Dissolved Organic Matter in Poyang Lake in Dry Season](#)  
Liu Lizhen (China, Jiangxi Academy of Sciences); Qi Huang (China, Jiangxi Normal University)
7. [Pollutant Dispersion Analysis of Lake Water Based on Hyperspectral Remote Sensing](#)  
Jianjun Lv; Zongji Shen (China, China University of Geosciences)
8. [Spatiotemporal Variability in Water Quality of the Poyang Lake and its Relation to Hydrological Conditions](#)  
Bing Li; Guishan Yang; Rongrong Wan (China, Nanjing Institute of Geography and Limnology)
9. [The Bio-degradation of COD in Unconventional Water Resources: A Case Study From Beiyun River in Beijing](#)  
Yi Du; Weixuan Hu (China, College of Resources, Environment & Tourism, Capital Normal University)
10. [The Regional and Structural Equilibrium Analysis of Grey Water Footprint in China Based on Gini Coefficient](#)  
Caizhi Sun (China, Center for studies of marine economy and sustainable development of Liaoning



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Normal University); Tianjiao Bai (China, the College of Urban and Environmental Science of Liaoning Normal University)

## A Landsat 8 OLI-based, robust model for estimating the diffuse attenuation coefficient in dynamic, turbid Dongting Lake

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### Abstract

The diffuse attenuation coefficient,  $K_d(\lambda)$ , is an important optical property that can be linked to light penetration and availability in aquatic systems, and  $K_d(490)$  usually considered as a proxy for water quality. Detection of  $K_d(\lambda)$  by means of remote sensing can provide significant assistance in understanding water environment conditions and many biogeochemical processes. Even when existing algorithms exhibit good performance in clear Open Ocean and turbid coastal waters, accurate estimation of highly turbid inland water bodies can still be a challenge due to their bio-optical complexity. We addressed this challenge by using the new Landsat 8 Operational Land Imager (OLI) images. As extremely turbid inland waters over Dongting Lake in China, a robust empirical algorithm to determine the diffuse attenuation coefficient of downwelling at a wavelength of 490 nm ( $K_d(490)$ ) from spectral remote sensing reflectance has been derived from the Landsat 8 OLI images. The  $K_d(490)$  estimation model was proposed using band ratio model of OLI5 and OLI2 from Landsat 8 OLI images, which was strongly correlated with in-situ  $K_d(490)$  ( $R^2 = 0.791$ ,  $MAPE = 26.85\%$ , and  $RMSE = 0.791\text{m}^{-1}$ ). Based on the acceptable performance of OLI image-based atmospheric correction and  $K_d(490)$  validation, the algorithm was subsequently applied to OLI images to estimate  $K_d(490)$  variation from April 2013 to April 2016. The distributions of  $K_d(490)$  for Dongting Lake exhibits a significant spatial and temporal heterogeneity. Generally, there was strong monthly variability in  $K_d(490)$  over the entire lake along with high variability of lake area, and the  $K_d(490)$  values shows the typical temporal characteristics. The spatial heterogeneity, significantly higher in Main channel and Eastern of East Dongting Lake. Our results show that for Dongting Lake, estimated  $K_d(490)$  data from the pre-existing models exhibited the poorer performance than the new retrieval model we proposed here, since the higher spatial resolution and signal-to-noise ratios (SNRs) for the Landsat 8 OLI, as well as the quantization. Our new algorithm proposed in this study has great potential of water quality and environmental conditions in the extremely turbid, shallow lake. It must be emphasized, however, that this algorithm may, at present, only be used for regional applications with  $K_d(490)$  in Dongting Lake, because our measurements with  $K_d(490)$  larger than this value in other regional waters with different bio-optical conditions and sediment types, the coefficients of the empirical optical model need to be calibrated. The study methodology could be easily extended to other similar lakes to assess temporal and spatial  $K_d(490)$  patterns, and the information provided here is critical for future long-term efforts to document and monitor the water parameters in Dongting Lake.

### Key words:

diffuse attenuation coefficient; Landsat 8 Operational Land Imager (OLI); Dongting Lake

## Case Study on Water Contamination in Some Bigger Depression of South Gobi Region of Mongolia

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### Abstract

The groundwater resources are relatively low in South Gobi region of Mongolia and the water quality are deteriorated in last decades and the mineralization and hardness of groundwater is over the drinking water standards. Droughts are being significantly depending from the evaporation changes exceeds over the precipitation increases in last few years. The potential groundwater resources low there due to ground water resources to some extent but the groundwater recharge is very low.

In this poster presented the result of case study of determination ground water contamination by using chemical and heavy metal analysis and isotope method in framework of fundamental research study of "Evaluation of groundwater resources in some bigger depression of Gobi region" in 2013-2015.

We have concluded that evaporation processes appears much in the dug well water in area of depression of South Gobi region Mongolia by the result of isotope analysis in this research study.

The results of chemical analysis have been shown that in the 9 production well water was bicarbonate class, and sodium group water dominated on those wells. In the 4 well water was chloride class and sodium group water and in 3 well water are bicarbonate and chloride class and sodium group and 1 well water was bicarbonate and chloride class and magnesium group water. Highest mineralization 906.4 mg/l appears on the Old Haya Brigad well (GW-13) water and most of fresh water appears in the Tsavchir well and the mineralization is 417.1 mg/l (2013).

The heavy metal contents of groundwater in South Gobi region of Mongolia are very much over the drinking water standard, for example Pb content was 34 times more, As content was 21 times more, Ni content was 8 times more and Co content was 8 times more than the drinking water standard near the bigger mining industrial area.

### Key words:

groundwater quality; heavy metal contamination; isotope method; ArcGIS

## **A Spatial Study of Access to Safe Water and Sanitation Condition and its Implication on Health in the Dhalai District of Tripura; India**

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### **Abstract**

Access to good quality water and improved sanitation plays vital role for developmental activities and is one of the basic right to healthy life. The global importance of water; sanitation and hygiene for development; poverty reduction and health is reflected in the United Nations Millennium Development Goals; in the reports of the United Nations Commission on Sustainable Development. Unsafe water; poor sanitation and deficient hygiene affect the life of an estimated 1.7 million people annually; particularly as a result of diarrhoeal diseases (WHO; 2002; Ashbolt; 2004). It is estimated that 58% or 842 000 deaths per year; is attributable to unsafe water supply; sanitation and hygiene and includes 361 000 deaths of children under age five; mostly in developing countries (WHO 2014). The present study area; Dhalai district is one of the most economically and socially backward district of Tripura located between two hill ranges of Atharamura and Sakhan range. More than 70 per cent of its area is covered by hill and forest. The Dhalai district is highly prone to diseases like Malaria; Diarrhea and Japanese Encephalitis. In summer 2014; there was a large outbreak of Malaria across the district. The region also suffers from water scarcity during the dry season and problems of water quality. Iron content is found in excessive amount in the ground water of Dhalai district. It has also been found that the district has high incidence of open defecation particularly in the interior hilly and forested areas; therefore diarrhoea is a common problem due to mixing of human excreta into drinking water sources in many of the villages. The present study therefore makes an attempt to spatially examine the status of access to safe water and sanitation condition. The study will also explore the relationship between safe drinking water and sanitation condition upon health of the population of Dhalai district. The present study is based on primary data collected from the households of selected villages along with secondary data on ground water quality. Map Info software has been applied for mapping and correlation statistics to understand the relationship studies.

### **Key words:**

Spatial mapping; Safe water; Improved Sanitation; Health

## Characteristics and Sources Analysis of Riverine Chromophoric Dissolved Organic Matter Inliaohe River; China

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### Abstract

Chromophoric dissolved organic matter (CDOM) in riverine systems can be affected by environmental conditions and land-use; and thus could provide important information regarding human activities in surrounding landscapes. The optical properties of water samples collected at 42 locations across the Liaohe River (LHR; China) watershed were examined using UV-VIS and fluorescence spectroscopy to determine CDOM characteristics; composition and sources. Trophic state index ( $TSI_M$ ) indicated that all the sites investigated were mesotrophic; and 64 % of them were eutrophic. High spectral slope values and low SUVA<sub>254</sub> (the specific UV absorption) values indicated that CDOM in the LHR was primarily comprised of low molecular weight organic substances. Although the spatial variation of TSI and fluorescence intensity did not follow a similar pattern; analysis of excitation-emission matrices (EEMs) contour plots showed that CDOM in water samples collected from upstream locations exhibited fulvic-acid-like characteristics whereas protein-like substances were most likely predominant in samples collected in estuarine areas and downstream from large cities. These patterns were interpreted as indicative of water pollution from urban and industrial activities in several downstream sections of the LHR watershed.

### Key words:

CDOM; DOC; fluorescence intensity; spectral slope; water pollution

## Continental-Scale Controls on Pathogen Concentrations across the Ganges

### Watershed

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#### Abstract

The Ganges is one of the most important rivers in Asia with a population of 475 million inhabitants residing in its basin. This basin is characterised by source areas in the high Himalayas which have a low population density and lowlands areas where agricultural and industrial activity deliver heavy pollution loads to surface waters. Furthermore; regional sewage treatment infrastructure is poorly developed leading to further pollution from human sources. Assessing the exact levels of pollution across the entire basin has always been challenging and; despite the general awareness of poor water quality at certain key locations; there is little knowledge of the continental-scale patterns and possible predictors of water quality degradation in Northern India. Here we present an analysis of a large database of water quality data recorded from 96 stations across the Gangetic system. By using a novel approach and using flow accumulation algorithms to calculate upstream population densities; we show that total upstream population is a strong predictor of local water quality which performs much better than local population. This predictive relationship of water quality has allowed us to produce the first detailed map of expected water quality for the entire Ganges basin. We find that *ca* 85% of the inhabitants in the basin; 403 million people; can expect to have their local surface waters failing both safe drinking and safe bathing standards. Our findings have important policy implications in the light of recent efforts by the Modi administration to restore the national river of India.

#### Key words:

India; Ganges; Water Quality; Surface Water; Continental-Scale

## Effects of Habitat Loss and Fragmentation on Surface Water Quality: A Case of the Shenzhen River Cross-border Watershed

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### Abstract

This study attempts to examine the correlation of habitat loss and fragmentation with surface water quality variation in the Shenzhen River cross-border watershed. A compound and normalization indicator NP/MPS was proposed; which can disentangle the fragmentation effect from pure habitat loss; can be compared among different spatial scales; and be easily understood and applied by decision makers. Five variables were selected to present the water quality; namely SS; BOD; DO; AN and TP. ANOVA test was adopted to examine if water quality changed with time and space; and the stepwise multiple regression model was used to examine if habitat loss and fragmentation are correlated with or have effects on water quality variation. Hypotheses proposed in the introduction part have been successfully tested: (1) habitat loss and fragmentation were tightly correlated with water quality variation; (2) the correlations were varying among different water quality variables and exploratory variables; as well as across different spatial scales; (3) habitat loss; compared with fragmentation; generally plays a more important role in affecting water quality; and (4) relationships between water quality and habitat fragmentation showed great discrepancies between the Hong Kong side and Shenzhen side. Our adopted method was proved to be effective in providing a sound foundation for future watershed management and landscape planning.

### Key words:

Habitat loss and fragmentation; Surface water quality; Different spatial scales; Indicator NP/MPS

## Globalization of Water Resources through Virtual Water Trade

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### Abstract

Amid the increasing water scarcity in many parts of the world; virtual water trade as both a policy instrument and practical means to balance the local; national and global water budget has received much attention in recent years. As the largest water user; accounting for over 80% of the global total water withdrawal; food production is directly affected by water scarcity. In many water scarce countries; an increasing amount of food is being imported to meet the domestic food demand. For these countries; importing food is virtually equivalent to importing water that would otherwise be needed for producing the food locally. Building upon the knowledge of virtual water accounting in the literature; this study assesses the efficiency of water use embodied in the international food trade from the perspectives of exporting and importing countries and at the global and country levels. The role of virtual water trade in redistributing global water resources and compensating for water scarcity is assessed. The investigation reveals that the virtual water flows primarily from countries of high crop water productivity to countries of low crop water productivity; generating a global saving in water use. Meanwhile; the total virtual water trade is dominated by green virtual water. The study ; however; raises awareness of the limited effect of water scarcity on the global virtual water trade and the negative implications of the global water saving for the water use efficiency and food security in importing countries and the environment in exporting countries. The analysis shows the complexity in evaluating the efficiency gains in the international virtual water trade. The findings of the study; nevertheless; call for a greater emphasis on rainfed agriculture to improve the global food security and environmental sustainability.

### Key words:

virtual water trade; water saving; green water; blue water

## Heavy Metal Flows in Mouth Areas of the Volga; Don and Kuban River

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### Abstract

River mouth areas occupy the lowermost parts of river basins; and thus reflect anthropogenic impacts on the river catchments. Evaluation of pollutant flows in the mouth areas is an important approach for the environmental assessment of river basins. However; this is one of the least studied topics of aquatic geochemistry. In this paper; we present the attempt to quantify heavy metal flows in aquatic systems of Volga; Don and Kuban River deltas for the low water period; and to analyse the spatiotemporal changes of heavy metal content and environmental variables.

We found that the most important natural factors of the metal fluxes formation are the hydrodynamic activity of the water streams and the presence of geochemical barriers on the flow path. Aquatic systems are subjected also to the impact of large settlements located in river mouths (Astrakhan; Rostov-on-Don; Azov; Temryuk). The results showed that heavy metal runoff in the Volga River delta considerably exceeds the runoff in the Don and Kuban River deltas. Don River mouth area distinguished by higher total metal runoff while Kuban delta showed larger flows of suspended forms of majority of metals (Cu; Ni; Cr; Co; Cd; Pb). For all the studied river deltas; the share of suspended forms of heavy metals was found significantly lower in comparison with the world averages. This is mainly due to the relatively low content of suspended matter in the deltaic water streams.

### Key words:

Aquatic systems; environmental geochemistry; heavy metals; river deltas; mouth areas; geochemical flows; water pollution; Volga; Don; Kuban.

## How Extent Does Rainfall Intensity Affect the Enrichment of Nitrogen and Phosphorus in the Dry and Paddy Fields?

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### Abstract

There are few studies specially focusing on the rainfall intensity as a key factor in the enrichment of nitrogen and phosphorus in the high-latitude agricultural field. Different crops have different response to the rainfall intensity. In order to research on migration and transformation of nitrogen and phosphorus in the fields with different crops; we took samples before and after the rain in two typical fields (maize and paddy) in the northeast China. Then the content of nitrogen and phosphorus in the water were tested in the laboratory. Total; nitrate; ammonium nitrogen; total phosphorus and soluble phosphorus in the interval of 5 days; 10 days; half a month and a month after the rainfall were also sampled and tested. Results show: (1) Nitrogen and phosphorus have different response curve to the same rainfall intensity. (2) The content of nitrogen and phosphorus will have a peak in 2 or 3 days after the rainfall; while the timing of peak changes along with the rainfall intensity positively. (3) In the maize and paddy fields the contents have entirely different value after a rainfall with that of the former greater than the latter. These results can provide firm basis for research on the source and process of agricultural non-point source pollution.

### Key words:

Rainfall intensity; Nitrogen and Phosphorus; enrichment; response

## Impact of Water Quality on Human Health in Arid and Semi-Arid Regions of Rajasthan (India)

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### Abstract

Water quality is key to human and ecosystem health. In a water deficit state of Rajasthan which consists of mainly arid and semi-arid regions; the quality of water is under continuous threat due to increasing population and climate variability. Demand supply imbalance has led to precarious condition of water resources. Human settlements; disposal of sewerage and industrial effluent are the main factors for degradation of water resource. Excess use of canal irrigation has culminated in water logging and salinity. Overexploitation of ground water has resulted in extraordinary levels of fluoride and arsenic problem. Deteriorating water quality has serious consequences for human health. The paper presents an account of water quality issues in Rajasthan and its impact on human health. It suggests a multi-sectoral approach to freshwater and waste water management to succeed in the face of threats to human health and environmental degradation.

### Key words:

Arid; Semi- arid; Water resources; Human health; Climate Variability

## Impacts of Rural Clusters and Urban Slum areas on the River Haora; Tripura

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### Abstract

Rapid exploration of population within the Haora River Basin is forcing the poor class people to settle down along the river without proper housing; sanitation and drinking water facilities. From the source up to the mouth of the Haora River; all the rural clusters as well as urban slum areas use *kachha sanitary system* (latrines; empty all their fecal matter directly into the river). These *kachha latrines* are the major sources of the solid waste within the Haora River. This paper is mainly concentrating in quantifying the impact of solid waste disposal coming from those *kachha latrines* as well as from other anthropogenic sources; such as garbage disposal and other major outlets. The impacts of deteriorating water quality of the Haora River is also analysed through household survey on the use of water by the slum and rural areas along the river and also by testing different parameters of the river water in the laboratory. A perception survey has also been carried out about the frequency of different water borne diseases.

Form the analysis it is found that particularly along the lower stretch of the Haora River the amount of solid waste disposal is more than 3000 heads/sq. km/day. This much amount of solid waste is a severe threat to the river that leads several water borne diseases. A distribution map of the acuteness of the diseases has been prepared from which it is found that about 28% stretch of the river is having acute risk of epidemic and other hazards.

### Key words:

Slum; Kachha sanitary system; solid waste disposal; acuteness of disease

## Investigating Human Health Implications of Surface and Ground Water

### Consumption in the Sokoto-Rima Floodplain; Sokoto; North-west Nigeria

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#### Abstract

This research was carried out to study the surface and ground water quality in the Sokoto-Rima floodplain and eventually determine the health implications of consuming it. Five samples points was selected systematically and in each sample point; three samples were taken each of ground (tube well); and surface (river) water. The surface water is taken from the river at hundred meters interval; the sampling was repeated after 20days. A total of 30 samples (1<sup>st</sup> batch-15 and 2<sup>nd</sup> batch-15) were collected. Data obtained from laboratory test were subjected to mean and standard Deviation; Pearson correlation; and paired test analysis was used to compare the means of surface and ground water pollutants. The results from the analysis show that: positive correlation exist in pH; BOD; TDS; TSS; NO<sub>3</sub><sup>-</sup>; SO<sub>4</sub><sup>2-</sup>. While; negative correlation in DO; Cl<sup>-</sup>; PO<sub>4</sub><sup>3-</sup> and K<sup>+</sup>. Paired test between surface and ground water pollution shows that: the mean difference of pH; BOD; PO<sub>4</sub><sup>3-</sup> and K<sup>+</sup> are significant at p<0.01 (2-tailed) and Cl<sup>-</sup> is significant at p< 0.05 (2-tailed). DO; TSS; Cl<sup>-</sup>; PO<sub>4</sub><sup>3-</sup>; NO<sub>3</sub><sup>-</sup>; and SO<sub>4</sub><sup>2-</sup> are within the WHO standards. While; BOD; TDS and SO<sub>4</sub><sup>2-</sup> (in NIS); are above the standard. These results were correlated with the WHO standard of water quality and finally tested for positive relationship with common ailments and/or sicknesses. The study therefore; concludes that; the quality of the surface and ground water in the area is a determinant of the soil characteristics and has a positive relationship with the health characteristics of the surrounding communities.

#### Key words:

Surface and ground water; physicochemical characteristics; water quality; permissible limit; pollution

## Retrieval of Chlorophyll-a Concentration of the Nine Plateau Lakes in Yunnan

### Province Based on MODIS Data

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#### Abstract

Chlorophyll-a concentration is an important parameter to reflect the degree of eutrophication in water. The dynamic observation of the chlorophyll-a concentration based on the remote sensing data in Lakes has attracted more and more attention. Based on the measured data and MODIS data; this study retrieves the chlorophyll-a concentration of nine plateau lakes in Yunnan Province. Firstly; the optimum statistical model of each lake is established by the combination of the radiation of the different bands of MODIS data based on the measured data of chlorophyll-a concentration in 2010-2012. Secondly; the retrieval model of the nine lakes is verified by the measured data of the chlorophyll-a concentration from 2013 to 2014 with the Root Mean of Standard Deviation (RMSE); the Standard Deviation; and the Nash efficiency coefficient (NSE). Finally; the spatial-temporal distribution(space distribution and dynamic change) of chlorophyll-a is retrieved by the optimal model. The results show that the chlorophyll-a concentration of space distribution is more in line with the professional judgment; and provides an important reference for further optimization of the measured sites. From the view of interannual variability; the chlorophyll-a concentration of Dianchi Lake; Erhai Lake; Xingyun Lake and Yilong Lake fluctuates greater in 2010-2014; which of Fuxian Lake; Chenghai Lake; Qilu Lake and Lugu Lake remains relatively stable; and which of Yangzonghai shows a decreasing trend.

#### Key words:

chlorophyll-a concentration; MODIS; remote sensing retrieval; dynamic change; monitoring

## Sanitization of Aqua-environment Contaminated with Arsenic by Bio- fabricated Nanoparticles

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### Abstract

The present study involves the development of adsorbent containing silver nanoparticles for arsenate removal using silver reducing property of a novel fungal strain *Aspergillusfoetidus* MTCC8876. Biological reduction of silver by the isolate has been deduced at various time intervals. The fungal biomass after biological silver reduction were harvested and subjected to carbonization and its properties were analyzed using Fourier Transform Infra-Red spectroscopy; X-ray diffraction; scanning electron microscope attached with energy dispersive spectroscopy; BET surface area analysis; field emission scanning electron microscope and transmission electron microscope. The average size of the silver nanoparticles present on the surface of the carbonized silver containing fungal cell (CSF) was 35 nm. The carbonized control fungal cells (CCF) did not contain any particles on its surface. As (V) adsorption efficiency of CCF and CSF was deduced in batch mode by varying parameters like contact time; initial concentration; and pH. Desorption studies were also carried out by varying the pH. The CSF was proved to be exceptionally efficient in arsenate removal when compared to CCF.

### Key words:

Arsenic contamination; Sanitization of environment; Biofabricates Nanoparticles

## Source Vulnerability Mapping in Karst Aquifers by COP and PaPRIK<sub>a</sub> Methods in Aleshtar Basin (West of Iran)

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### Abstract

Karstic aquifers are well known for their vulnerability to groundwater contamination. This is due to characteristics such as thin soils and point recharge in dolines; shafts; and swallow holes. In karstic areas; groundwater is often the only freshwater source. In case of groundwater resources; vulnerability maps of the aquifers are an important tool for the groundwater management and protection. The purpose of this paper is vulnerability mapping of karstic aquifers in Aleshtar basin (West Iran) to contamination by using COP and PaPRIK<sub>a</sub> methods and management for preserve of these water resources. The Aleshtar basin; where a large and deep carbonate aquifer; affected by karstic and fracturing phenomena; is located. PaPRIK<sub>a</sub>; Protection of karst Aquifers which is based on four criteria: **P**rotection; **R**eservoir; **I**nfiltration and **K**arstification degree and **C**OP; **C**oncentration of flow; **O**verlying layers; and **P**recipitation regime; are also suggested for karstic aquifer vulnerability analysis. Results of the PaPRIK<sub>a</sub> approach categorize karst plains into three zones with; high; moderate and low sensitivity. In other words; these classes are covers 11; 65 and 23.4 percent of the study area respectively.

In addition of the COP approach that show in study area COP coefficient between 0.5-12 is varies. Due to high rainfall and low slope; C Parameter (Concentration of flow) most significant role of recharge and karst aquifer vulnerability in the study area. Finally; the result shows that the karst aquifer Aleshtar is a conduit flow system. So fissured carbonate aquifers (diffuse flow systems) are less vulnerable than karst aquifers (conduit flow systems).

### Key words:

Vulnerability mapping; karst aquifers; COP method; PaPRIK<sub>a</sub> method; Iran.

## Spatio-Temporal Pattern of Microbiological Drinking Water Contamination in Germany: The Roles of Climate and Sociodemographic Change

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### Abstract

In Germany; drinking water is considered to be safe straight from the tap; and there is a long tradition of both chemical and microbiological surveillance. Contaminations do occur; however; and a deterioration of microbiological water quality is the most common case. This is partly due to the complexity of drinking water supply systems; and the relatively old age of most water supply infrastructures in Germany.

In the recent past; two independent developments have received increasing attention with regard to drinking water safety in Germany: climate change; and sociodemographic changes. Recent studies have shown that areas with a shrinking population are over proportionately affected by problems with drinking water hygiene; as are peripheral rural regions. Hypothetical explanations for this pattern are infrastructural overcapacities; increased water transit times and a lack of revenue (and thus investment capabilities) by water suppliers. Climate change; on the other hand; is relevant for drinking water supply in two ways: it (a) leads to an increase in average temperatures which is beneficial for some pathogenic microorganisms; and it (b) is associated with an increasing trend towards hydro-meteorological extremes (heavy precipitation events and droughts); which were identified as the underlying causes of major contamination events in industrialized countries in the recent past.

In the future; ongoing climate and socio-demographic changes are expected to create greater challenges for drinking water hygiene than today. Therefore; adaptations are needed in order to maintain a high level of drinking water safety.

### Key words:

Drinking water; hygiene; demographic change; climate change

## The Role of Safe Water Management in Diverting the Risk of Adverse Pregnancy

### Outcome: A Study Focusing the Rural India

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#### Abstract

Scarcity of clean water coupled with poor sanitation and hygiene contribute to a considerable proportion of global burden of disease. Although there is a paucity of rigorous research showing the degrading effect of limited accessibility to clean water on maternal health and pregnancy outcomes; emerging evidence indicates a link between these. This study using the latest round of India Human Development Survey conducted in 2011-12 aims to assess the association of limited access to safe water resources and drinking water management practices with pregnancy outcomes in rural India. Multinomial logit regressions were used to estimate the unadjusted and adjusted odds ratio with 95% of confidence interval. Result shows that less than half of the women in rural areas of India have improved source of water in their compound. Main sources of improved water used were piped water; hand pump and tube well. Almost 75% women store the drinking water in vessel covered with lid; yet pouring practices involve hand contact with water. Almost 80% women do not purify the water before drinking. The adverse pregnancy outcomes like still births and spontaneous abortions were significantly associated with both unimproved water source and water management practices. This study contributes to the scarce literature providing the association between access to safe water and maternal health. Programs working towards improving maternal health must also include the provision of improved water; sanitation and hygiene as their core strategies besides increasing knowledge of family planning methods; improving access to quality maternal health care.

#### Key words:

Water crisis; pregnancy outcome; drinking water; water management

## The Study of Monitoring Total Suspended Substance in Donghu Lake in Wuhan Based on HJ-1A/1B Remote Sensing CCD Data

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### Abstract

To implement a large area of water quality monitoring; remote sensing offers the possibility. This paper takes Donghu Lake in Wuhan as the research area. Pearson correlation analysis was used to analyze the correlation between the band and band combination with the total suspended substance; and the best inversion band and band combination were determined; by using the HJ1A/1B CCD data. The RBF neural network was trained by the data of the measured spectrum and the total suspended substance concentration of water as the training sample; after this the RBF neural network model was formed. The atmospheric correction of satellite data could obtain more accurate remote sensing reflectance; and by means of field observation results of water in optically shallow waters to divide the lake; and do the bottom reflection correction after the atmospheric correction. Finally; the total suspended substance concentration of the lake was inverted by the accurate remote sensing reflectance.

### Key words:

Remote Sensing; HJ-1A/1B; Donghu Lake; RBF neural network model; optically shallow waters

## The Value of Forest Recovery for Water Quality and Health

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### Abstract

In the last 50 years Puerto Rico has been transformed from a highly deforested agricultural landscape to a landscape dominated by secondary forests in the mountains and urban development in the plains. These transformations have shaped the current water quality. We observe how the levels of nitrogen; phosphorous; faecal bacteria; turbidity and temperature increased in urbanized areas; while they were reduced in watersheds that became naturally reforested. We used the extensive historical database of water quality in Puerto Rico starting from the 1950s to the present; and historical land use maps of Puerto Rico; to demonstrate the correlations in transformations of water quality in Puerto Rico. In this presentation I will give particular attention to levels of nitrogen; faecal contamination and sediments in water; and how precipitation and watershed composition shaped these variables. Using data from the Puerto Rican health department and data on the expenditures of the government water authority I demonstrate how these transformations in watershed composition translate to safer water quality and to reductions in the cost of water treatment for forested watersheds.

### Key words:

safe drinking water; ecosystem services; watershed analysis; faecal contamination; land cover change

## Water Related Health Issues Study In Upper Catchment of Maha Oya River Basin- Sri Lanka

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### Abstract

Water resources exist in environments comprising complex dynamic geo-morphological and ecological systems that are extremely sensitive to misuse by man. The research study aimed to identify evaluate the water quality variation; water pollution by human activities and in upper catchment of the Maha Oya river basin located in Kegalle and Mahanuwara District in central Sri Lanka. Dug wells in the catchment of the Maha Oya were selected to identify ground water quality changes due to water pollution in the river. GIS package ArcMap10 was used to identify the water quality changes in river and as well as ground water pollution area. Water samples were assessed for selected parameters; temperature; pH; Electric Conductivity and chemical parameters during the period. A sociological survey was conducted concurrently to study the impact of two communities (tea factory line house and agricultural) living along the stream bank; on water quality. The lowest pH of near Th most upper catchment of the area is probably due to the large amount of household refuse that is discharged directly into the stream at this location. The study revealed the decomposition of organic matter produces CO<sub>2</sub>; which dissolves in water as carbonic acid; thereby lowering the pH values. The study further reveled that the major health problems in the lower part of the basin due to unplanned settlements; direct discharge of effluent from factories and urban waste to the river; and negative impacts of water tapping for mini hydropower projects.

### Key words:

Electric Conductivity; GIS; pH; sociological survey; temperature

## Water Resource Management in Chhattisgarh State of India: Strategies for Sustainable Development

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### Abstract

Water is one of the most valuable natural resources gifted by nature to mankind. Out of the 3 percent fresh water available globally; 77.2 percent is stored in glaciers; 22.4 percent is ground water and just 0.4 percent is distributed among lakes; swamps; rivers and streams. World water demand doubles every 21 years; but the volume available is the same as it was in Roman times. Something has to be done urgently. According to UN and Stockholm Environment institute; statistics (1995) by the year 2025; two third of the world population will be affected by water scarcity. In such a situation our most valuable water resources are deteriorating; polluting and depleting day by day. Hence; each and every drop of rain water has to be conserved through various methods. In order to manage and conserve our precious water resources applying various scientific approaches; traditional method; technology and effective and relevant water policies of state government we may achieve the sustainable development of water resources in the state. In Chhattisgarh state about 80 percent population is rural and mainly dependent on agriculture. The biggest effect of PWC influence on state policy has been the three principles – location Specificity; decentralization and multipurpose water resources development. Instead it is replaced by state sponsored groundwater exploitation; which is underutilized is also most fragile in Chhattisgarh hydrological setting. A sustainable strategy for management of water resources is must to make aware masses for conservation of water and make the best use of our water by water saving programs; by capturing rain water from roof top. An attempt has been made in the present research paper to suggest the relevant strategies for the management of water resources. The aim of the research paper is to highlight various programs & policies of state government to manage and conserve the water resources of the state.

### Key words:

Natural Resource; Depleting; water Storage; Sustainable; Ground Water exploitation

## A Methodology Study of Watersensitiveurban Design Based on the Polder Buffering System

### —A Case Study about the Urban Design of Mengjin River Basin in Changzhou

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#### Abstract

Nowadays, ecological patches in the area with lakes and rivers are gradually destroyed with the development progress of urban construction land-use. As a result, some environmental problems such as flood disaster and water pollution occur. Under the circumstances, domestic researchers use a WSUD method recognized by International Water Association to solve these problems. WSUD method is a new urban planning approach respecting urban water circulation and ecological progress. The article analyzes the water security grid and ecological network from a macroscopic angle by using GIS spatial analysis and confirms the ecological base line of Mengjin River basin. Based on these analysis, land-use and landscape design in the polder area can adjust to the environmental situation. By learning and researching the characteristics and key point of WSUD, the article aims to help the areas with lakes and rivers solve water ecology and security issues on urban planning level.

#### Key words:

water security grid; ecological network

## Evaluation of Rural Water Resources System Vulnerability in Hengyang Basin Based on the GIS&RS

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### Abstract

In order to study the dynamic evolution of the vulnerability of rural water resources system in Hengyang Basin, collecting required data of the research through RS, constructing the spatial model, and conducting the spatial analysis with GIS, this essay has constructed the mathematical model to extract the changing information and generated the changing layers about vulnerability of water resource system in Hengyang Basin to analyze the spatial-temporal characteristics of vulnerability of water resources system and the changing trend during recent two decades. The conclusions as below: 1) the water resource system in Hengyang Basin has become much more vulnerable in recent two decades. 2) Vulnerability of rural water resources system in Hengyang Basin shows "low around and high in the middle, north strong and south weak" of the distribution pattern. 3) in the study period, the overall vulnerability has increased, spatial differentiation significantly. 4) The spatial differentiation of Vulnerability index changes can be divided into four types. 5) Trends from the vulnerability changes, the vulnerability of rural water resources system with no change for the main types, two types of monotonic change very little. 6) The variation period of vulnerability index has presented a typical character of sharply increasing, especially in the ending period of 2005-2010.

### Key words:

water resource vulnerability; Dynamic evolution; Hengyang Basin; GIS; RS

## Spatiotemporal Variability in Water Quality of the Poyang Lake and Its Relation to Hydrological Conditions

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### Abstract

A study of the spatiotemporal water quality patterns and the factors that impact these patterns is crucial for lake water quality maintenance and managements. For this purpose, a combination of nutrient and geochemistry concentrations from 15 sampling sites during 2009-2014, as well as hydrological data was used for visualization, principal component analysis and density analysis. The nutrient indicators examined included total nitrogen (TN), total phosphorus (TP), ammonia nitrogen (NH<sub>3</sub>N) and chlorophyll-a (Chl<sub>a</sub>). Results showed that the water quality did not demonstrate significant spatial variations except for stations near the outlets of tributaries, however the water quality of sites in the northern waterway connecting the Poyang Lake and the Yangtze River is influenced by different environmental parameters compared to sites in central lake, especially for Chl<sub>a</sub> concentration. While significant temporal variations, especially seasonal variations were found. Furthermore, the nutrient indicators experienced substantial changes between river phase and Lake Phase, the latter of which showed great possibility of excellent water quality. Future research is required in order to ascertain the specific impact of discharge from tributaries to give a reliable advice for improvement and maintenance in the Poyang Lake.

### Key words:

nutrient indicators; water quality; hydrological conditions; Poyang Lake

## Groundwater Quality Influenced by Spatial Planning in a Rural Area

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### Abstract

The paper examines the impact of surrounding areas on groundwater sources (wells) situated in a rural village. Groundwater from private water wells is the major source of drinking water in rural and peri-urban areas. The current problems facing groundwater quality derive from spatial arrangement flaws that facilitate nitrate contamination. These originate from fertilizer application to agricultural lands and from biochemical reactions of untreated human and animal wastes. Water samples collected from wells in a rural area in Romania were analyzed using fluorescence spectroscopy and the cadmium reduction method for nitrates. Maps with the distribution of fluorescent organic matter and nitrates in the groundwater were created to understand the role of local planning in the quality of groundwater. Fluorescence data evidenced high quantities of microbial organic matter in the water sampled from wells located near sheepfolds and poor management of domestic/animal wastes. Nitrates concentration exceeded the maximum admitted limit in some wells due to soil infiltration from agricultural practices and animal wastes. The study has shown that groundwater is negatively influenced by animal sheds, local cemetery and natural pools. The effect is amplified by the area's geomorphological features, such as: soil type, altitude levels, hydrological and hydrogeological flows. The employed methods offer a rapid and sensitive evaluation of water quality in order to avoid health hazards for the population. [This work was supported by a grant of the Romanian National Authority for Scientific Research, CNDI–UEFISCDI, project number PN-II-PT-PCCA-2011-3.2-0084]

### Key words:

groundwater; fluorescence; spatial distribution; dissolved organic matter

## Heavy Metals in Aquatic Systems of the Don River Delta

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### Abstract

River deltas can be considered as the biogeochemical filters on the way of the pollutants flows from the land into the sea. Don is the largest river of the Azov sea basin. Landscapes of Don River have been influenced by agricultural and industry for a long time. A significant amount of heavy metals and other pollutants comes into the river annually. This paper is focused on the spatiotemporal analysis of the heavy metals (Fe, Mn, Zn, Cu, Ni, Co, Cr, Pb, Cd) in the water and bottom sediments of the Don River Delta.

The results are based on the field studies carried out in 2010-2015. Aquatic systems of the Don River delta have been sampled, and content of heavy metals identified. The research covered different seasons and characterize geochemical features of the aquatic systems for the spring floods, summer, autumn and winter low water periods. As a result, the seasonal change of the heavy metal inflow to the delta apex was determined and spatial diversity of metal content identified. A significant increase of the heavy metal flows downstream the big settlements proves the considerable anthropogenic impact on the aquatic systems of Don River delta.

### Key words:

Heavy metals; water pollution; river deltas; aquatic systems; geochemical flows

## Optical Absorption Properties of Chromophoric Dissolved Organic Matter in Poyang Lake in Dry Season

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### Abstract

The optical absorption properties of chromophoric dissolvable organic matter (CDOM) of the waters in Poyang Lake including estuary, nearby waters in Nanjishan Wetlands, and main lake in dry season in 2015 was researched and its relationship with dissolved organic matter was discussed. The results showed that CDOM absorption coefficients in whole waters in Poyang Lake at 254, 280, 350, and 440 nm were in the range of 7.74–20.03 m<sup>-1</sup>, 5.54–14.37 m<sup>-1</sup>, 1.37–4.24 m<sup>-1</sup>, 0.29–0.94 m<sup>-1</sup>, respectively. M values which could reflect the molecule size ranged from 5.61 to 8.18. The order of CDOM concentrations was nearby waters in Nanjishan Wetlands > main waters > estuary, which indicated there was the large effect of wetlands on the waters in Poyang Lake. The M values (molecular size) in nearby waters in wetlands were significantly higher than other lake areas, suggesting that high proportion of humic-matters would lie in CDOM. Dissolved organic matter (DOC) ranged from 1.39 to 4.86 mg/L, with the mean value of 2.33 mg/L. The correlation between CDOM absorption and DOC concentrations at 254 nm was the best among the common wave lengths used, and the coefficient could reached up to 0.88. The liner regression equation between absorption coefficient at 254 nm and DOC concentration ( $CDOM_{a(254)} = -0.53 + 0.27 \times DOC$  ( $R^2 = 0.76$ ,  $p < 0.01$ )) showed that CDOM in Poyang Lake in dry season could be a promising tracer for the source of DOC.

### Key words:

Chromophoric dissolved organic matter; Absorption coefficient; Dissolved organic carbon; Poyang Lake

## Pollutant Dispersion Analysis of Lake Water Based on Hyperspectral Remote Sensing

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### Abstract

Water pollution monitoring for prediction of lake water quality trends and propose appropriate countermeasures is of great significance. In this paper, HJ-1A / 1B satellite hyperspectral imaging and inherent optical properties of the lake water, including characteristic absorption and scattering coefficients of the chlorophyll a, BOD, DO, TN, TP, etc. Analysis of Water reflectance measured or from the water radiation to estimate the concentration of the above water quality parameters, The spatial distribution and variation of water quality and the numerical simulation of pollutant dispersion are simulated based on the WASP water quality model of the convection diffusion equation and the water flow rate, the flow rate and the volume of the lake. The accuracy of simulation results areverified by the measured data of water quality parameters obtained from Honghu in 2010-2015, On the basis of this, analysis the spatial distribution and variation of water quality in Honghu and predicting the diffusion of pollutants.

### Key words:

Hyperspectral Remote Sensing; Water pollution monitoring; dispersion analysis; WASP

## The Bio-Degradation of COD in Unconventional Water Resources: A Case Study from Beiyun River in Beijing

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### Abstract

Taken the Beiyun River in Beijing river basin (from Shahe Reservoir to Yangwa Dam) as the study area, 19 sampling sites were selected to monitor the water quality of Beiyun River in October, 2013. The types of pollution and temporal and spatial characteristics of COD were recognized. Based on activated sludge model (ASMs), combined with aerobic respiration measurement and physical-chemical method, biodegradation of component in Beiyun River was analyzed by using BM-Advance breathing apparatus. The result shows that there was no obvious trend of COD, and the water quality of most sampling sites was beyond class V. Biodegradable COD (BCOD) was higher than un-biodegradable COD (UBCOD). The bio-degradation of COD was not good. Based on the water pollution characteristics, the sampling sites were classified into 3 categories with system clustering method. Category 1 was located in the upstream and downstream of Beiyun River. The main component was the soluble inert fraction ( $S_i$ ), Category 2 was near the dam and the main component was the slowly hydrolysable COD fraction ( $X_s$ ). Category 3 was located in the midstream, and the main component was the particulate inert fraction ( $X_i$ ). According to the PCA results, the first principal component of water quality involved TN、TP、 $NH_3$ -N. The second principal component included readily biodegradable COD fraction ( $S_s$ ) and the particulate inert fraction ( $X_i$ ). The third principal was heterotrophic bacteria ( $X_H$ ) and the forth was the soluble inert fraction ( $S_i$ ).

### Key words:

Beiyun River; COD fraction; biodegradability

## The Regional and Structural Equilibrium Analysis of Grey Water Footprint in China Based on Gini Coefficient

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### Abstract

Based on calculating grey water footprint in 31 provinces of China from 1997 to 2013, we select the population and GDP as indicators, and use the Gini coefficient to study the spatial and structural equilibrium of the grey water footprint of China during 1998-2013 in this paper. The results suggest that (1) In terms of regional equilibrium, the balance of economic grey water footprint is worse, at the same time, the proportionality of the eastern regions in the economic grey water footprint and western regions in the population grey water footprint is relatively low; (2) In structural equilibrium respect, the equilibrium of economic grey water footprint has reached the "big gap" range, and the proportionality of economic grey water footprint of both agriculture and industry is poor, in the meanwhile, the equilibrium of the economic grey water footprint of the life has declined significantly in recent years; (3) From the point of view of the marginal effect, we could improve the overall equilibrium by reducing the grey water footprint of the heavily polluted regions of the West and the agricultural grey water footprint of each province, and promote the improvement of the equity of China's water environment effectively. At last, aiming at the concrete problems of the balance of the grey water footprint in China, we put forward some suggestions to reduce the grey water footprint and improve the equity of the water environment in China.

### Key words:

grey water footprint; Gini coefficient; region and structure; equilibrium

## C12.40 Water Sustainability

### Water Availability Between Floods and Droughts



Home

#### Oral

1. [Analyzing and Simulating Response of Soil Moisture-Groundwater to Continuous Light Rainfall Events in a Lowland Paddy Field with Shallow Groundwater Table](#)  
Yang Hai; Wang Chuanhai; Chen Jingbo; Xiang Xiaohua (Hohai University, China)
2. [Assessment of Ground water level and quality for future use: A case study of Haryana, India](#)  
Mehtab Singh (M.D.University, Rohtak, Haryana, India, India)
3. [CFSv2-based Seasonal Meteorological Drought Prediction over the Low Latitude Highland](#)  
Yang Lang (Yunnan University, China)
4. [Changing Climate and Indigenous Community: An Odyssey of Leh's water Scarcity to Stress](#)  
Devinder Singh, (Associate Professor, Department of Geography, University of Jammu, Jammu 180006, Jammu & Kashmir, India, India)
5. [Comparison of IDW and Physically-Based IDEW Method in Hydrological Modelling for Large Mountainous Watershed, Northwest China](#)  
Lanhui Zhang, Chansheng He; Jinlin Li; Yong Wang; Zhongfu Wang (Key Laboratory of West China's Environmental System (Ministry of Education), College of Earth and Environmental Sciences, Lanzhou University, Lanzhou, 730000, China, China)
6. [Dangerous Ice Phenomena on the Lowland Rivers of European Russia](#)  
Natalia Frolova; Svetlana Agafonova; Alexey Sazonov; Dmitriy Magritsky; Maria Kireeva (Lomonosov Moscow State University, Russian Fed)
7. [Drought Evolution and Its Impact on Crop Yield in the North China Plain](#)  
Xianfeng Liu; Yaozhong Pan; Xiufang Zhu; Shuangshuang Li; Zhangli Sun (Beijing Normal University, China)
8. [Environmental Analysis of the South Cubatão River Catchment through the Use of GIS and Geographical Categories](#)  
Alex de SA motta Lima (UFSC, Brazil)
9. [Evaluation of Glacier Melt Contribution to Runoff in North Caucasus Alpine Catchments Using Isotopic Methods and Energy Balance Modeling](#)  
Ekaterina Rets (Water Problems Institute, Russian Academy of Sciences, Russian Fed), Nadezhda Loshakova (Lomonosov Moscow State University, Russia); Igor Tokarev (Centre for Geo Environmental

Research and Modelling (GEOMODEL) at St. Petersburg University)

10. [Future Changing Climate and Its Implications on Floods and Water Availability across China](#)  
Jianfeng Li (Hong Kong Baptist University, HongKong SAR, China); Yongqin David Chen (The Chinese University of Hong Kong, HongKong SAR, China); Lu Zhang (CSIRO); Qiang Zhang (Sun Yat-sen University, China); Francis H.S. Chiew (CSIRO)
11. [Hydro-ecological Researches on the Loess Plateau of China](#)  
Wenzhao Liu; Zhi Li (Northwest A&F University, China); Liping Cheng (Pingdingshan University, China); Jun Wang (Northwest University, China); Rui Wang (Henan Polytechnic University, China); Tingting Ning (State Key Laboratory of Soil Erosion and Dryland Farming on the Loess Plateau, Northwest A&F University, China); Mei Liu(Northwest A&F University, China)
12. [Hydrograph Separationmethod Issues for Different River- Station in Mongolia](#)  
Minjuurlunden Enkhtuya (Institute of Geography Geocology of MAS, Mongolia); Dambrajaa Oyunbaatar (Information and Research institute of Meterology, Hydrology and environment, Mongolia)
13. [Modeling Urban Floods in a Changing Climate: From Reconstructing the Past to Projecting Future Risks](#)  
Heejun Chang; Hue Doung; Lumas Helaire; Stephan Talke (Portland State University, United States)
14. [Pattern of Drinking water Availability and use in Assam, India: A Geoenvironmental Study](#)  
Nripendra Kalita (B.Borooah College, India)
15. [Spatial Perspective of Drinking Water in Rural Haryana: A Case Study of Village Panghal, District Hisar](#)  
Kuldeep Singh (Panjab University, Chandigarh, India, India)
16. [Spatial-temporal Variation of Soil Moisture Based on In-Situ Observations and Remote Sensing Application in the Qilian Mountain, China](#)  
Xiao Bai; Lanhui Zhang; Yibo Wang; Chansheng He; Guohua Liu (Lanzhou University, China)
17. [Using Isotope Method on Determination of Groundwater Age for Feasible Utilization of Water Resource in Arid Region of Mongolia](#)  
Erdenechimeg Badamgarav (Institute of Geography and Geocology, MAS, Mongolia)
18. [WALRUS-Paddy Model for Simulating Hydrological Processes of Lowland Polders with Paddy Fields and Pumping Stations](#)  
Renhua Yan (Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China)
19. [Watershed Hydrologic Research in Arid Regions: Advancement, Opportunities and Challenges](#)

Chansheng He; Lanzhui Zhang; Baoqing Zhang; Juan Gu (Lanzhou University, China)

## Poster

1. [Analysis Drought Pattern in the Upstream of the Heihe Watershed by Palmer Drought Severity Index](#)  
Lixiao Yang; Chansheng He (China, Lanzhou University)
2. [Characteristic of Soil Moisture under Different Artificial Forestland in the Loess Hilly Regions of the Loess Plateau, Northwestern Shanxi](#)  
Niu junjie (China, Research Center for Scientific Development in Fenhe River Valley, Taiyuan Normal University)
3. [Climatological Characteristics of the 2013-2014 Water Crisis in São Paulo Metropolis, Brazil](#)  
Graziele Muniz Miranda; Emmanuel Reynard; Marianne Milano (Switzerland, UNIL/Institute of Geography and Sustainability (IGD))
4. [Dangerous Hydrological and Morphological Processes in the River Mouths of Unstable Caspian Sea](#)  
Dmitry Magritsky; Vadim Mikhailov; Valentina Kravtsova (Russian Fed, Lomonosov Moscow State University)
5. [Detecting Spatial and Temporal Changes in Flood Cycles Within the two Largest Freshwater Lakes of China from Time-series Modis Imagery](#)  
Yanxia Hu (China, Hubei University); Jinliang Huang; Yun Du (China, Institute of Geodesy and Geophysics, Chinese Academy of Sciences)
6. [Diurnal Variations of Grassland Evapotranspiration over Different Periods in Pailugou Catchment at the Upper Reach of the Heihe River, Northwest China](#)  
Zhong fu Wang; Lan hui Zhang; Yi bo Wang (China, Center for Dryland Water Resources Research and Watershed Science, Key Laboratory of West China's Environmental System (Ministry of Education), College of Earth and Environmental Sciences, Lanzhou University)
7. [Observed Changes in the Frequency and Magnitude of Floods in the Eastern Part of Romania](#)  
Liliana Zaharia; Gabriela Ioana-Toroimac (Romania, University of Bucharest, Faculty of Geography); Romulus Costache (Romania, National Institute of Hydrology and Water Management)
8. [Poyang Lake Temporal and Spatial Characteristics of Water Area Change based on Remote Sensing and Hydrological Data](#)  
Dan Wang; Dian Wang; Shuhua Qi (China, School of Geography and Environment, Jiangxi Normal University, Nanchang)
9. [The Evaluation of the Risk of Absolute Maximum Runoff of the Small Mountainous Rivers in the](#)



# 33rd International Geographical Congress

21-25 August, Beijing, China

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## [Republic of Armenia](#)

Trahel Vardanian (Armenia, Yerevan State University)

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## **Analyzing and Simulating Response of Soil Moisture-Groundwater to Continuous Light Rainfall Events in a Lowland Paddy Field with Shallow Groundwater Table**

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### **Abstract**

After long-term cultivation, artificial deposition, irrigation and leaching, paddy soil profile generally shows clear and unique layered structure with poor permeability and a high content of clay, which makes the regime of infiltration complicated. Additionally, the shallow groundwater table (GWT) affects the soil water transformation as water infiltrates through the soil profile. In such circumstances, the unsaturated zone and saturated zone should be regarded as a continuum. In this paper, the response of soil moisture and groundwater to rainfall is studied simultaneous based on the field data in the past two years in a lowland paddy field in Taihu Lake basin. To weaken surface ponding effect, several continuous light rainfall events with different antecedent soil moistures while similar GWT levels are selected. The results of four soil moisture profiles show that the response time of soil moisture at different depth differs greatly when the top 40cm height soil is very dry, which infers the presence of preferential flow paths in some surface layers and great variability of dry soil structure in the field. The GWT level rises when the surface layers are not saturated nor the soil moisture adjacent to the GWT responses. The trapping and compressing air in the surface layers may change the vertical pressure head distribution, pushing the capillary fringe water into the GWT. When the surface soil is relatively wet, the infiltration process seen from soil moisture response appears uniform while the GWT still rises in advance. Considering the effect of trapping air and capillary fringe transport, we modified the module in Hydrus-1D model to simulate the soil moisture-groundwater response. The results showed the modified version simulated better than the original one compared with the measured process.

### **Key words:**

soil moisture; groundwater; shallow groundwater table; paddy soil; capillary fringe; Hydrus 1D

## Assessment of Ground Water Level for Future Use: A Case Study of Haryana, India

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### Abstract

Advancement of agriculture has led to peculiar situation in northern India. In some areas, ground water is depleting fast where as in other, ground water is threatening the very existence of crops due to rising of ground water. The present study has been carried out in Haryana which is one of the most agri-productive state of India. Some of the districts have witnessed a fall in the ground water level as much as 7 metres during last 10 years. At the same time , ground water level in other districts is with in 3 meters from the surface. Monitoring the quality of groundwater in agriculture intensive areas is as important as assessing its quantity. Uncontrolled extraction without commensurate recharge and heavy leaching of pollutants from pesticides and fertilizers has resulted in pollution of groundwater. Hence, The mapping of ground water level will help to understand the spatial variability over an area on the bases of such studies. Secondary data has been used to study the spatial pattern of ground water level as well as the quality of ground water. The spatial distribution maps for level of ground water and quality of ground water were prepared in GIS environment using Quantam GIS.

### Key words:

Ground Water; Monitoring; pollutants; recharge

## CFSv2-based Seasonal Meteorological Drought Prediction over the Low Latitude

### Highland

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#### Abstract

Drought in southwestern China, especially durative drought over the low latitude highland, will seriously affect the utilization of water resources and hydropower resources development in our country. Therefore, research on seasonal drought and flood prediction over the low latitude highland has very important significance and application value for flood control and drought relief, water resources planning and management. NCEP Climate Forecast System version 2 seasonal precipitation prediction is used to calculate six-month standardized precipitation index (SPI6), which is used as the primary drought indicator to measure the medium-term meteorological drought. To fully understand the potential and limitation of CFSv2 in predicting seasonal drought over the low latitude highland, this study investigated how the seasonal drought predictive skill varies with multiple lead-times and spatial scales. The predictive skill was then assessed by the correlation coefficient between observation-based SPI6 and CFSv2 forecast-based SPI6 during the period 1982-2008. Through this analysis, we will better understanding the capability of CFSv2 in seasonal meteorological drought prediction, which can help us to better manage water resource over the low latitude highland.

#### Key words:

Seasonal Meteorological Drought Prediction; CFSv2; lead-times and spatial scales; the low latitude highland

## Changing Climate and Indigenous Community: An Odyssey of Leh's Water Scarcity to Stress

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### Abstract

This work is concerned with the changing human nature relationship in the glaciated mountain ranges in Ladakh in Western Himalayas. By taking a case study of rapidly growing Leh town, located in the semi-arid Ladakh region and sustained largely by the glacier-fed small streams, it demonstrates how combined factors of climate and social change have been influencing the flow of water across urban landscape and reshaping human and nature relationships. The emerging relationship exhibits the ways indigenous community is treading the path vulnerable to unsustainability and water stress. The traditionally designed water networks are being replaced by technologically supported administrative networks. Historically, water resources fed by the glaciers have played a key role in the origin and spread of settlements in Ladakh region and indigenous society displaying human wisdom evolved indigenous sustainable water management system. This study assumes greater significance in the light of projections of water shortages in the world's glaciated mountain ranges (Bury, et.al, 2013) due the climate change and societal forces. Methodologically, this work draws upon both intensive and extensive methods. Besides, realizing the fact that water histories have enormous power and insight (Wescoat, 2013: 408), this inquiry employs historical geographic perspective to unfold how communities in different levels of cultural development organized their life around water in this fragile ecological setting.

### Key words

Ladakh Region; Indigenous community; hydro-climatic conditions; water management system; societal forces

## Comparison of IDW and Physically-Based IDEW Method in Hydrological Modelling for Large Mountainous Watershed, Northwest China

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### Abstract

Topography and spatial patterns of landscape significantly affect spatial distribution of atmospheric processes, and in turn hydrological modeling, especially in high elevation, mountainous watersheds of arid regions. This study incorporates a physically-based inverse distance and elevation weighted method (PBIDEW) and an inverse distance weighted method (IDW) into a distributed conceptual hydrological model, Distributed Large Basin Runoff Model (DLBRM) to assess the impacts of topography on hydrological modeling at watershed scale. The PBIDEW considers the impacts of topography using month-dependent parameters in its interpolation of meteorological variables while the IDW method doesn't. Both the IDW and the PBIDEW methods are evaluated and compared in hydrological modeling at different spatial resolutions in the upper reach of the Heihe River Watershed, Northwest China. Results show that the IDW method does not sufficiently account for the spatial variability of the precipitation as the PBIDEW method does. Considering the impacts of topography and using month-dependent physically interpolation parameters, the PBIDEW method seems more suitable in data lacking, high elevation, and topographically complex mountainous watersheds in arid area. In addition, it is important to evaluate the performance of interpolation methods at different spatial resolutions and finer temporal scales (e.g. seasonal or monthly) for more accurate hydrological modeling at watershed scale.

### Key words:

IDW; PBIDEW; Distributed Large Basin Runoff Model (DLBRM); the Heihe River Watershed; Northwest China

## Dangerous Ice Phenomena on the Lowland Rivers of European Russia

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### Abstract

In Russian climate, population and economy security is often limited by dangerous ice phenomena. It is not just ice jam floods, but also about the processes that lead to violation of operating conditions of various facilities (water intakes, roads, bridges) and damage hydraulic structures and fleet. Currently, the rivers' ice regime characteristics change under the influence of both natural (primarily climatic) and anthropogenic factors. Changes of these characteristics have been analyzed in detail on the basis of observations of 300 hydrological stations for the period from 1936 to 2013. Change of ice phenomena hazard is estimated. During high spring water on the rivers of the North of European part of Russia severe ice jams are regular occurrence. Our investigations showed that climatic changes of the last decades led to noticeable changes of the water and ice regime of the rivers. Now we often observe the long periods of freezing up which are followed by formation of sludge ice jam and coming to significantly later freeze-up at high water levels. Break-up during the winter period are now frequent. The last catastrophic flood in this area was observed in the spring of 2013. For an assessment of danger of the hydrological phenomena in the period of high waters and formation of ice jams on the northern rivers of Russia the questions connected with an assessment of probability of such events, calculation of duration and depth of flooding at various water levels with an assessment of the corresponding economic damage are considered. Modeling of formation of maximum water levels and flooding of the territory in the period of a high water and formation of ice jams was carried out by means of the Russian program complex "Flood" on the basis of the numerical solution of the two-dimensional Saint-Venant equations.

### Key words:

dangerous ice phenomena; runoff; climatic changes

## Drought Evolution and Its Impact on Crop Yield in the North China Plain

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### Abstract

Understanding and assessing the effects of extreme drought on agricultural ecosystems is a key step toward minimizing drought-related yield losses and impacts. In this study, we analyzed the spatiotemporal characteristics of drought in the North China Plain (NCP) based on the Standard Precipitation Evapotranspiration Index (SPEI) and also examined the impacts of drought on winter wheat and summer maize. An overall drought trend and a wetting trend were detected in Henan Province and Shandong Province, respectively, during the winter wheat growing season, whereas a wetting trend was dominant in the NCP during the summer maize growing season. Moreover, the drought episodes clearly revealed the evolution of drought from summer and autumn drought in the 1980s and autumn and winter drought in the 1990s to winter and spring drought in the recent decades. Our results also suggested that the year-to-year variations in the detrended SPEI could explain well the extensive fluctuations in the yields of both crops between the late 1990s and the earlier 21st century. However, considerable differences in the responses of the agricultural crops to different lags of the SPEI were observed, and the most correlated time scale increased with advancement of the winter wheat growth stage. In addition, the correlations between winter wheat yield and SPEI in three sub-periods were relatively stable, whereas all time scales except for a 1-month lag exhibited a substantial decreasing trend in the relationship between summer maize yield and SPEI in its growing season.

### Key words:

drought evolution; SPEI; crop yield; North China Plain

## Environmental Analysis of the South Cubatão River Catchment through the Use of GIS and Geographical Categories

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### Abstract

The South Cubatão River Catchment located in Santa Catarina, Brazil, is responsible to provide water for 700.000 inhabitants. Although the importance of this hydrological basis are known, the expansion of urbanism, agriculture, planted forests and pastures are affecting terrestrial ecosystems, presenting the greatest reduction of pioneer formations, riparian and the Atlantic forests, increasing the water flow and decreasing the water quality in the rivers of this region.

The dynamics of land use and land cover changes and its impacts in the water resources are being well explored through the use of geotechnologies (remote sense and GIS) combined with the water quality and hydrologic flow monitoring. This kind of work is justified by the growing need for natural resources management in the south part of Brazil. However these technologies are not enough to understand the complexity of the water problem.

Based on a national and international methodological framework, the main purpose of this work is to define few geographical categories and environmental management's skills to explore the water issue in this catchment. Is the possibility to join the human, physical geography and geotechnologies for better understading of the environmental problems. The present work was a final thesis presented in 2016 to obtain the bachelor diploma in Geography.

### Key Words:

Geographical Analisis; Water resources management; Land use and cover change

## Evaluation of Glacier Melt Contribution to Runoff in North Caucasus Alpine

### Catchments Using Isotopic Methods and Energy Balance Modeling

Rets E.<sup>1</sup>, Loshakova N.<sup>2</sup>, Tokarev I.<sup>3</sup>, Kireeva M.<sup>2</sup>, Frolova N.<sup>2</sup>, Terskaya E.<sup>2</sup>,  
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#### Abstract

North Caucasus is one of the most dangerous parts of Russia in terms of hydrological risks. During last decades a rise in frequency and intensity of river floods is observed in North Caucasus that is considered to be caused by recent climate change. On the one hand a rise in mean annual temperature provokes an increase in glaciers melt rate, and on the other hand a rise in precipitation sum contributes to the process through more frequent rain flooding. According to this in order to predict possible future trends in extreme hydrological events in the context of climate change it is essential to estimate contribution of different nourishment sources in rather complicated flow forming processes in the alpine part of North Caucasus.

A study was carried out for Djancuat river basin that was chosen as representative for Northern Caucasus during International Hydrological Decade. Simultaneous solution of water, isotopic and ion balance equations and energy balance modelling of ice and snow melt was used to separate Djancuat river hydrograph by such nourishment sources as ice melt, seasonal snow melt, rain precipitation, base flow. The study allowed to obtain new results on river runoff respond to glaciers melt regime, seasonal redistribution of melt water due to accumulation ability of the glaciers as a prerequisite of the formation of extreme hydrological events.

#### Key words:

Mountain hydrology; isotope methods; hydrological hazards; energy-balance modelling; representative glacier Djancuat; North Caucasus; climate change; deglaciation

## Future Changing Climate and Its Implications on Floods and Water Availability across China

Li, J.<sup>1</sup>, Chen, Y.D.<sup>2</sup>, Zhang, L.<sup>3</sup>, Zhang Q.<sup>4</sup>, Chiew, F.H.S.<sup>3</sup>

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### Abstract

The changing climate and future variations in floods and water availability across China during 2070-2099 under Representative Concentration Pathway 2.6 (RCP2.6) and RCP8.5 are studied. We analyze the discharge simulations from hydrologic models forced by the Global Climate Model (GCM) outputs of the Coupled Model Intercomparison Project Phase 5 (CMIP5). The outputs are provided by the Inter-Sectoral Impact Model Intercomparison Project (ISI-MIP). The results show that: (1) the intensities of floods increase during 2070-2099 under RCP8.5 relative to those during 1971-2000; (2) water availability decreases in southern China, and increases in northern China under RCP8.5, but changes negligibly under RCP2.6; (3) more intense precipitation extremes in the future cause more severe floods over China. The negligible change in mean precipitation and the increase in actual evapotranspiration bring about a decrease in the water availability in southern China; and (4) projections of increasing precipitation extremes are more consistent among different GCM outputs compared to mean precipitation.

### Key words:

climate change; floods; water availability; climate extremes; China

## Hydro-ecological Researches on the Loess Plateau of China

Liu, WZ<sup>1</sup>, Li, Z<sup>1</sup>, Cheng, LP<sup>2</sup>, Wang, J<sup>3</sup>, Wang, R<sup>4</sup>, Ning, TT<sup>1</sup>, Liu, M<sup>1</sup>

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### Abstract

The Loess Plateau is located in the upper and middle reaches of the Yellow River valley. In this paper, our researches on hydro-ecology in the Loess Plateau over the past 10 years are briefly introduced, focusing on the water behaviors, ecological effects and optimal regulation. (1) Soil moisture characteristics in deep soil profiles and groundwater recharging processes by precipitation, in which the preferential flow played an important role. (2) The internal connection of crop production with water consumption and WUE was elucidated based on an elasticity index. (3) The water balance and its optimal management on rainfed cropland were studied, such as the components and coupling relations of precipitation use efficiency chain, the optimal crop-water-fertilizer coupling supplies, etc.. (4) The method of watershed hydrological assessment. Under the framework of the Budyko hypothesis, a modified formula of the first-order approximation for assessing the contribution of climate change to runoff, and a semi-empirical formula of the controlling parameter for water balance of a watershed were put forward. (5) The processes of watershed hydro-ecology and their responses to climate change and human activities. Results showed that river runoff volume in the watersheds was reduced significantly, in which the human activities played an important role; the watershed hydrological variability would be enlarged in the future due to intensified extreme climate events like rainstorm. Enhancing research on hydrological ecology is of significance in agricultural development and ecological construction in the loess plateau where water resources shortage has been considered to be a major restricting factor.

### Key words:

Water Sustainability; eco-hydrology; climate change; soil water; water use efficiency; water cycle; the loess plateau; Budyko hypothesis

## Hydrograph Separation method Issues for Different River- Station in Mongolia

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### Abstract

This study aim was at understanding of separation of annual hydrograph into surface and groundwater components. Daily discharge data of different river-stations in Mongolia and different flow years are used to run the selected software and method. The Boughton's two-parameter filter algorithm and simple linear methods are used to separate groundwater component of annual hydrograph. Results of separation are discussed and compared to each other. The two-parameter filter algorithm provide physically better results in terms of temporal variation of groundwater components and percentage of the groundwater source expected to be higher than pervious linear estimation results by 10-20 percent. Further more detailed study and analysis are required with use of more comprehensive data in terms of spatial and temporal variation such long term annual hydrographs or selected river systems with different physio-geographic conditions. Also to improve the results of separation is needed to calibrate different parameters with local data set and under local condition.

### Key words:

runoff hydrograph; ground water; hydrograph separation; ground water source

## Modeling Urban Floods in a Changing Climate: From Reconstructing the Past to Projecting Future Risks

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### Abstract

The city of Portland, Oregon, USA has historical records of flooding dated back to the mid-19<sup>th</sup> century. Located at the confluence of the Willamette and Columbia Rivers, the city has historically been exposed to large floods from both rivers. Climate change in the region is projected to bring more intense winter storms with higher temperatures, possibly leading to more intense flooding on the Willamette such as the 1996 rain-on-snow event. Combined with an earlier spring snow-melt on the Columbia (the largest river in the Pacific NW and 30<sup>th</sup> largest in the world), climate change may exacerbate flood risks in the future. Using archival river data and flood maps, we develop and calibrate two modelling tools, Delft 3D and HEC-RAS. The simulations allow us to re-assess present-day and historical flood risk. Next, using downscaled climate change scenarios from CMIC5, we project future changes in flood risks under different land management and climate scenarios. The integrated modelling approach offers potential synergies and trade-offs in urban flood risk management.

### Key words:

Floods; hydraulic modelling; climate change; geographic information systems; urban floods

## Pattern of Drinking water Availability and use in Assam, India: A Geoenvironmental Study

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### Abstract

The state of Assam covers an area of 78438 sq. Km and its population according to 2011 census is 31,205,576. Due to heavy rainfall in the sub-Himalayan region as well as in the valley portion, Assam is endowed with rich water resources potential carried by an elaborate river system consisting of the Brahmaputra, Barak and their large number of tributaries and as ground water reserve. The main source of drinking water for the people in the state is ground water. Here, annually replenishable ground resources occur in large alluvial deposits of the Brahmaputra and Barak river. In this paper an attempt is made to study ground water potential of the state and its spatio-temporal distribution and to estimate the present status as well as future scenarios. In order to estimate the status of water availability in the state, hydrogeomorphological studies based on satellite as well as conventional data have been carried out. The study related to water use will be primarily based on secondary data sources. The collected data is analysed using appropriate computer assisted analytical procedures. The analysed data will be presented through a series of maps, tables and graphs using appropriate cartographic techniques. The study is expected to generate considerable scientific data necessary for drinking water planning and development in the state. The study will help also help in understanding the problems and prospect of drinking water development and management in the state in the background of its unique geoenvironmental and socio-economic setting.

### Key words:

Hydrogeomorphological studies; drinking water development and management; geoenvironmental setting

## **Spatial Perspective of Drinking Water in Rural Haryana: A Case Study of Village Panghal, District Hisar**

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### **Abstract**

The supply of safe drinking water, most important basic needs of life, is currently the major challenge before the governments in developing countries including India. Rapid growth of population, competing demands, pollution and depletion of water sources have posed serious problem before the policy-maker and planners in our country. After 73rd Constitutional Amendment (1992) and Swajaldhara programme (2002) the government gave the responsibility of management of drinking water to local bodies such as Gram Panchayats.

In Haryana, 65 per cent population live in 6642 villages (Census, 2011). Haryana is one of the foremost states to provide piped water supply to its all villages by 1992. But there is a significant change in sources of drinking water used by rural population. In 1981 a majority of rural households (53 per cent) use well water as a source of drinking water, whereas in 2011 main source of drinking water was tap with 63 per cent households (Census of India).

The objective of the present study is to find out the variation in drinking water sources among various caste groups and to find out temporal change in sources of drinking water from 2011 to 2016 and to study the determinants.

The study area of the present study, Panghal village, lies in Hisar district of Haryana. The climate of the district is characterised by its dryness and extreme temperature and scanty rainfall. According to Census of India (2011), 82 per cent households of village use tap as a source of drinking water but in 2016 it reduce up to 69 per cent. Whereas use of borehole increased up to 17 per cent from 0.5 per cent in 2011. The present study is based on primary and secondary data both. Arc map will be used to show spatial pattern.

### **Key words:**

Safe drinking water; Local bodies; Caste Groups; Schedules caste; Tap; Borehole

## Spatial-temporal Variation of Soil Moisture Based on In-Situ Observations and Remote Sensing Application in the Qilian Mountain, China

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### Abstract

Soil moisture links the atmospheric precipitation, surface water, and groundwater, its spatial-temporal variability influences ecological processes and the river flow. We established the soil hydrological observation system with 36 in-situ soil moisture observation stations in the Qilian Mountain, Northwest China. Subsequently we analyzed the spatial-temporal variability of soil moisture in the study area, and results show that: 1) Significant differences existed in soil moisture content among the different vegetation types, particularly between shrubs and other types of vegetation's; 2) In the 0 ~ 70 cm layer, soil moisture increased first and then decreased with the depth, and the largest variability occurred on the surface layer; 3) on the daily scale, temporally soil moisture was low in the morning and higher in the afternoon; seasonally, soil moisture was highest in the summer and the lowest in the winter; 4) Spatial distribution of soil moisture was affected by rainfall and soil hydraulic properties. Then based on MODIS data, the improved ATI and TVDI model were used to calculate the soil moisture in the Qilian Mountain for each month, 2014. The results show that: 1) ATI and TVDI model for soil moisture inversion in Qilian Mountain looks feasible; 2) 10 ~ 20cm layer soil moisture inversion result expresses best; 3) During the rainy season, soil moisture is closely related to altitude, and varies from extremely wet to extremely arid, while in the dry season, soil moisture is low overall. These findings provide important information for eco-hydrological research in the Hexi Corridor, Northwest China.

### Key words:

Soil Moisture; Spatial-temporal Variation; Land Use Land Cover; In-Situ Observation; Remote Sensing Inversion; Qilian Mountain

## Using Isotope Method on Determination of Groundwater Age for Feasible

### Utilization of Water Resource in Arid Region of Mongolia

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#### Abstract

The water resources can be distributed unevenly throughout the country depending on geological and topographical conditions of the country. Mongolia is situated in the southern part of the north hemisphere and plays an important role in originating natural water resource. However, the southern part of Mongolia lacks surface water resources and annually fourtimes lower than world's average. The amount of precipitation that fall in the South Gobi region of Mongolia is very limited thus only groundwater resources are used with very small recharge rate. If the consumption of the groundwater resources exceeds the ecological capacity, this will have a negative impact on this arid region.

This paper presented the results of research on determining groundwater origin, its age and recharge rate by using  $^{18}\text{O}$ ,  $^2\text{H}$ ,  $^3\text{H}$ ,  $^{14}\text{C}$  isotope method. This was part of research "Evaluation of groundwater resources in large depressions in the Gobi region" and provided recommendations for an adequate utilization rate of water in the arid region of Mongolia. The isotope analysis was undertaken in the nuclear laboratory of Geological and Geophysical Institute of Beijing, China.

The result of isotope study showed that the groundwater age was between 11063-25900 years in the artesian well and deep borehole located in Sain-us and Bor huuvur depressions and recharge rate was lower than 0.7-2.1 mm/year, but the groundwater age was younger in the dug well, and recharge was 89.1 mm/year.

#### Key words:

groundwater age; groundwater recharge;  $^{18}\text{O}$ ;  $^2\text{H}$ ;  $^3\text{H}$ ;  $^{14}\text{C}$  isotope method

## **WALRUS–Paddy Model for Simulating Hydrological Processes of Lowland Polders with Paddy Fields and Pumping Stations**

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### **Abstract**

Simulating the rain-runoff process in lowland polder will lead to improvements to hydrological modeling of entire floodplain catchments. The lumped Wageningen Lowland Runoff Simulator (WALRUS) provides an efficient and reliable model for simulating the hydrological processes in lowland catchment with shallow groundwater. However, this model needs to be improved before being applied to Chinese polders, which have multiple land use types and pumping stations. This study proposes an improved version called WALRUS-paddy that accounts for the discharge from multi-sources, including drylands, paddy fields, residential areas, and water areas. A water management scheme is incorporated to control the irrigation and drainage operation in paddy rice fields and the groundwater flow between the paddy field and the adjacent dryland is considered. In addition, a new stage-discharge relation function is introduced to represent the discharge process of the polder with pumping stations and culverts. Then, the model is validated in the Jianwei polder of east China. The modeled results agree well with the observed discharge and show that the improved model can provide good estimates of the discharge in this polder district. Thus, the improved model is feasible and helpful for water resources management of Chinese polders.

### **Key words:**

lowland polder; hydrological processes; multi-type land use; paddy field; pumping station

## Watershed Hydrologic Research in Arid Regions: Advancement, Opportunities and Challenges

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### Abstract

Arid areas account for approximately 41 percent of the global land surface, and support over 2.5 billion people. Understanding spatial and temporal distribution of hydrological process at the watershed scale is essential for effective management of water resources to ensure sustainable regional development in arid regions. This paper reviews recent advances in watershed hydrological research, particularly applications of remote sensing, GIS, and simulation models in estimating rainfall and snowmelt, evapotranspiration, soil moisture, groundwater, discharge and storage at the watershed scale. Subsequently, the paper discusses opportunities and challenges in watershed hydrological research and suggests that 1) long term, detailed spatial coverage, high quality in-situ observation data need to be collected and assimilated with current regional and local datasets to advance watershed hydrological modeling; and 2) regional/watershed hydrology and water resource models need to be developed to integrate components of climate, economy, ecology, and water consumptions through international collaborations to support water resource policy/decision making at the regional/watershed scale.

### Key words:

Watershed Hydrology; Storage; Process; Remote Sensing; Integration.

## Analysis Drought Pattern in the Upstream of the Heihe Watershed by Palmer

### Drought Severity Index

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#### Abstract

Based on the meteorological data from the 4 meteorological station (Qilian, Yeniugou, Tuole, Sunan) in the upper reaches of Heihe basin during 1960-2009, the Palmer Drought Severity Index (PDSI) method is applied to calculate the annual, quarterly and monthly Palmer drought index at each station, respectively. And the drought frequency of annual and seasonal of each station is counted further. The results show that the PDSI in the upper reaches of Heihe basin has a changing trend of decreasing-increasing-decreasing in the past 50 years. According to the statistical analysis, the drought level in the upper reaches of Heihe basin is mostly concentrated in slight drought and medium drought. In the seasonal scales, the serious drought mainly occurred in summer and autumn. Compared the PDSI with the SPI at different time scale, it suggests that the SPI is easy to leave out some heavy drought processes, while the PDSI still accurately reflect some drought events. Therefore, the PDSI is more systematic and targeted than SPI to describe the drought in the upper reaches of Heihe basin.

#### Key words:

PDSI index; drought evaluation; drought frequency; the Upstream of the Heihe watershed

## Characteristic of Soil Moisture under Different Artificial Forestland in the Loess Hilly Regions of the Loess Plateau, Northwestern Shanxi

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### Abstract

The northwestern of Shanxi Province as a typical arid and semiarid region on the Loess Plateau, is the ecological transition zone and fragile environment area. The special natural environment and climate conditions have led to a lot of ecological problems in the region, such as droughtland, and poor soil and fragile ecological environment. Soil water is the main source demand for vegetation growing water, is the main influencing factors for limiting the vegetation type, growth and distribution. The study area of artificial vegetation soil moisture has made great important scientific significance for soil drying causes. It can evaluate the soil reservoir, guide the rational configuration of vegetation in the area model and avoid the green desert environmental problems. This research adopts the field sampling and laboratory analysis, combines with a variety of statistical methods. It studies systematically soil moisture content of different soil depth in the northwestern Shanxi multiple county various vegetation types. Besides, it put forward the development of the area suitable for vegetation types of artificial vegetation types in the area of different soil drying and dry layer distribution. The study area of this topic is in northwestern of Shanxi, such as Wuzhai, Lanxian, Pianguan, Zuoyun, Youyu, Shechi, Kelan. Taking the local common seabuckthorn, *caragana korshinskii* and for comparison of populus *simonii*, larch, *pinus tabulaeformis*, elm, willow, abandoned, farmland as experimental samples, and using descriptive statistics analysis, variance analysis, correlation analysis and spatial variation analysis model, it analysis the differentiation characteristics of soil moisture content in the depth of 0-6 m and 0-10 m and the distribution regularity of soil dry layer in different vegetation types in different seasons. Studying the soil moisture content change of different age of *korshinskii* forest as a whole, it reveals the characteristics of vertical distribution and degree of soil drying and the relationship between the various levels of different age of *korshinskii*, soil moisture forest age *korshinskii*. It compared the soil moisture content change of different vegetation types in different depth of soil layer and factor correlation in northwest mining and non-mining area. And evaluate the effects of mining on different vegetation types of soil moisture. By building the appraisal model of soil water deficit, it quantitatively evaluate the deficit of soil moisture of different artificial forest land and reveals the relative stem characteristics of soil water deficit and drying of different layers in different artificial forests in the

northwestern of Shansi. It also studied the soil moisture of jujube and apple in depth of 4 m and analyzed the differences of available water resources and the type of availability soil moisture in Yanchuan county, Shaanxi province. And the soil moisture availability, dry soil layer and the water cycle, etc were analyzed. This topic research results had important scientific significance to find out the different artificial vegetation soil moisture vertical stratification in northwestern Shanxi in different parts of the thickness differences, water content and the cause of the different areas of soil drying and the change of farmland soil moisture content and the change of farmland temporary dry layer, and provided a basis for the regional ecological reconstruction and agricultural production and theoretical support.

**Key words:**

Northwestern Shanxi Province; soil moisture; vegetation types; soil drying; ecological reconstruction

## **Climatological Characteristics of the 2013-2014 Water Crisis in São Paulo**

### **Metropolis, Brazil**

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#### **Abstract**

São Paulo metropolitan region experienced an acute water crisis in the years 2013 and 2014, which resulted in interruptions of drinking water supply for some cities and industries. In the literature, this crisis is generally attributed to an exceptional decrease in rainfall coupled with high temperatures. After characterizing the regional climate, this study analyses the long-term evolution (1944-2015) of rainfall and flow rates in the Piracicaba River, one of the basins that supply water to the metropolis. Rainfall, temperatures and flow rates of the 2013-2015 period are then confronted to the climatic and hydrological norms, and the long-term evolution of climate and hydrology. The main conclusion is that the 2013-2015 period has indeed been relatively dry, but is not unique according to the past 70 years. The origin of the 2013-2014 water crisis is not only related to the climatic situation, other factors must be addressed.

#### **Key words:**

water stress; water crisis; climatological norms; São Paulo; Brazil

## Dangerous Hydrological and Morphological Processes in the River Mouths of Unstable Caspian Sea

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### Abstract

Population, the branches of economy, biocenosis in the mouths of rivers flowing into the Caspian Sea are very vulnerable and susceptible to the adverse effects of hazardous hydrological-morphological processes and ill-conceived economic activity. The results of long-term and comprehensive research show that inundations, low-water periods, water pollution, storm surges and wind-induced down-surges, water logging, rapid reformation of sea-coast line, riverbeds and degradation of lakes, storm waves threaten safety of peoples and its health, economic activity, ecological communities and natural objects in the mouths of Caspian rivers, especially the Urals, Volga, Terek, Sulak, Kura and Sefidrud. List of hazardous hydrological-morphological processes and their characteristics depend on the location, size and structure of the river mouth area, on the river regime. In addition, water management activities can regulate these processes. Large-scale and rapid sea-level fluctuations also influence the intensity of some of the processes. All of these issues are discussed in detail by the authors of the report, the patterns and characteristics of hazardous hydrological and morphological processes are defined.

### Key words:

river; Caspian sea; delta; hazardous hydrological-morphological processes

## Detecting spatial and Temporal Changes in flood Cycles within the Two Largest Freshwater Lakes of China from Time-Series MODIS Imagery

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### Abstract

Dongting Lake and Poyang Lake are the two largest freshwater lakes in China, and both are the most important regulation lakes of the Yangtze River. Hydrological regimes have appeared some changes in these two lakes after the impoundment of the Three Gorges Reservoir. This study was aimed at finding out the action mechanism of the Three Gorges Project on flood cycles in the two lakes. A methodology was proposed to detect spatial characteristics of flood cycles (including inundation areas, start dates, end dates, and durations of floods) based on MODIS imagery between 2000 and 2015. The estimated flood cycles were validated via comparisons with hydrological data, and there was excellent agreement between them. The results showed that annual inundation areas in the two lakes experienced a downward trend after the impoundment of the Three Gorges Reservoir. Specifically, inundation areas presented a decrease in flood periods but an increase in normal periods. Furthermore, annual start/end dates of floods and those in normal periods all occurred ahead of time, except for those in flood periods. These variations in flood cycles will probably break the present wetland vegetation pattern and lead to forward succession of wetland plants in the two lakes. This study enabled an understanding of seasonal and annual changes in the hydrologic environment of Dongting Lake and Poyang Lake from a global viewpoint, and can provide scientific guidance for the optimal scheduling of the Three Gorges Reservoir and the enhancement of ecosystem services of wetlands.

### Key words:

spatial and temporal change; flood cycle; inundation area; flood duration

## Diurnal Variations of Grassland Evapotranspiration over Different Periods in Pailugou Catchment at the Upper Reach of the Heihe River, Northwest China

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### Abstract

Evapotranspiration (ET) is an important component of water cycle, but its measurement in high altitude mountainous region is quite difficult, resulting in the poor understanding of the temporal and spatial variations of actual ET in high altitude mountainous region. In this paper, a weighing lysimeter was used to measure the hourly ET in a grassland in the Pailugou Catchment, in the Upper Reach of Heihe River, northwest China. Based on the measured data, diurnal variations of grassland ET over different periods were analyzed. Results indicate: (1) snow and ice sublimation appeared during the freezing period, with a very different diurnal variation pattern: during the period without sunshine, the amount of snow and ice sublimation was nearly constant; when the highest global radiation and lowest relative humidity appeared in the same period, the amount of snow and ice sublimation increased a little. (2) The early growth period was a period when snow and ice started to melt, at which snowmelt evaporation and soil evaporation occurred at the same time. (3) The growth period had the highest evapotranspiration rate. Due to continuous rainfall events, maximum and minimum ET values appeared at the same hour. (4) The late growth period mainly produced on soil evaporation, producing 3 peaks in diurnal variation, which is different from only one peak in both the early growth and growth.

### Key words:

Upper reach of the Heihe River; Weighting lysimeter; Grassland evapotranspiration; Diurnal variations

## Observed Changes in the Frequency and Magnitude of Floods in the Eastern Part of Romania

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### Abstract

The study of floods is particularly important for flood risk management and sustainable development strategies design. This work aims to identify possible changes in the frequency and magnitude of floods in some watersheds located in the eastern part of Romania, a region heavily affected by damaging floods in the last decades. The considered watersheds are spread over different landform (mountains, hills, plains), and have surfaces varying from less than 100 km<sup>2</sup> to over 2000 km<sup>2</sup>. They are more or less engineered.

The work is mainly based on the statistical processing (frequency and trends analysis) of monthly and annual maximum discharges data series, recorded between 1971 and 2010 at the gauging stations (belonging to the national hydrometric network) controlling the selected watersheds.

The results showed no significant trends in the magnitude of annual floods, but some cyclicity has been identified, including periods with high peak flows (before 1980, after 1990, and especially after 2000) and low peak flows (1980-1990). The decennial analysis of the frequencies and magnitudes of major floods (with the peak higher than the average of the annual maximum discharge) revealed a relatively heterogeneous situation. Nevertheless, after 2000, an increasing trend of peak flows and of the number of large floods has been identified, especially in the watersheds without dams and reservoirs.

Excepting the climate variability and the reservoir design, intensive deforestations performed after the fall of the communism period (starting with 1990) had an important role in the change of floods' features in the study area.

### Key words:

floods; magnitude; frequency; trend; Romania

## Poyang Lake Temporal and Spatial Characteristics of Water Area Change Based on Remote Sensing and Hydrological Data

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### Abstract

In this paper, the spatial variation characteristics of Poyang Lake during the flood period and receding period were analyzed by using the 50 years' waterlevel data from the seven gauging stations of Poyang Lake, the area of Poyang Lake flooded area from year 2000 to 2013 was calculated by using the MODIS high time resolution characteristics, combined with the water level observation data of Poyang Lake, the difference of Poyang Lake water area between receding period and flood period in recent years and the difference characteristic of Poyang Lake flooding range before and after sandexcavation was both analyzed. The study indicates that: (1) The absolute value of Poyang Lake water level gradient decreased with the increase of the water level and it tended to zero when the water level arrived about 14 meters, the absolute value of water level gradient in flood period was greater than that in with precede water period within 14 meters of the water level; (2) The changes of Poyang Lake area was consistent with the changes of its water level, Poyang Lake area at the high water level was about 4 times greater than that at the low water level, the waters of Poyang Lake would have the corresponding changes in the form at different water levels. However, due to the complexity of Poyang Lake hydrological conditions, the water area of discrete degree at different water level segment was not consistent; (3) The difference of water area of flooding range in different water level segment during flood period and recede period was not the same when they were at a similar water level, this difference was affected by the incoming water, the Yangtze River backwater and the Poyang Lake and form; (4) The river channel become wider and the lake shore form become irregular in the main engineering area after the sand mining ship entering Poyang Lake for jobs, and these phenomena were more and more obvious with the pushing back of date.

### Key words:

NDVI; hydrological data; water level gradient; sand mining

## The Evaluation of the Risk of Absolute Maximum Runoff of the Small Mountainous Rivers in the Republic of Armenia

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### Abstract

Risk assessment is the determination of qualitative and quantitative indicators' change's degree of risk which are closely correlated with each other. Taking into account these approaches, the differences and similarities of assessment principles and final goals the quantitative method has been applied for risk assessment for absolute maximum runoff of rivers. The quantitative method of risk assessment is based on mathematical statistics and probability theories.

This paper explores the evaluation of the risk of absolute maximum discharges of the rivers in Armenia. The evaluation of the risk of the absolute maximum discharges of the rivers

in Armenia shows that a tendency of reduction of the risk level is observed, and this means that the degree of probability of disastrous floods makes up 0,1%, or they can repeat once per 1000 years. The values of coefficient of changeability or variation (Cv) of absolute maximum discharges of the rivers in Armenia fluctuate from 0,3 to 1,5. The mean value of the coefficient is 0,6. For the absolute maximum discharges of the rivers such values are rather small, in other words one could conclude that the absolute maximum discharges of rivers are quite stable, and they have relatively small risk values.

### Key words:

Maximum runoff; risk assessment; disastrous floods; coefficient of variation

## C12.40 Water Sustainability

### Water and Energy



Home

### Oral

1. [Assessment of Inter-provincial Virtual Water Flows Embedded in Energy Production and Trade in China](#)  
Lu LIN (China University of Petroleum (Beijing), China), Yongqin CHEN (The Chinese University of Hong Kong, HongKong SAR, China)
2. [Exploring the Use of Deep Level Gold Mines for Underground Pumped Hydro Energy Storage in Karst Areas of South Africa](#)  
Frank Winde (MWRG, NWUVT, South Africa), Ewald Ersamus (MWRG, South Africa), Friederike Kaiser (EFZN, Germany)
3. [Fluctuations of Lake Baikal Level: Past Changes and Current Problems](#)  
Endon Garmaev, Sergey Andreev, Alexander Ayurzhanov (Baikal Institute of Nature Management SB RAS, Russian Fed)
4. [Projected Impacts of Climate Change on Hydropower Potential in China](#)  
Xingcai Liu, Qihong Tang, Huijuan Cui (Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
5. [Sedimentation and Carbon Sequestration in Xiaolangdi Reservoir, China](#)  
Yang Hong, Junqiang Xia (Wuhan University, China), Julian Thompson (University College London, United Kingdom)
6. [Water Surface Temperature Variation for Large Lakes Across the Tibetan Plateau using MODIS Imagery](#)  
Kaishan Song, Yue Yuan, Jianhang Ma (NEIGAE, China)

### Poster

1. [Reduced Energy Consumption in Wastewater Treatment Plants by Optimizing the Control of Effluent Quality](#)  
Elfrida M. Carstea; Gabriela Pavelescu (Romania, National Institute of Research and Development for Optoelectronics, INOE 2000)

## Assessment of Inter-Provincial Virtual Water Flows Embedded in Energy Production and Trade in China

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### Abstract

As the most populous country, China has become the second largest economy, the largest energy consumer and producer in the world. Energy demand and consumption will continue to increase as a result of socio-economic development which will continue to be mainly driven by industrialization and urbanization in the coming decades. Water and energy are fundamental resources to economic growth and human life and their inextricably linkage termed as Water-energy Nexus has become a hot research and policy topic in recent years around the world. Energy production and electricity generation heavily rely on water and this is particularly a grand challenge in China with severe and uneven water stress across the country. This study applies the Virtual Water Approach to developing a comprehensive understanding of water use for energy in China at the provincial level, aiming to contribute to integrating water implications and constraints into energy policies and strategies.

As a dominant water user in China, the energy industry is only smaller than agriculture in terms of water use and the largest water user among all industrial sectors. Through a water-extended multi-regional input-output model (WATER-MRIO model), virtual water flows embedded in energy trade among provinces are evaluated. This study also illuminates energy development policies and water management policies and then builds five scenarios of electricity generation, presenting combinations of cooling technology upgrading, adjustment of power generation mix and change in the spatial distribution of thermal power plants. Finally, the study evaluates water use under various energy development strategies.

### Key words:

Water-energy nexus; virtual water; input-output model; energy trade; China

## Exploring the Use of Deep Level Gold Mines for Underground Pumped Hydro Energy Storage in Karst Areas of South Africa

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### Abstract

The paper explores the feasibility of using deep level gold mines in dolomitic karst areas of South Africa to install underground pumped hydro energy storage (UPHES) schemes which not only prevent the post-mining flooding of mine voids and the associated pollution of overlying karst aquifers but also generate much needed peak-demand electricity. Hosting the deepest mines in the world the identified study areas provide shafts of up to 4 km depth allowing to exploit a significantly larger hydraulic head than commonly utilised at surface schemes. Possible combinations with the storage of renewable energy (wind, solar) and the extraction of geothermal energy are also discussed. Apart from assessing the economic feasibility of the concept the paper also covers peculiarities of its design (e.g. sourcing feed flow from overlying aquifers), selected engineering aspects (e.g. dimensioning of the turbines, diameter of pipes etc.) and the required underground infrastructure (e.g. storage capacity). Given the generally conducive conditions and encouraging preliminary results it is strongly recommended to conduct an in-depth investigation to assess the feasibility of implementing a world's first UPHES in South Africa. The concept has the potential to prevent abandoned mine voids becoming costly, long-term liabilities by turning them into assets that generate clean water and energy as critical elements for sustainable post-closure development in a water- and energy stressed economy.

### Key words:

Deep level mines; underground pumped hydro energy storage; feasibility; karst

## Fluctuations of Lake Baikal Level: Past Changes and Current Problems

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### Abstract

In the report the results of dendrochronological reconstruction of Lake Baikal level from 1750 to the present are shown. In the Baikal region the trees (*Pinus Sylvestris* L.) are reliable proxies of total precipitation amount variability, which determines the change in lake level fluctuations. Reconstruction identifies periods of high lake levels (1775-1795, 1825-1835, 1852-1856, 1865-1870) and a sufficiently long period of low levels (1795-1805, 1840-1850), which are in good agreement with the available historical data. It is revealed that the Lake Baikal level fluctuations have a 30-year periodicity.

In the report the consequences of modern extreme fluctuations of Baikal level caused by the commissioning of HPP cascade on the river Angara and low water content of the rivers flowing into the lake are examined. The high level contributes to erosion processes of coastline, including the unique ecosystem of shallow waters in the northern Baikal. Low levels appear in a negative impact on the organisms living in the coastal zone, groundwater regime change, sprawl algae colonies, etc. It concludes with recommendations for the conservation of the lake level regime.

### Key words:

Lake Baikal level; dendrochronology; water use

## Projected Impacts of Climate Change on Hydropower Potential in China

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### Abstract

Hydropower is an important renewable energy source which is sensitive to climate change. Future changes and associated uncertainties in China's gross hydropower potential (GHP) and developed hydropower potential (DHP) are projected using simulations from eight global hydrological models (GHMs) forced by five general circulation models (GCMs) with climate data under two representative concentration pathways (RCP2.6 and RCP8.5). Results show that the annual GHP is projected to change by -1.7 to 2% in the near future and increase by 3 to 6% in the late 21st century. The annual DHP is projected to change by -2.2 to -5.4% and -1.3 to -4% for 2020-2050 and 2070-2099, respectively. GHP will increase in northern China, but decrease in southern China where numerous reservoirs and large IHCs currently are located. The area with the highest GHP in Southwest China will have more GHP, while DHP will reduce in the regions with high IHCs (e.g., Sichuan and Hubei) in the future. The largest decrease in DHP (in %) will occur in autumn or winter, when streamflow is relatively low and water use is competitive. Large ranges in hydropower estimates across GHMs and GCMs highlight the necessity of using multi-model assessments under climate change conditions. This study prompts the consideration of climate change in hydropower development and operations in China.

### Key words:

Hydropower; Climate change; Hydrological modeling; Reservoir regulation; China

## Sedimentation and Carbon Sequestration in Xiaolangdi Reservoir, China

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### Abstract

Hydropower plants have been developed quickly to meet the demand of electricity and reduce of the carbon emission, especially in developing countries. When the dams are reconstructed, some trees, grass and soil will be submerged and the organic matters are decomposed and mineralized to CO<sub>2</sub> and CH<sub>4</sub> and emit to atmosphere. Despite the greenhouse gas emission from the water-air interface, large amounts of sediment deposit in the reservoir bottom and some amounts of carbon are preserved in the sediment. It is important to evaluate the carbon stock in the sediment deposits for the comprehensive understanding of carbon cycle in hydropower reservoirs. Xiaolangdi Reservoir, the last reservoir in the main Yellow River, was investigated in the current study. The volume of sediment deposition was up to approximately 3.07 billion m<sup>3</sup> in October 2014 when the mainstream delta vertex moved to 16.4 km upstream of the dam. During the operation of water impoundment and sediment detention for the Xiaolangdi Reservoir, the particle organic carbon (POC) concentrations in the reservoir water body ranged between 0.43 and 693.75 mg L<sup>-1</sup>. The spatial and temporal variations of carbon in the sediment deposits and water body increase the calculation uncertainty of carbon sequestration in the reservoir bottom. The large sedimentation volume and high POC in water body indicate a potentially big carbon sink in the Xiaolangdi Reservoir.

### Key words:

Sedimentation; Carbon Cycle; Particle Organic Carbon; Xiaolangdi Reservoir

## **Water Surface Temperature Variation for Large Lakes across the Tibetan Plateau Using MODIS Imagery**

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### **Abstract**

Lake surface temperature plays a vital role for aquatic ecosystems in both ecological functioning and biogeochemical processes. Remote sensing provides a powerful tool for assessing lake water surface temperature (LWST) variation, particularly for water bodies located in remote areas. In this study, MODIS land surface temperature (LST) product were used to examine LWST of Tibetan lakes with area > 50 km<sup>2</sup>. Altogether, 3620 daytime and 3720 nighttime imagery from MODIS/Terra and Aqua in clear-sky conditions from 2000 to 2015 were used. Qualified imagery data were built through visual inspection, and QA flags stored in the imagery products. In situ meteorological data and WST measured over lakes were used to validate the MODIS LST product, and the MODIS LST products matched well with in situ measured bulk lake water temperature ( $R^2=0.91$ ). It turned out that the LWST ranged from 11 to 28°C for lakes across the Tibetan Plateau during hot month starting mid-July to mid-August in day time. Generally, large and deep lakes (e.g., Nam Tso) located at high altitude show low temperature, while these shallow ones (e.g., Gas Hure Lake) sitting at low elevation present high temperature. Likewise, large LWST variation was observed at night time, ranging from 1.5 to 20°C. Our results also indicated that large diurnal LWST differences were exhibited (4.2-14.8°C), where water bodies with large volume demonstrate small diurnal difference (around 4°C); on the contrary, shallow ones exhibit relatively larger diurnal difference (around 15°C). In addition, lakes showed large diurnal difference in spring (8.53°C) than that in fall (4.81°C) for all lakes investigated. In summary, lake elevation, morphology, water supply source, and local air temperature are the major factors regulating LWST variations for lakes across the Tibetan Plateau.

### **Key words:**

MODIS imagery; bulk temperature; Tibetan Plateau; water supply source

## Reduced Energy Consumption in Wastewater Treatment Plants by Optimizing the Control of Effluent Quality

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### Abstract

Society faces an urgent need to adapt to reductions in energy consumption due to climate change, population growth, urbanisation and pollution. Wastewater treatment is an energy-intensive operation, caused by the vigorous aeration in the activated sludge process (ASP), contributing to over 55% of the energy costs associated with wastewater treatment. The quality of wastewater is generally assessed using biological oxygen demand (BOD), chemical oxygen demand (COD) and total organic carbon (TOC). However, these global parameters depend on expensive or time-consuming methods. Consequently, water utilities often over-aerate in order to ensure compliance with final effluent standards. This means that energy can be saved if an effective method is used for effluent quality monitoring. This study aims to use fluorescence spectroscopy as an innovative and robust method to monitor the chemical and microbiological quality of wastewater. The removal efficiency of OM in five wastewater treatment plants was investigated. Fluorescence was measured on samples collected from the inlet, primary settling tank, secondary settling tank and outlet. The measurements were correlated with BOD, COD and TOC. Moreover, the potential of using portable fluorimeters was explored in comparison to laboratory-based instruments. Good correlations were observed for wastewater samples between fluorescence intensity and BOD ( $r = 0.78$ ), COD ( $r = 0.90$ ) and TOC ( $r = 0.79$ ). The results indicated that fluorescence spectroscopy could be used for continuous, real-time assessment of DOM removal efficiency in wastewater treatment plants. [This work was supported by the Romanian Core Program OPTRONICA IV]

### Key words:

energy; wastewater treatment plants; fluorescence spectroscopy; organic matter

## C12.40 Water Sustainability

### Water Resources in Eurasia in the 21st Century



Home

#### Oral

1. [A Comparative Evaluation of Stone Spout Management systems in Heritage and non-Heritage Areas of the Kathmandu Valley, Nepal](#)  
Mira Tripathi (Lincoln University, New Zealand)
2. [Applicability Evaluation of Climate Forecast System Reanalysis Data for Hydrologic Prediction: A Case Study in the Bahe River Basin](#)  
HU Sheng; Cao Mingming; Qiu Haijun; Song Jinxi; Wu Jiang (Northwest University, China)
3. [China and Trans-Pacific Partnership Agreement Members: Consideration under the Framework of Virtual Water Trade of Agricultural Products](#)  
Yu ZHANG; Jinhe ZHANG; Guorong TANG; Hongsong PENG; Chang Wang; Huan Hu (Nanjing University, China)
4. [Contribution of Recycled Moisture to Precipitation in Oases of Arid Central Asia Based on Stable Isotope Approach](#)  
Shengjie Wang; Mingjun Zhang (Northwest Normal University, China)
5. [French Rhone River and Its Basin Harnessing](#)  
Zongxia CAI (IGSNRR, China)
6. [Institutional Responsibilities to Recharge Ground Water, Need for Policy Implementation: A Case Study of Banaras Hindu University Campus](#)  
Chanchal Shakya (Banaras Hindu University, India)
7. [Landscape-Hydrological approach to Water Management of Lake Baikal Catchment Area](#)  
Olga Gagarinova (Sochava Institute of Geography SB RAS, Russian Fed)
8. [Mechanism of Groundwater Recharge Using Hydrochemical and Isotopic Methods in Guanzhong Basin, China](#)  
Feihe Kong; Jinxi Song (Northwest University, China)
9. [Patterns of Natural and Anthropogenic Changes in Runoff of the Rivers Flowing Into the Seas in the Russian Arctic](#)  
Dmitry Magritsky; Natalia Frolova (Lomonosov Moscow State University, Faculty of Geography, 119991, Leninskie gory, GSP 1, Moscow, Russian Federation, Russian Fed)
10. [Spatial Patterns and Driving Factors of Conversion Coefficients for Free Water Surface Evaporation of](#)

[the Two Different Pan Evaporation in China](#)

Li Yanzhong (Institute of Geographic Sciences and Natural Resources Research, CAS, China)

11. [The Assessment of Ecological Restoration Effect of Comprehensive Treatment of Shiyangriver Basin Based on Gis—As the Spatial and Temporal Variation of Groundwater Level in Minqin Oasis for Example](#)

Yuanyuan Hao; Yaowen Xie (Lanzhou University, China)

12. [Using Different Parameterization Schemes to Assess the Changes and Variability of Seasonal River Flow in the Main River Basins of European Russia](#)

Maria Kireeva; Natalia Frolova; Ekaterina Rets; Natalia Efremova; Natalia Ezerova; Roald Dzhamalov; Viktor Juk; Valeriy Evstigneev(Lomonosov Moscow State University, Russian Fed)

## Poster

1. [Analysis of Water Security Dynamic Simulation and Variation Law in Karsts Ecological Fragile Areas Based on System Dynamics and Geographic Information System](#)

Yin Su (China, Chongqing Jiaotong University)

2. [Application of the Satellite System of the Earth's Gravity Field Measurement \(GRACE\) for the Evaluation of Water Balance in River Catchments](#)

Natalia Frolova; Leonid Zotov; Vadim Grigoriev (Russian Fed, Lomonosov Moscow State University)

3. [Estimation of Stream Flow Responses to Land Use Change in the Yan River Using SWAT Model](#)

Kaijie Yang; Changhe Lu (China, Key Laboratory of Land Surface Pattern and Simulation, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

4. [Integrated Assessment of Water Bodies in the Kharaa River Basin as a Prerequisite for IWRM Planning](#)

Daniel Karthe (Germany, Helmholtz Centre for Environmental Research)

5. [Response of Reference Evapotranspiration to More Variables in Watershed between Yangtze River and Huaihe River, China](#)

Lan-gong Hou; Youcun Liu (China, School of Civil and Architectural Engineering, Southwest University of Science and Technology); David Labat(France, Géosciences Environnement Toulouse (GET), Université de Toulouse)

## **A Comparative Evaluation of Stone Spout Management systems in Heritage and non-Heritage Areas of the Kathmandu Valley, Nepal**

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### **Abstract**

Management of water resources is a major challenge throughout the world and in many long-established societies people still use traditional water harvesting and management techniques. Despite often being seen as efficient and cost effective, traditional methods are in decline or have been abandoned in many countries. Nevertheless, traditional approaches continue to be useful in some countries such as Nepal. The extent to which such traditional measures, in this case via stone spouts, may survive modernization, while fulfilling socio-cultural and other needs is the focus of the research. The research develops an understanding of the socio-cultural and other values of stone spouts for the people of urban and peri-urban heritage and non-heritage areas of the Kathmandu Valley to help ongoing sustainable management of remaining spouts. Three research questions are addressed: the impacts of changes in social and cultural norms and values; development activities; and, the incremental and ongoing loss of traditional stone spout infrastructure. A meta-theory framework has been developed which synthesizes Institutional, Attachment, Central Place and Common Property theories, which form analytical lenses for the mixed-method research approach. From the exploration of the meta-theory approach, it was found that no spouts are in pristine condition but those in non-heritage areas are in better condition than those in heritage areas. "Utility value" is the main driver that still motivates people to conserve spouts.

### **Key words:**

Stone spouts; Meta-theory; Social and cultural norms and values

## Applicability Evaluation of Climate Forecast System Reanalysis Data for Hydrologic Prediction: A Case Study in the Behe River Basin

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### Abstract

In recent years, global reanalysis weather data has been used more often during the hydrology modeling around the world, but the results of simulation vary greatly. To discuss the applicability of CFSR (Climate Forecast System Reanalysis) data in the hydrologic prediction of watersheds, taking Bahe River Basin as a case, the paper uses two types of weather data (the conventional weather data and the CFSR weather data) to establish SWAT hydrologic model, and makes use of such evaluation methods as regression analysis, Nash-Sutcliffe Efficiency (NSE) and Percent Bias (PBIAS) to compare the simulation effect of both data. At last it puts forward CFSR weather data correction method. The research result shows: (1) although the quality of the CFSR weather data has some problems, it basically achieves a satisfactory result in the hydrologic simulation of Bahe river basin. The  $R^2$  of the simulated results is above 0.50; the Nash-Sutcliffe Efficiency (NSE) is above 0.33;  $|\text{Percent Bias (PBIAS)}|$  is below 14.8. (2) The simulated flow of the CFSR weather data is higher than the observed flow; the reason may be that there are more rainy days and the rainfall intensity is much stronger according to the estimation of day-to-day rainfall data by CFSR, which leads to the data will simulate a higher base flow and flood peak discharge in terms of the Water Balance. (3) The relation between the CFSR rainfall data and the observed rainfall data of Bahe river basin can be displayed by a power exponent equation:  $y=1.4789x^{0.8875}$  ( $R^2=0.98$ ,  $P<0.001$ ); the fitted equation of each CFSR station varies slightly from others. The equation just lays the theoretical basis for correction of the CFSR rainfall data.

### Key words:

CFSR; weather data; hydrologic prediction; applicability evaluation; SWAT model; Bahe River Basin

## China and Trans-Pacific Partnership Agreement Members: Consideration under the Framework of Virtual Water Trade of Agricultural Products

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### Abstract

Water scarcity has become increasingly severe in China. Virtual water trade is a useful tool to alleviate water shortage. China has a close relationship with Trans-Pacific Partnership Agreement (TPP) members. This paper focuses on a comprehensive study between China and TPP members from the perspective of virtual water trade of agricultural products and completes a diachronic analysis from 2001 to 2014. The results show that China was in trade surplus in relation to the virtual water trade of agricultural products with TPP members. The exported virtual water amounted to 7 billion m<sup>3</sup>/yr. while 63 billion m<sup>3</sup>/yr. was embedded in imported products. The trend that China exported virtual water per year was on the decline while the imported was on a rising trend. Virtual water trade between China and the TPP members generally conforms to the virtual water strategy, but with specific countries still need to adjust. The largest exported virtual water flow of China was to Japan while the largest imported was from Malaysia. Not all of the exported products had comparative advantages in virtual water content. Imported products were excessively concentrated on soya beans, palm oil and cotton. From the ethical point of view, TPP members were classified into four types in terms of “net import” and “water abundance”: mutual benefit countries; unilateral benefit countries; supported countries; and double pressure countries. Virtual water strategy can alleviate Chinese water shortage as well as TPP members, is beneficial for promoting water saving and adjusting trade structures.

### Key words:

virtual water; agricultural product; trade partner type; Trans-Pacific Partnership Agreement

## **Contribution of Recycled Moisture to Precipitation in Oases of Arid Central Asia Based on Stable Isotope Approach**

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### **Abstract**

Terrestrial moisture contributed by surface evaporation and transpiration, also known as recycled moisture, plays an important role in hydrological processes especially across arid central Asia. The stable hydrogen and oxygen isotopes can be used for water budget analysis to calculate the contribution of recycled moisture to precipitation between two locations along the moisture flow. Based on a three-component isotopic mixing model, the moisture recycling in oasis stations of arid central Asia during summer months is assessed. At large oases of Urumqi, the proportional contribution of recycled moisture to local precipitation is approximately 16.2%, and the mean proportions of surface evaporation and transpiration are  $5.9\% \pm 1.5\%$  and  $10.3\% \pm 2.2\%$ , respectively. At small oases like Shihezi and Caijiahu the contribution of recycled moisture is less than 5%, and the proportion of surface evaporation is much less than that of transpiration. The vegetative cover in arid central Asia is generally sparse, but the evapotranspiration contribution to precipitation cannot be ignored at the widely distributed oases. The oasis effect shows great variability depending on locations and water availability for evapotranspiration.

### **Key words:**

moisture recycling; water stable isotope; central Asia; oasis effect

## French Rhone River and Its Basin Harnessing

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### Abstract

The Rhone has been a typical fierce river in European history. The untamed river, suffered from fierce currents, shallows, and floods, was a mythological symbol of force, power and ruthless. Then, the Rhone became a tame river that made great contributions to the recent industrial revolution and modern economic development of France. 20 hydropower stations were built along the 500 km river reach, which set a world record in cascade development of river hydropower station. However, the era of cascade development of river hydropower station ended when France shifted its energy policy to rapid development of nuclear power since 1980s. Claims of environmental protection grew heater and heater. The Rhone basin harnessing entered an age of sustainable development by restoring and protecting natural ecological environment. Dams and dikes were torn down; wetlands and floodplains showed up. Perception, policy and technology about river basin harnessing changed dramatically during development of complicated relations between human beings and rivers. The Rhone basin harnessing centered on a development strategy of healthy river and river health, which provides precious experiences for Chinese river basins harnessing.

### Key words:

Rhone River; Basin Harnessing; Cascade Development of Hydropower; Restore Natural Ecology of River; Wetlands and Floodplains; Environmental Protection of River Basins

## **Institutional Responsibilities to Recharge Ground Water, Need for Policy**

### **Implementation: A Case Study of Banaras Hindu University Campus**

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#### **Abstract**

In some large cities of India situated in the Ganga plains, one of which is Varanasi, 50% of water supplied is tapped from the ground and hence ground water levels are falling down deeper and deeper year after year. Besides a large military cantonment and a large manufacturing unit (Diesel Locomotive Works), there are three large universities one of which is Banaras Hindu University, in Varanasi City. These institutions draw groundwater to meet their various needs. Banaras Hindu University alone occupying about 1270 acres, accommodating about 20000 residents (students and staff) is drawing about 20.00 lakhs liters per day through its 20 boreholes. Of course, it doesn't take a single drop of water from Corporation's supply. Since, it is extracting enormous volume of water every day; it should harvest rain water to recharge the ground water. Just as there are many policies/guidelines for individuals, there are policies/guidelines for institutions to tap ground water as well as responsibilities to recharge ground water. The current study emphasizes on, how much its campus can harvest out of the rain it receives and on the structures to impound the harvested water for some campus uses as well as recharge sources. Surface water yield is worked out and measures are suggested to take harvested water into the recharge structures.

#### **Key words:**

Groundwater; Extraction; Recharge; Institutional Responsibilities

## Landscape-Hydrological approach to Water Management of Lake Baikal Catchment

### Area

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### Abstract

The development of any area is related to water resources supply, which is a topical issue at the moment. The water reserves of Lake Baikal are a strategic resource for the Asian region and that makes the urgency of environmentally oriented development of its catchment area.

Water management, including the water resources use and water protection measures do not provide conditions for reproduction and preservation of high quality of natural waters, as they are directed primarily at preventing and eliminating the effects of negative water and environmental situations.

Previous studies on the Baikal Natural Territory show that the river basin management should be based on knowledge of the laws governing the formation and transformation of natural waters in the context of internal changes and external influences.

Landscape-hydrological approach to the research of the Lake Baikal catchment area reveals hydrological properties of individual landscapes, especially the formation of water-resource and hydro-ecological potentials of the territory. Analysis of the physical and geographical conditions, combined with environmental and socio-economic features of the territory makes it possible to identify the areas that are most important in the formation of qualitative and quantitative characteristics of natural waters, show the areas experiencing the greatest burden on the environment, identify areas with different resistance to human and natural impact. Functional zoning is the basis for the development schemes of water resources use and protection, the general development direction of the Baikal Natural Territory according to the water factor.

### Key words:

catchment; surface water; landscape; hydrological processes; ecology

## Machanism of Groundwater Recharge Using Hydrochemical and Isotopic Methods in Guanzhong Basin, China

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### Abstract

Based on stable isotopic ( $\delta D$  and  $\delta^{18}O$ ) and hydrochemical data, the sources of groundwater recharge and factors controlling them in the Weihe River basin in Shannxi province, China was demonstrated. Comparative analyzed isotopic values and hydrochemical data between surface water and groundwater of south tributaries, north tributaries and the main stream, it is found that the main hydrochemical pattern of the study area is  $HCO_3^- \bullet SO_4^{2-} - Ca^{2+} \bullet Na^+$  and precipitation is the main recharge source of groundwater. For the west area of Jinghe River of Weihe River basin, the dominate ions are  $HCO_3^-$ ,  $Ca^{2+}$  and  $Na^+$ , and in autumn the groundwater recharges from surface water while in winter the groundwater mainly accept the recharge from precipitation. For the east area, the pattern of groundwater recharging from the surface water and groundwater discharge into surfacewater exist in different place. For the south tributaries, in autumn the water type is  $HCO_3^- \bullet SO_4^{2-} - Ca^{2+}$  while in winter the water type is  $HCO_3^- - Ca^{2+} \bullet Na^+$  and the groundwater recharges mainly from the surfacewater in downstreams of south tributaries; and the groundwater recharges from the surfacewater seepage and precipitation infiltration occur in upstreams. For the main stream, the water type is  $HCO_3^- \bullet SO_4^{2-} \bullet Cl^- - Na^+ \bullet Ca^{2+}$  and the recharge relationship is complicated and frequent.

### Key words:

groundwater recharge; hydrochemistry and isotopes; the Guanzhong basin

## Patterns of Natural and Anthropogenic Changes in Runoff of the Rivers Flowing Into the Seas in the Russian Arctic

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### Abstract

Climate change together with water use generates changes in the runoff, morphological processes, hydro-ecological conditions, hydrological hazards, etc. Large-scale changes in the runoff of large rivers may affect the regime of the seas, and possibly the processes in the atmosphere. Runoff of the Arctic rivers is particularly prone to the current changes. Long-term fluctuations of annual runoff of such rivers in Russia have been established to contain alternation of periods with different runoff, upward trends. The trend exists due to increased runoff since the late 1980's - mid 1990's. As a result, the average runoff of most of the major rivers increased by 5–10% in 1976–2013, in comparison with 1935–1975. In the rivers of the North European part and Yakutia (except Kolyma), runoff increase is observed in all seasons. The volume of runoff in spring-summer flood increased on average by 2.5–7%. In the Ob and Yenisei, regulated by reservoirs, runoff reduction is observed over the entire period of open channel, in the Kolyma – only in the flood season. All the rivers demonstrates positive winter runoff dynamics, especially Ob (+17.9), Yenisei (+68.4), Lena (+46.3) and Kolyma (+169%). Water consumption in the Arctic river basins does not affect the fluctuations of river inflow in the Arctic seas, whereas the operation of large reservoirs has changed the regime of the rivers in the Kola Peninsula and in Karelia, as well as of the Ob, Yenisei, Lena and Kolyma rivers. The studies were performed due to RSF (No.14-37-0038).

### Key words:

Eurasian major rivers of Russia; runoff; hydroclimatic changes; water management

## Spatial Patterns and Driving Factors of Conversion Coefficients for Free Water Surface Evaporation of the Two Different Pan Evaporation in China

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### Abstract

Pan evaporation measurement is considered as the most practical, stable and reliable method to estimate free water evaporation. Determining the conversion coefficient ( $K_p$ ) among various pans evaporation is necessary for scientifically detecting and comparing evaporation trend. Using the evaporation data of the 20 cm pan ( $\phi 20$ ) and the E601B from 541 Chinese meteorological stations from 1998 to 2001, this study estimated monthly variation and spatial distribution of  $K_p$  for the two pans evaporation, and explored its possible underlying mechanisms. Results showed that (1) the two pans evaporation shared similar spatial patterns, and exhibited good correlation. The  $K_p$ , with a great deal of geospatial heterogeneities, varied prominently from 0.46 to 0.92 with mean of 0.60 in warm season across China and 0.49 to 0.81 with mean of 0.66 in cold season in humid regions. Higher and lower  $K_p$  were detected in the southeast and northeast regions of China in warm season (May-September), while in southeast and east of humid area in cold season (October to April). Moreover, the  $K_p$  differed significantly by month, characterized by increase trend in warm season for all regions, and a continued increase to December or January and then decrease to April for humid regions. (2) The net radiation was the dominant climatic factor accounting for  $K_p$  variation with better correlation and stronger explanation power in most of regions, followed by the relative humid and vapor pressure deficit. The combined explanation rate was 23.1% with regional difference. (3) Although we found the overwhelming control of climate on  $K_p$  spatial variability, the climatic factors employed in this study explained a much smaller fraction, indicating more complicated mechanisms underlying the distribution of  $K_p$ , including pan area, water depth, installation. (4) Compared to global typical pans (Class A, GGI-3000,  $\phi 20$ ), the E601B exhibited a better performance in depicting the free water evaporation and was recommended for estimating reference evapotranspiration and hydrological studies.

### Key words:

conversion coefficient; pan evaporation; E601B; 20 cm pan; climatic factors

## The Assessment of Ecological Restoration Effect of Comprehensive Treatment of Shiyangriver Basin Based on Gis

### —As the Spatial and Temporal Variation of Groundwater Level in Minqin Oasis for Example

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#### Abstract

Ecological restoration effect evaluation not only is the important way to judge the effect of ecological restoration, but also one of the hot spots of current research. Comprehensive Treatment of ShiyangRiver Basin (CTSRB) is one of the important measures for ecological restoration in Shiyang river basin, its main purpose is to restore the groundwater level in the Minqin oasis. In this paper, we used geostatistics and spatial analysis methods to study the spatial and temporal variation of groundwater level from 2000 to 2015. The results illustrate that in the study area, the groundwater level in Minqin oasis was declined sharply, which the largest drop of 5.15 m and the “water funnel” appeared and expanded gradually before CTSRB (2000-2005 a); afterwards, the groundwater level continue declined sharply and remarkably, which the largest drop even up to 34.82 m and thus that the “water funnel” deepening and expanding rapidly at the preliminary period of CTSRB (2006-2010 a); but by the later period of CTSRB (2011-2015 a), the groundwater level began to slowly rebound, which the highest rise up to 8.45 m and the area of the “water tunnel” began narrower more and more gradually. Thus it can be seen that CTSRB has a certain positive role about recovery of the groundwater level in Minqin oasis, but this impact has certain hysteresis effect and will be more pronounced in the coming years.

#### Key words:

The assessment of ecological restoration effect; Comprehensive Treatment of Shiyang River Basin; Minqin oasis; the groundwater level; spatial and temporal variation; GIS

## Using Different Parameterization Schemes to Assess the Changes and Variability of Seasonal River Flow in the Main River Basins of European Russia

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### Abstract

New intelligence on the mechanism of seasonal and occasional flood formation has been achieved. Based on data for the period 1946-2015 yy. Changes in the coefficient of natural runoff regulation were identified. It is shown that the transformation of spring flood type is closely related to the other phases of the water regime. Mostly it connected with the changes in the characteristics of occasional floods in different seasons (spatially winter thaws). Statistical analysis shown, that these changes are various in different geographical regions. The role of peak flow increase in the central and in the southern sub regions, while on the north it decreases. Through the author's original program, based on the genetic daily hydrograph separation, according to the methodology of B.I. Kudelin, the calculations of seasonal flood characteristics were done. After that the parameterization scheme of these changes was created. The main selected parameters include maximum to the 5-day minimum ratio, seasonal peak in compared to flash flood maximum, the minimum flow during summer and winter for the annual. It is shown that, the most of the rivers is characterized by reduction in these rates exponentially. Series of the inequalities describing the state and variability of water resources have been developed.

The study was supported by the Russian Science Foundation (grant No. 14-17-00155) in data and materials and Russian Foundation for Basic Research (grant No. 16-35-60080) in methodology and calculations.

### Key words:

Water resources; seasonal runoff; water regime; spatiotemporal analysis; hydrological rates

## Analysis of Water Securitydynamic Simulation and Variation Law in Karsts Ecological Fragile Areas Based on Systemdynamics and Geographic Information System

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### Abstract

Limited water resources are available for human use within a certain time and space. In this study, system dynamics (SD) and geographic information system (GIS) were combined to establish an evaluation index system. GIS method performs qualitative analysis from the perspective of space and SD method performs quantitative calculation about related water security problems from the perspective of time. We established a water security system model for Guizhou Province, China to analyze influential factors, main driving factors and system variation law using SD method. We simulated the water security system from 2005 to 2025 under four scenarios (Guiyang model, Zunyi model, Bijie model and concerted development model). The results demonstrate that: (1) The water resources of the three cities is secure in Guizhou Province. Four cities are situated in the basic security and two cities are situated in the insecurity from the space dimension of GIS through water security synthesis. (2) The major driving factors of the water security system in Guizhou Province include the agricultural irrigation water demand, soil and water losses area, ratio up to the Standard of water quality and the investment of environmental protection. The concerted development model is the best solution for water security system by 2025 in Guizhou Province under the four scenarios from the time dimension of SD.

### Key words:

Water security; scenario parameters; System dynamics; Geographic information system

## Application of the Satellite System of the Earth'S Gravity Field Measurement (GRACE) For the Evaluation of Water Balance in River Catchments

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### Abstract

Space-based Earth observing systems provided a substantially large amount of information to the scientific community in recent decades. One of the most important contributions of these data sets is their use to study Climate Change. Cumulative effects of redistribution of masses in the Earth system can be seen in the changes of the gravity field of the Earth. Gravity Recovery and Climate Experiment (GRACE) satellites, launched 17.03.2002 from Plesetsk, provide a set of monthly Earth's gravity field observations. GRACE data is very useful for hydrological and climatological studies, especially over large territory, not completely covered by the meteorological and hydrological networks, like Russia. Possible application of the satellite gravity survey data obtained under the GRACE for solving various hydrological problems is discussed. The GRACE-based monthly gravity field data are transformed into the maps of water level equivalent and averaged for the catchments of the largest rivers of Russia. The temporal variability of the parameter is analyzed. Possible application of the GRACE data for the evaluation of particular components of water balance within the largest river basins of the European part of Russia is discussed. After averaging over 15 large Russian rivers basins annual component shows amplitude increase since 2009. Trend component grows until 2009 and then reaches a plateau. It is mostly dominated by Siberian rivers. Map for the trend show gravity field increase in Siberia, at Black Sea and decrease over Caspian Sea since 2003. The studies were performed due to RSF (No.14-37-0038).

### Key words:

monitoring; satellite gravity survey; GRACE; water resources

## Estimation of Stream Flow Responses to Land Use Change in the Yan River Using SWAT Model

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### Abstract

This study quantified stream flow responses of the Yan River to land use change. As a key area of the Grain for Green Project implemented in 1999, the Yan River Basin, located on the Loess Plateau, has experienced substantial land use changes since then, and could induce a change in stream flow.

Firstly, the Soil and Water Assessment Tool (SWAT) model was parameterized and the modelling performance was evaluated by the Nash-Sutcliffe efficiency and Coefficient of Determination. Then, two land use maps in 1999 and 2010 were used to simulate the effect of land use change on stream flow. With same climate records of 1999-2010, annual stream flow was simulated under land use condition of 1999 and 2010, respectively; then the average value of annual stream flow was calculated and analysed. The results show that 1) SWAT model has relatively satisfactory modelling performance in the Yan River; 2) Land use change during 1999-2010 has induced a 1.52 mm stream flow decrease in the Yan River as well as reduction of the inter-annual stream flow variability indicated by decrease of the Coefficient of Variation from 0.42 to 0.39; 3) The differences of annual stream flow between two scenarios show negative linear correlation with annual stream flow amounts with coefficient of 0.86. Results of this study indicate that land use change have not only reserved more water but also enhanced the inter-annual dampening capacity of the hydrologic system in the Yan River.

### Key words:

stream flow responses; land use change; SWAT modelling; inter-annual variability

## Integrated Assessment of Water Bodies in the Kharaa River Basin as a Prerequisite for IWRM Planning

Karthe D and the IWRM MoMo Project Team

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### Abstract

The Kharaa River Basin in Northern Mongolia was selected as the study region for a project aiming at the conceptualization and implementation of a model framework for integrated water resources management in Mongolia and neighboring regions of Central Asia. In this context, a multidisciplinary study on hydrology, hydro-morphology, climatology, water quality and aquatic ecology was conducted between 2006 and 2013. The results allow, for the first time in this region, the development of a science-based water management concept.

Key findings include the following:

- Climate change will most likely not have a major effect on the available water quantity. However, land use changes are likely to modify regional hydrological cycles. Deforestation in the headwater regions is specifically relevant in this regard.
- When compared to water bodies in other parts of the world, the water quality in the Kharaa and its tributaries is good to moderate. However, high fine sediment loads caused by grazing pressure in the floodplain and resultant riverbank erosion in the floodplains, and heavy metals released by mining activities and energy production are problematic.
- Ecologically, the river system is in a good to moderate state, but with a clear longitudinal gradient. Nutrient levels are increasing and elevated downstream of urban wastewater influxes. The accumulation of heavy metals in sediments and aquatic biota indicate that water pollution has reached levels that are relevant for aquatic ecology and potentially public health.

These findings are currently being introduced into river basin management planning in the region.

### Key words:

Mongolia; Kharaa River Basin; IWRM

## Response of Reference Evapotranspiration to More Variables in Watershed between Yangtze River and Huaihe River, China

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### Abstract

The standardized FAO56 Penman–Monteith model, which has been the most reasonable method in most climatic conditions, provides reference evapotranspiration (ET<sub>o</sub>) estimates for planning and efficient use of agricultural water resources. Response analysis is important to understand the relative importance of climatic variables to the variation of reference evapotranspiration. And more variables are used to analyze response of reference evapotranspiration, more helpful to cognition of ET<sub>o</sub> response to climate change. In this study, a non-dimensional relative sensitivity coefficient was employed to analyze responses of ET<sub>o</sub> to perturbations of five climatic variables in the watershed between Yangtze river and Huaihe river China. A 35-year historical dataset of daily air temperature, sunshine duration, wind speed, saturation vapor pressure deficit and atmospheric pressure in the watershed between Yangtze river and Huaihe river was used in the analysis. Results have shown that daily sensitivity coefficients exhibited large fluctuations in a year, and saturation vapor pressure deficit was the most sensitive variable in general for the watershed, followed by atmospheric pressure, air temperature, wind speed and sunshine duration. In the recent 35 years, variations of yearly sensitivity coefficients were more stability. Among all sensitivity coefficients, the average yearly sensitivity coefficient of wind speed and atmospheric pressure showed larger spatial variability. Uniform distribution of sensitivity coefficients for air temperature, saturation vapor pressure deficit and sunshine duration was also found, which was similar to the distribution of the three climate variables.

### Key words:

Sensitivity coefficient; FAO Penman–Monteith model; Watershed between Yangtze river and Huaihe river

## C12.41 Geomorphology and Society (GAS & IAG)

### Geomorphological Hazards For a Sustainable Society (Sponsored by the IAG)



Home

#### Oral

1. [A New 'Hybrid Complexity' Approach to Modeling Changes in Estuary Hydrodynamics and Extreme Flood Levels at 10 to 100 Year Timescales](#)

Jon French; Helene Burningham; Gillian Thornhill (UCL Department of Geography, University College London, UK, United Kingdom)

2. [Debris Flow Hazards Emergency Assessment Method and Its Application](#)

Yan Yan; Peng Cui (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)

3. [Geoarchaeology: Man and Environment in Past Times](#)

Morgan DE DAPPER (Ghent University, Belgium)

4. [Geomorphic Constraints to Urban Development in National Capital Territory of Delhi \(India\)](#)

Naveen Singh (M.M.H. (PG) College Ghaziabad, India)

5. [Human Adaptation Technology to River Bank Erosion in the Jia Dhansiri River, Assam, India: A Case Study of Five Villages](#)

Rana Sarmah (Pandur College, India)

6. [Landslide Risk Perception and Exposure in Teziutlán, Puebla, Mexico](#)

Irasema Alcántara Ayala; Ricardo Javier Garnica Peña (Institute of Geography, National Autonomous University of Mexico (UNAM), Mexico); Ana Rosa Moreno (Faculty of Medicine, National Autonomous University of Mexico (UNAM), Mexico City, Mexico); Karina Landeros-Mugica; Javier Urbina-Soria (Faculty of Psychology, National Autonomous University of Mexico (UNAM), Mexico City, Mexico)

7. [Mapping of Global-Scale Landslide Susceptibility Based on GIS and Method of Logistic Regression](#)

Le Lin; Qigen Lin; Ying Wang (Beijing Normal University, China)

8. [Risk Monitoring: Dynamics of Exposure to Mountain Hazards](#)

Margreth Keiler (University of Bern, Institute of Geography, Switzerland); Sven Fuchs (University of Natural Resources and Life Sciences, Institute of Mountain Risk Engineering, Austria); Veronika Röthlisberger (University of Bern, Institute of Geography, Switzerland)

9. [Spatial-temporal Dynamic Monitoring of Vegetation Recovery after the Wenchuan Earthquake](#)

Wentao Yang (Beijing Forestry University, China); Wenwen Qi (Beijing Aerospace TITAN Technology

Co., LTD, China)

## Poster

1. [Benefit Evaluation for Comprehensive Control in Small Watershed of Guangdong Province](#)  
Meili Wen; Qinghua Gong; Long Yang (China, Guangzhou Institute of Geography)
2. [Changing Pattern of Channel Morphology of Alaknanda River in Srinagar Valley \(Garhwal Himalaya\), India](#)  
Devi Datt Chauniyal; Surajit Dutta; Sapna Semwal (India, Department of Geography, HNB Garhwal University, Srinagar (Garhwal))
3. [Distribution of Landslides on Each Landforms Unit Based on Geomorphological Approach in Merawu Sub-Watershed, Indonesia](#)  
Gerry Utama; Djati Mardiatno (Indonesia, Faculty of Geography Universitas Gadjah Mada)
4. [Early-warning Model for Clustering Shallow Landslides Induced by Extreme Rainfall in Southern Mountain Areas of China](#)  
Qinghua Gong; Guangqing Huang; Jun Wang (GuangZhou Institute of Geography)
5. [Examining the Zuru Gullies of Kebbi State, Northwest Nigeria\(1994-2014\)](#)  
Sheikh Abubakar (Nigeria, Ibrahim Badamasi Babangida, University, Lapai)
6. [Geomorphic Expression of paleo-earthquakes on the Minle-Damayng Fault, Middle of the Hexi Corridor, Northwest China](#)  
Youli L; Jianguo Xiong; Weilin Xin (China, Peking University)
7. [Influences of Exogenic and Endogenic Processes on Landslide Orientation](#)  
Yi-Chin Chen; Kang-Tsung Chang; Jr-Chuan Huang (China Taiwan, Taiwan University)
8. [Landslide Dams on Large Chinese Rivers: An Under-estimated hazard?](#)  
David Higgitt (China, University of Nottingham Ningbo China)
9. [Morphological Dynamics of River Bank Erosion: A Case Study of Brahmaputra River System in Assam; India](#)  
Nikhil Roy; Bindhy Wasini Pandey (India, University of Delhi)
10. [Potential Risks of Natural Hazards in Kayseri Region, Central Turkey](#)  
Yuichi Hayakawa (Japan, The University of Tokyo); Hiroyuki Obanawa (Japan, VisionTech Inc.); Hidetsugu Yoshida (Japan, Meiji University)
11. [Sedimentological Characterization and Microsurface Texture Influence on Slope Instability, Garhwal Himalaya \(India\)](#)



Vijendra Kumar Pandey; Sharma Milap Chand (India, Jawaharlal Nehru University, New Delhi (INDIA))

12. [The Space Distribution of Houses at Debris Flow Prone Area and Its Role in Disaster Risk Reduction](#)

Yu Lei (Singapore, Institute of Mountain Hazards and Environment, CAS); Peng Cui (China, Institute of Mountain Hazards and Environment, CAS)

## **A New ‘Hybrid Complexity’ Approach to Modeling Changes in Estuary Hydrodynamics and Extreme Flood Levels at 10 to 100 Year Timescales**

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### **Abstract**

The risk of extreme coastal flooding is expected to increase with climate change, especially in estuary floodplains susceptible to inundation during tidal surges. Estuary hydrodynamics are well understood but propagation of surges and extreme water levels can be modified significantly by changes in estuary morphology. We currently have only a limited ability to predict morphological change at time scales relevant to management of flood risk under climate change. Conventional (‘reductionist’) hydrodynamic and sediment transport models often perform poorly at longer timescales and estuary morphodynamics are increasingly modelled using ‘synthesist’ approaches that capture behaviour that emerges naturally at broader time and space scales. However, non-linear interaction between tidal hydrodynamics and morphology means that it is useful to retain some hydrodynamic complexity in models of estuary morphological change over 10 to 100+ year timescales. We present a novel approach to mesoscale estuary morphological evolution that combines 1D simulation of tidal channel hydrodynamics, parameterised 2D representation of tidal flat dynamics driven by fetch-limited waves, and more empirical representation of 2D variation in salt marsh morphodynamics. We use this in combination with a full 2D shallow water equation model to simulate changes in extreme flood levels at 100 year timescales that include the effect of changes in estuary morphology due to sedimentary processes and realignment of flood defences to accommodate sea-level rise.

### **Key words:**

estuary; storm surge; flood risk; hydrodynamic model; landform evolution; marine geohazard; participatory modelling; geomorphology and society

## Debris Flow Hazards Emergency Assessment Method and Its Application

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### Abstract

Emergency assessment is extremely useful in urban hazard reduction and post-hazard reconstruction at hazard prone region. It is also imperative to the development of sustainable society at mountainous countries. In this paper, we have developed a debris flow emergency hazard assessment method and its application. This method was based on the analysis of the unmanned aerial vehicle aerial photography data. From the aerial photographs, the information on sediment thickness and diameter of the large particles in debris flow deposition zone were extracted and analysed. This information allowed us to retrieve flow path, and dynamic parameters of debris flow including velocity, impact force, and momentum of debris flow. The availability of these debris flow parameter can be used to derive a quantitative analysis of destructive degree due to debris flow in its deposition area, as well as to carry out the rapid assessment of hazard. This proposed method could carry out dynamic inversion for specific location over the whole area, and make a quantitative analysis of the damage within the debris flow deposition zone after the hazards. The application of this method will be very instrumental for the post hazards relief and reconstruction operation. As a case study, the method is applied to the quantitative analysis of a specific debris flow event in Wenchuan earthquake area.

### Key words:

debris flow; hazards emergency assessment; dynamic inversion; degree of damage

## Geoarchaeology: Man and Environment in Past Times

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### Abstract

The term 'Geoarchaeology' was first used in 1973 by BUTZER, a geomorphologist who did important research on archaeological sites in Egypt.

There are numerous definitions for Geoarchaeology and its related terms: 'Archaeometry', 'Bioarchaeology', 'spatial archaeology', 'Archaeological geology', 'Environmental Archaeology', 'Landscape Archaeology'. They are all formulated from a different point of view, giving away as much about the authors and time spirit of the definitions than about geoarchaeology itself. However, all of these definitions have in common the combination of geo-sciences and archaeology.

Geoarchaeology has often been described as a one-way relationship between the geo-sciences and archaeology. The 'geologic' arsenal is treated as mere 'auxiliary' tools which are only 'at the service' of archaeology. It is a 'one way' definition which does not stress the mutual interest between geo-sciences and archaeology. Indeed, Man himself is an important actor in the complex human-environmental relationships. BUTZER expresses this very well: "Human populations have always interacted with their environment in multiple ways, using it, shaping it, and devising alternate ways to bend its constraints – but also abusing it and sometimes degrading it. At the core of human history is a long tradition of persistence in the face of adversity and resilience in the throes of crisis". This statement will be illustrated by examples from research in Italy, Syria and Egypt.

### Key words:

Geoarchaeological research; Italy, Syria; Egypt

## Geomorphic Constraints to Urban Development in National Capital Territory of Delhi (India)

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### Abstract

Geomorphic setting, which plays a vital role in urban planning and development, is regrettably ignored in planning of most of the Indian cities. Town planners and policy maker are sufficiently unaware whether the land, which has been chosen for urban development, is geomorphologically suitable or unsuitable. Consequently some of the urban land shows a mismatch between adopted land use and geomorphic setting. The proper realization of the effects of geomorphic setting and surface processes may be helpful in classification of suitability of land for different urban uses. Delhi, which has an ancient origin, has been destroyed and built several times. Rapid population growth especially during last six decades has led to physical expansion of the city. Despite physiographical, topographical, hydrological and seismic constraints, Delhi continues to expand towards its periphery and much of the suburban area has been added into its urban limit. These constraints have become even more critical as the rate of urbanization increases. Therefore it becomes essential to analyze the geomorphic constraints to urban development of Delhi in order to measure the geomorphic capability of the area. The present paper attempts to find out topographical, physiographical, geological and hydrological constraints to urban development of Delhi by applying geomorphic information.

### Key words:

Geomorphic process; geomorphic capability; urban development

## **Human Adaptation Technology to River Bank Erosion in the Jia Dhansiri River, Assam, India: A Case Study of Five Villages**

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Key words: Human Adaption, Bank erosion, Jia Dhansiri River

### Abstract

This study is an attempt to examine the human adaptation technology to river bank erosion in the Jia Dhansiri River at five villages during a period of 15 years 2000-2015. The study adopted the method of superimposition of bank lines of variously dated maps and satellite imageries for examination of the bank erosion hazard and interview method through personal household survey using a questionnaire for examination of human adaption technology. It is found that more than 60% and 81% land area of the villages under study are engulfed by the river during 2000-'06 and 2000-'15 respectively. Thus, river bank erosion is found to be an extremely dominant fluvial hazard in the Jia Dhansiri River at five villages under study. This study reveals that bank erosion affected families living based on crops grown in own agricultural lands has been decreased from 89% to 65% during 2000-'06 and 65% to 45% during 2006-'15. Families living through earnings from paid agricultural labour has been increased from 6% to 21% during 2000-'06 and 21% to 22% during 2006-'15. Families who have opted secondary occupation after losing their lands on bank erosion has been increased from 7% to 13% during 2000-'06 and 13% to 32% during 2006-'15. It is also found that there were no families living based on tertiary occupation during 2000-'06, which has been increased to 2% during 2006-'15. It is examined that people of the five villages under study has responded to bank erosion hazard mostly by changing their occupation.

### **Key words:**

Human adaptation; River bank erosion; Jia Dhansiri River

## Landslide Risk Perception and Exposure in Teziutlán, Puebla, Mexico

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### Abstract

Disaster risk reduction involves complex processes not only to mitigate, but to avoid the creation of new risks. Landslide disaster risk is particularly multifaceted since landslide controlling factors can be both, natural and human induced. Aiming at establishing risk communication strategies, in the municipality of Teziutlán, Puebla, Mexico, an area that has been historically affected by landslides, landslide risk perception analyses have been carried out. Such analyses were undertaken in Juarez and Xoloco, two neighbourhoods highly exposed to landsliding. Risk perception surveys were constructed by conducting in-depth interviews, followed by the application of a pilot study derived from in-depth interviews, and preparing the final version of the questionnaire accordingly. Questionnaires comprised more than 200 questions and covered five major topics: (1) Landslide experience; (2) Landslide risk awareness; (3) Exposure; (4) Preparedness; and (5) Risk communication and trust. In addition to risk perception analyses, field recognition and survey in both neighbourhoods was carried out by using an unmanned aerial vehicle (UAV), a DJI-Phantom 3 drone, in order to map the different degree of exposure to landslides. Results of the potential linkages between risk perception, particularly of exposure, and actual landslide exposure conditions, derived from the survey are presented in this paper.

### Key words:

Landslides; risk perception; exposure; risk communication; disaster risk; unmanned aerial vehicle; drone

## Mapping of Global-Scale Landslide Susceptibility Based on GIS and Method of Logistic Regression

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### Abstract

Using a self-built database of global landslides, this paper proposes a quantitative model for mapping landslide susceptibility based on logistic regression. After investigating explanatory factors for landslides in the existing literature, five factors were selected to model landslide susceptibility: relative relief, extreme precipitation, lithology, ground motion and soil moisture. When building model, 70% of landslide and non-landslide points were randomly selected for logistic regression, and the others were used for model validation. For evaluating the accuracy of predictive models, this paper adopts receiver operating characteristic (ROC) curve method. Logistic regression experiments on six datasets found all five factors to be significant in explaining landslide occurrence on a global scale. During the modelling process, percentage correct in confusion matrix of landslide classification was approximately 80% and the area under the curve (AUC) was nearly 0.90. During the validation process, the above statistics were about 80% and 0.85, respectively. Experimental outcomes for all six datasets were similar, which indicates that the model has strong robustness and stable performance. Existing studies of landslide susceptibility mapping have generally used qualitative methods based on expert knowledge and semi-quantitative methods. The accumulation of global landslide data makes it practical to mapping landslide susceptibility quantitatively. This quantitative assessment found that at a global scale, extreme precipitation dominates the occurrence of landslides and topographic factors are secondary. Soil moisture, which has not received much attention in quantitative studies, has a significant contribution on landslide occurrence.

### Key words:

global scale; mapping; landslide susceptibility; explanatory factor; logistic regression

## Risk Monitoring: Dynamics of Exposure to Mountain Hazards

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### Abstract

Disaster risk is continuing to increase, main drivers are environmental change influencing hazard processes, but also greater numbers of vulnerable people and assets located in exposed areas. Techniques to monitor risks and the effects of the risk reduction instruments are essential for improving disaster risk management. This study takes as starting point for risk monitoring a co-evolutionary perspective to understand the dynamics of exposure to mountain hazards in the European Alps. A spatially explicit object-based temporal assessment of elements at risk to mountain hazards (river floods, torrential floods and debris flows) in Austria and Switzerland is presented for the period 1919-2012. The assessment is based on two different datasets, (a) hazard information using legally binding land use planning restrictions, and (b) information on the building stock/residential buildings combined from different spatial data available on the national level. We discuss these dynamics trans-disciplinarily and focus on economic, social and institutional interdependencies and interactions between human and physical systems. The results show that some regions have a strong increase in assets exposed to hazards over the monitoring period, while other regions are characterised by a below-average development. The results indicate stable hot spots, which mirrors the topography of the countries, but also the different economic activities and political settings within the different regions. A co-evolutionary framework widens the explanatory power of multiple drivers to changes in risk and risk monitoring enables to support a change in natural hazard management from a structural, security-based policy towards an integrated, risk-based management system.

### Key words:

Risk monitoring; natural hazard management; co-evolutionary perspective; exposure; drives of disaster risks; spatiotemporal analysis; path-dependency; European Alps

## Spatial-temporal Dynamic Monitoring of Vegetation Recovery after the Wenchuan Earthquake

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### Abstract

Major earthquakes can be important disturbances to mountain ecosystem. The spatial and temporal influence of such disturbances to post-seismic vegetation is unclear. This paper uses 16-day interval MODIS NDVI time series from 2000 to 2014 to track vegetation recovery processes after the Ms. 7.8 Wenchuan earthquake. To assess vegetation conditions, Savitzky-Golay filter and cross-correlogram spectral matching (CCSM) were used to overcome cloud and phenology influences. Then, change vector analysis (CVA) was applied to measure post-seismic vegetation recovery conditions for each year. Finally, trend analysis is carried out to classify post-seismic vegetation conditions into three recovery types: recovering, fluctuating and deteriorating. Spatial analysis shows that low elevation and southern slope aspects are favorable for post-seismic vegetation recovery, whereas vegetation at higher elevations above 3000-meter experience difficult recovery processes. These results demonstrate that major earthquakes may have long and important influences on high mountain vegetation, and more care should be taken to these locations after mountain disasters.

### Key words:

post-seismic vegetation recovery; time-series of images; spatial analysis

## Benefit Evaluation for Comprehensive Control in Small Watershed of Guangdong Province

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### Abstract

Many small watersheds have been took measures of comprehensive control to reduce flood disaster and soil loss in recently years in Guangdong province. Now that was a problem how to evaluate the benefit of control. This paper reviewed construction rules of indicator system of benefit assessment for comprehensive management in small watersheds in China. Then according the characteristic of small watershed in Guangdong province, 4 benefit types (flood protection and disaster reduction, ecological, economic and social benefit) and 21 indices were chosen to evaluate the benefit of comprehensive control of soil and water conservation of Guangdong, using national standards, frequency in references, theoretical derivation, and selection of specialists. The study gave the method of data standardization and built the fuzzy comprehensive evaluation model. The model was used in a small watershed named Yao'an of Guangdong province. The result showed that: (1) chosen indices system and evaluation model can present the comprehensive benefit of soil and water conservation of small watershed, were suitable in the region of Guangdong province and the similar zone, and also the scientific basis of policy decision for government department. (2) Comprehensive whole benefit and four single benefit improved to varying degree from 2007 to 2013 in Yao'an small watershed, with the most increase in flood protection and disaster reduction benefit and economic benefit.

### Key words:

Quantitative benefit evaluation; Small watershed; Comprehensive control of Soil and water conservation; Guangdong province of China

## Changing Pattern of Channel Morphology of Alaknanda River in Srinagar Valley (Garhwal Himalaya), India

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### Abstract

Srinagar is a famous cross road town along the Badrinath NH 58 of the Garhwal Himalaya, located at the left bank of Alaknanda River. The Alaknanda River is a most significant tributary of Ganga and forms an 8 km long and 3 km wide valley locally known as the Srinagar Valley. The purpose of the present study is to highlight the recent landform changes in the Alaknanda channel course after Kedarnath disaster 2013.

The disastrous Kedarnath flood completely changed the channel morphology of the Alaknanda river. The river changed its course at Srikot, SSB and Sriyantra Tapu. The lower terraces were silted by sands at Ranihat, SSB, Bhaktiyana and Sriyantra Tapu. A new depositional terrace is also formed just opposite of Sriyantra Tapu. New lateral channel bars, braided channels, back swamp, rapids, pools and river souls are identified in the channel course of the river. Shifting of channel course at Chauras is a very serious problem to the Garhwal University Campus. The river undercut the terrace scarp which is still in process. About 2-5 m silt was deposited on the lower terrace at SSB, and ITI. At Srikot river bed was upgraded to 4.60m during 2013 flood. Shifting of channel course of the river arises many problems in the valley. Out of these the natural landforms are changing into anthropogenic landforms. Urbanisation, sand and boulders mining, construction of dams, road, hydroelectric canal, etc are the prominent examples.

### Key words:

Alaknanda; channel bars; upgraded; anthropogenic landforms

## **Distribution of Landslides on Each Landforms Unit Based on Geomorphological Approach in Merawu Sub-Watershed, Indonesia**

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### **Abstract**

The Merawu Sub-Watershed is a part of Serayu Watershed located in Central Java Province, Indonesia. Exogenous processes that occur is very intensive such as rainfall, weathering and the arrangement of topography with steep slope and thick soil material to trigger the occurrence of landslides in this region. This study aims to 1). Identify the types of distribution of landslides that occurred on each unit of landforms, 2). Determining the level of potential landslides occurrence based on the density of landslides.

The research method is done by census aims to collect distribution of landslides data and types of landslides. Measurement of the thickness of soil by conducting transect method. The analysis is done by descriptively to explain the relationship between the distribution of landslides using geomorphological aspects morphology, morphogenesis, morphochronology, and morphoarrangement.

The results of this study showing a link between landforms and distribution of landslides. High potential for landslides on steep slope conditions, and soil characteristics is thick. Landuse evolved into one of the factors that influence the occurrence of landslides in Merawu Sub-Watershed.

### **Key words:**

landslides; geomorphological approach

## Early-Warning Model for Clusteringshallow Landslides Induced Byextreme Rainfall in Southern Mountain Areas of China

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### Abstract

Extreme rainfall-induced landslides usually gathered in a small watershed caused great harm in South China. Those landslides formation mechanism are essentially different from general rainfall pattern of landslides. Geological environment has a unique regional characteristic in South China. In this study, the river basin was selected as the basic unit to deduce landslide processes and mechanisms under different rainfall intensity conditions. The rainfall threshold will be calculated by couple the landslide hydrological model and landslides stability model. Through the analysis of the response mechanism of slope for the heavy rains insouth china, coupledthe hydrological model and the landslide stability modelusing a deterministic approach based on the SINMAP model.Suitable FS thresholds forlandslide warnings are proposed for each slope unit in the watershed area.Based on DEM data, the slope units were automatically partitioned on GIS platform. Based on GIS spatial analysis, hydrological analysis and map algebra, a set of suitable framework and method of landslide disaster warning system was put forward. TyphoonFanapiin 2010 was selected as a simulation scenario to calibrate the efficacy ofthe cumulative rainfall thresholds derived in this study.The results show that the result of model is more ideal.

### Key words:

Early-warning model; shallow landslides; extreme rainfall; southern mountain areas of China

## Examining the Zuru Gullies of Kebbi State, North-West Nigeria (1994-2014)

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### Abstract

The menace of gully erosion is widespread in Nigeria, particularly in the savannah ecological zone within a broad East-west belt from the Eastern highlands to the edge of Sokoto basin (Ologe 1986). The aim of this study is to empirically examine the characteristics of the gullies in Zuru and project the extent of the land loss for 10 years. The study identified and classified the gullies into zones to be able to determine the rate of change that occurred between 1994- 2014 and used surface Analyst tools of ArcGIS software, using Digital Elevation Dataset from Shuttle Radar Topographical Mission (SRTM) to determine the topography and terrain of the area. Using the elevation datasets created from the Digital Elevation Model (DEM), a raster of flow direction from each cell to its steepest down slope neighbor was generated. The data were used to determine the rate of change that occurred between 1994- 2014. Furthermore, the area measurements obtained for each gully prone areas were then taken to Microsoft excel 2007 to have outline result into a series of graphs. The rate of change was calculated using Change rate  $(D) = B-A$ . It might be argued that the growth and decline from one area to the other within this period on the gully formation can be attributed to changes in external factors in the gully areas. From the evidence derived in the direct field measurement of the sites (2014), it has been noticed that the external factors especially man's activities have greatly contributed to the changing flow of the runoff channels.

### Key words:

Menace; Gully; Digital Elevation Model; Ecological

## Geomorphic Expression of Paleo-Earthquakes on the Minle-Damayng Fault, Middle of the Hexi Corridor, Northwest China

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### Abstract

The Minle-Damayng Fault (MDF) is a segment of the north frontal fault of the Qilian Mountains, and the southern boundary fault of the Zhangye Basin in the middle of the Hexi Corridor, a foreland basin system in the northern margin of the Qinghai-Tibet Plateau. Based on field investigation and topographic survey, it is found that the river terraces of a tributary of the Dongdahe River were vertically offset by the MDF around 15m, 10m, 7.5m, and 5m from older to younger, respectively, indicating at least 4 faulting events. A trench on the lowest terrace reveals 2 paleoseismic events, each with an around 2.5 m vertical dislocation. Abandon ages of the terraces are  $12.7 \pm 0.7$  ka (T6),  $10\,320 \pm 80$  cal a BP (T5),  $5\,838 \pm 30$  cal a BP (T4),  $3\,138 \pm 78$  cal a BP (T3),  $2\,807 \pm 52$  cal a BP (T2) and  $1\,360 \pm 50$  cal a BP (T1). These ages are used to limit the periods of paleo-earthquakes, and calculate the average vertical slip rate of the fault. It is found that the vertical slip rate of the fault is around 1.2mm/a-1.0mm/a, and the paleo-earthquakes have different reoccurrence intervals.

### Key words:

River terrace; slip rate; paleo-earthquake; Minle-Damayng Fault; Hexi corridor; Qilian Mountains; Tibet Plateau

## Influences of Exogenic and Endogenic Processes on Landslide Orientation

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### Abstract

The genesis of landslides is essentially ascribed to exogenic and endogenic processes. These processes produced systematic or random orientation patterns and redistributed on rugged topography, resulting in different landslide features on slopes of different aspects. Previous studies have noted that landslides were active on some specific slope aspects, which were also regarded as an important landslide predictor. The causes included sunlight, weather and climate, geological structure, seismic wave, etc. However, current explanations were only applicable in a small or specific case, and the influences of exogenic and endogenic processes on landslide orientation were still overlooked. This study used regional, island-wide landslide inventories triggered after the 1999 Chi-Chi earthquake and Typhoon Morakot in 2009 in Taiwan and a set of small basin-wide, multi-temporal typhoon-triggered landslide inventories. By systematically examining orientations of landslides and processes, we attempted to clarify the mechanism of genesis of landslides. The results showed that earthquake-triggered landslides tend to occur on slopes opposite to the approaching seismic waves. Typhoon-triggered landslides were constantly active on the eastern and south-eastern slopes that were uncorrelated with the main direction of wind during the typhoon events. This suggests that endogenic, tectonic factors are a fundamental control on the orientation of mass movement.

### Key words:

landslide; orientation; exogenic and endogenic processes; earthquake and typhoon

## Landslide Dams on Large Chinese rivers: An Under-estimated Hazard?

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### Abstract

Landslides forming natural dams across rivers have been described from numerous mountain environments. Such features pose considerable hazards particularly the risk of catastrophic flooding after dam failure. The topic has received increasing attention in recent years. In China, documentary records of large earthquakes and river blocking landslides have enabled inventories to be compiled. However, the remote and rugged terrain shelters evidence both of recent landslide dams which escaped the attention of official records and of ancient landslides which occurred before documentary records. Recognition and interpretation of palaeo-landslides and their lake impoundments is vital to extend understanding of the frequency-magnitude and spatial characteristics of landslide dams. Evidence of a previously unrecognized ancient landslide which dammed the main stem of the Yangtze River, China (crest height 200 m; lake volume  $11.4 \pm 1.3 \text{ km}^3$ ) indicates that very large rivers have – and can be - impacted by persistent river-blocking landslides. Combining geospatial techniques with field evidence of sediment deposited in landslide dams lakes, identifies a number of candidate sites in the large rivers of the Upper Yangtze basin where river blocking may have occurred. It is argued that the potential for large earthquakes to generate enormous river-blocking landslides may be underappreciated as a mega-hazard.

### Key words:

Landslide dam; flood hazard; large rivers; Yangtze River; China.

## Morphological Dynamics of River Bank Erosion: A Case Study of Brahmaputra River System in Assam; India

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### Abstract

River Brahmaputra has been regarded as the lifeline of Assam. However, this life giving river is also the harbinger of disasters. In 1950, Brahmaputra valley was the epicentre of an 8.7 magnitude earthquake that raised the North East section of the valley by 3-4 meters that caused severe flooding in Assam. The earthquake caused extensive landslides and rock falls on hill slopes, subsidence and fissuring in the valley and changes in the course and configuration of several tributaries as well as the main course. Post-earthquake, the river has been eroding land along its banks at an alarming rate. While in 1920s, the Brahmaputra River occupied an area of 4000 Km<sup>2</sup> in Assam; today, it occupies more than 6000 Km<sup>2</sup>. This study tries to assess the morphological changes of river Brahmaputra in Assam by examining three LANDSAT images of 1995 (TM), 2005 (ETM+) and 2015 (OLI). In this study, it is endeavoured to assess the morphological changes of the river channel actuated by stream bank erosion process. The braiding indicators such as Plan Form Index (PFI) and Flow Geometry Index (FGI) have been adopted in the study to analyse the braiding behaviour. This study aims to quantify the human tragedy and minimise its adverse effects by trying to develop a quantitative model to assess the callous hazard on the one hand, and finding solutions to mitigate the issue on the other hand.

### Key words:

Brahmaputra; Erosion; Plan Form Index; Flow Geometry Index

## Potential Risks of Natural Hazards in Kayseri Region, Central Turkey

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### Abstract

Either in historic or prehistoric period, human beings have experienced a wide variety of natural hazards including flood, volcanic activities and earthquakes. Since the frequency of extreme events of such phenomena is low, the historic records of severe natural hazards often lack in ancient periods, but there may be some suggestions in archaeological records for such events. Here we explore the geomorphological and geological records in Kayseri region, central Anatolia where many archaeological settlements (mainly B.C. 3000 – A.D. 1000) are located under potentially hazardous environmental settings with presence of floodplains, volcanoes and faults. We started our field survey by acquiring detailed topographic data of the study sites using recent technologies of high-definition topographic measurements such as laser range measurement, global navigation satellite system and structure-from-motion multi-view stereo photogrammetry with a small unmanned aerial vehicle. We also performed on-site geological or sedimentological recordings. From our investigations of landforms including floodplain, alluvial fans, fault scarps and hummocks in debris avalanche deposits, it was found that there are several potential risks of natural hazards in the area with regard to flooding in basins, sector collapse of volcanic mountain body and earthquakes by normal fault displacements in the Holocene period. The geomorphological and geological data, including a regional geomorphological map, will be further analyzed to explore spatiotemporal relationships of archaeological settlements and landform developments. Learning from the past, the hazard risk assessment will also be applied to the modern city.

### Key words:

natural hazards; geoarchaeology; flood; sector collapse; faults; UAS; SfM-MVS photogrammetry;

## **Sedimentological Characterization and Microsurface Texture influence on Slope Instability, Garhwal Himalaya (India)**

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### **Abstract**

This paper describes the sediment characteristics and influence of geomorphic process that induces slope failure. Sediment samples were collected from five active landslides to understand the role of grain size composition of landslide slip zone. In order to understand the instability mechanism; grain size distribution, mineral composition and micro-surface texture have been carried out. X-ray diffractometry of fine sediments was done to analyse mineral composition, crystalline structure and lattice strain of slip zone. The composition of grain size and minerals significantly relate to volume and types of landsliding in the area. Quartz was abundant mineral, with a higher concentration in the debris fall and rock slide, particularly in the Lesser Himalayan metasedimentary silicate rock groups. Microsurface features of quartzite rock with higher composition of quartz mineral, lesser strain, little 'd' spacing within molecules show high shear strength and greater resistant to slope failure. Surface microtextures presents on the quartz grains provide significant insight to geomorphic process and depositional history of clastic sediments. The prominent surface features that are established to sedimentary process are grain outline, types of edges, steps, pits, crystal overgrowths, ridges etc. The surface features are mainly related to the transportation mode, run-out distance and time, and often the size of particle. But features are equally a function of the original grain shape of the particle in the parent material. Significant relationship between types of landslide and volume of displacement related to grain size and mineral compositions exists in each of the slope failure investigated.

### **Key words**

Landslide; geomorphic process; grain size; x-ray diffractometry; SEM; Garhwal Himalaya

## The Space Distribution of Houses at Debris Flow Prone Area and Its Role in Disaster Risk Reduction

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### Abstract

Geomorphological hazards impose great potential risk towards the human settlements at mountainous region. For countries like China, mountain terrains covered large portion of its territory, therefore, reduce the risk from mountain hazards is imperative to the development of a sustainable community. Due to the space limitation at mountain terrain, human settlements normally concentrated at alluvium fan or river bank, which happened to overlap with the high risk zone of mountain hazards such as debris flow or flash flood. By conducting field investigation of damaged houses after several debris flow events, information on the structure type, space distribution, failure mode and degree of damage for 197 houses were recorded. The space distribution model for houses was constructed using quantified parameters which described the relationship between houses and debris flow gully. Distance ratio and angle ratio were used to quantify the relationship between the houses and debris flow gully while spacing between different houses were used to describe the inter-houses relation. Afterward, the space distribution model was correlated with the records of houses damage to develop a vulnerability chart for houses at debris flow prone area. This chart gives guideline to the authorities when conducting housing planning at debris flow prone area since it indicates the potential damage of houses when debris flow occurs. This study also provides an alternative solution to disaster risk reduction which could be put in place at the housing planning stage.

### Key words:

Debris flow; Space distribution; Housing planning; Risk reduction

## C12.41 Geomorphology and Society (GAS & IAG)

### Geomorphology, Geomorphosites and Landscape (Sponsored by the IAG)



Home

#### Oral

1. [Ainterpreting Physical Landscapes – Challenges at Viewpoint Geomorphosites](#)  
Piotr Migon (University of Wroclaw, Poland); Edyta Pijet Migon (Wroclaw School of Banking, Poland)
2. [Artificial Landform Extraction and its Water and Conservation Effect--A Case Study of Terraced Field in Loess Plateau of China](#)  
Na Jiaming; Yang Xin; Ding Hu; Zhao Hanqing (Key Laboratory of Virtual Geographic Environment (Nanjing Normal University), Ministry of Education; Jiangsu Center for Collaborative Innovation in Geographical Information Resource Development and Application, China)
3. [Beach-Barrier Dynamics under Rapid Sea-Level Fall](#)  
Ata Abdollaahi (University of Tehran, Iran)
4. [Cave Dwellingcultural Heritage in Plateau Geomorphology \(SE Tunisia\)](#)  
Tarek Benfraj (Université de Sousse, Faculté des Lettres et des Sciences Humaines, Tunisia, Tunisia); Nouri Boukhchim (Université de Kairouan, Faculté des Lettres et des Sciences Humaines, Tunisia, Tunisia); Emmanuel Reynard (University of Lausanne, Lausanne, Switzerland)
5. [Identification and Assessment of the Desert Geosites \(Case study: Lut Desert in Iran\)](#)  
Mehran Maghsoudi (Associate Professor, University of Tehran, Iran); Anvar Moradi (Ph.D. Candidate, University of Tehran, Iran)
6. [Landscape Connectivity Evolution Responses to Landcover Changes in Dryland Environments, Serra Talhada, Pernambuco](#)  
Jonas Souza (UFPB, Brazil)
7. [Research of an Artificial Controlling Model and Relevant Morphology , Transformation of the Alpine Sand Dune](#)  
Dengshan ZHANG (1 Key Laboratory of Environmental Changes and Natural Disaster, Ministry of Education, Beijing Normal University; 2 Qinghai Academy of Agricultural Forestry Sciences, China); Wangyang WU (Key Laboratory of Environmental Changes and Natural Disaster, Ministry of Education, Beijing Normal University, China); TIAN Lihui (1 Key Laboratory of Environmental Changes and Natural Disaster, Ministry of Education, Beijing Normal University; 2 College of Earth and Environmental Sciences, Lanzhou University, China); ZHANG Pei(Key Laboratory of

Environmental Changes and Natural Disaster, Ministry of Education, Beijing Normal University, China)

8. [Shaping Distinct Landscapes by Dynamic Fluvial-Aeolian Interaction Processes](#)

Baoli Liu (Xiamen University, China); Ping Yan (Beijing Normal University, China), Xiaomei Li (Shaanxi Normal University, China); Wei Wu (Beijing Normal University, China)

9. [Study of Landscape Changes after the 2012-2013 Tolbachik Fissure Eruption \(Kamchatka, Russian\) Based on Remote Sensing Data](#)

Polina Mikhaylyukova; Olga Tutubalina; Alexey Sazonov (Lomonosov Moscow State University, Russian Fed)

10. [The Formation of the Yangtze River. And Assessing Zheng Hong bo's Pre-Miocene birth of the Yangtze River](#)

Liankang Yang (The Ministry of Land and Resources. P. R. China, China)

11. [Visitors' Background and Expectations – How to Incorporate into Geosite Assessment](#)

Piotr Migon; Milena Rozycka (University of Wroclaw, Poland)

## Poster

1. [Assessing Geometric Configuration of Son Alluvial Fan System Using SRTM DEM: Implications for Delineation and Evolutionary History](#)

Manish Pandey (India, Jawaharlal Nehru University); K. N. Prudhvi Raju; U. K. Shukla (India, Department of Geology, Banaras Hindu University, Varanasi-221005)

2. [Automatic Recognition of Loess Landform Integrating Terrain and Texture Features](#)

Wufan Zhao; Guo'an Tang; Xiaoli Huang (China, Nanjing Normal University)

3. [Beach-Barrier Dynamics under Rapid Sea-level Fall](#)

Ata Abdollaahi (Iran, University of Tehran)

4. [Coupling of the Channel Downcutting Rate at the Heishan Gorge and Sedimentation Rate in the Yingchuan Plain of the Upper Yellow River since 700 ka B.P.](#)

Suiji Wang (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

5. [Distinguishing Desert Landscapes Base on Eco-geomorphic Thresholds](#)

Sara Abdollahzadeh; Adel Sepehr; Alireza Rashki (Iran, Dept of Desert and Arid Zone Management, Ferdowsi University of Mashhad)

6. [Domination of Climatic over Tectonic Controlling on River Incision Across the Tuostai Anticline in](#)

[the Northern Chinese Tian Shan Foreland](#)

Honghua Lu; Lu Cheng; Zhen Wang (China, School of Geographic Sciences, East China Normal University)

7. [Fluctuations in Surface Temperature of Menthosa and Gangstang Glaciers using MODIS LST Satellite Data](#)

Manish Pandey; Milap Chand Sharma; Vijendra Kumar Pandey (India, Center for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi-110067 INDIA)

8. [Geomorphological challenges and mapping of the Vouraikos basin, North Peloponnissos, Greece.](#)

Charoula Petrakou (Harokopio University Athens); Kosmas Pavlopoulos (The United Arab Emirates, Paris Sorbonne University Abu Dhabi); Dimitrios Vandarakis (Greece, Harokopio University Athens)

9. [Geomorphological Mapping of Colima Volcano, Mexico](#)

José Juan Zamorano Orozco; José Ernesto Figueroa García (Mexico, Institute of Geography)

10. [Geomorphological Processes and Relative Sea Level Changes, in Wadi Matar, Farasan Island, Red Sea, Saudi Arabia.](#)

Kosmas Pavlopoulos (The United Arab Emirates, Paris Sorbonne University Abu Dhabi); Olga Koukousioura (University of Thessaloniki); Dimitrios Vandarakis (Greece, Harokopio University Athens)

11. [Geomorphology of Punpun River System](#)

Lalkeshwar Prasad Singh (India, University Professor of Geography, Patna University, Patna, Bihar 800005, India)

12. [Glacial And Karstic Processes as Main Driving Forces of the Landscape Evolution in Ano Loussoi polje, Mount Chelmos, North Peloponessus, Greece.](#)

Kosmas Pavlopoulos (The United Arab Emirates, Paris Sorbonne University Abu Dhabi); Dimitrios Vandarakis; Aris Leondaritis (Greece, Harokopio University Athens)

13. [Glacio-Karstic Evolution of Western Taurus \(SW Turkey\)](#)

Cihan Bayrakdar (Turkey, İstanbul University, Department of Geography); Zeynel Çılğın (Turkey, Tunceli University, Department of City and Regional Planning)

14. [Landform Planation Index Extracted from DEMs—A Case Study in Ordos Platform of China](#)

Jilong Li; Yeqing Qian; Fei Tao (China, Key Laboratory of Virtual Geographic Environment, Nanjing Normal University, Ministry of Education)

15. [Late Quaternary Alluvial Cone Formation and Climatic Change in the Inawashiro Basin, Northeast Japan](#)  
Ayako Funabiki (Japan, College of Engineering, Nihon University); Masayuki Seto (Japan, Fukushima University)
16. [Late Quaternary Glacial Landform Evolution And Paleoclimatic Implications of the Tien Shan Mountains](#)  
Gengnian Liu (China, College of Urban and Environmental Sciences, Peking University)
17. [Luminescence Dating of the Minjiang River Terraces and its Geomorphological Implication](#)  
Yesong Han; Zhijiu Cui; Gengnian Liu (China, MOE Laboratory for Earth Surface Processes, Department of Geography, College of Urban and Environmental Sciences, Peking University)
18. [Modeling Geomorphic Processes and Simulation of Virtual Landform Changes for the Future 120ka Shown as Animations](#)  
Michio NOGAMI (Japan, Tokyo Metropolitan University)
19. [Modern Methods for Studying Exogenous Processes of the East European plain](#)  
Aydar Sharifullin (Russian Fed, Kazan Federal University)
20. [Old Landslide Deposits and Formation of Block Stream in Mt. Maneo, South Korea](#)  
Masayuki Seto (Japan, Fukushima University); Song-Hyun Kim (Japan, Kyung Hee University); Yosuke Nakamura (Japan, Fukushima University)
21. [Sedimentary Environments of Terrace Gravel Layers of the Qingyi River along the Jingxian Basin, China, Based on a Combined Analysis of Gravel Fabric and ESR Dating](#)  
Chunsheng Hu (China, Anhui Normal University; Nanjing University); Youpeng Xu (China, Nanjing University); Chenqi Hu (China, Anhui Normal University)
22. [Spatial Association between Valley Density and Environmental Factors over the whole of Conterminous China](#)  
Xuezhi Cang; Wei Luo (United States, Northern Illinois University)
23. [Spatial Association between Valley Erosion Degree and Minerals Factors over the Global Mars](#)  
Xuezhi Cang; Wei Luo (United States, Northern Illinois University)
24. [Study of Glaciers in Drass Basin and Mass Balance of Machoi Glacier in Kargil district, J&K–India](#)  
Davinded Singh; Rajender Singh (India, University of Jammu)
25. [Tectono-morphic Analysis of Sundor Basin in Chhattisgarh, India](#)  
Ahamed Sk Nasib (India, Pt. Ravishankar Shukla University)

26. [The Progress of DEM based Terrain Texture Research ——A Novel Perspective of Digital Terrain Analysis](#)

Xiaoli Huang; Guo'an Tang; Kai Liu (China, Key Laboratory of Virtual Geographic Environment (Nanjing Normal University), Ministry of Education; Jiangsu Center for Collaborative Innovation in Geographical Information Resource Development and Application)

27. [Three-Gorges Dam: a Gigantic Mechanism for all-year-round riverbed erosion of Yangtze River](#)

Daowei YIN; Xiaohe LAI; Zhongyuan CHEN (China, East China Normal University)

28. [Topographic Mapping of Large-scale Tidal flats Using Waterline Method](#)

Yanyan Kang; Xianrong Ding; Changkuan Zhang (China, Hohai University)

## Ainterpreting Physical Landscapes – Challenges at Viewpoint Geomorphosites

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### Abstract

Viewpoint geomorphosites are specific geosites which allow one to see, interpret and understand a wider landscape rather than show an individual landform from a close distance. Moreover, other than providing a viewpoint, they may not be of any particular geomorphological value. Nevertheless, they may play a key role in geotourism and geoeducation, being also much more attractive to casual visitors than geosites *sensu stricto*. It is therefore important to realize not only opportunities provided by viewpoint geomorphosites but challenges as well. These can be divided into a few thematic groups, i.e. selection, criteria of evaluation, maintenance, access and suitability for tourism, and interpretation. In contrast to other geomorphosites, their success as site of geomorphological interest is very much weather-dependent. Access may be technical difficult and not for everyone, especially for hilltop locations. In warm and humid areas, with vigorous growth of vegetation, regular clearance is necessary to sustain the scenic values which may generate conflicts with biological conservation. Being often exposed locations in the landscape, any facilities for tourism (shelters, rest places, information panels) are at risk to spoil the scenic quality of the viewpoint and careful decisions have to be made how such facilities should be erected. Finally, the level of interpretation usually varies from simple naming of geographical spots through identification of specific features, explanation of rock-landform relationship, to storytelling about how the particular landscape evolved. The latter is most exciting, but also most challenging, requiring considerable skills in showing such a story in pictures.

### Key words:

geosite; geotourism; landscape aesthetics; geoeducation

## Artificial Landform Extraction and its Water and Conservation Effect

### --A Case Study of Terraced Field in Loess Plateau of China

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#### Abstract

With the increase of human activities, artificial landforms become one of the main terrain features with special geographical and hydrological value. Terraced field, as the most important artificial landscapes of the loess plateau, plays an important role in conserving soil and water. With the development of digital terrain analysis (DTA), there is a current and future need in developing a robust, repeatable and cost-effective research methodology for terraced fields. In this paper, a novel method using bidirectional DEM shaded relief is proposed for terraced field identification based on high resolution DEM, taking Zhifanggou watershed, and Shannxi province as the study area. Firstly, 1m DEM is obtained by low altitude aerial photogrammetry using Unmanned Aerial Vehicle (UAV), and 0.1m DOM is also obtained as the test data. Then, the positive and negative terrain segmentation is done to acquire the area of terraced field. Finally, a bidirectional DEM shaded relief is simulated to extract the ridges of each terraced field stages. The method in this paper can get not only polygon feature of the terraced field areas but also line feature of terraced field ridges. The accuracy is 89.7% compared with the artificial interpretation result from DOM. And additional experiment shows that this method has a strong robustness as well as high accuracy. Moreover, the influence of terraced field on LS factor in Revised Universal Soil Loss Equation (RUSLE) is discussed, which shows that terraced fields may reduce the average capability of carrying sands, but may have larger detriment at the high-slope position.

#### Key words:

DEM; Terraced Field; Digital Terrain Analysis; Artificial Landform

## Beach-Barrier Dynamics under Rapid Sea-Level Fall

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### Abstract

The Caspian Sea is well-known for its rapid sea-level changes. This can help us to observe rapid coastal evolution which may take a millennium in oceans. Between 1929 and 1977 the level of the Caspian Sea fell down around 3 m and rose back in the former sea level in 1995. Again it started falling with a minor sea level rise in 2005. Afterward up to now, 2016, based on satellite data altimetry, its level is decreasing and rapid sand progradation is dominated. This real observed record allow us to detailall characteristics of sand facies including grain size, thickness and its progradation under rapid sea level fall.Considering the lack of tide in the Caspian Sea the most controls of this process which appeared as beach-barrier, spitare rapid sea-level change, sand supply and wave dominated coast respectively.By using high satellite images we estimate sand progradation and its behavior during this period of sea-level fall.

### Key words:

The Caspian Sea; Beach-Barrier; Rapid Sea-level change. Sefidrud Delta

## Cave Dwellingcultural Heritage in Plateau Geomorphology (SE Tunisia)

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### Abstract

South-East Tunisia is known for different types of cave dwellings developed for centuries on the Matmata-Dahar plateau. Their shaping takes into account the geological and geomorphological context of the sites. They thus provide an interesting example of geoheritage on which was developed an important cultural and architectural heritage. An interdisciplinary research – crossing geomorphological and archaeological approaches – was carried out in two sites: Haddej and Guermessa. Haddej site belongs to the Matmata area and its surroundings located in the northern part of the plateau. It is characterized by cave dwellings dug deep into Quaternary aeolian silt accumulations that are filling the valleys that dissect the plateau surface. Guermessa site belongs to the Tataouine region, located in the southern part of the plateau. It is characterized by troglodyte dwellings dug laterally in alternations of limestone, clay, marl and dolomite layers of Cenomanian and Turonian age. These alternations are the backbone of buttes still partially attached to the front of the cuesta.

Both sites offer favourable conditions for geomorphological study. They exhibit a wide range of structural landforms within the monoclinic structure, and their surroundings present a variety of shapes and Quaternary formations allowing the study of the geomorphological and palaeoenvironmental changes that happened during the Quaternary in this now arid region. These geosites were assessed using the method developed by the University of Lausanne, which allowed us to assign them a strong scientific, aesthetic, cultural, educational and tourist value. Proposals for their tourist promotion were then proposed.

### Key words:

geoheritage; geomorphosites; cultural heritage; cave dwellings

## Identification and Assessment of the Desert Geosites

### (Case Study: Lut Desert in Iran)

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#### Abstract

The Lut Desert is located in the southwest of Asia and in the southeast of Iran. This Desert, with the unique landforms, is a perfect laboratory for geologist and geomorphologist. This desert represents an interesting scene of the integrated performance of geomorphic and geologic processes and climate changes. The Hydro-Aeolian erosional and depositional landforms in the area can be seen widely. The wind processes are the most dominant formative processes affecting the landforms. This desert with the staring scenes of the highest and longest yardangs (Kalut) of the world presents interesting scenes of different forms of yardangs (Kalut). Unique landscapes of the Yallan Sand Sea (Rig-e Yallan) have the highest sand dunes of the world and a variety of landforms. The area has also the highest nebkhas of the world. Playa, desert pavements and Hamada, gypsum crusts, salts and salt weathering, cavernous weathering forms, ventifacts, desert varnishe, desert karst, lake basins with palaeo shorelines, ephemeral stream channels, badlands, inselbergs, sand ramps, dark lava irregular basalt pavement and other related landforms identified in the study area . According to field work, images and aerial photos 58geosites were identified in study area. Assessment of geomorphosites was done using a suitable model for the study area. According to the assessment model 8 areas were selected for development of tourism activities.

#### Key words:

Iran; Lut desert; Kalut; Geosite assessment; Desert landform

## Landscape Connectivity Evolution Responses to Landcover Changes in Dryland Environments, Serra Talhada, Pernambuco

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### Abstract

The present work has as a goal to analyze the dryland fluvial dynamics to Saco Creek Watershed, Serra Talhada, Pernambuco, focusing the change probability in the fluvial structure and landscape connectivity. At the end, the methodology will be applied to identify the response of behavior transmission due to natural and anthropogenic changes in the landcover, and how these changes could cause adjusts in the fluvial structure. The local hydrologic behavior was detailed, as well the precipitation distribution by altimetric zone, and the detailed, using soils and land cover data, runoff behavior. After the landscape connectivity and effective catchment area were defined, and were created logical scenarios of landcover changes, based in the social economical dynamic of the region. There are two major scenarios planned by the planning department, one to expand the agricultural areas in sub humid zone, and the second one with the increase of removal of semiarid vegetation. In the first scenario the landcover change leads to an increase in the gully processes and induce canal aggradation, locally decreasing the landscape connectivity, holding a bigger amount of sediment. In the other hand, the second scenario leads to a major increase in the runoff and in the peaks of stream power, and this induce a riverbed vertical incision, removing the channel sediments and increasing the landscape connectivity. Lastly, the proposed methodology proved to be adequate to initial analyze about the transmission hydrosedimentological responses to processual and structural changes scenarios, natural and/or anthropogenic.

### Key words:

landscape connectivity; hydrosedimentological responses; semiarid

## Research of an Artificial Controlling Model and Relevant Morphology Transformation of the Alpine Sand Dune

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### Abstract

In the alpine sand area of china, the wind-sand movement is peculiar for its long wind seasons, strong wind velocity and changeful wind directions, great wind-sand hazards need urgent controlling measures to stabilize the moving sand dunes and recover the ecosystem. Through field experiments of different artificial controlling measures and a continuous investigation of soil erosive depth, wind-sand flow, and topography monitoring from 2009~2014, an artificial controlling model of stabilizing sand dunes was concluded and reflected by its morphology transformation. The model went with three periods: paving straw checkerboards with small or middle norms in the first year, transplanting saplings for afforestation in the second year, and then resetting the straw checkerboard barrier with large norm in accordance with a measure of direct seeding afforestation in the following 2~3 years; Relatively, the sand dune structure would suffer different changes with controlling steps, the depositional intensity increased to 83.8~120.6 kg·m<sup>-2</sup>, the erosive intensity in the top of sand dune decreased to 37.2 kg·m<sup>-2</sup>, the height fall has reduced to almost 1m per year, and the length of the windward slope was equated with the backward slope. Additionally, the monthly moving speed of the sand ridge line changed from 5.2m to less than 0.5m, the primary crescent shape turned symmetrical and oblate. In consequence, the methodical artificial controlling model contributed to convert the original form of the sand dune, reduce wind-sand hazards, and improve desert ecosystem. Otherwise, the morphology change reflected the scientificity and availability of the artificial controlling model.

### Key words:

straw checkerboard; afforestation; sand ridge; wind-sand movement ; morphology;

## Shaping Distinct Landscapes by Dynamic Fluvial-Aeolian Interaction Processes

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### Abstract

Although the interaction between fluvial and aeolian system have been noticed in many studies, very few of them have focused on the dynamic interaction process and the implication on geomorphology. Liu and Coulthard (2015) have classified six fluvial-aeolian interaction types after a global inventory. However, these are based on static satellite images which could not allow the generation of information relating the specific physical processes occurring within each of the systems being mapped.

As such, in the current study, preliminarily investigations into the geomorphologic characteristics as well as dynamics of four distinctive fluvial-aeolian interaction landscapes in China are undertaken. The dominant processes at the four sites are namely Fluvial dominant (F), Mostly Fluvial (MF) dominant, Balanced (B) and Mostly Aeolian (MA) dominant interaction, respectively, according to Liu and Coulthard (2015)'s classification.

By contrasting the fluvial/aeolian regime at each location, and mapping the resulted landscape characteristics, this study provides in situ field monitoring data to test the theory of fluvial-aeolian interaction classification and further numerical modelling work. The results have the potential to inform our understanding of the ways in which humans in dynamic fluvial-aeolian environments are at risk through both internal systems and natural landscape evolution processes. Given the changing patterns of flooding occurring globally it is apparent that a more nuanced understanding of these environments is fundamental to future risk management strategies in many areas.

### Key words:

Fluvial-aeolian interaction; geomorphology; sand dunes; river

## Study of Landscape Changes after the 2012-2013 Tolbachik Fissure Eruption (Kamchatka, Russian) Based on Remote Sensing Data

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### Abstract

Volcanic eruption is one of the primary planetary resurfacing agent. Lava post-emplacement deformations and formation of surface of lava flows still need to be explored. Remote sensing data and its increasing availability allows to explore lava flows and landscape changes in different period of eruption with high periodicity.

According to seismic data the 2012-2013 Tolbachik Fissure Eruption started on November 27, 2012. Landscape of TolbachinskyDol was strongly changed. Three new lava fields were formed with a total area is about 36 km<sup>2</sup>. The scientific and touristic infrastructure was damaged. Two scientific bases had been destroyed by lava flows. The road to TolbachinskyDol was blocked. The full picture of landscape transformation was analyzed on the basis of remote sensing data.

Remote sensing data (optical and radar imagery) were regularly acquired during the whole eruption period. These series of radar interferometric pairs, optical imagery, digital elevation model (DEM) and results of fieldwork provide valuable information for complex thematic mapping. A series of thematic maps were created as a result of the study. They show dynamics of lava flow areas during eruption, provide complex maps of lava flow formation and describe landscape changes.

### Key words:

The 2012-2013 Tolbachik Fissure Eruption; landscape transformation; remote sensing; volcanic activity

## The Formation of the Yangtze River. And Assessing Zheng Hong Bo's Pre-Miocene birth of the Yangtze River

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### Abstract

Early in 1959 and 1960, the author attended the investigation of the Yangtze Gorges evolution .He also surveyed the Yangtze River from its source to mouth on foot with 6300 km for 750 days during 1982-1984 , which is the first time in Chinese history. Since then he made his conclusion and published in 1985 ,1990, 1991, 1995: the Yangtze has been largely linked up in Miocene based on his evidence which discovered separately at upper reaches(Dege County, Hutiao Gorge)、 middle reaches (Sichuan Basin, Three Gorges) and lower reaches (Jiangnan Basin 、 Nanjing ) of the Yangtze [ *The Formation of the Yangtze River*. Abstracts XIV INQUA etc.].

This conclusion is 28 years earlier than *Pre-Miocene birth of the Yangtze River* (Zheng Hongbo et al. PNAS 2013.4). The following is Zheng's respond to author's statement above: "Our understanding is an affirmation of your early cognition" in 2015. However Zheng didn't provide any direct evidence (gravel, sand etc.) showing the Yangtze ran through the sites around the Three Gorges and above it with 4500km in Miocene, his article is obviously not rigorous and questionable. And to confirm the Upper-Mid Yangtze's waterway with 4500 km and to draw out its map in Miocene (Zheng 's Fig 4 )is simply impossible just according to Zheng' s evidence in Nanjing. Its hasty publishing is irresponsible for science and needs to be corrected by geographers.

### Key words:

Yangtze River; formation; Miocene; survey; discover; evidence

## Geomorphology of Punpun River System

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### Abstract

The Punpun river rises in the lower reaches of the highlands of Palamau district of Jharkhand state in India. Its course is nearly 200 km and discharges its water into the sacred Ganga river near the small town of Fatuha of Bihar state. The river flows northward almost parallel to the east of the Sone river and to the west of the Phalgu river. The Sone and the Phalgu rivers have shallow depth in their river courses. However, the Punpun river has a deep course, in between the shallow courses of the Sone and the Phalgu rivers. The Punpun river course is 40' to 50' deep throughout its extent, except in its 15 km upper reaches. The river forms many sharp meanders throughout its course. At many places, water is sweeping out in its course from the bed. Thus it is a perennial river. The entire length of the river is sand free.

The present paper addresses the following pertinent questions to be answered:

1. Why the river is so deep, despite being flown over plain areas?
2. Why does the river create many sharp meanders?
3. Why does the water often sweep out of the bed of the river?
4. Why the river bed is sand free?

The entire work is based upon the field work and explanations have been drawn through statistical and cartographic calibration.

### Key words:

geomorphology; river system

## Assessing Geometric Configuration of Son Alluvial Fan System Using Srtm Dem: Implications for Delineation and Evolutionaryhistory

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### Abstract

Alluvial fan surface profiles are least studied and poorly understood elements of the fan systems. This study is an endeavor to fill this gap by analyzing cross & radial profiles of the Son Alluvial Fan System (SAFS) in order to: 1) understand fan boundary extent, and 2) inter gradational history. SAFS is a megafan formed by coalescence of the Son fan and a number of small alluvial fans deposited mainly by the Son River and some of the right bank tributaries of the Ganga River. Reclassified SRTM DEM was used to enhance fan boundary and various fan components' appearance as well as to calculate cross and radial surface profiles along and across the SAFS. Radial fan profiles show concavoplanar form from proximal to distal part of fan with maximum surface slope ranging from 0.4% to -1.2% and average surface slope from 0.0% to -0.1%. Radial altitudinal variation from apex to distal part of the fan along various profiles is from 458m to 75m to western most part whereas it ranges from 458m to 42m to eastern most part of the fan. Cross sectional slope (max slope 0.7% to -0.0%; avg. slope 0.2-0.0%) and altitudinal variation (ranging from 408m-51m) gives the fan SE-NW orientation. Concavoplanar shaped long profiles along SAFS indicate that there is not sufficient sediment supply which may be due to effects of interplaying factors like changing climate, basement fault movements, and changing base level of the Ganga which acts as temporary base level for the Son River.

### Key words:

Son Alluvial Fan System (SAFS); SRTM DEM; Radial fan profile; Cross fan profile

## Automatic Recognition of Loess Landform Integrating Terrain and Texture Features

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### Abstract

Automatic recognition of landform is one of the hotspots in modern geomorphology. This research presents an automatic method for loess landform recognition which integrating terrain and texture features based on the digital elevation models (DEMs) data. Small watersheds of loess plateau, which have high homogeneity in topographic features, were divided as analysis units to extract geomorphic information. Terrain features such as average slope gradient, elevation range and texture features such as slope gradient contrast, elevation variance were used to quantify characteristics of landforms. By taking advantage of Random Forest algorithm, the recognition achieved a good result. Experimental results show that the highest recognition accuracy based on the fusion features is 92.06%, which is higher than that of single-class feature data set. Meanwhile, the terrain features made more contribution to the recognition processing than the texture features. In addition, among the selected seven typical types of loess landform, loess terrace and loess mid-mountain obtained the highest accuracy while the precision of loess hill, loess hill-ridge and loess sloping ridge is relatively low. Further, compared to the CART trees and TreeNet Gradient Boosting Machine classifier, Random Forest performs better in features extraction and recognition process.

### Key words:

Landform Recognition; Feature Fusion; DEM; Random Forest; Loess Landform

## Beach-Barrier Dynamics under Rapid Sea-Level Fall

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### Abstract

The Caspian Sea is well-known for its rapid sea-level changes. This can help us to observe rapid coastal evolution which may take a millennium in oceans. Between 1929 and 1977 the level of the Caspian Sea fell down around 3 m and rose back in the former sea level in 1995. Again it started falling with a minor sea level rise in 2005. Afterward up to now, 2016, based on satellite data altimetry, its level is decreasing and rapid sand progradation is dominated. This real observed record allow us to detail all characteristics of sand facies including grain size, thickness and its progradation under rapid sea level fall. Considering the lack of tide in the Caspian Sea the most controls of this process which appeared as beach-barrier, spit are rapid sea-level change, sand supply and wave dominated coast respectively. By using high satellite images we estimate sand progradation and its behavior during this period of sea-level fall.

### Key words:

The Caspian Sea; Beach-Barrier; Rapid Sea-level change. Sefidrud Delta

## **Coupling of the Channel Downcutting Rate at the Heishan Gorge and Sedimentation Rate in the Yingchuan Plain of the Upper Yellow River since 700 Ka B.P.**

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### **Abstract**

In order to analyze the historical variation trend of the sedimentation rate and their influence factors in the Yinchuan Plain of the upper Yellow River, this work based on bore columnar section to estimate the sedimentation rate. The results show that the sedimentation rate has an inapparent increase trend during the time period from 700 ka B.P. to 200 ka B.P. while a distinct increase trend since 200 ka B.P. The peak value of the sedimentation rate was 3.43 cm/a. The channel downcutting rate at the Heishan Gorge which located upwards the Yinchuan Plain showed a similar variation trend with the sedimentation rate. Furthermore, there is a good linear relationship with a correlation coefficient of 0.995 between the sedimentation rate and the channel downcutting rate. Apparently, the increased sedimentation rate in the Yinchuan plain was mainly influenced by the increased channel erosion rate in the upper stream basin. The increased channel erosion rate resulted by climate change as well as the tectonic rise in the upriver basin. Since 200 ka B.P. the climate of the upper Yellow River basin has changed to more arid which could diminish annual precipitation and enhanced accident of rainstorm. Accordingly, vegetation coverage reduced and rainstorm erosion enhanced gradually in the upriver basin. The tectonic rise in the upstream basin would increase sediment supply to the Yinchuan Plain. These factors consequentially resulted in increased sediment delivery to and increased sedimentation rate in the Yinchuan plain.

### **Key words:**

sedimentation rate; downcutting rate; climate change; tectonic rise; Yellow River

## Distinguishing Desert Landscapes Base on Eco-geomorphic Thresholds

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### Abstract

The resilience of an ecosystem determines recovery time after pressures as well as ecosystem resistance. Short recovery time and high erodibility can be used for distinguishing sustainable and unsustainable ecosystems. A transitions zone can be considered as a critical threshold in non-equilibrium state, where is emersion of heterogeneous patterns of vegetation, soil and bare rock. To distinguish desert ecosystem base on transition zones, the approach was applied in Khorasan Razavi province in north-east of Iran. To determine ecogeomorphic threshold in transition zones of semi-arid ecosystems, the spectral and morphological algorithms were implemented in remote sensing images of MODIS surface reflectance. The spectral angle mapper analysis was applied for surface conditions (vegetation, bare soil and rock) and the mathematical morphology algorithm of dilation was used for identifying potentials erodibility and recovery in heterogeneous patterns. Detailed assessment of this mappingwas achieved by implementation an iterative self-organized clustering technique (ISODATA) and calculation of separability of formed typologies classes using application of transformed divergence algorithm. Several desert threshold were detected in susceptible ecosystems to desertification in KR under the influence of natural and anthropogenic factors. Some of intrinsic thresholds were crossed due to influences of ecogeomorphic factors, such as formation, lithology, soil, land cover and geomorphology. Some of them are crossing under the anthropogenic disturbances, because of the high rate of disturbances over the ecosystem resilience. Meanwhile, in prone areas which have the high potential to desertification like KR, ecosystem reach to the tipping points and will cross over into the desert state.

### Key words:

Ecogeomorphic thresholds; Transition zones; SAM; Morphological algorithm of Dilation; Hysteresis

## Domination of Climatic Over Tectonic Controlling On River Incision across the Tuostai Anticline in the Northern Chinese Tian Shan Foreland

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### Abstract

The topographic evolution of an active orogenic belt derives from the interactions of tectonics and surface processes. However, the relative role of tectonism and climate in the recent topographic evolution, especially terrace formation, remains an issue of debate. The Tian Shan and its foreland basins provide such an excellent natural laboratory to probe this scientific question. In the northern Chinese Tian Shan foreland, transverse rivers northward flow across the piedmonts and incise into the anticlines. We focus on the range front of the Sikesu River, where the Tuostai anticline develops. Well-developed terrace staircase and alluvial fans display along the course in the range front. Further work is needed to better understand the geomorphic processes forcing river incision and terrace formation. In order to better understand the driving force behind terrace generation in the range front of the Sikesu River, we have measured several terrace cross sections and defined the types and distributions of terraces and their correlations with alluvial fans. From these, we have dated seven samples using <sup>10</sup>Be-derived cosmogenic exposure age and optically stimulated luminescence (OSL) dating methods. The goals of this work are (i) to describe the sequence and distribution of fluvial features, and (ii) to evaluate the possible contribution of tectonics and climate change to river incision and terrace formation. Our results suggest that climate change during the transition of late Quaternary and Holocene promoted the river incision and the formation of main terraces in the range front of the Sikesu River.

### Key words:

river terrace; tectonic activation; climate change; the Tian Shan

## Fluctuations in Surface Temperature of Menthosa and Gangstang Glaciers Using MODIS LST Satellite Data

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### Abstract

Analysis of temperature fluctuations is significant to understand the local and regional trend of climate change and variability in the Himalayan Cryosphere. In the present study two glaciers have been selected to analyse the temperature fluctuations at micro as well as regional scale. Moderate Resolution Imaging Spectroradiometer (MODIS) LST onboard Terra (MOD11L2) satellite product, with 500m spatial and daily temporal resolution for the period 2001-2015 was used in the study. After extracting day and night bands separately for the entire period, the data products are stacked and processed using MODIS tool in ArcGIS10.2. Temperature information derived in kelvin has been exported for 5 random points for each glacier, two points from accumulation zone, two from ablation zone and one from terminal zone. Temperature variability in both the glaciers was analyzed using co-efficient of variation (CV). The land surface temperature indicates slightly declining trend for Menthosa glacier; whereas a negligible rising trend is noted for Gangstang glacier. The temperature within the accumulation zone varied from -9.11°C to -10.72°C in Menthosa glacier. However, the ablation zone temperature has been recorded as -5.41°C in 2002 and declined to -7.15 °C during 2013. The terminal zone also indicates high variability in temperature as it varies from -4.13 °C to -6.43°C. Gangstang glacier also has shown high variability in the temperature of accumulation and ablation zones. In the accumulation zone it varied from -9.23°C to -11.38°C and in the ablation zone it ranges from -11.09°C to -12.73°C. The analysis has been validated with temperature data from meteorological observatory (Keylong).

### Key words:

Land Surface Temperature; Menthosa&Gangstang Glaciers; MODIS

## Geomorphological Challenges and Mapping of the Vouraikos Basin, North

### Peloponnissos, Greece

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#### Abstract

Vouraikos basin, which is located in Kalavryta area, in the northern part of Peloponnesus in Greece, flows from Priolithos to Diakopto, in the Corinth gulf, which is one of the most active tectonic areas in Europe. Its valley is characterized of a diverse relief, which is dominated by a variety of landforms. This is the result of a mixture of different processes and complex geology, along with intense tectonic activity (uplift rate 1,3mm/year) which dominates the area of the Corinth gulf. The geomorphology of the basin is a result of fluvial processes, the tectonic uplift of the north Peloponnesus and the last Glaciation during Pleistocene of the Chelmos Mountain. To detect and analyze the processes affected the relief, sophisticated methods for geomorphological mapping were used. Specifically, a semi-automated method was selected in order to interpret and analyze the Digital Elevation Model from National Cadastre, to construct aspect, hill shade and slope models, with cell size 5 meter, through the software Arc GIS v. 10,3 and remote sensing data. From the automated models (Slope, Aspect), the principal landforms can be depicted. The results were evaluated through the fieldwork and the use of remote sensing data. The geomorphological map, scaled 1:25.000, presents, with symbols derived from the literature review, the principal landforms, which specify the dominant processes, such as canyons, knick points, cliffs, alluvial fans, cirques, U shaped valleys etc., of the present landscape and indicate the evolution of the relief.

#### Key words:

Vouraikos basin; Corinth Gulf; tectonic uplift; semi-automated geomorphological mapping

## Geomorphological Mapping of Colima Volcano, Mexico

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### Abstract

The Colima Volcano is a late Pleistocene composited cone, built by overlapping lava (andesite), pyroclastic flows and fallen material (ash). This structure, as part of a mountain range oriented N-S, was created by the intersection of three other volcanoes: El Cantaro, Nevado de Colima and Colima, all located in the western sector of the Mexican Volcanic Belt. The origin of the Colima Volcano is associated with complex tectonic dynamics, in which the subduction of the Cocos Plate under the North American Plate and the triple point formed by the *Rifts Tepic-Zacoalco, Colima and Chapala* interact. The Colima Volcano had an explosive and effusive activity, which explains its complex and heterogeneous morphology. In this investigation, we documented and analyzed landforms associated with volcanic dynamics and represented them in a detailed geomorphological map (1:25 000), which is our main research contribution. The methodology we followed included the interpretation of aerial photographs to identify the volcanic relief, and the representation of the morphologies in a plain (cf. Bashenina, 1977). As for the classification of the relief, we used the genetic parameters proposed by Simonov (1985). In sum, this geomorphological study reveals the particular characteristics of each morphological unit of the aforementioned volcano.

### Key words:

Geomorphology; Cartography; Colima Volcano; Explosive volcanic activity; landforms genesis

## Geomorphological Processes and Relative Sea Level Changes, in Wadi Matar, Farasan Island, Red Sea, Saudi Arabia.

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### Abstract

A geomorphological survey for a roman age settlement in Farasan island (Saudi Arabian coast, Red Sea), resulted to sea level estimation during Roman times (approx. 2000 yrs BP). A multi-proxy methodological approach including, processing of remote sensing data, such as Shuttle Radar Topography Mission (SRTM) and ASTER GDEM (2009) obtained digital elevation models DEM; old Russian maps have been georeferenced, digitized and processed through the software ArcGIS v. 10.2. In addition, geomorphological mapping and hand drilled core at a depth of 3,5m have been performed. The samples collected, were micropaleontologically analyzed for their benthic foraminiferal content and dated using AMS C<sup>14</sup> method. A rocky planation surface has been identified, comprised of fractured and karstified reef limestones of late Pleistocene, displaying cliffs of various heights (1-3m) at its borderline. The planation surface neighbours with the main Wadi Matar valley, featured by downcutting erosion, and the presence of an alluvial fan at its end. Uplifted notches and residual wave cut platforms were also discovered along with a playa at the northwest part of the study area. The paleoenvironmental study of the drilled sediments in the interval between 0 - 1.18 m (Unit I), revealed only rare marine, mostly broken/reworked foraminiferal specimens, which are considered mainly transported. Therefore Unit I is evaluated as a paralic environment. From 1.18 till 2.40 m depth (Unit II) the microfauna findings suggested high energy conditions at nearshore environments. The rest of the core (2.40 - 3.20 m; Unit III) presented high foraminiferal density and low ratio of broken/reworked foraminiferal tests, indicating a shallow marine paleoenvironment.

The Lambeck's glacio-hydro-isostatic model along with the ratio of the sea level rise in this area and the correlation with paleo-shoreline indicators resulted that the coastline was uplifted about 3m the last 5.000yBP (uplift rate 0,6mm/year) due to the diapirism of underlying layers of Miocene evaporites.

### Key words:

Farasan Island; Relative Sea Level Changes; micropaleontological analysis; geomorphological mapping; uplift rate

## Geomorphology of Punpun River System

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### Abstract

The Punpun river rises in the lower reaches of the highlands of Palamau district of Jharkhand state in India. Its course is nearly 200 km and discharges its water into the sacred Ganga river near the small town of Fatuha of Bihar state. The river flows northward almost parallel to the east of the Sone river and to the west of the Phalgu river. The Sone and the Phalgu rivers have shallow depth in their river courses. However, the Punpun river has a deep course, in between the shallow courses of the Sone and the Phalgu rivers. The Punpun river course is 40' to 50' deep throughout its extent, except in its 15 km upper reaches. The river forms many sharp meanders throughout its course. At many places, water is sweeping out in its course from the bed. Thus it is a perennial river. The entire length of the river is sand free.

The present paper addresses the following pertinent questions to be answered:

5. Why the river is so deep, despite being flown over plain areas?
6. Why does the river create many sharp meanders?
7. Why does the water often sweep out of the bed of the river?
8. Why the river bed is sand free?

The entire work is based upon the field work and explanations have been drawn through statistical and cartographic calibration.

### Key words:

geomorphology; river system

## Glacial and Karstic Processes as Main Driving Forces of the Landscape Evolution in Ano Loussoi Polje, Mount Chelmos, North Peloponessus, Greece

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### Abstract

The aim of this study is the analysis of the processes that have affected the relief and thus the glaciation of Mt Chelmos. Several glacial landforms have been recognized, such as moraines, cirques, and tillites, indicating its quite extended glaciation during Middle and Late Pleistocene. Two ground moraines located at 2000m and 1850-1900m within the Ano Loussoi basin, have been dated using the OSL method. These ages indicate a Late Pleistocene phase of glacier advance/stabilization during MIS 3, which is in consistence with the well established stratigraphical framework of Northern Pindos. These findings come to widen our understanding of the late Pleistocene glacial history of Mt Chelmos, which up to now has been limited to the identification and dating of two distinct glacial phases at 40-30 ka and 13-10 ka respectively. The basin of Ano Loussoi is a Polje created by the chemical dissolution of limestone and by the still active tectonism with an uplift rate of approximately 1,3mm/year. Along with the Polje many different Karstic landforms can be identified such as karstic springs, caves, potholes and hums. A sophisticated semi-automated method was used in order to analyze the Digital Elevation Model from National Cadastre, and to develop aspect, hill shade and slope models. The developed models were created with commercial software Arc GIS and additional Aster satellite images. The detailed presentation of the driving forces of the relief evolution as well as of the karstic and glacial landforms allow for their direct comparison and correlation on an explanatory base.

### Key words:

Semi-automated geomorphological mapping; glacial geomorphology; karstic geomorphology; Pleistocene; glacial deposits dating

## Glacio-Karstic Evolution of Western Taurus (SW Turkey)

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### Abstract

Akdağ, Barla, Dedegöl, and Beydağları Mountains are subjected to Pleistocene glaciations in Western Taurus. Lithologically all the mountains are substantially formed from limestones. Even though glaciated mountains in Western Taurus have similar elevations and climate characteristics, there are significant discrepancies as to the extent and style of Pleistocene glaciations and the size of landforms and their spatial distributions created by glaciers. Litho-stratigraphy is the main factor affecting this situation. Western Taurus mostly consist of carbonate rocks and the karstic evolution has started in Anatolian landmass surfaced above the seas; even though it has been affected by tectonic activities and climatic changes the karstic evolution has continued so far. Karstic evolution in Western Taurus has developed in distinct courses in the sections of autochthons and nappes. Due to the complex lithological units resulted from the Lycian (Teke) nappes, shallow surface karstification (epikarst) is dominant in Akdağ where soluble and permeable carbonate rocks are surrounded by the ophiolites and insoluble rocks from the bottom or round of the mountain. On the other hand, endokarst is dominant in Mount Beydağları and Mount Dedegöl where thick and continuous carbonate rocks consist of a thousand meters vertical extent. These conditions have affected development and extent of the Pleistocene glaciations. Therefore, both on these mountains polygenic landforms have been produced by karstic and glacial processes. In Western Taurus wherever epikarst prevailed, Pleistocene glaciations developed as an icefield style occupying paleo-karstic depressions above the equilibrium line altitude, while areas wherever endokarst prevailed above the equilibrium line altitude, older cave systems were destructed and transformed into steep walled cirques and glacial troughs by glaciers. As a result, litho-stratigraphic formations have significantly affected the development of glaciations and the distributions of glaciated areas in a different manner even those areas are closely situated in western Taurus and created a polygenic topography peculiar to its own. In this study we try to explain how paleo-karstic features affect the Pleistocene glaciations in Western Taurus. Geographic information systems, morphometric analysis were used in this study.

### Key words:

Glacio-Karstic; Western Taurus

## Landform Planation Index Extracted from DEMs—A Case Study in Ordos Platform of China

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### Abstract

Planation surface is the consequence of the denudation and planation processes under a tectonic stable condition. The quantitative expression of the characteristics of planation surface plays a key role in reconstructing and describing the evolutionary process of landforms. In this study, Landform Planation Index (LPI), a new terrain derivative, was proposed to quantify the characteristics of planation surface. The LPIs were calculated based on the summit surfaces formed according to the clustering results of peaks. Ten typical areas in the Ordos Platform located in the central part of the Loess Plateau of China are chosen as the test areas for investigating their planation characteristics with the LPI. The experimental results indicate that the LPI can be effectively used to quantify the characteristics of planation surfaces. In addition, the LPI can be further used to depict the patterns of spatial differentiation in the Ordos Platform. Furthermore, the characteristics of the planation surfaces can also reflect the original morphology of the Ordos Platform before the loess dusts deposition process evolved in this area. The statistical results of the LPI show that there is a gradually increasing tendency along with the increasing of slope gradient of summit surface. It indicates that the characteristics of planation surfaces vary among test areas with different landforms. These findings help to deepen the understanding of planation characteristics of the loess landform and its underlying paleotopography. Results of this study can be also served as an important theoretical reference value for revealing the evolutionary process of loess landform.

### Key words:

LPI; summit surface; peaks; DEM; Ordos Platform, China

## Late Quaternary Alluvial Cone Formation and Climatic Change in the Konan District, Koriyama, Northeastern Japan

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### Abstract

A new 30m-long drilling core was obtained from in the Konan district, Koriyama, northeastern Japan. The location is on the small alluvial cone formed at the foot of the Oumountains, which was formed by old debris flows from mountains.

The core consists of the alternations of gravel and peaty silt layers, with some volcanic pumice layers accumulated during the late Quaternary. Gravel layers are poorly sorted and contain much plant fragments and wood pieces. We carried out radiocarbon dating, tephra analysis, and pollen analysis. These results enabled us to consider the environmental change of the Inawashiro basin, surrounded by the Oumountains, during late Quaternary period.

In this presentation, we will discuss the age of the debris flows at the drilling point. Furthermore, local environment changes in this region during the late Quaternary will be discussed.

### Key words:

Alluvial cone; Debris Flow; Northeastern Japan; Quaternary

## Late Quaternary Glacial Landform Evolution and Paleoclimatic Implications of the Tien Shan Mountains

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### Abstract

The Tien Shan Mountains are located in arid, mid-latitude regions in Central Asia, with abundant glacial geomorphological and depositional phenomena. However, Late Quaternary glaciations and their climate implications in Tien Shan are lack of attentive discussion. Based on previous glacial landform and chronological studies, and modern landform analyses, we select 7 typical study areas where glacial landform and chronological data are available in Tien Shan, to discuss the Late Quaternary glacial history and the paleoclimate change. The temporal and spatial characteristics of glacial landforms in Tien Shan show that from MIS 4, through MIS 3 and MIS 2 to Holocene, the climate of Tien Shan area gradually dried. The great glacial expansions in MIS 4 and MIS 3 are related to more moisture brought by westerlies from ice-dammed lakes formed by Eurasian Ice Sheet. Since MIS 2, the gradually strengthened Mongolia High and decrease of moisture brought by westerlies might be reasons for glaciers becoming smaller and smaller. The local reliefs also play an important role in glacier size.

### Key words:

Tien Shan; Last Glacial; climatic change

## Luminescence Dating of the Minjiang River Terraces and Its Geomorphological Implication

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### Abstract

The river terraces of Minjiang located at the east margin of the Tibet Plateau have been used to investigate the tectonic history of the region during the late Quaternary. However, the chronology of the terraces has not been well constructed due to the lack of suitable materials for dating. In this study, we investigated the river terraces in the upper reaches of the river in Songpan, a total of five terraces were identified in the field. 21 terrace samples were collected for optically stimulated luminescence (OSL) dating. The results showed that some samples were not well bleached at the time of deposition. Based on the equivalent dose ( $D_e$ ) distribution and the value of the overdispersion, a minimum age model (MAM) was used to calculate the  $D_e$  values of the samples. The minimum ages obtained are considered to represent the true burial ages of the samples, and then the formation ages of the river terraces. The five river terraces were thus dated to  $\sim 3.3$ ,  $\sim 7.2$ ,  $\sim 12.7$ ,  $\sim 40.9$  and  $\sim 55.4$  ka, respectively. Based on the terrace ages and their elevations above the modern channel, the river incision rates were calculated to be 0.90-1.49 mm/yr, which reflect the differential uplift rates during the past  $\sim 55$  ka. In addition, the terrace ages are also compared with the ages of moraine deposits located in the Xuebaoding Mountain close to the Minjiang River. The factors affecting the formation of the terraces were discussed, including the uplift of the Minshan and Longmenshan mountains.

### Key words:

Minjiang river terrace; Luminescence dating; Minimum age model; Tectonic uplift

## Modeling Geomorphic Processes and Simulation of Virtual Landform Changes for the Future 120ka Shown as Animations

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### Abstract

A versatile simulator of landform changes was built up in Windows® computer. All parameter values are designed to be obtained from a separate list file. Initial conditions are a DEM of an island in this case and corresponding digital map of rock types. The simulator is adaptive to (s-1) wearing down of slope, (s-2) intermittent collapse of loose layers on steep slopes, (f-1) fluvial erosion of bed rocks, (f-2) sediment transportation with progressive abrasion of gravels downstream, (m-1) storm-originated sea-cliff collapses, and (m-2) wave erosion and sediment transportation above the surf-base.

Sea-level as an independent condition of the simulation is designed to be selectable from prepared change curves, for example, the curve from the last interglacial (mis5e) to the last glacial maximum (mis2). The climate types "inter-glacial", "moderate" and "glacial" are classified according to sea-level heights in the curve. Coefficient values of diffusion models for slope and fluvial processes depend on the climate types, and determine speed of landform changes. The other intermittent events like as river flood and sea-cliff retreat will occur after probabilistically determinative equations.

Almost all parameters of geomorphic processes are unknown numerically in Geomorphology. But specific numerical values of them are required to run the simulator. The more than one hundred values in the list file were given after repeating trial and error observing animations of landform changes compiled from time-serial DEMs of the simulator output. The simulation is suggestive for understanding basic geomorphologic concepts that landform change, that is, height change is equivalent to difference between material in-flux and out-flux measurable for the simulation, and that different parameters of rock properties and climate types make different landforms through time.

### Key words:

simulation; landform change; modelling; animation

## Modern Methods for Studying Exogenous Processes OT the East European Plain

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### Abstract

The role of exogenous processes in the formation of sediment load is poorly investigate. The processes are not just change relief of the Earth, but they have more influence on agriculture, construction of hydropower. In the last decade the exogenous processes are studied by satellite data, 3D scanning and radioisotope methods. This study examines the modern methods of studying exogenous processes. For assessment the intensity of them makes vast-scale geomorphological map. It is used field data, results of identification of satellite images. On the satellite images identified landforms (areal and linear) and determined channel sediment storage inside small watersheds. Finally, we propose that geomorphological maps and data of intensity of exogenous processes can estimate the total volume of transported sediment.

### Key words:

exogenous processes; sediment storage

## Old Landslide Deposits and Formation of Block Stream in Mt. Maneo, South Korea

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### Abstract

This study revealed that formation processes and period of slope deposits include block stream near Mt. Maneo, South Korea. In this study, we examined slope deposits including a block stream on Mt. Maneo. When examining the plan view and incline of the block stream, we observe that in the central section of the block stream becomes wider, and the incline becomes gentler. The contour lines indicate the presence of a valley in the upper half of the block stream and a ridge in the lower half. We found some spring water at the upper end and lower end of block stream. These general geomorphological and hydrological characteristics mean that this block stream was formed by landslide. Outcrop shows a silt layer mixed with weathered gravel of biotite granite below the block stream. There are three silty layers. These layers contain weathered gravel and AT (ashfall). The weathered gravel and AT are scattered throughout the three silt layers, but never form their own layers. The results can be summarized as follows: On Mt. Maneo, after the AT descent around 26 to 29 ka, slope deposits consisting of weathered gravel and AT were mixed. At some point after this mixing period, a large-scale landslide that reached the weathering layer occurred. This was followed by the removal of fine-grained material from the landslide block by flowing water, which led to the formation of a block stream.

### Key words:

Block stream; Landslide; slope deposits; South Korea

## **Sedimentary Environments of Terrace Gravel Layers of the Qingyi River along the Jingxian Basin, China, Based on a Combined Analysis of Gravel Fabric and ESR Dating**

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### **Abstract**

The Qingyi River, which issues from the northern fringe of Mt. Huangshan, is an important tributary of the lower Yangtze River. Field investigation focuses on the natural outcrops along the Qingyi River in the Jingxian Basin, where a well-preserved sequence of three terrace gravel layers is present. Based on the gravel fabric analysis and ESR dating, this paper tries to discuss the sedimentary environments of the terrace gravel layers. The results show that: (1) The gravels are mainly medium and coarse in diameter, showing the hydrodynamic conditions were strong in the formation periods of the terrace gravel layers when the maximum flow velocity could be up to 3.5 m/s; (2) The gravel orientations in the gravel layers of the T3 terrace and T2 terrace are 191° and 250°, respectively, pointing to SSW and SWW, similar to the present current; (3) The gravels are mainly sub-round or round in shape, implying these gravels should have been transported over a long distance from their provenances; (4) The terrace gravel layers contain mainly quartz sandstone, sandstone, vein quartz and quartzite, showing the change of the provenances was not significant; (5) The gravel layers of the T2 terrace and T1 terrace are typical fluvial sediments, whereas the gravel layer of the T3 terrace might be a product of the superimposition between debris flow deposits and fluvial deposits to some extent; (6) The ESR dating of the T3 terrace suggests that the Qingyi River has developed in the Jingxian Basin since about 0.9 Ma B.P., as a response to the MPR when the 0.1 Ma cycle began.

### **Key words:**

Qingyi River; Terrace gravel layer; Gravel fabric analysis; ESR dating; Development of river; Jingxian Basin

## **Spatial Association between Valley Density and Environmental Factors over the whole of Conterminous China**

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### **Abstract**

The density of valleys is a quantitative parameter which describes the degree of land surface dissection. This research analyzes the valley density and environmental factors which include three types of environmental factors (geology, climate, and terrain). Previous research found contradictory results about the controlling factors in different research areas. We hypothesize that the dominant controlling factor, or the interactions between factors, vary from region to region due to differences in each region's local characteristics and geologic history. This hypothesis is tested by using the geographical detector method to conterminous China's three levels of physiographic divisions. The geographical detector method computes the power of determinant that quantitatively measures the affinity between the factor and valley density. Our results show that the factors, with the largest determinant value, or their interactions, with the largest determinant value, are different between physiographic divisions. For example, lithology dominates in mountainous regions, relief dominates in plains. We compared this result to a similar research over the entire conterminous United States

### **Key words:**

geographical detector; valley density; conterminous China

## Spatial Association between Valley Erosion Degree and Mineral Factors over the Global Mars

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### Abstract

Valley networks are the evidence of the fluid process that existed on ancient Mars. Their spatial pattern and erosion degrees vary from region to region. The main contributors to their difference are 1) ancient climate factors and 2) geological factors. The Mars' valley networks were mainly formed in Noachian period (3.1-4.7 Gya). The high resolution and high accuracy ancient climate distribution is hard to estimate from the existing data because of lack of in situ data. The terrain and geologic factors may have been changed over time, however they are more stable and easier to estimate than climate, because of low temperature, lack of liquid water and weak tectonic plate process. The valley networks have been modified by re-surfacing processes and the impacting of craters, however their depths and boundaries could be extracted from terrain data. The terrain data was provided by Mars Orbiter Laser Altimeter (MOLA), which covered Mars' global surface, and High/Super Resolution Stereo Colour Imager (HRSC) which covered 50% of the surface. The mineral endmember data was provided by the OMEGA Mars global maps which used an infrared mineralogical mapping spectrometer. These maps provided six types of endmember on the Mars surface. This research used different resolution digital elevation model (DEM) data to estimate the erosion degree and analysed the relationship between erosion degrees, mineral endmembers, and terrain factors by applying the geographical detector method to the Mars geological divisions. The results showed that the factor, or their interactions with the largest determinant value, is different for geological divisions.

### Key words:

Mars; geographical detector; valley networks; mineral endmembers

## **Study of Glaciers in Drass Basin and Mass balance of Machoi Glacier in Kargil district, J&K–India**

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### **Abstract**

The Himalayan Glaciers comprise nearly 30% of glaciers outside the polar region and cover an area of 20 times the glaciers of Alps (Weismann, 1959). Drass is one of the coldest places in India and second in the world. It extends from Gumri (Close to Zojila pass) on National highway in the west to Kargil district. Drass sub-basin holds special geographical significance for the study of snow cover changes in the light of climate change phenomena. The study region has cold sub-arid type of climate with long chilly winters (Oct. to May) with minimum temperature ranges from (-15°C to -25°C) and strong snow storms, and a short mid summers (June to Sept.) with maximum temperature varying from 10°C to 25°C. Drass in western Ladakah is located at the altitude of 3230m in the Kargil district of Jammu and Kashmir. From the last ten years Drass basin glaciers have shown slight changes in snout position and 40% retreat and 60% advance. Overall the glaciers positive and negative balances thus indicate that glaciers are having secular retreat with large percentage of steady state.

### **Key words:**

Drass Basin Glaciers Satellite data; Accumulation; ablation; Snout; Machoi Glacier

## **Tectono – Morphic Analysis of Sundor Basin in Chhattisgarh, India**

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### **Abstract**

Tectonic activities shape the terrain. Topography is the surface expression of the earth surface motored by tectonic deformation which encourages the denudation process. Rivers are the most powerful agent among all denudation agents. Tectonic activities play an important role for developing drainage system and controlling the river behaviour. In the present study morphometric analysis has been carried out in Sundor basin with the help of geospatial technology. Morphometric analysis helps to understand the tectonic incidents as well as the present condition of the basin. Various geomorphic indices of active tectonics (GAT) are measured in Arc GIS environment using SRTM DEM and topographical sheet. Lithologically the area is homogeneous in character (mainly granite rock) which gives birth the dendritic drainage pattern and all the rivers are monsoon fed. The geomorphic indices reveal that the Sundor basin is in old stage or monadnock stage where recent tectonic deformation is not found. Some portion of the upper basin indicates the late youth and early mature stage but it has happened due to the hardness of rock (granite) and lack of erosive agent (water). Over the entire basin is tectonically stable in condition. This study demonstrates the importance of geomorphic study as well as geospatial technology to evaluate the tectonic sensitivity.

### **Key words:**

tectonic deformation; denudation; GAT; geospatial; monadnock

## The Progress of DEM based Terrain Texture Research—A Novel Perspective of Digital Terrain Analysis

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### Abstract

Existing digital terrain analysis is mostly based on the neighborhood or track analysis to get terrain factors. Obviously it is hard to reflect the characteristics of the topography in a macroscale. To solve this problem, we did a lot of works on DEM textures. In some particular spatial scales, natural terrain texture distinctly shows the similarity of similar landforms and the difference of different landforms. Unlike the satellite images texture, DEM terrain texture expresses pure terrain without surface mulches. Some major achievements were: (1) Proposed conceptual models of DEM texture and its basic attribute, influencing factors, internal mechanism and external appearance. Besides, built a mathematical model for describing it. (2) Hu Invariant Moment model, spatial Gray-level Co-occurrence Matrix model (GLCM), improved three dimensional lacunarity model (3D-LCA) and Daubechies-4 wavelet decomposition model are selected and improved to quantify the morphological and spatial structural features of landform. (3) Discussed the application of DEM texture by two examples: recognition of the mare and lunar highland; recognition of typical landforms in the Loess Plateau. On the basis of the above research, we explore a new research method of landform morphology cognitive, analysis, quantization and application based on texture analysis. The results show that texture analysis starts from human vision perceptive mechanism can effectively analyze and quantify the morphological and structural characteristics of terrain surface at multi levels of terrain morphology. Texture based digital terrain analysis methods can better explore and recognize the spatial distributing characteristics and the nested hierarchical structure characteristics of landform morphology.

### Key words:

DEM; Terrain Texture; Digital Terrain Analysis; Landform Morphology

## Three-Gorges Dam: A Gigantic Mechanism for All-Year-Round Riverbed Erosion of Yangtze River

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### Abstract

Three-Gorges Dam (TGD) play an important role on the adjustment of the runoff and sediments from the upper Yangtze to the estuary. This adjustment strengthens the stream power and accelerates the incision of the middle Yangtze channel. Although previous studies predicted the evolution of the Yangtze after the construction of the TGD, the limitation of the incision is still unclear. This study aims to investigate the potential of incision of the middle Yangtze in order to understand the recent mechanism of the river bed evolution by using the hydrological data from nine main gauging stations (from 1950s to 2010s). The preliminary results demonstrate that after the construction of the TGD, (1) the mechanism of the erosion and deposition alters from “non-flood-deposition and flood-erosion” to all-year-round erosion; (2) the closer to the TGD, the worse the relation is between the discharge and sediment concentration; (3) erosion is resisted by the gravel armour layer at upstream of the Shashi Station and the channel between the Shashi and Jianli Station currently suffers from the most intensive erosion in accordance with the grain size analysis; (4) the channel downstream the Jianli Station still has potential to be eroded based on the carrying capacity calculation. Briefly, this study indicates that the middle Yangtze River is under the all-year-round erosion and is experiencing an adjustment from an unsteady stage to a new steady stage. The next goal of our study is to discover the temporal and spatial limitation of the influence of the TGD.

### Key words:

Yangtze River; Three-Gorges Dam; River bed erosion; Carrying capacity

## Topographic Mapping of Large-Scale Tidal Flats Using Waterline Method

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### Abstract

Tidal flats, considered as a natural ecosystem and landscape style, have an important environmental function and significant resource potential, especially in terms of land. Remote sensing has become an established technique for the measurement of topography over tidal flats; of such methods, the waterline method is particularly effective for constructing a digital elevation model of intertidal areas. Based on this method, this paper concentrated on obtaining a topographical map of tidal flats on Radial Sand Ridges in the southern Yellow Sea, using optical remote sensing images (HJ-1 and TM) and a high-precision hydrodynamic model based on measured water level data. From December 2013 to May 2014, 21 waterlines under different tidal conditions were extracted from satellite images. A hydrodynamic numerical model was established and run to simulate the tide level for every position of the waterline at the time of image acquisition. Five new tide stations were built for both monitoring the variation of tidal level and accurate validation of the numerical model. The points from every waterline were given the synchronous tide level values calculated from the model. The DEM was then generated using the natural neighbourhood interpolation method based on the height attribute of 21 waterlines. In this paper, a DEM covering an area of approximately 1900 km<sup>2</sup> was constructed using the waterline method. The height accuracy of the DEM was within 20 cm. This method offers the clear advantage of being able to construct an intertidal DEM over large areas cost effectively and efficiently.

### Key words:

topography; tidal flat; waterline; Radial Sand Ridges; remote sensing

# FORUMS, SYMPOSIUMS & SPECIAL SESSIONS

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JOINT COMMISSIONS

KEY TOPICS

PLENARY LECTURES



## Interactions Between Geomorphic Processes and Human Activities and Geographical Aspects in Geoarchaeology

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Home

### Oral

1. [Geoarchaeology of Settlement Mounds in Tehran Plain](#)  
Mehran Maghsoudi (Associate Professor, University of Tehran, Iran); Asghar Navidfar; Afsaneh Ehdaei (Ph.D. Candidate, University of Tehran, Iran)
2. [Geochemical Evidence for the Provenance of Aeolian Sands in the Ordos Deserts, North China](#)  
Qianqian Liu; Xiaoping Yang (Institute of Geology and Geophysics, Chinese Academy of Sciences, China)
3. [Human Occupation and Relative Sea Level Changes along the Western Abu Dhabi Coastline, United Arab Emirates](#)  
Damien Arhan; Kosmas Pavlopoulos; Eric Fouache (Paris Sorbonne Abu Dhabi, UAE)
4. [Initial Investigations into the Origin and Morphology of Clay Dune in Alashan Plateau Desert, North China](#)  
Fangen Hu; Xiaoping Yang (Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences, China)
5. [Landscape Sensitivity, Climate Change and Land Use Change: Learning from the Past](#)  
Michael Meadows (University of Cape Town, South Africa)
6. [Landscape Spatial Patterns in the Maowusu \(Mu Us\) Sandy Land, Northern China and Their Impact Factors](#)  
Peng Liang; Xiaoping Yang (Institute of Geology and Geophysics, CAS, China)
7. [Landscape-Scale Geomorphic Evolution Constrained by OSL Dating: An Example around Taosi, an Archaeological Site in Eastern Loess Plateau of China](#)  
Liping Zhou; Jun Feng; Duowen Mo (Peking University, China)
8. [Paleochannels of the Zerafshan River \(Ouzbekistan\) and Human Occupation since Neolithics in the Oasis of Bukhara and Qaraqol](#)  
Eric Fouache (University Paris Sorbonne Abu Dhabi, UAE); Rocco Rante (Le Louvre); Dupays Malvina; Vella Claude; Fleury Jules (Aix Marseille Université AMU CNRS, CEREGE UMR 7263, France); Ragala Rachid (University Paris Sorbonne Abu Dhabi, UAE/France); Andrieu-Ponnel Valerie (Aix Marseille Université IMBE, CNRS UMR 7263, France); Zink Antoine; Porto Elise (Centre de

restauration et de recherche des musées de France, Ministère de la Culture et de la Communication, France)

9. [Sediment Grain-size Analysis of the Niya Drainage Area in the Taklamakan Desert, Northwest China](#)  
Qida Jiang (Institute of Geology and Geophysics, Chinese Academy of Sciences, China)
10. [Sedimentological Reorganization of Aeolian Sands on the Barchan-To-Parabolic Dune: Evidence from the Maowusu Sandy Land, North China](#)  
Deguo Zhang; Xiaoping Yang (Institute of Geology and Geophysics, Chinese Academy of Sciences, China)
11. [The Chinese Plain Ancient Landscape Survey: A Geoarchaeological Investigation of Human-Environmental Impacts](#)  
Michael Storozum; T.R. Kidder; Zhen Qin (Washington University in St. Louis, USA); Haiwang Liu (Henan Provincial Institute of Cultural Relics, China)
12. [The Geoarchaeology and Geomorphology of Maya Wetlands from the Late Holocene to the Anthropocene](#)  
Timothy Beach; Sheryl Luzzadder Beach; Samantha Krause (The University of Texas at Austin, United States)
13. [The Initial Formation of the Modern Dune Landscape and Environmental Changes in the Hunshandake Sandy Land, Eastern Inner Mongolia, China](#)  
Xiaoping Yang (Institute of Geology and Geophysics, Chinese Academy of Sciences, China)

## Poster

1. [Aeolian-fluvial Interactions in Dryland Environments: Evidence from the Ejina Basin, NW China](#)  
Bingqi Zhu; Jingjie Yu; Xunming Wang (China, Key Laboratory of Water Cycle and Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, 100101, P. R. China)
2. [Coexistence of Crest Orientation in Star-dune Fields](#)  
Deguo Zhang (China, Institute of Geology and Geophysics, Chinese Academy of Sciences); Clement Narteau; Olivier Rozier (Institut de Physique du Globe de Paris)
3. [Geohistorical Analysis of Fluvial Landscape Evolution Near a Roman Villa in Western Switzerland](#)  
Maxime Capt; Emmanuel Reynard; Yves Dubois (Switzerland, Institute of Archaeology and Sciences of Antiquity, University of Lausanne, Lausanne, Switzerland)
4. [Heavy Metal Contamination of Agricultural Soils in the Low Reaches of the Yellow River](#)

Ziting LIU; Baohua ZHANG; Jianrong CAO (China, School of environment and planning, Liaocheng University)

5. [Holocene Landscape History of Lower Yellow River Valley: A Geoarchaeological Approach](#)

Jinok Lee (United States, University of Texas, Austin); Xuexiang Chen; Hui Fang (China, Shandong University)

6. [Provenance of Aeolian Sands of Dune Fields in Northern China, Inferred from Geochemical and Sedimentological Data](#)

Ziting LIU (China, School of environment and planning, Liaocheng University); Xiaoping YANG (China, Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences)

7. [Sea Level Changes and Shoreline Reconstruction Since Bronze Age in Attica Peninsula and SW Euboea Island, Greece. The Significance of Beachrocks](#)

Kosmas Pavlopoulos (UAE, Paris Sorbonne University Abu Dhabi); Dimitrios Vandarakis (Greece, Harokopio University Athens); Vasileios Kapsimalis (Hellenic Centre for Marine Research)

8. [Shallow Landslide Study and Mapping in Volubilis Archaeological Site \(Morocco\)](#)

Mohamed Rouai; Abdelilah Dekayir; Khaoula Qarqory (Morocco, Meknes University)

## Geoarchaeology of Settlement Mounds in Tehran Plain

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### Abstract

The ancient mounds are the area of human activity in the near and far past. These places may be the ruins of remainders or transit camp of a village or town. This study examines the archeology of ancient mound of Meymanatabad by using granulometry, geochemical and micromorphological methods. Natural and cultural characteristics of the samples taken from Meymanatabad site were studied and finally, the abandonment of settlements or their shift to another place was examined. In general, the results of the study showed that residents were strongly influenced by changes in water flow and river course changes on the alluvial fan of Karaj River and its tributaries like Shadchay River. Since the youngest sediments of Shadchay River terraces are sedimentologically bimodal, it represents the theory of flow rate and its impact on the residents. Based on micromorphological and clay mineralogy results before the entrance of settlers, warm and wetter conditions than present predominated over the region. According to the cubic \_ microscopic structure that is characteristic of the natural samples of region, a period lack of establishment from section E to section D has occurred. Section C is the last stage of culture and after this section cultural heritage is not present. The results show that flooding was the main reason of disappearance and abandonment of the civilization from the Shadchay River bank which resulted in the loss of civilization in this region.

### Key words:

Tehran plain; Meymanatabad cluster; Micromorphology; Settlement mounds; Sediment analysis; Karaj River

## Geochemical Evidence for the Provenance of Aeolian Sands in the Ordos Deserts, North China

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### Abstract

Identifying the provenance of aeolian sediments in the Ordos deserts is of great importance for understanding the responses of earth surface processes to climate change and the linkage with the Yellow Rivers which is still controversial. We investigate the major, trace and rare earth element composition of sandstones, lacustrine sediments and aeolian sands collected in the Ordos deserts. Our result shows that the aeolian sands in the Kubq Desert have experienced multiple sedimentary cycles. They derived primarily from the north Tibetan Plateau by the Yellow River rather than from the sandstones underlying Aeolian sands. No obvious genetic linkage between the Helan Mountain, the Yinshan Mountain and the aeolian sands in the Kubq Desert. The lacustrine sediments and sandstones are the main sources of aeolian sands collected in the east part of the Mu Us Sandy Land, but they may not contribute much to aeolian sands in the west part of the Mu Us Sandy Land, especially the lacustrine sediments. Aeolian sands collected in the west part of the Mu Us Sandy Land have been transported by rivers according to the grain size distribution and trace and rare earth element composition. Further study still needed to determine which contribute more on transporting sands, either the Yellow River or small rivers developed in the Mu Us Sandy Land.

### Key words:

the Ordos desert; aeolian sand; provenance; trace and rare earth element

## Human Occupation and Relative Sea Level Changes along the Western Abu Dhabi Coastline, United Arab Emirates

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### Abstract

The Arabian Gulf is characterised by important sea level glacio-hydro-isostatic fluctuations during Late Pleistocene and Holocene. Between Late Glacial Maximum and 6 000 years BP, the Gulf basin is relatively quickly flooded, through an important post-glacial marine transgression. So far, researches has considered this sea level drop as globally homogeneous. However, coastline lateral geometry variations are much more complex, especially because of uplift processes and diapiric dynamic.

Holocene human occupation of Western Abu Dhabi coastal areas remains still quite poorly known, in spite of archaeological survey and excavation programs. Reconstructing these coastline local variations become thus a key issue to characterize coastal palaeo-environments during Holocene and identify the spaces settled by human populations.

In order to adress theses issues and bring elements of response, we relate geological, geomorphological and archaeological data, by using ArcGIS10.1. A review of the archaeological sites of the region, allowed us to define the spatial and temporal indicators of human coastal occupation. On the other hand, a fieldwork has been conducted in specific coastal places, identifying coastal geomorphological landforms (beachrocks, beach ridges) as sea level indicators during Holocene. Selected samples were dated by 14C AMS method.

Crossing and relating all theses data allow us to model relative sea level variations, comparing with the glacio-hydro-isostatic model of Lambeck, and determine the evolution of western Abu Dhabi coastline area and its human occupation through Middle to Late Holocene.

### Key words :

UAE; Abu Dhabi; relative sea level changes; Holocene

## Initial Investigations into the Origin and Morphology of Clay Dune in Alashan Plateau Desert, North China

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### Abstract

Clay dunes, characterized by a higher content of silt and clay commonly occurred on the lee side margin of closed-basin in arid and semi-arid areas, are important component of aeolian landform and extensively identified in most of continents on the Earth. While little is known about its development and distribution in Asian continent. Our field investigations firstly identified the occurrence of clay dunes in the Alashan Plateau Desert, north China, an important part of arid central Asian. Clay dunes occurred in three isolated lowland areas of the SHT Basin are of barchans, hooked barchans, asymmetrical barchans, linear or seif dunes in morphology, which are different to most of the well-studied clay dune in Australian, African and American. These differences may be main attributed to the asymmetric bimodal wind regime, prolonged droughts and physical nature of sediment. Based on the history of the SHT lake-basin evolution and climate change, we inferred that the landscape of modern clay dunes in Alashan Plateau Desert could not predate to the MIS 5, and probably formed since late Holocene. Evidences from characteristic of particle size distribution and trace and rare earth elements, combining geomorphological characteristic, indicate that source sediment of the clay dune are main derived from the local Cretaceous and Quaternary red fluvial-lacustrine mudstone and sediment, and the ultimate source is the weathered and denuded products of granitoids from East Altay Mountains. Comparison of the shapes and alignments of clay dune with the pattern of winds tends to support Tsoar's model of transitions in dune shape from barchans to seif or linear dunes. Seif and linear dunes laterally migrated and elongated, and the northeastward lateral migration was about 20~40 m and 100~200 m between 2003 and 2013 with a rate of about 2~4 m/year and 16~20 m/year, supporting the idea that seif and linear dune could migrate laterally, although the migration rate is very low.

### Key words:

Clay dune; Origin; Sediment source; Grain-size; Trace and rare earth elements; Morphology and migration; Alashan Plateau Desert



## Landscape Sensitivity, Climate Change and Land Use Change: Learning from the Past

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### Abstract

The concept of climatic geomorphology developed to explain apparent relationships, mainly at large geographical scales, between landforming processes and climate. Although there are clearly some problems of applying this idea to a direct understanding of the impact of climate change, there are situations whereby the dynamics of climate in the past, most particularly in the late Quaternary, can be shown to have impacted on geomorphic processes. Such evidence may be usefully employed in assessing the potential degree of landscape sensitivity to projected climate change in the future. Geomorphic process response to successive climate shifts in the late Quaternary is demonstrated, in the case of the Kalahari of southern Africa, to have been both substantial and widespread. Other case studies from southern Africa indicate the potential of land use change, coupled with climate shifts, to induce land degradation. It is concluded that a perspective from the past is useful in estimating landscape sensitivity to both climate and land use change in the future.

### Key words:

Geomorphology; Climate change; Land use; Quaternary environmental change; Landscape sensitivity

## Landscape Spatial Patterns in the Maowusu (Mu Us) Sandy Land, Northern China and Their Impact Factors

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### Abstract

On the basis of interpretation of satellite imageries and field investigations, we studied the distribution patterns of sand dunes in the Maowusu (Mu Us) Sandy Land in the southern Ordos Plateau, northern China. Our research questions included: which parameters are critically responsible for the landscape spatial pattern? How is the relative importance among various factors? Our initial analysis was enhanced by applying a new approach, i.e., the Geographical Detector that has been developed for geographical spatial analysis, and being now increasingly used in the epidemiology in China. Using the combined methods of the Geographical Detector, digital image processing, field investigation and Normalized Difference Vegetation Index (NDVI) spatiotemporal analysis, our work aimed to contribute to a better understanding of the causal relations between landscapes' distribution and variations of geographical factors within this Sandy Land and beyond. The findings of this study highlighted that the climatic potential productivity, local relief and river system are the first order of important factors in shaping the landscape spatial pattern. In addition, landscapes' distribution at different spatial scales is controlled by different predominant driving factors. Owing to different climatic backgrounds and land use histories, the responses to external forcing change between western part and eastern part of the Maowusu Sandy Land are out-of-step. We conclude that the desertification of the eastern part of Maowusu Sandy Land has been mainly caused by unecological human activities while the western part is governed by natural factors.

### Key words:

Landscape evolution; Spatial analysis; Human impact; Desertification; Geographical Detector

## Landscape-Scale Geomorphic Evolution Constrained by OSL Dating: An Example around Taosi, an Archaeological Site in Eastern Loess Plateau of China

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### Abstract

Reconstruction of landform evolution at landscape-scale is important for both geomorphological and archaeological studies. Previous attempts to constrain the chronology of the Earth surface processes of such a scale have been impeded by the lack of precise dating techniques. In this study, we apply optically stimulated luminescence (OSL) dating method to reconstruct geomorphic evolution at a relatively small scale around Taosi, an archaeological site in the eastern part of the Loess Plateau. The present landscape of Taosi area is a loess platform cut by several large deep gullies. It has been a mystery how the landform of such an area in the heart of an ancient capital has changed over the last few millenniums. Fluvial sediments samples at ten sites were collected and quartz extracted was dated with blue light OSL measurements. The OSL ages obtained vary from  $0.9\pm 0.1$  ka to  $22.5\pm 2.1$  ka. These new data provide not only chronological constrain on the evolution of the fluvial systems in the Taosi area but also clues for the connection between human activities and Earth surface processes during the last twenty thousand years.

### Key words:

Landform evolution; OSL dating; archaeological site

## **Paleochannels of the Zerafshan River (Ouzbekistan) and Human Occupation since Neolithics in the Oasis of Bukhara and Qaraqol**

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### **Abstract**

The history of the civilizations of the oasis of Bukhara and Qaraqol (south-eastern Uzbekistan) since the Neolithic in link with environmental changes is study by the French/Uzbekistan Archaeological Mission in Bukhara<sup>1</sup> in the continuity with pioneer Russian studies<sup>2</sup>. Using a methodology tested in Afghanistan, the geoarchaeological side of the program focused on the drawing of a regional geomorphological map then on the identification, mapping and dating of the paleochannels of the river Zerafshan. We established the chronology of several fluvial channel generations by association with archaeological settlements of different eras (Early Neolithic, Neolithic, Bronze Age, Iron Age, Islamic period) and with optically stimulated luminescence dating carried out on alluvium deposits. Based on preliminary results of these OSL dates we propose and discuss a regional reconstruction.

### **Key words:**

Geoarchaeology; Fluvial geomorphology; Geohazard; OSL dating; Tributary Migration; Uzbekistan

## **Sediment Grain-size Analysis of the Niya Drainage Area in the Taklamakan Desert, Northwest China**

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### **Abstract**

Sediment grain-size closely relates to sand migration, and the Niya drainage area is a representation in the Taklamakan desert, which sand migration is governed by aeolian and fluvial process. Therefore, we study the grain-size distribution of the Niya drainage systematically to explore mechanisms of aeolian and fluvial transport and to identify grain-size characteristics of internal drainage systems of the Taklamakan desert. In this study, grain-size parameters of 29 aeolian and fluvial samples from the Niya drainage area were analysed. The main composition of the Niya drainage area is very fine sand and fine sand. Sorting improves as mean grain-size decreases, sand become progressively symmetrical-skewed as sorting improves and become progressively mesokurtic as grain-size decreases. It indicates that the main loss of particle composition is coarser grains during sand migration in the desert. Combining topography, wind and hydrological data, our result shows an obvious different relationship between grain-size and sorting in cases of along the river and increasing distance to the river, indicating spatial variability of aeolian and fluvial transport. And a high difference of particles of the same latitude between adjacent drainage areas, implying restricted sand migration in the east-west direction. We herein conclude that grain-size parameters change regularly along the Niya river and others from the edge of the desert into the interior, and the two transports work variably both parallel and perpendicular to the rivers.

### **Key words:**

Aeolian; grain size; transport mechanism; Niya river; Taklamakan desert

## **Sedimentological Reorganization of Aeolian Sands on the Barchan-To-Parabolic Dune: Evidence from the Maowusu Sandy Land, North China**

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### **Abstract**

The grain-size distributions (GSDs) pattern of aeolian sands of an individual dune may contain information about fluctuations of wind regime and vegetation cover. While some earlier studies were focused on the response of GSDs to aeolian processes and source area, research of the effect of bi-modal wind regime and vegetation cover on GSDs is still rare. In this paper, grain-size parameters were determined for bulk sand samples along the longitudinal profile and crestline of a transitional (barchan-to-parabolic) dune. Along the longitudinal profile, the grain-size and sorting pattern is characterized with the finest sands and the worst sorting occurring on the middle of stoss face, and the coarsest sands and the best sorting occurring on the crest. Under the effect of spatial variation in vegetation and dune slope, the grain-size and sorting vary along the dune crestline, which is characterized by a decrease in grain-size and improvement in sorting toward two horns. Decomposition analysis of the bulk sand samples indicate that the modern aeolian dune sands contain a bimodal distribution with a coarse reptation and a fine saltation component. Our results show that each component in sand samples have different responding level to bimodal wind regime and vegetation cover. The coarse component, comprising the main part of the dune sand, has pronounced kurtosis and is well sorted, which is interpreted to be the product of sand transport generated by near-surface strong northwesterly winds. Conversely, the fine component has a wide grain-size range and is poorly sorted. Its modal size and sorting pattern suggest that it can be readily transported by near-surface weak southeasterly winds. It appears that temporal variation in dune-scale factors, such as wind regime, rather than vegetation, is responsible for the grain-size variations on a barchan-to-parabolic dune, and thus for its transformation.

### **Key words:**

Grain-size; barchan-to-parabolic dune; Aeolian sediment; sorting pattern; Maowusu Sandy Land

## The Chinese Plain Ancient Landscape Survey: A Geoarchaeological Investigation of Human-Environmental Impacts

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### Abstract

Over the past five years, the authors have conducted a geoarchaeological survey in Northern Henan Province, China, to test three hypotheses of regional and global significance. First, many Chinese archaeologists consider this area void of archaeological remains. Based on our data, the majority of the archaeological material in Northern Henan is far below the surface - approximately 5 to 8 meters. Our preliminary results suggest that an area over 50km<sup>2</sup> was buried by Yellow River flood deposits, preserving a great variety of archaeological and geological features, including roads, towns, fields, lakes, and buried soils, capable of answering many questions concerning the subsurface archaeological record of the region. We have found human disturbance in nearly all stable land surfaces dating from the Bronze Age to the Song dynasty. Some archaeologists argue that buried soils are a marker bed for the Anthropocene. The stratigraphic sequence in Northern Henan contains buried soils from as early as the Pleistocene and as late as the Song dynasty, making this an ideal area to test if buried soils do reflect changes in land use. Our preliminary results suggest that the deep sedimentary record of Northern Henan can reveal much about the intricate inter-relationship between human behaviour and environmental change.

### Key words:

Geoarchaeology; China; Henan; sedimentology; micromorphology; Anthropocene; archaeology

## The Geoarchaeology and Geomorphology of Maya Wetlands from the Late Holocene to the Anthropocene

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### Abstract

Based on many field studies from 2000 to 2016 in Central America we present models of the natural and human factors of wetland agroecosystems. We start with the broader context by considering Pre-Columbian wetland agriculture in the Americas and in ancient China. Next, we consider multidisciplinary evidence for the formation of ancient Maya wetland agriculture. Evidence ranges from hundreds of field excavations to the lab with many radiocarbon dates, pollen, soil and water chemical analyses, and remote sensing including Lidar in 2016. We then consider the natural and human altered formation of wetland fields, what crops grew in the fields, and when they were active. We synthesize older models with new findings from three distinct wetlands field complexes on three chemically diverse river systems in Belize. Each system has slow rates of aggradation before the Maya Preclassic, about 3000 BP. After the Maya Preclassic, sedimentation increased, and multiple proxy show the expansion of cultigens like maize, cassava, and fruit trees. The Maya built field and canal systems in these wetlands over periods of drought and rising water tables in the Late to Terminal Classic from 1500 to 1000 BP, and the canals became traps for sedimentation after Maya abandonment about 1000 BP. Based on remote sensing, we next consider the extent and importance of wetland agriculture to Mesoamericans. Lastly, we consider what these agroecosystems tell us about adaptation and resilience to climate change but we question whether they provide a successful model for development and restoration.

### Key words:

Geoarchaeology; Geomorphology; Wetlands; Rivers; Soils; Tropics

## The Initial Formation of the Modern Dune Landscape and Environmental Changes in the Hunshandake Sandy Land, Eastern Inner Mongolia, China

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### Abstract

The initial formation of the current desert landscapes in northern China and the environmental changes in these regions since then have been a big question mark although deserts account for about one third of Chinese land territories. On the basis of detailed geomorphological and sedimentary studies and OSL chronologies of various sedimentary sequences, we suggest that the dune landscape of the Hunshandake Sandy Land in eastern Inner Mongolia has been initially formed about 4000 years ago, much younger than assumed earlier. The palaeoenvironmental proxies indicate that the currently desert-like areas were occupied by forest with different species of trees, and with dense occurrence of wetlands and rivers. Although the abrupt aridification of the regional climate ca 4200 years ago was crucial to this shift, we found out that geomorphological and hydrological processes had played a significant role in the change. The headward erosion of the Xilamulun River reached the sandy land also ca. 4200 years ago, drained the water via groundwater sapping and caused ca. 30 m decrease in groundwater table. The loss of water via groundwater sapping is still going on, and impacts the environments and human society even today.

### Key words:

Desert; geomorphology; surface processes; palaeohydrology; environmental change

## **Aeolian-Fluvial Interactions in Dryland Environments: Evidence from the Ejina Basin, NW China**

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### **Abstract**

Understanding how aeolian sediment systems respond to internal and external forcing factors is important to evaluating their significance as an environmental proxy. Comparison of granulometric characteristics between aeolian and fluvial sediments in the Ejina Basin was conducted in this study aiming to examine the textural response of single-process systems in desert environment. Sediments studied were collected from four geomorphological units, i.e. river channel (fluvial), foredune (palaeo-alluvial), interdune and dune crest (aeolian). Most of the dune-crest sands are of unimodal distribution with medium to fine sand. The interdune sands are generally bimodal to slightly polymodal with medium and fine sand. The foredune and riverbed sediments are greatly polymodal with wide size classes. All Mz values of aeolian, fluvial and alluvial sediments tend to decrease from southwest to northeast, but in different SD patterns, indicating a general grain-size variation but different sorting processes between wind-dynamical and water-dynamical sediments at the basin. Aeolian sediments are relatively coarser and worse-sorted in comparison with other deserts, implying closer sources for the Ejina dunes. Detrital-sediment transportation modal analysis suggests that sources of aeolian sediment for the most part are the distal palaeo-alluvial fan deposits (foredune) rather than the modern fluvial sediments. The Ejina dunes is unlike so-called 'mature' sands (e.g., central Namib Sand Sea), which lie at some distance in space from the original sources of sediment, indicating that the availability of particle sizes in source area exerts a strong influence on the formation of aeolian dunes in the Ejina Basin.

### **Key words:**

Desert environment; Aeolian-fluvial interactions; Land surface processes; Ejina Basin

## Coexistence of Crest Orientation in Star-Dune Fields

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### Abstract

In sand seas submitted to multi-directional wind regimes, star dunes exhibit crests with various orientations giving rise to a huge variety of shapes. Using numerical modelling, we show that stationary star dune patterns may be the result of simultaneous growth in both the bed instability and the fingering modes. As the central part grow in height from the local sediment source, arms may extend in multiple directions. Thus, distinct sediment fluxes may coexist as the result of the speed-up effect in multidirectional wind regime, i.e., the apparent dune aspect ratio is not the same for each wind. We also find that star dune morphodynamics is not only related to the period of wind reorientation but also to the specific sequence of wind directionality. Starting from a flat sand bed, star dune fields may develop as individual dunes collide with one another and exchange sediment through their arms dynamics. Then, star dune size is not entirely controlled by the depth of the flow even if they need to remain voluminous (i.e., few times the elementary length scale for dune formation) to combine a variety of superimposed bed forms.

### Key words:

Star dunes; Sediment transport; Dune fields; Wind speed-up; Cellular Automaton

## Geohistorical Analysis of Fluvial Landscape Evolution near A Roman *Villa* in Western Switzerland

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### Abstract

In the Menthue catchment (Western Switzerland) archaeological remnants of a Roman *villa* are investigated in a rural area, near Neuchâtel Lake. Aerial photographs, taken in particular during dry years (e.g. 2003), show traces of former meanders of the Menthue River close to the villa location. In order to study the Menthue River former channels and the former lake shorelines, a geohistorical analysis was carried out, combining several methods: (1) High-resolution (2m) Digital Terrain Models (DTM) processing; (2) Analysis of historical maps dating back to 1722 AD; (3) Analysis of vertical aerial photographs of the Swiss Topographic Service (swisstopo) dating back to 1934; (4) Analysis of oblique aerial photographs using the WSL-monoplotting tool. Processed images and documents were included in a Geographical Information System (GIS).

The various analyses allowed us: (1) to reconstruct palaeo-channels of Menthue River and palaeo-shorelines of Neuchâtel Lake; (2) to map a maximum space of river divagation; (3) to show a fluvial metamorphosis (from a braided river to a meandering river); (4) to show possible links between former meanders, an possibly artificial watercourse and the villa. Nevertheless, the absence of sedimentological investigations and absolute dating – which are the next step of the study – only allowed us to reconstruct a relative landscape evolution.

### Key words:

Geohistorical methods; geoarchaeology; Switzerland

## Heavy Metal Contamination of Agricultural Soils in the Low Reaches of the Yellow River

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### Abstract

Heavy metals are potentially harmful contaminants that can accumulate in the tissues of organisms and cause severe environmental damage. Thus it is necessary to assess the accumulation degree of heavy metals in agricultural soils. In this study, surface and profile soil samples in agricultural fields were collected from the low reaches of the Yellow River. The concentrations of trace elements were measured using the inductively coupled plasma-mass spectrometry (ICP-MS). The results show that the concentrations of heavy metal elements such as Cr, Ni, Cu, Zn and Pb in most samples are lower than the recommended values of the Environmental Quality Evaluation Standards for Farmland of Edible Agricultural Products (HJ/T 332-2006), but the Pb concentrations in the roadside soils are higher than the standards. The chondrite-normalized rare earth elements (REE) of soil samples are characterized by similar distribution patterns. Based on the distributions of trace elements data, we suggest that the abundances of Pb, Cu, Zn, Ni and Cr in the agricultural soils from the low reaches of the Yellow River were mainly sourced from natural species, but the positive anomalies of Pb were derived from human activities.

### Key words:

Heavy metal; contamination; agricultural soil; trace elemental data; Yellow River

## Holocene Landscape History of Lower Yellow River Valley: A Geoarchaeological Approach

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### Abstract

The region of the Yellow River valley has experienced significant climate and geomorphic change through time. Since the broad floodplain of the Yellow River and its tributaries is very sensitive to hydrological changes caused by climate and human land-use, the sedimentary archive of the Yellow River system provides valuable information on the long-term alluvial history of the catchment. In this poster I present results of Geoarchaeological and archaeobotanical investigations I conducted in multiple locations in Shandong Province, including Rizhao, Heze, and Qufu. The research focuses on ca. 6000 years in the region, from the early Neolithic to the Han Dynasty. Using geomorphological and archaeobotanical data, I reconstruct local-level environmental history and land-use practices, to demonstrate that farming communities had sophisticated adaptation strategies to cope with environmental variations.

### Key words:

Geoarchaeology; archaeobotany; Shandong Province; environmental history; land-use strategy

## Provenance of Aeolian Sands of Dune Fields in Northern China, Inferred from Geochemical and Sedimentological Data

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### Abstract

Identifying provenances of aeolian sediments in dune fields is of great importance for understanding the formation of dune fields, surface processes and dynamics of aeolian sand systems. By using the published geochemical and sedimentological (mainly grain size) data of aeolian sands from the Hunshandake Sandy Land, the Badain Jaran Desert and the Taklamakan Desert in northern China, we compared and investigated the sediment sources in the desert belt of northern China. The trace elements data show that the sources of the coarse- and medium-sized dune sands, the major component of aeolian sands, change distinctly among the various dune fields, suggesting diverse sources constrained by local geology and geomorphology. Trace elements and grain size features suggest that aeolian sands should be sourced mainly from the surrounding mountains initially via fluvial processes.

### Key words:

Dune Fields; Aeolian sand; Sand provenance; Geochemistry; Sedimentology; China

## Sea Level Changes and Shoreline Reconstruction since Bronze Age in Attica Peninsula and SW Euboea Island, Greece. The Significance of Beachrocks

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### Abstract

The coastal and marine area surrounding the Attica Peninsula and the southwest Euboea Island has a high geoarchaeological potential, since intense human activity has been ascertained from Neolithic. This region has played an essential role in Bronze Age cultural interactions and the subsequent evolution of the classical Greek civilization. However, few studies have combined the cultural growth with the landscape changes caused by the Holocene fluctuations of the sea level. During Early Bronze Age, the sea level was about 5 m lower than its present-day position, and therefore, the Greek mainland had a greater surface area. Nowadays, the locations of the paleo-shoreline are detected by a variety of archaeological and geomorphological indicators, such as the submerged ancient constructions in Delfinion (pier), Sounion (walls), Pountazeza (Public building with ashlar marble blocks), Anavyssos (coastal settlement), Daskaleio (mole) and Marathon Plain – Nea Makri (remains of settlement), as well as the submerged beachrocks in Aghios Nikolaos – Thorikon, Sounion, Aghios Nikolaos – Anavyssos, Aghios Nikolaos – Kalyvia and Eretria. The presence of the aforementioned sea level indicators is crucial for identifying not only the local climatic conditions during Holocene, but also the relative vertical movements (uplift of subsidence) due to tectonic activity. The present study collects, analyzes and assesses the available geological and archaeological information that focus on the gulfs of eastern Saronikos, western Petalion and Euboean, as well as it reconstructs the paleo-shoreline since Early Bronze Age. Landscape changes seem to be related with shifts in settlement patterns, resource exploitation and engagement of ancient civilizations with the sea.

### Key words:

Bronze Age; Paleo-shoreline mapping; sea level indicators; geoarchaeology

## Shallow Landslide Study and Mapping in Volubilis Archaeological Site (Morocco)

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### Abstract

Volubilis is an important and famous Roman archaeological site in Morocco. Founded in the 3rd century BC, the site holds fine monuments and beautiful Roman mosaics, and is classified as world cultural heritage by Unesco.

Volubilis is located 400m height on the south-western hillside of Jbel Zerhoun mount, with 10% average slope, the most part of the city lies on marls of Miocene age, overlying calcareous Jurassic terranes.

A field study showed obvious soil instability, consisting mainly of a superficial gravitational creep. This landslide phenomenon affects some precious Roman mosaics, and threatens to ruin ancient house walls. The marls mineralogical composition and the geotechnical characterization showed a high swelling potential of these expansive soils.

In the north-eastern quarter of Volubilis, measurements of the whole house walls inclination using a dipmeter device have been carried out, leading to determine the magnitude and direction of soil displacements and to perform statistics.

The study has led to draw quantitative mapping of marly soil movement, mapping both the direction and intensity of displacement, and to determine the most vulnerable zones and walls under the threat of fall over.

The establishment of database maps under a geographic information system (GIS) will be an important tool for monitoring the landslide phenomenon and the proposed solutions for risk mitigation, contributing to the protection and conservation of this universal human heritage.

### Key words:

Landslide; geoarcheology; spatial analysis; risk mapping; volubilis; Morocco.

## 3rd International Conference on Mountain Environment and Development,

### ICMED Theme: Future Mountain Development



Home

#### Oral

1. [A Case Study of Nujiang Prefecture: Construction of Ecological Security Pattern in Alpine-Gorge Area](#)  
Yimin Li (Yunnan Institute of Geography, Yunnan University, China)
2. [Assessment of Geo-hazards Induced by Gorkha Earthquake Sequences in Nepal](#)  
Hriday Lal Koirala (Tribhuvan University, Nepal)
3. [Characteristics of Debris Flows in a Drainage Channel with Stepped Dissipater](#)  
Huayong Chen (Key Laboratory of Mountain Hazards and Earth Surface Process, China)
4. [Characteristics, Change and Sustainability Strategies of Human-land Relationship in the Upper Minjiang River Basin](#)  
Liu Ying (Institute of Mountain Hazards and Environment, Chinese Academy of Science, China)
5. [Different Terrain to Earthquake-Induced Landslide Effect Research](#)  
Chen Cheng; Hu Kaiheng (Institute of Mountain Hazards and Environment, China)
6. [Dynamic Analysis and Numerical Modeling of the 2015 Abandoned Soil Landslide in Guangming New District, Shenzhen, China](#)  
Chaojun Ouyang (Institute of Mountain Hazards and Environment, China)
7. [Ecosystem Service Function in Recovering Process of Desertification Grassland Since 1995 in Zoigê, China](#)  
Wei Shui; Jianping Bai; Xiaomei Jian (Fuzhou University, China)
8. [Experimental Study of the Impact Force and Superelevation Features When Debris Flow Passing Channel Curves](#)  
Yuanhong HUANG (imde, China)
9. [Landslide Spatial Distribution Analysis in Deep-Incised Valleys of the Eastern Margin of the Qinghai-Tibet Plateau](#)  
Bai Shibiao; Cui Peng; Ge Yonggang (Key Laboratory of Mountain Surface Process and Hazards/Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)
10. [Mountain Disaster Risk Management during Emergency Avoidance Process in Country Resort Area of Western China](#)  
Rong Chen; Peng Cui (Institute of Mountain Hazards and Environment, CAS, China)
11. [Mountain Hazards: A Case of Nepal Himalaya](#)

Narendra Raj Khanal (Tribhuvan University, Nepal)

12. [Probability Prediction of Rainfall-Induced Shallow Landslides Based on a Coupled Physically-Based Model](#)

Xiuzhen Li (Key Laboratory of Mountain Hazards and Surface Processes, China)

13. [Rapid Weathering Processes of a 120-Year-Old Chronosequence in the Hailuoguo Glacier Foreland, Mt. Gongga, SW China](#)

Jun Zhou; Haijian Bing; Yanhong Wu (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)

14. [Roads and Agricultural Terraces in Mountain Areas of the World: Their Geomorphological and Hydrological Role](#)

Paolo Tarolli (University of Padova, Italy)"

15. [Rock Fall Hazard and Risk Assessment along Araniko Highway, Central Nepal Himalaya](#)

Amardeep Regmi (Institute of Mountain Hazards and Environment, CAS, Nepal)

16. [Simulating Mountain Resource City Expansion Based on Ecological, Resistance Surface Model: A typical Chinese City Case Study](#)

Jifei Zhang; Wei Deng (Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, China)

17. [Sustainable Livelihood Approach to Poverty Reduction: A Geo-Empirical Analysis of Mizoram, the Eastern Extension of the Himalaya](#)

Sati Vishwambhar Prasad (Mizoram University, India)

18. [The Quality and Sustainable Use of Soil in Mountain Areas, Southwest China](#)

Junfang Cui; Xiangyu Tang (The Institute of Mountain Hazards and Environment, CAS, China)

19. [The Varieties of Mountain Hazards and Human Resilience in Koshi Trans-Boundary Basin of Himalaya](#)

Ningsheng Chen (Institute of Mountain Hazards and Environment, CAS, China)

## Poster

1. [A Meta-analysis of the Change Characteristic of Vegetation in Shenfuyu Coal Mining Collapse Area](#)

Yaping Wang (China, Institute of soil and water conservation, Northwest A& F University); Wenzhao Liu (China, Institute of soil and water conservation, Chinese academy of sciences)

2. [The Space Distribution of Houses at Debris Flow Prone Area and Its Role in Disaster Risk Reduction](#)

Yu Lei (Singapore, Institute of Mountain Hazards and Environment, CAS); Peng Cui (China, Institute

of Mountain Hazards and Environment, CAS)

3. [Diversity and Conservation of the Endangered Species, \*Cercidiphyllum Japonicum\*, and its Communities in the Shennongjia Reserve, Central China](#)

Zhang Jin-tun; Zhang Bin (China, Beijing Normal University); Zhu Xunzhi (China, Jiangsu University of Science and Technology)

4. [Failure Mechanism of Rainfall-induced Karst Accumulation Landslide in Northeast of Yunnan](#)

Jiao Wang (China, Institute of Mountain Hazards and Environment); Xiuyuan Yang (China, Center for Hydrogeology and Environmental Geology Survey); Peng Cui (China, Institute of Mountain Hazards and Environment)

5. [Numerical Study of the Particle Segregation Effect on the Flowing Mobility of Granular Debris Flows](#)

Gordon Zhou (China, Institute of Mountain Hazards & Environment)

6. [Soil Moisture and Vegetation on Sloping Land in the Shenfu Coal Mining Area as Affected by Collapse Fractures](#)

Chao Li; Wenzhao Liu (China, Northwest A&F University); Xiaoqiang Song (China, Soil and Water Conservation Bureau of Shaanxi Province)

7. [Study on Physical Properties of Soil in Sliding Zone of Gravel Soil Landslide](#)

Lijun Su (China, Institute of Mountain Hazards and Environment, CAS)

## A Case Study of Nujiang Prefecture: Construction of Ecological Security Pattern in Alpine-Gorge Area

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### Abstract

As part of our national security, correlational research on ecological security must be given high attention. Aiming at the importance of ecosystem services, such as biodiversity protection, water and soil conservation etc., scholars focused on building up ecological security pattern based on ecological principles. Many factors must be considered when build up ecological security pattern in alpine-gorge area for its prominent and complex ecological security issues. Take Nujiang Prefecture, a typical alpine-gorge area, as study area, this program will build up ecological security pattern based on the characteristic of seriously water and soil erosion, geological disaster susceptibility and the human settlements environment vulnerability. 3S technology, hydrological analysis model and methods of landscape ecology were applied to this research to identify the key “source land”. Then build up ecological security pattern of Nujiang Prefecture based on resistance surface constructed by the factors of ecological security assessment, elevation and slop with the MCR model. After that, identify the corridor and node, then set key node in the eco-fragile region to improve the landscape connectivity.

### Key words:

Nujiang; Alpine Canyon; ecological security

## Assessment of Geo-hazards Induced by Gorkha Earthquake Sequences in Nepal

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### Abstract

Nepal experienced a major earthquake with magnitude of 7.6 on 25 April, 2015 and was followed by more than 30,000 aftershocks out of which 400 were greater than magnitude of 4.0. The district level database produced by the National Planning Commission had recorded 8,800 casualties and over 22,000 injuries and displacement of more than 100,000 people as the overall earthquake disaster affect. There were lack of information on the damage and loss from the earthquake induced geo-hazards. However, literatures have identified that the high magnitude earthquake followed by many aftershocks results a number of geo-hazards particularly in mountain areas. The present study is an attempt to explore the earthquake induced geo-hazards and its losses within seven severely affected districts. The study is based on secondary data collected from different sources such as national daily newspapers; Google Earth Images; available reports; District offices and primary data generated through case studies at local level. The study identified altogether 1654 landslides covering a total area of 3121.68 hectare. The results produced different clusters of districts in numbers of pre-existing landslides and landslides induced by the earthquake sequences. The study found that the analysis on local level are more useful than the district level in representing ground realities on the damages and loss from the earthquake as well as geo-hazards induced by earthquake sequences.

### Key words:

assessment of geo-hazards; earthquake sequences; damage and loss; severely affected

## Characteristics of Debris Flows in a Drainage Channel with Stepped Dissipater

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### Abstract

Debris flows are one of the common natural hazards in the mountainous area. They often cause devastating damages to the lives and property of local people. The construction of drainage channels in the discharging area is considered to be a useful method for hazard mitigation. Due to the lack of energy dissipation, large scale debris flows often lead to serious abrasion on the channel surface. In order to prevent drainage channels from scouring by debris flows, a new type of debris flow channel with stepped dissipaters was proposed. Debris flow patterns under different types of drainages (Rectangular channel, Dongchuan channel, and channel with stepped dissipater) were investigated. Variation of flow velocity and debris flow depths along the drainage channel was measured. The mechanism of energy dissipation was also analysed for the new type of drainage channel. The results indicated the drainage channel with stepped dissipater had higher energy dissipation than that of other types of drainage channel. With decreasing the debris flow scales, the energy dissipation rate for the drainage channel with stepped dissipater increased gradually.

### Key words:

Debris flow; Drainage channel; Velocity; Energy dissipation; Stepped dissipater

## Characteristics, Change and Sustainability Strategies of Human-land Relationship in the Upper Minjiang River Basin

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### Abstract

Due to the ecological vulnerability and the strengthening of economic activity as well as the interaction between them, the human-land relationship of the Upper Minjiang River Basin become worse which restrict the sustainability of the basin. So we choose it as study area to explore characteristics, change and sustainability strategies of human-land relationship.

This research includes four parts. Firstly, it quantitatively analyzes the element of human-land system and explains the relationship and interaction between each system. Secondly, it quantify human activity intensity and ecological vulnerability from spatial aspect, and builds a comprehensive discriminant model to explain spatial pattern of human-land relationship. Thirdly, it analyze the change and development trend of human-land relationship by matter-element model and Grey model. Fourthly it provides suggestion for human-land system sustainable development.

The result shows that: (1) the settlement distribution and mountain disaster distribution is highly overlapped, due to the contradiction between the space limitation and increase of construction demand, the human-land relationship is intension; (2) When the altitude is lower than 2300m, human-land relationship is the worst, meanwhile the juncture of Wenchuan county, Mao county and Li county is cool point which means the contradiction of human-land relationship concentrate in these area. (3) The human activity index and resource-environment carry ability index respectively increase from 0.141, 0.172 to 0.502, 0.298 from 2000 to 2010. If keep the same way of development, the two index will increase from 1.24, 0.36 to 8.43, 2.18 from 2015 to 2025. The human-land relationship will become worse and worse.

### Key words:

Human-land Relationship; Characteristics; Change; Sustainability Strategies; The Upper Minjiang River Basin

## Different Terrain to Earthquake-Induced Landslide Effect Research

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### Abstract

The areas affected by landslides in the earthquakes correlated with earthquake magnitude and other factors. Some empirical formulas just discuss the main factor magnitude with areas. However, the terrain can have a great effect on the landslide areas. In this study, we use the database of earthquake-induced landslides and digital elevation model to establish a modified correlation by terrain. The result indicates different places have different terrain, the former empirical formulas can be modified by calculating the terrain prominency. It can also increase the relevance of landslide areas and magnitude.

### Key words:

Earthquake; Landslides; Earthquake-induced landslides

## Dynamic Analysis and Numerical Modeling of the 2015 Abandoned Soil Landslide in Guangming New District, Shenzhen, China

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### Abstract

As amounts of underground and slope excavation work is done with the urbanization process, a rising number of abandoned soil sites are built between the ravines around in the cities. Analysis of its mobility and risk of this kind of landslide is crucial for city managers. In this paper, the recently occurred abandoned soil landslide in Guangming new district, Shenzhen, China in 2015, which caused 69 deaths and 8 losses, was investigated. In spite of no high rainfall and antecedent rainfall, about 2 million cubic meters abandoned soil traveled over a gentle terrain more than 1.0 km. It indicates its landslide mobility index ( $H/L \approx 0.1$ ) is much lower than general designed value and value in most other cases. The depth-integrated continuum method and a MacCormack-TVD finite difference algorithm and discrete element method (DEM) were both adopted to numerically analyse this landslide. It is indicated that a Coulomb friction model with consideration of the pore pressure effects could well reproduce the dynamic process. Sensitivity analysis shows that the high pore pressure plays a significant role in its mobility is the key factor to its severity.

### Key words:

Landslide; Abandoned soil; Mobility; MacCormack-TVD; Discrete element method; Numerical modeling

## **Ecosystem Service Function in Recovering Process of Desertification Grassland Since 1995 in Zoigê, China**

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### **Abstract**

Zoigê Plateau is not only the important ecological function area but also the environmental sensitive area in China. Specially, grassland desertification has happened at different degree under the dual influence of global climate change and unreasonable human activities. Large-scale vegetation restoration has been initiated by the central government over the past decades to improve ecosystem services, and ecological restoration benefit of desertification grassland is widely focused at home and abroad. The plant samples and soil samples were collected from five desertification grasslands of different managed year (including 1995, 2007, 2009, 2010, 2011 years) in Zoigê County. According to spatio-temporal eco-geographical process, the investigation and experiment was used to analyze the changes of ecosystem services from water and soil conservation, carbon sequestration and maintenance of biodiversity. The results show that along with the managed time increasing, community succession and soil physico-chemical property of the desertification grassland was gradually improved, and the function of soil and water conservation and carbon sequestration capacity was also enhanced. Overall, ecosystem service function was increased at different degree. Based on the above results, the research of ecosystem services can provide basic data for the government achievement of grassland desertification under the background of global climate change, and also provide a realistic basis for the further improvement of Zoigê desertification grassland management and the study of ecological restoration.

### **Key words:**

Zoigê plateau; grassland; desertification; ecosystem services; ecological recovery

## Experimental Study of the Impact Force and Superelevation Features When Debris Flow Passing Channel Curves

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### Abstract

Through conducting flume tests focused on the impact force and superelevation of debris flow when passing channel curves, we derive the following conclusions: 1. The impact force obviously increased in the outer flank and the eccentric degree of the impact load show positive correlation with the velocity of debris flow; 2. The peak values of the impact force of debris flow were treated with dimensionless analysis, and we obtain an effective formula to evaluate the space distribution of eccentric load; 3. The separation of solid and liquid phase when diluted debris flows passing channel curves is quite apparent while in the case of viscous ones, the separation of the two phases is hard to detect. In the same experimental conditions, the superelevation of the diluted debris flows is greater than that of the viscous ones; 4. The position of the superelevation peak value varies with the density of debris flow. It is in the intersection angle 75° of the curved channel for diluted debris flows, and in the intersection angle 45° of the curved channel for viscous debris flows.

### Key words:

debris flow; impact force; superelevation; channel curves

## Landslide Spatial Distribution Analysis in Deep-Incised Valleys of the Eastern Margin of the Qinghai-Tibet Plateau

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### Abstract

The eastern margin of the Qinghai-Tibet Plateau is one of the four most active landslide and debris flow regions in China. The previous research points out that the Late Quaternary rapid uplift and deep incisions of valleys control the occurrence and distribution of landslide. The purpose of this study is presented the approach for the analysis of distribution characteristics and modeling of the multi-temporal landslide considering the regional geomorphic evolution. We combine the landslide causative factors, elevation-area integral value, and drainage branching ration to the eastern margin of the Qinghai-Tibet Plateau of the geomorphic evolution. The pre-Holocene to recent landslides (include fossil landslides, rainfall triggered landslide and the WenChuan Earthquake induced landslides) inventory are built up based on the previous papers, these geological hazard investigations documents, field investigation, monoscopic manual interpretation, image classification and texture analysis using SPOT 5 and ALOS remote-sensing image data. The landslide causative factor database was constructed, digital elevation model (DEM, 30×30m and 90×90m) and derived topographical parameters (e.g. altitude, slope, aspect, profile curvature, plan curvature), geology (the map scale of lithological properties and fault is 500,000), land use (the map scale is 100,000) and further different environmental layers including road network and rivers. The trigger factors include the Peak Ground Acceleration, Peak Ground Velocity, Modified Mercalli Intensity of WenChuan Earthquakes and rainfall data from 600 weather stations in China include the study area available for the investigations.

### Key words:

landslide; geomorphic evolution; landslide causative factors; eastern margin of the Qinghai-Tibet Plateau; China

## Mountain Disaster Risk Management during Emergency Avoidance Process in Country Resort Area of Western China

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### Abstract

Emergency avoidance is one of the most important mountain disaster mitigation measures at mountainous region, which directly influence the severity of casualties. Country resort area is highly populated with tourists whose conscious and behaviors against mountain hazards are unpredictable, which has made it is very difficult to organize and manage the risk when mountain hazards occur. This study focus on this issue and concentrate on mountain disaster risk management during the emergency avoidance process in country resort area. Based on analysis of recent mountain disaster events and semi-structured interviews with 70 local people in country resort areas of western China, we identified the whole process of emergency avoidance and the potential risks, and found that the owners of farmhouse and the monitoring personnels play great roles in emergency avoidance process. The evacuation model led by monitoring personnels was summarized and feasible measures to reduce loss of mountain disasters were proposed and applied in empirical research of Longmenshan town, Pengzhou County. The results of this study will improve the mountain disaster risk management during emergency avoidance process and provide scientific support of hazard prevention and mitigation at mountainous region.

### Key words:

mountain disasters; emergency avoidance; risk management; country resort area

## Mountain Hazards: A Case of Nepal Himalaya

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### Abstract

Nepal is a mountainous country. It comprises series of mountain ranges extending from the west to the east. Those are Chure (Siwalik) Hills, Middle Mountain, High Mountain and High Himal (Greater Himalaya). A combination of factors such as highly rugged topography, active tectonic and highly concentrated monsoon precipitation has made this area highly susceptible to a wide range of hazards such as earthquakes, landslides, debris flow, landslide dam and its outburst flood, avalanches, glacial lake outburst flood, drought and epidemics. Recent global warming and subsequent increase in extreme precipitation events and rapid melting in snow and ice has been exacerbating the occurrence and magnitude of water induced hazards in these mountains. Moreover, the rapid growth in population, subsistence based economic activities and mass poverty have resulted the country most vulnerable to these hazards. So, the country has both high exposure and high vulnerability to natural hazards, thereby creating high risk of loss of life and property. Nepal is one of the 20<sup>th</sup> most disaster-prone countries in the world. It is ranked 11<sup>th</sup> in terms of risk from earthquake, 30<sup>th</sup> in terms of flood risk, and 5<sup>th</sup> in terms of risk from the impacts of climate change. A World Bank study in 2005 classified Nepal as one of the global “hot-spots” for natural disasters. This paper discusses the types of mountain hazards occurring in the country, the loss and damages from those hazards, and vulnerability context; and identify the gaps in disaster risk management efforts for sustained development of the country.

### Key words:

Nepal Himalaya; hazards; losses and damages; vulnerability; disaster risk management

## Probability Prediction of Rainfall-Induced Shallow Landslides Based on a Coupled Physically-Based Model

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### Abstract

Rainfall-induced shallow landslides not only have extensive distribution and high occurrence frequency, but also will often cause loss of lives and serious damage to infrastructure. Therefore, landslide space-time prediction is an important issue for human lives, urban planning and infrastructure management.

This study presented an efficient probabilistic method for predicting the space-time change of rainfall-induced landslides, based on a coupled physically-based stability model: Transient Rainfall Infiltration and Grid-based Regional Slope-stability analysis (TRIGRS) and a probability assessment model: Rosenblueth's point estimate method for Bayi gully in the Sichuan province of China. In the study, we collected a lot of data of the study area, including investigating and sampling data on the spot and relevant research reference data. We determined a line relationship between the wetness index and soil thickness of the study area based on powerful ArcGIS platform. We set a kind of rain scenario: 20-year rainfall at 24 hours recurrent period. The space-time change characteristics of landslides in the study area were deeply analyzed based on the coupled model of the TRIGRS model and Rosenblueth's point estimate method.

The research results were compared with the historical rainfall-induced shallow landslides in the study area and showed that the probabilistic analysis had better performance than the deterministic analysis. In addition, the results showed that TRIGRS model is an effective tool for rainfall-induced shallow landslides and proper understanding uncertainties of rock-soil mass plays an important role in accurately predicting space-time change characteristics of shallow landslides.

### Key words:

Rain-induced Shallow landslides; Space-time prediction; TRIGRS model; Rosenblueth's point estimate method

## Rapid Weathering Processes of a 120-Year-Old Chronosequence in the Hailuoguo Glacier Foreland, Mt. Gongga, SW China

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### Abstract

Knowledge on the initial stages of weathering at the decadal time scale is limited. Our aim is to reveal the weathering processes and influential factors in a 120-year-old chronosequence in southwest China. Soil and water samples were collected from 6 sites with different exposure ages. Mineral compositions were determined using X-ray diffractometry, and four mineral pools were separated using a sequential extraction method. The results reveal that the soil particle sizes of  $< 2 \mu\text{m}$  in the A horizons increased and the particle sizes of  $20 - 2000 \mu\text{m}$  decreased with time. The weathering can be generally divided into two stages: the first stage was dominated by the weathering of carbonates and was present at sites with an exposure age of  $\leq 52$  years; the second stage was characterized by the intense weathering of biotite, hornblende and apatite and was present at the 80- and 120-year-old sites. The rapid weathering was a result of the interactions of the lithology, rapid vegetation succession and climate in the Hailuoguo Chronosequence. Fine silt was produced in large quantities by the strong glacial abrasion and freeze-thaw cycles, providing rich materials for the subsequent chemical and biogeochemical weathering. The decarbonation and the rapid establishment of the conifer forest due to relatively high temperatures and precipitation promote mineral weathering by decreasing soil pH. The high permeability of the soil horizons due to the high content of rock fragments and abundant precipitation allows water and organic acids to infiltrate and dissolve mineral soils above the impervious bedrock.

### Key words:

mineral weathering; proglacial area; water chemistry; soil formation; young chronosequence

## Roads and Agricultural Terraces in Mountain Areas of the World: Their Geomorphological and Hydrological Role

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### Abstract

Humans are among the most prominent geomorphic agents, causing direct consequences on natural processes (e.g. soil erosion, surface runoff) through agricultural practices, road network construction, and urbanization (Tarolli and Sofia, 2016). High-Resolution Topography (HRT) derived from the recent remote sensing technologies (e.g. lidar, low cost Structure from Motion photogrammetry) allows for a better understanding of the interaction between anthropogenic elements and the geomorphology of a landscape (Tarolli, 2014). The present research shows the effectiveness of HRT to highlight the influence of anthropogenic topographic signatures on hillslope processes in mountain areas. The first analysis is related to agricultural terraces. Agricultural terraces are among the most evident and extensive human fingerprint on different landscapes of the world. Terraces are generally built to retain more soil and water, to reduce erosion, and to support irrigation. They reduce the slope gradient and length, facilitating the cultivation on steep slopes, and they increase the infiltration of water in areas with a moderate to low soil permeability, controlling the overland flow and velocity, with positive effects on agricultural activities. If poorly designed or not properly maintained (e.g. terraces subject to abandonment) a terrace system can progressively increase gully erosion and cause landslides. The second analysis discusses about the role of agricultural and forest roads on surface erosion and landslides. The construction of these anthropogenic features can have deep effects on surface water flows and sediments. The long-term consequences of road-associated landslides and surface erosion are still an open question in the Earth science community (Sidle and Ziegler, 2012). The results show how anthropogenic elements have crucial effects on sediment production and sediment delivery, also influencing the landscape connectivity. Thus, the availability of HRT can help in understanding and mitigating anthropogenic hillslope processes. The results presented here may be used for rural development planning, provide useful guidelines for sustainable land use planning, and they might help guiding future research directions for development-based watershed studies.

### Key words:

Humans; roads; agricultural terraces; mountain areas; water; landslides; erosion; sediments; high-resolution topography

## Rock Fall Hazard and Risk Assessment along Araniko Highway, Central Nepal Himalaya

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### Abstract

Rock falls are frequent along the steep slopes of highway cuts in mountainous areas like Nepal. Araniko Highway is a major highway connecting Nepal and China that has suffered from several instability problems. Recent earthquake activity in Nepal has generated many landslides, including rock falls along the highway, mostly between Lamosangu and Liping. These landslides have deposited huge piles of debris along the highway, as well as in the hill slope above, which has increased future risk of rock fall. Here, we have tried to analyze the distribution of rock falls along the highway, their mode of failure and the associated hazard and risk. The analysis show that most of the rock falls are concentrated along steep rock cliffs and are of wedge and plane failure type. For the rock fall hazard and risk assessment of the highway, we have slightly modified the original Rock fall Hazard and Risk Assessment (RHRA) method to fit the condition of the Araniko Highway. The developed hazard and risk map effectively indicates various levels of rock fall hazard and risk along the highway. Thus, based on the level of hazard and risk, the maintenance and inspection work can be carried out. In addition, the study reveals that this system can be effectively used to prioritize the severity of potential rock falls along other highways with similar geological and morphological settings.

### Key words:

Rock fall; Steep slope; Hazard; Risk

## Simulating Mountain Resource City Expansion Based on Ecological

### Resistance Surface Model: A typical Chinese City Case Study

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#### Abstract

Urban expansion is one of the core contents for urban studies. Using expansion model to simulate urban spread has been a highlight of the world. As a useful tool for exploring urban expansion, minimum cumulative resistance (MCR) model has been given much attention in recent decades. However, there are two main problems when directly applying the MCR model to simulate mountain resource city expansion: not considering the levels of different urban expansion sources and overlooking the existence of absolute ecological constraints (such as natural reserves, basic farmland etc). Hence, the reliability of urban expansion simulation is greatly reduced. In this paper, we view the expansion of mountain resource city as a process that city landscape spreads by surmounting ecological resistance. Based on MCR model, the resistances of different levels of ecological sources and the inflexibility restriction of ecological barrier on city expansion are incorporated. The mountain resource city ecological resistance (MRCER) model is constructed and applied to the growth simulation of Dongchuan District, one of the most typical mountain resource cities in China. The results illustrate that the ecological resistance surface produced by the MRCER model comprehensively reflects the ecological resistance of the city expansion and its spread trends. Compared with MCR model-based simulation, the simulation results derived from MRCER model are more reasonable for guiding territorial development (city expansion) in mountain resource area. The proposed model may have significant implications for mountain territorial development study.

#### Key words:

city expansion; simulating; ecological resistance surface model; mountain resource city

## **Sustainable Livelihood Approach to Poverty Reduction: A Geo-Empirical Analysis of Mizoram, the Eastern Extension of the Himalaya**

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### **Abstract**

Mizoram characterises primitive economy where livelihood of people depends on production of biomass based agriculture system, livestock rearing and on use of forest products. Meanwhile, output from these activities does not meet the food requirement and thus, the people suffer from chronic poverty and malnutrition. This paper examines sustainable livelihood approach to poverty reduction in mountainous region of Mizoram. We conducted a case study of sixteen villages of eight districts of Mizoram. Total 1527 households were surveyed through random sampling method (76% sample size). An analysis of all livelihood assets – natural, human, physical, financial and social/institutional was carried out and vulnerability context was assessed. Our study reveals that about 53% population in the study villages is engaged in agriculture and related activities. About 51.3% populations live below poverty line and out of it, 17.6% live under chronic poverty. Mizoram also suffers from malnutrition and natural hazards. At the meantime, it characterises plenty of natural resources – land, water and forest – the life sporting layers and human assets. In terms of financial and institutional support, it lags behind. We concluded that development of all livelihood assets, social and institutional support and coping with malnutrition and natural hazards will enhance livelihood and will reduce poverty.

### **Key words:**

Primitive economy; poverty; livelihood assets; vulnerability; Mizoram.

## The Quality and Sustainable Use of Soil in Mountain Areas, Southwest China

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### Abstract

In mountain areas, soil is vulnerable by being exposed to wind and water runoff, and mountain hazards. Compared to traditional definition of soil quality, in mountain areas, it is more proper to define soil quality in a way that stresses functionality in a broad context, involving soil not only as a medium for agricultural production but also as an important reservoir for water storage, as a buffer for the filtration, transformation and neutralization of pollutants and as a pool for carbon storage, which smooth the challenges caused by climate change. Correspondingly, the sustainable use of soil in mountain areas, should meet the needs of agricultural development, but also the enhancement of overall environmental quality and of the natural resource base. This paper reviews the soil quality in mountain areas, Southwest China, and how it functions in relation to water quality. This paper also discusses the role of soil as a “bio-filter” in reducing the load of pollutants (i.e. heavy metal, antibiotics and pesticide, etc.) to aquatic environment, through various physical, chemical and biological processes.

### Key words:

Soil quality; sustainable use; mountain area; bioreactor

## The Varieties of Mountain Hazards and Human Resilience in Koshi Trans-Boundary Basin of Himalaya

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### Abstract

Koshi trans-boundary basin enjoys the largest elevation difference in the world, where mountain hazards, including mountain torrent, debris flows, landslides and GLOF is frequent, whereas disaster characteristic and the mitigation measures are quite different among China, Nepal and India, respectively in the upper, middle and lower part of Koshi basin. In China, landslides and GLOFs is the prime disasters with large magnitude and low frequency and the transformation disaster chain can significantly influence large domain. The government leads the disaster mitigation efforts through spending money on the high standard mitigation measures such as engineering, monitoring and warning works. In Nepal, debris flows and landslides are the major hazards with medium magnitude and low frequency and the disaster chain can pose bad effect to a certain area. The local residents lead the disaster mitigation efforts under government's suggestions, and community based warning is the primary measure, followed by the flexible engineering works. In India, torrent is the main type, covering a large area with high frequency and large magnitude. The government, non government organization and local residents work together and conduct limited flexible engineering works and partly non-structural warning system. Research suggests in the analogous basin, the scientific disaster mitigations should cover the whole basin falling in different countries to make a scientific plan and the utilization of water resource in disaster mitigation. Besides, the resilient alleviation model among different countries requires corporation from all the countries.

### Key words:

Koshi trans-boundary basin; varieties; mountain hazards; mitigation measures

## A Meta-Analysis of the Change Characteristic of Vegetation in Shenfuyu Coal Mining Collapse Area

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### Abstract

Subsidence is one of the serious geological disasters in well mining area. More than 20 published papers were synthesized using meta-analysis method to assess quantitatively the influence of coal mining subsidence on the vegetation changes in the Shenfuyu area. The results show that: The vegetation coverage shows a decreasing trend in the early stage of subsidence, then it increases and gradually exceeds the level before the collapse. The constructive species change little after mining subsidence, but the number of species increases after 1-2 years of subsidence. The new plant species mostly belong to ephemeral or ephemeroïd plant after collapse interference, such as *Agriophyllum squarrosum* (Linn.) Moq. and *Incarvillea sinensis* Lam. The change characteristic of vegetation in the subsidence area displays the important role of natural restoration in vegetation construction. The ecological construction measures that the natural recovery is major and complementally adopts artificial restoration should be carried out in the Shenfuyu mining area and even the whole Loess Plateau.

### Key words:

Meta-analysis; Shenfuyu coal mining; Coal mining collapse; Vegetation; Ecological construction; Loess plateau

## The Space Distribution of Houses at Debris Flow Prone Area and Its Role in Disaster Risk Reduction

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### Abstract

Geomorphological hazards impose great potential risk towards the human settlements at mountainous region. For countries like China, mountain terrains covered large portion of its territory, therefore, reduce the risk from mountain hazards is imperative to the development of a sustainable community. Due to the space limitation at mountain terrain, human settlements normally concentrated at alluvium fan or river bank, which happened to overlap with the high risk zone of mountain hazards such as debris flow or flash flood. By conducting field investigation of damaged houses after several debris flow events, information on the structure type, space distribution, failure mode and degree of damage for 197 houses were recorded. The space distribution model for houses was constructed using quantified parameters which described the relationship between houses and debris flow gully. Distance ratio and angle ratio were used to quantify the relationship between the houses and debris flow gully while spacing between different houses were used to describe the inter-houses relation. Afterward, the space distribution model was correlated with the records of houses damage to develop a vulnerability chart for houses at debris flow prone area. This chart gives guideline to the authorities when conducting housing planning at debris flow prone area since it indicates the potential damage of houses when debris flow occurs. This study also provides an alternative solution to disaster risk reduction which could be put in place at the housing planning stage.

### Key words:

Debris flow; Space distribution; Housing planning; Risk reduction

## Diversity and Conservation of the Endangered Species, *Cercidiphyllum Japonicum*, and Its Communities in the Shennongjia Reserve, Central China

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### Abstract

*Cercidiphyllum japonicum* is an endangered and nationally protected plant species; its conservation is important and urgent. Fifty-eight 10 m × 20 m quadrats of *Cercidiphyllum japonicum* communities were randomly set up along an altitudinal gradient in the Shennongjia Nature Reserve, Central China. Data for species composition and environmental variables were measured and recorded in each quadrat. To investigate the community variation, two-way indicator species analysis (TWINSpan) and canonical correspondence analysis (CCA) were conducted. Moreover, species diversity indices were used to analyze the relationships between species diversity and environmental variables. The results showed that there were eight types of *Cercidiphyllum japonicum* communities. Each community had its own compositional, structural and environmental characteristics. The variation in *Cercidiphyllum japonicum* communities was significantly related to elevation and slope; aspect and litter thickness were also related to community variations. Elevation and slope were revealed as important factors that influence community distribution and diversity. Species diversity showed a quadratic and negative correlation with elevation. The importance values of *Cercidiphyllum japonicum* also showed a quadratic and negative correlation with species diversity. For conservational purposes, species diversity should be maintained within a reasonable range.

### Key words:

Endangered species; plant community; diversity; conservation; quantitative analysis; vegetation-environment relation

## Failure Mechanism of Rainfall-induced Karst Accumulation Landslide in Northeast of Yunnan

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### Abstract

Under rainfall or earthquake conditions, karst accumulation bodies on the slopes were easily triggered and transform into landslides which may lead to major disasters. Huluqiao landslide, occurred in Longtoushan mountain before Ludian 8-03 earthquake, went through obvious deformation process, did not cause any casualties of residents or passing vehicles due to the success of early warning. Based on field investigation and lab analysis, this landslide was identified as a progressive failure type according to the characteristic of its slope deformation vs. failure time curve. Steep slope, loose structure and low intensity of the accumulation horizon provided favorable environment for landslide formation. Long duration rainfall with high intensity caused the rock and soil particles to flow and rupture inside the sliding area at micro scale. At the same time, the flow and micro rupture play imperative roles in the macro deformation and failure of slope. The rainfall infiltrated into landslide along the surface of the accumulation mass, formed conflux transfixion at the interface between the soil and rock where backwater was formed. The backwater reduced the soil strength and introduced dynamic uplift force in the landslide. Meanwhile, with the rainfall filled in the cracks and the weak structural planes, the dynamic expanding force was induced and the tension crack was enlarged. As a results, the deformation of the accumulation mass was intensified. Revealing the mechanism of such landslide provided support to the slope stability assessment at regions with similar geological condition and laid the guideline for early warning of such landslides.

### Key words:

Karst accumulation landslide; Rainfall; Dissolution; Sliding mechanism

## Numerical Study of the Particle Segregation Effect on the Flowing Mobility of Granular Debris Flows

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### Abstract

Granular debris flows are of great concern because they often cause catastrophic disasters due to the long run-out distance and large impact forces. Based on the field investigation, the particle segregation can be always observed inside the deposited debris flows and it occurs both parallel and perpendicular to the flow direction no matter there is pore fluid or not. To investigate the mechanisms of particle segregation and its influence on the debris-flow mobility, granular debris flows with grains of mixed sizes are numerically modeled and the contact behavior of solid particles is fundamentally studied using the discrete element method (DEM). Compared to granular flows with uniform solid particles, the effect of segregation on granular flowing mobility is investigated. It is found that reverse segregation can significantly influence the flowing mobility and the flowing regimes in the front head of the granular body. The development of solids segregation needs certain traveling distances, which depend on the slope inclination. This research illustrates that the segregation for debris flows is usually completed before the flows become inertial flows.

### Key words:

granular debris flow; segregation; mobility; DEM

## Soil Moisture and Vegetation on Slope in the Shenfu Coal Mining Area as Affected by Collapse Fractures

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### Abstract

Soil bulk density, soil moisture and vegetation on two sides of collapse fractures in the Shenfu coal mining area were investigated and analyzed in order to explain the effects of collapse fracture occurrence (two years after collapse) during coal mining on slope vegetation and their characteristics. Research showed that (1) the collapse fracture occurrence made surrounding soil loose and thus resulted in a decreased soil bulk density nearby. (2) In the case of fracture strike at right angle or close right angle to slope, the fractures had effects on soil moisture about 3 m below fractures. Water status in the lower part of the fractures became worse due to intercepting effect of the fractures on runoff. In the walls of the fractures, soil water content on fracture slope was much lower than that on slope without fracture because of strong evaporation effect. (3) Without considering other factors, fracture occurrence worsened the soil moisture status within fracture and in the lower part of slope and further inhibited the growth of vegetation.

### Keywords:

collapse by coal mining; soil moisture; aboveground biomass; sloping land; Shenfu mining area

## Study on Physical Properties of Soil in Sliding Zone of Gravel Soil Landslide

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### Abstract

The stability of gravel soil slope is an important problem for disaster prevention and mitigation in China's mountainous west. Danba JiaJu landslide, Danba Suopo landslide, Lixian Xishan village landslide in Sichuan province and Wushan landslide in Chongqing are selected as typical examples to study the physical properties of slip soils of gravel soil landslide. The study methods are field investigation and sample testing. The results showed that slip soil of gravel soil slope is wide grading and gap grading, and the content of grain smaller than 2mm is less than 10%; The mineral composition of slip soils are mainly White mica, Sodium feldspar, Kaolinite, Calcite and Quartz, but lack of clay mineral with strong swell-shrink such as Montmorillonite; The surface area of soil sample is small and most of nitrogen adsorption is occurring in macropore; The shear strength increase firstly and decrease secondly as the moisture content increasing. The slip soil of Wushan landslide has some characteristics as follows: high content of carbonate minerals, large specific surface area and low shear resistance. The characteristic confirmed that Wushan landslide is much more likely to occur suddenly under groundwater than three other landslides. The analysis results were consistent with true situations.

### Key words:

gravel soil landslide; slip soil; grading; mineral composition; specific surface area; shear resistance

## Comparative Study of Danxia Landform Between Different Countries



Home

### Oral

1. [A Study of the Development of Red Bed Landscapes in Zion National Park, the United States: Are They Danxia Landforms?](#)  
Zhixin Pan; Hua Peng (Sun Yat-sen University, China); Fang Ren (Chinese Academy of Geological Sciences, China); John Encarnacion (Saint Louis University, United States)
2. [Cretaceous Stratigraphic Correlation between China and Russia](#)  
Qiuxiang Cao (East China University of Technology, China)
3. [Future Studies and Perspectives of Danxia Landform](#)  
Fusheng Guo; Liuqin Chen; Fuwei Jiang (East China University of Technology, China)
4. [Late Cretaceous Alluvial Stratigraphy and Its Response to Paleoclimate, Northeastern Jiangxi Province, South China](#)  
Liuqin Chen; Fusheng Guo; Xin Liu (East China University of Technology, China)
5. [Mechanisms of Escarpment Retreat in Sedimentary Tablelands](#)  
Filip Duszynski; Piotr Migon (University of Wroclaw, Poland)
6. [Methods for the Quantitative Study of Danxia Landform Processes](#)  
Jin Huang (School of Geography and Planning, Sun Yat sen University, Guangzhou 510275, PR China, China); Deli Qi (Institute of Geographic Sciences and Natural Resources of Research, CAS, Beijing 100101, PR China, China)
7. [Morphometric Analysis of Danxia Landform in Longhushan](#)  
Fang Ren (Institute of Geomechanics, Chinese Academy of Geological Sciences, Beijing, P. R. China, 100083, China); Jason H. Knouft (Department of Biology, Saint Louis University, USA, United States)
8. [On Danxia Culture and the Cultural Heritage Value of Danxia Landscapes in China](#)  
Renshun Zhang; Deli Qi (Institute of Geographic Sciences and Natural Resources of Research, CAS, Beijing 100101, PR China, China)
9. [Peculiarity Morphology, Genesis and Age of the Formation of the Landscape within the Reserve Longhushan](#)  
Elena Morozova; Anastasia Chernyatieva (Institute of Earth Sciences St. Petersburg State University, Russia)
10. [Rill/Lithology Interaction in Arid/Semi-Arid and Humid Badlands](#)

Milica Kasanin Grubin (University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Serbia); Luobin Yan; Hua Peng (Sun Yat sen University, School of Geography and planning, China)

11. [The Role of Structural and Climatic Processes in the Formation of the Relief on the Territory of Nature Reserve Longhushan](#)

Irina Sitina (Institute of Earth Sciences St. Petersburg State University, Russia)

12. [The Significance of the Extension of China Danxia Research to the Redbed Issue](#)

Hua Peng (Sun Yat-sen University, China)

## Poster

1. [Danxia Landform and Redbeds in Southwest United States – A Comparison Study](#)

Scott Louis Simonson; H Peng; ZX Pan (China, School of Geography and Planning, Sun Yat-sen University)

2. [Definition and Classification and Distribution of Danxia landform in China](#)

Jin Huang (China, School of Geography and Planning, Sun Yat-sen University, Guangzhou); Zhijun Chen (China, Department of geology Science, Lanzhou University); Deli Qi (China, Institute of Geographic Sciences and Natural Resources of Research, CAS)

3. [On Landscape Characteristics of Danxia Landforms in Arid Area of Northwestern China](#)

Zhijun Chen (China, Department of geology Science, Lanzhou University, Lanzhou, 730000 China); Deli Qi (China, Institute of Geographic Sciences and Natural Resources of Research, CAS, Beijing, 100101 China)

4. [Peculiarity Morphology, Genesis and Age of the Formation of the Landscape within the Reserve Longhushan](#)

Elena Morozova; Anastasia Chernyatieva (Russian Fed, Institute of Earth Sciences St. Petersburg State University)

5. [Preliminary Study on the Relations between Danxia Landform and Traditional Culture of Mt. Longhushan](#)

Zhiwen Li (China, East China University of Technology)

6. [The Developmental Conditions and Landscape Characteristics of Danxia Landform at the Northern Slope of Dabie Mountain](#)

Zhang Guangsheng; Huang Run; Hao Lixia (China, West Anhui University)

7. [The Geomorphological Formation and Sedimentary Characteristics of Danxia Landform of Zuixian Lake in Nancheng county, Jiangxi Province, China](#)

Qingkun Yang (China, East China University of Technology)

8. [The Preliminary Research on the Pillar Stone Rockfall in Danxia Landform Area](#)

Luobin Yan; Hua Peng (China, Sun Yat-sen University); Milica Kašanin-Grubin (Serbia, University of Belgrade)

9. [The Protection of Zhejiang Red-Beds and Danxia Landforms and the Construction of Environmental Education Model](#)

Shaohua Wang (China, Hangzhou Normal University)

10. [The Research Progress of Jiangxi Danxia Landform](#)

Yongbiao Jiang (China, East China University of Technology)

11. [The Role of Subsurface Erosion in Shaping Sandstone/Danxia Landscapes](#)

Piotr Migoń; Filip Duszyński (Poland, Institute of Geography and Regional Development, University of Wrocław)

## **A Study of the Development of Red Bed Landscapes in Zion National Park, the United States: Are They Danxia Landforms?**

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### **Abstract**

Named by Chinese geologists, Danxia landforms refer to an erosional landscape developed on red beds and featured by scarp slopes. As a representative of red beds distributed in the western United States, Zion National Park is characterized by a geomorphic combination of plateau and canyons in arid climate. Based on field investigation and lab analysis of rock samples, this paper looks at the developmental mechanism of landforms in Zion. In terms of geologic structure, Zion is a fault block on the western margin of the Colorado Plateau, a regional network of oriented fractures controlled the development of canyons in the park. The major rock strata exposed in Zion belong to red beds, which were mainly deposited in the Jurassic within a variety of environments, including near shore/shallow sea, streams, lakes, and deserts. In terms of lithological features, most red beds in Zion are fine-grained sandstones and siltstones. Among them, the spectacular cliffs in Zion are made of eolian quartz sandstones. However, due to cement differences of each rock member, there are remarkable diversities in rock strength and colors. Moreover, this study also found that rock hardness values do not positively correlate with mountain slopes in Zion. Finally, in terms of exogenic forces, fluvial incision plays a dominant role in the formation of cliffs and canyons in Zion, followed by lateral erosion and sapping process. As controlling factors for landform development in Zion are similar to Danxia landforms in China, they may be ranked as Danxia.

### **Key words:**

Zion National Park; red beds; Danxia landforms; developmental mechanism

## Cretaceous Stratigraphic Correlation between China and Russia

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### Abstract

Base on the distribution in the world, Cretaceous system is one of the most important example among the divisions of the Phanerozoic, and the same in China and Russia. Distribution of complex facies (marine, continental, lagoon, volcanogenic) in Russian Cretaceous system is presented in various kinds of sedimentary, igneous and metamorphic rocks with different colors on the Russian plate and their boundaries, especially the Late Cretaceous with high-carbonate are widespread. Meanwhile, continental Cretaceous system is an important part in China which Red Bed has been one of the most attractive topics in Cretaceous research in the last several years. In the aspect of paleoclimate the temperature east-Europe, Siberia, the Far East where located at the subtropical zone was less than 18-20°C while the average temperature in the blocks near to the coast was almost 19-23 °C. At the same time, the average temperature in some blocks of China was a bit higher than most territory in Russia and the strata became to red cause the salt accumulation and dry weather.

In Russia some nice monocline and folds exist on the Cretaceous stratigraphic, and furthermore the outstanding Danxia landforms develop on the Chinese Red Beds. It is also noticed that there are deposits of energy, chemical, engineering-building materials preserved in Russian Cretaceous stratigraphic.

### Key words:

Cretaceous stratigraphic; volcanogenic; monocline; paleoclimate

## Future Studies and Perspectives of Danxia Landform

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### Abstract

Danxia landform was first named in China and then well known all over the world. Though great progress has been made in Danxia landform research and discipline construction in recent 30 years, the theoretical construction of Danxia landform is far behind other disciplines of rock geomorphology. Normative regional investigation has not been carried out on Danxia landform resources, and weak basic geological research and environmental geology issues are also very serious. Based on previous investigation on the basic theory of Danxia landform and tourism development for many years, the following main development directions of Danxia landform research are proposed. Firstly, the normative investigation and database construction of regional distribution of Danxia landform resources. Secondly, the basic geological research on Danxia landform, including formation conditions, dynamic mechanism, evolution process and systematize classification, especially the relationship between different landscape formation mechanisms, sedimentary facies and the development of Danxia landform. Thirdly, the rockfall landscape survey, detection and prevention programs research. Fourthly, biodiversity and human landscape research and construction of scientific tourism and research base. Finally, the subject and theoretical system of Danxia landform should be perfected.

### Key words:

Danxia landform; Research direction; Tourism geoscience; Geopark

## Late Cretaceous Alluvial Stratigraphy and Its Response to Paleoclimate, Northeastern Jiangxi Province, South China

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### Abstract

Late Cretaceous continental redbeds, the Guifeng Group of the Yongchong basin in South China have been investigated to link alluvial stratigraphy to paleoclimate change. The Guifeng Group is divided into the Hekou, Tangbian and Lianhe formations in ascending order. The Hekou conglomerates are typically polymict, moderately sorted with erosional bases, cut-and-fill features, normal grading and sieve deposits, representing rapid shifting and abandonment of stream-flow dominated fans during the incipient stage of the basin infill. The Tangbian Formation, however, is characterized by structureless fine-grained sediments with dispersed coarse clasts, recording a change to a quiet playa environment with occasional ephemeral stream flooding, thus indicating a basin expanding stage. The Lianhe conglomerates are disorganized, poorly sorted, lack of erosional bases, and a wide particle-size range from clay to boulders reflect mud-rich debris-flow process on fans, likely related to reactivation of faulting along the northwestern mountain fronts during a post-rift stage. The depositional system changes from stream-flows up through playa to debris-flows during the accumulation of the three formations are attributed to different source rocks and climatic conditions. The fluvial-dominated fans of the Hekou Formation were accompanied by a subarid to subhumid paleoclimate. The dominant subarid climate during the Campanian Stage produced abundant fine-grained sediments in the Tangbian Formation. A climatic change from subarid to subhumid during the latest stage was probably favourable for high deposition rate of coarse clasts in debris-flow dominated fans of the Lianhe Formation.

### Key words:

alluvial fan; paleoclimate; sedimentary facies; continental redbeds

## Mechanisms of Escarpment Retreat in Sedimentary Tablelands

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### Abstract

Sedimentary tablelands, including Danxia tablelands, are distinctive regional geomorphic landscapes and may be found within every continent. In the long term, their areal extent is reduced due to retreat of their marginal escarpments, whilst they may also become fragmented due to fluvial incision into the plateau level and dissection of escarpments. In consequence an array of mesas, buttes and pinnacles may originate at the expense of a once uniform plateau. Hillslope processes are thus crucial in understanding the patterns and efficacy of long-term landscape evolution of tablelands. A variety of mechanisms is involved in escarpment retreat, depending on geological structure, lithology and environmental setting. They include preparatory physical and chemical weathering, followed by mass movements. Rock falls and avalanches, rockslides, topples, landslides, debris flows, and lateral spreading phenomena may occur. Groundwater sapping has been recognized as an important prerequisite to rock slope failures. Bedding caves are valuable indicators of sapping and locations of future collapses. In all these cases escarpment retreat is episodic and catastrophic. Non-catastrophic scenarios are also possible and particularly applicable to sandstones. They involve subterranean detachment and removal of sand grains by groundwater flow. In effect, massive caprock compartments lose support, disintegrate and settle, producing 'blocky chaos' instead of a regular cliff line. This mechanism applies to both frontal escarpments and backslopes, where canyons may develop. Mechanisms and patterns of escarpment retreat are typically inferred from landforms and correlative deposits, hence the value of landform recognition and mapping in the study of tablelands.

### Key words:

sandstone; tableland; mass movements; groundwater geomorphology; Danxia

## Methods for the Quantitative Study of Danxia Landform Processes

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### Abstract

To estimate the tectonic uplifting rate, geomorphic age, cliff retreating rates and erosion rates and so on, this paper presents four simple formula proposed by author after sever years field-test. In order to obtain a more accurate rate of the tectonic uplifting, the gravel samples of the bottom of riverbed in the bedrock seated terrace must be obtained form various locations at the same level terraces far away from the river. The age of the oldest gravel samples can be taken as basis for calculating the rate of tectonic uplifting. This improved sampling method can improve the accuracy of quantitative research on Danxia landform process. These quantitative research methods for the study on Danxia landform processes can be used to reflect more truly that the fluvial terraces are formed on the condition of intermittent tectonic uplift, to calculate geomorphic ages, cliff retreating rates and erosion rates of Danxia landforms more reasonably, and also can be applied in non-Danxia landforms areas to resolve quantitative measurement of above-mentioned issues.

### Key words:

Danxia Landforms; tectonic uplifting rate; geomorphic age; cliff retreating rates; erosion rates

## Morphometric Analysis of Danxia Landform in Longhushan

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### Abstract

Morphometric parameters are found a useful statistical study of the Earth's surface for understanding landform evolution. This research applied dimensionless morphological parameters to quantify the erosional stage of the Danxia landform in Longhushan, and the tectonic/lithological controls in the formation of the local topography. In this paper, Longhushan, an archetypal Danxia landform site, is selected to conduct the morphometric features, using DEM- and GIS-based analysis. Geomorphologic parameters are adopted including normalized stream length-gradient index (SLK), hypsometric integrals (HIs) and hypsometric curves (HCs) as well as river longitudinal profiles. SLK anomalies for the seven streams across the study area are found to positively correlate with the presence of faults and changes in rock erodibility, reflecting tectonic and lithologic controls on the formation of topography. Hypsometric analysis of the 26 subwatersheds in Danxia landform areas yield low HIs ( $<0.42$ , mean=0.21) with concave up hypsometric curves, suggesting Danxia landforms in Longhushan are in an old erosional stage. The findings in this research are in accordance with the previously proposed, but invalidated, old geomorphic stage of Longhushan that is based on estimated eroded land mass. This work is an attempt to quantify the erosional status of Danxia landforms at basin scales and for validating lithological and tectonic controls on its topography in relation to bedrock channels. The parameters used in this research are dimensionless, thus can be applied in other Danxia landform areas for future comparison.

### Key words:

Danxia landform; Longhushan; Hypsometric analysis; SLK; Erosional stage

## On Danxia Culture and the Cultural Heritage Value of Danxia Landscapes in China

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### Abstract

Danxia landform is a highly artificial landform. The color and landscape of Danxia landform is so close to people's life. The colour of the rocks accord with Chinese auspicious red, so often temples and caves are built in the Danxia areas. Many religious architecture and their residence and domicile choose in the caves of Danxia landform. Difficult to climb, Danxia landscapes often become the old society, the local residents escape banditry and war-torn fortress, and even become a military defense heavy. Red sandstone with a solemn auspicious red and easy to carve, the Danxia landforms often associated with the grottoes together, such as Sichuan, Leshan Giant Buddha, Anyue sculpture carvings, Chongqing Dazu rock carvings. Especially the ancient Silk Road more closely associated with caves. In Gansu, such as Maijishan, Daxiangshan, Binglingsi, Tiantishan, Matisi and so on, all is the soul of the Silk Road treasure. In the red sandstone rock, and cliff stone calligraphy close companions, many Danxia Landform Scenic Area, different degree left very high level of cliff stone calligraphy, adequately the brilliance of the art of calligraphy in China. The magnificent Danxia landform and the rich cultural landscape together, often become famous scenic spots. This paper system analysis including ancient myths, cave cliff, religious books, landscape poetry, famous celebrities, construction drawing, College site selection, and so on, describes the color of the landform trends of human aesthetic value. Deeply research the original psychological mechanism of the color preference. It is possible to apply for the landform investigation, heritage protection and tourism development, and provide multi-disciplinary field of academic support basis and reference for further improvement Danxia culture and aesthetics building.

### Key words:

Danxia landscape; Danxia aesthetics; Danxia culture; World heritage

## **Peculiarity Morphology, Genesis and Age of the Formation of the Landscape within the Reserve Longhushan**

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### **Abstract**

Jiangxi Province is one of the most widely spread areas of danxia landform. The new research the distribution, formation mechanism and comparative study at home and abroad, in particular, the study of the sedimentary facies and structure of red beds have injected new vigor into the study of Danxia landform in China.

To reveal the morphological features of the relief is possible to use techniques "the principle of elementarisation" relief proposed by A. N. Lastochkin (Lastochkin, 1987, 1991). This technique is allows exclude subjectivity in the analysis of the relief. Morphological studies because of the enormous possibilities of computer technology have become one of rational method.

We planned basic geological research on Danxia landform, including formation conditions, dynamic mechanism, evolution process and systematize classification, especially the relationship between different landscape formation mechanisms, sedimentary facies and the development of Danxia landform.

Danxia landform appropriate place to develop an algorithm of morphological analysis of dynamic topography as a basic operation of landscape planning and definition of the specificity of the method in terms of different types of landscapes, as well as in the territories of different dimensions, character and degree of development. Morphological study of the relief can be regarded as one of the traditional part of its study.

### **Key words:**

Morphology; genesis; the principle of elementarisation; continental redbeds

## Rill/Lithology Interaction in Arid/Semi-Arid and Humid Badlands

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### Abstract

Badlands are areas in which soil cover has been eroded and a wide range of erosional processes are governed by lithological properties and climate. They are therefore ideal locations to study rill/lithology interactions. This study will focus on rill characteristics in three badland areas to ensure the range of lithologies and different climatic conditions. Dinosaur Park badlands, Canada, mean annual precipitation 350mm, are developed in the Upper Cretaceous sandstone and smectite-rich mudrocks. Chinguacousy badlands, Canada, mean annual precipitation 885mm, are developed on the Ordovician illite/chlorite-rich shale. Red-bed badlands in Nanxiong basin, China, mean annual precipitation 1560mm, are developed in illite-rich sediments. Total of 1200 rill depth and width measurements were taken on 80 slopes. Weathering profiles were examined and unweathered samples were collected for the weathering experiment by rainfall simulation or water immersion. The surface weathered layer on smectite-rich sediments was 2cm, on illite-rich sediments 1cm, on sandstone 0.5cm thick. Slope angles varied in a wide range 17-54° regardless of the lithology. Rills width/depth ratio showed statistically significant variation depending on the lithological unit. Rills on sandstone had the width/depth ratio 1.3, smectite-rich sediments 1.6 and illite-rich sediments 2.7. Weathering experiment has shown that the physical breakdown was dominant for illite-rich sediments, while dispersion and sealing was dominant for smectite-rich sediments. Sandstone sample completely dispersed after 2h immersion in water. This study proves that rill morphology is controlled by lithology and not by climate. Higher climate control is expected regarding other hillslope processes, but that remains for future studies.

### Key words:

badlands; rills; lithological properties; clay minerals

## The Role of Structural and Climatic Processes in the Formation of the Relief on the Territory of Nature Reserve Longhushan

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### Abstract

Jiangxi Province is one of the most widely spread areas of danxia landform.

To reveal the morphological features of the relief is possible to use techniques "the principle of elementarisation" relief proposed by A. N. Lastochkin (1987, 1991). This technique is allows exclude subjectivity in the analysis of the relief.

Works based on the experience of Russian scientists in the field of relief as the foundations of morphodynamic landscape (landscape envelope component).

Traditionally, as a basic (initial) operation of landscape mapping method was used "relief sculpture", first developed and tested in the practice of drawing up geomorphological maps. According to the method of relief sculpture first on the topographic base stand and river erosion Network (are outlined by river valleys, ravines, gullies). Land between the rivers are divided into the surface with different exposure, slope, concavity or convexity of the slope profile and plan. It is expected that the selected contours correspond to certain landscape units as well as the nature of landscape processes controlled relief, in each circuit is the same as the uniform relief

Of greatest interest is advanced by A. N. Lastochkin geotopological concept postulates the leading role in the differentiation of the relief sculpture of the landscape envelope, and offering rigorous, mathematically based approach to elementarizatsii landscape structure. In general, the meaning of the operation morphodynamic analysis is to identify within geomorphological surfaces elementary surfaces (EP). In the role of elementary geomorphological boundaries or structural characteristic line (SL) contouring EP top bottom and side stand.

As a formalized method morphodynamic analysis eliminates the factor of subjectivity and largely impartially resolve emerging conflicts in progress in landscape planning, making, thus, this procedure is not only advisory and auxiliary (secondary), and, above all, a major Engineering Design procedure with conclusive findings and recommendations.

**Key words:** Nature Reserve LonghuShan; morphology; the principle of elementarisation.

## The Significance of the Extension of China Danxia Research to the Redbed Issue

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### Abstract

In May 2009, the first international academic conference on Danxia Landform was held at Danxiashan in Guangdong Province. In July, 2009, at the 7<sup>th</sup> International Association of Geomorphologists (IAG) conference in Melbourne, Australia, the IAG Council approved the establishment of the IAG Danxia Geomorphology Working Group, which symbolized that Danxia research had risen to the international stage. In October 2011, six famous Danxia landform sites representing “China Danxia” were included on the World Natural Heritage list as a type of landform, which brought much attention from the rest of the world. Now, we are thinking on how to orient the future research of Danxia landform as China Danxia research further reaches across the globe.

Concerning the research of Danxia landform in recent years, we find that there is a lack of attention from international geoscientists to redbeds and the study of redbed landforms. Also the approach to the redbed issue from different disciplines lacks integration, and is especially lacking attention on the land degradation and ecological problems of redbeds, which are a special and fragile geographical unit. The Southern China humid region is one of the areas with a concentrated distribution of redbeds. In most of the redbed areas, there exists serious geomorphological hazard and soil erosion problems, even as far as “redbed desertification”. In addition, the deepening of study of Danxia landform demands us to deeply analyze the features of redbeds. So, we intend to extend the research of Danxia to the redbed landforms and redbed issues. The “Geographical Society of China Redbeds & Danxia Research Working Group” was founded with the approval of the Geographical Society of China in 2011. Then at the 8th IAG conference in Paris, France, the IAG made the necessary adjustment to the “Danxia landform working group” according to China’s conditions. The name of the working group was changed to “IAG Redbeds and Danxia Geomorphology Working Group”. This was not just a change of name, but a qualitative promotion and extension of the research field, showing that the research field was extending to the redbed landform and redbed issues. The qualitative promotion means the transition from landscape and form research to a comprehensive study of underground-surface-above ground which blends geology, geomorphology, and ecology. The extension also indicates the development from landscape research to the comprehensive study of the geological environment, geomorphological hazards,



ecological security, and land conservation. Also it increases the interaction between the national economy and the people's livelihoods, and the discipline's room for development. So the redbed issue is not only a geomorphologic issue, but a comprehensive scientific issue of Earth surface systems, a large issue of comprehensive physical geographical systems which covers the relationship between rock features and geomorphological evolution, rock features and geohazards, rock features and weathering-erosion and soil erosion, the water in weathered crusts and soils, special organisms and the ecological structure, land degradation in redbeds and environmental protection. We propose an interdisciplinary comprehensive research of redbeds, in line with the thinking of system dynamics, for pursuing the measurement of environmental optimization and desertifying land.

**Key words:**

Redbed; Redbed issue; Danxia landform; Extension

## Danxia Landform and Redbeds in Southwest United States – A Comparison Study

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### Abstract

The worldwide distribution of redbeds has long been of interest to geomorphologists. Within China, the study of a particular type of redbed landform, Danxia landform, has been advancing since the 1920s. Danxia landform scholars desire to promote their study on an international level. One method for this is to create direct comparisons between Danxia landform in China and redbeds found elsewhere in the world. Once the language barrier is overcome, the next difficulty for this type of study is to gather enough information from international scholars to be able to make said comparisons. This research focuses on understanding the availability of literature to a student in China, how much literature can be collected, and ultimately will attempt to create a substantive comparison between Danxia landform in China and redbeds located in the Southwest United States.

Due to limited database access, the literature used for this study derives mainly from free-to-view journal articles found via Google Scholar searches. The literature found ranges from early 20<sup>th</sup> century geologic surveys to 21<sup>st</sup> century scientific research. This research intends to make substantive comparisons between Danxia landform and redbeds in the southwest United States on categories such as: genesis; depositional environment; lithology; stratigraphy; tectonics; and geometry. Data for Danxia landform will come from recent national surveys performed by Danxia scholars.

### Key words:

Danxia; redbeds; Southwest United States; comparison

## Definition and Classification and Distribution of Danxia landform in China

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### Abstract

Danxia landform is a special continental red beds landform which is characterized by red scarp slope. Danxia landform as a new rock landform types is named by Chinese geologists. A great amount of work has already been done by Chinese scholars on Danxia geomorphology more than 80 years of history. Up to now, 1061 Danxia landform sites have been discovered in 28 provinces in China. In this paper, we make a brief overview on the field of China Danxia geomorphologic study, including the definition of Danxia landform, types and distribution of Danxia landform in China, internal and external forces of landform processes, Danxia landscapes tourism development and its protection aspects. The authors regard that eighty percent of them are distributed in the crust uplifting red basins formed in Mesozoic and Cenozoic fault basins. Altitude from sea level to 5,000 meters, from semi-arid and arid areas to semi-humid and moist zones, fourteen climatic regions have Danxia landform distribution. It is estimated about one fifth of national scenic spots is Danxia landscapes in China. Danxia landform is one of natural rock scenery. They are human's wealth and the earth heritage. Some endangered and famous Danxia scenic sites must be protected.

### Key words:

Danxia landform; Definition; Classification; Distribution; earth heritage; China

## On Landscape Characteristics of Danxia Landforms in Arid Area of Northwestern China

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### Abstract

Danxia landform is widespread in the arid and semiarid areas in Gansu, Qinghai, Ningxia, Xinjiang and others region of north-western China. Danxia landforms in Gansu has confirmed 116, ranks the 3rd in China, located in the the Yellow River Valley plateau, Hexi Corridor, Qilian mountain, Longnan and Liupan mountains. The climate situation in Gansu province is complex, generally Jingning-Weiyuan-Lintao-Huajialing-Linxia line for the community, divided into the south semi humid region, the north arid humid area, and semi-arid area. Danxia landforms are very developed in arid areas and many arid types of Danxia landform is named here. This paper intends to explore the landscapes characteristics of Danxia landform in arid area of Gansu, including its types, characteristics and difference between Danxia landform with Colourful hills and Yardang landform. The paper analyses some fundamental conditions, characteristics, categories, evolutionary processes and hypogene /exogenic action of the Danxia landform in arid and semiarid areas. Additional it is Interesting research on the relationship between Danxia landform and caves alone Silk Road in north-western China.

### Key words:

Danxia landform; colourful hills; Yardang landform; characteristics and difference; arid area

## **Peculiarity Morphology, Genesis and Age of the Formation of the Landscape within the Reserve Longhushan**

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### **Abstract**

Jiangxi Province is one of the most widely spread areas of danxia landform. The new research the distribution, formation mechanism and comparative study at home and abroad, in particular, the study of the sedimentary facies and structure of red beds have injected new vigor into the study of Danxia landform in China.

To reveal the morphological features of the relief is possible to use techniques "the principle of elementarisation" relief proposed by A. N. Lastochkin (Lastochkin, 1987, 1991). This technique is allows exclude subjectivity in the analysis of the relief. Morphological studies because of the enormous possibilities of computer technology have become one of rational method.

We planned basic geological research on Danxia landform, including formation conditions, dynamic mechanism, evolution process and systematize classification, especially the relationship between different landscape formation mechanisms, sedimentary facies and the development of Danxia landform.

Danxia landform appropriate place to develop an algorithm of morphological analysis of dynamic topography as a basic operation of landscape planning and definition of the specificity of the method in terms of different types of landscapes, as well as in the territories of different dimensions, character and degree of development. Morphological study of the relief can be regarded as one of the traditional part of its study.

### **Key words:**

Morphology; genesis; the principle of elementarisation; continental redbeds

## Preliminary Study on the Relations between Danxia Landform and Traditional Culture of Mt. Longhushan

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### Abstract

Based on the field investigation and summarizes previous research results, We hold that there are strong internal relations between Danxia landform and Traditional Culture of Mt. Longhushan. As for Taoist culture: the red color of Danxia landform agrees with cultural psychology of Taoism which advocates the color of red and purple, and the combined landscape of clean water surrounding red Danxia landform caters for the ideology of Taoism which regards harmony between human and nature as the best. Secondly, the sites in front of the Luxi River and surrounded by mountains with a large plain, according with the Geomantic Theory of Taoism. Thirdly, various exquisite Danxia microlandforms provide many inspirations for Taoism myths. As for Cliff tomb culture, Firstly, the red color of Danxia landform agrees with cultural psychology of the ancient Baiyue ethnic which advocates the color of red and enlighten to God. Secondly, the image of mother modeling in cliff of fairy according with their thight which want their body back to mother. Thirdly, the flat Danxia sandstone cave provide a natural place for the Cliff tombs which near the mountain and the river. As for Poetry culture, various exquisite Danxia microlandforms, and the strong religious flavour breath, and their mysterious customs attract believers and literati select Mt. Longhushan for preaching, practice austerities and sightseeing, and then create lots of poems and songs which becomes immensely popular. These traditional Culture with deeprooted and originally long become treasure of cotemporary culture, and made Mt. Longhushan become a well-known mountain of culture.

### Key words:

Mt. Longhushan; the characteristics of landform; Taoist culture; Cliff tomb culture; Poetry cul-ture

## The Developmental Conditions and Landscape Characteristics of Danxia Landform at the Northern Slope of Dabie Mountain

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### Abstract

At the northern slope of Dabie Mountain, some typical Danxia landforms are distributed in this region. They are Wanxi Rift, Dabie Mountain Grottoes and Songliaoyan. Through the research methods of field statistics, document retrieval and experimental geomorphology, we had analyzed geological background and landscape characteristics of Danxia landform in this region. The results showed that the Dabie Mountain Orogenic Belt driving mechanism, the tectonic basin and Fenghuangtai Group red sandy rock are the basic conditions for the development of Danxia Landform. The Danxia landform in this area is composed by the conglomerate (maximum particle size reaches 60 \* 50cm) and fine sandstone interbed at the bottom of Wanxi Rift, and the gritrock and siltstone interbed on the top of Songliaoyan strata. On this basis, through the study of the formation mechanism and landscape classification of the Danxia landform, we had found Danxia landform in this region is adolescence (Wanxi Rift), postadolescence (Dabie Mountain Grottoes) and topographic old age (Songliaoyan) complex developmental stage. From the Danxia landform landscape, it is mainly manifested in the rift valley, steep cliff, horizontal trench, cave and monadnock, etc. The characteristics of Danxia landform at the northern slope of Dabie Mountain are determined by sedimentary phases, the diversification of development stage, the features of landscape composition and the micro structure with the lens. Furthermore, the Danxia landform at the northern slope of the Dabie Mountain can be contrasted with Danxia landform in other regions in China, which had been assessed as World Natural Heritage.

### Key words:

Danxia landform; developmental conditions; landscape characteristics; tectonic basin; experimental geomorphology; northern slope of Dabie Mountain

## The Geomorphological Formation and Sedimentary Characteristics of Danxia Landform of Zuixian Lake in Nancheng County, Jiangxi Province, China

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### Abstract

There are giant thick red beds of the Hekou formation widely distributed in early cretaceous in southeastern Nancheng county, Jiangxi province, China. They are divided into small groups by the Zuixian lake, and become the landscape of Danxia Landform. By the study, we find that: 1) There were mainly the braided rivers in the study area in cretaceous period, and developed braided river deposition, no flood deposition; 2) The different sedimentary facies in Southern China play a certain restrictive role in the formation of Danxia landform, for example, the red beds of alluvial fan facies mainly formed landforms of the rock fort, rock dyke, and rock pillar; the braided river( alluvial plain) facies developed the rounded mountain landform, and the lakeshore or deep lacustrine facies usually can not form the Danxia landform; 3) According to the different characteristics of Danxia Landform in Southern China, we think that there are three genetic types: ① Sedimentation and sedimentary environment. ② Exogenic geological processes (water flow erosion and corrosion, and other different weatherings). ③ Endogenic geological processes (fault, cleftiness); 4) The formation and evolution of Danxia landform in Nancheng county are the result of interaction of exogenic and endogenic geological processes, however, each genetic type of Danxia landform usually is controlled by a magisterial geological process, and the other exogenic and endogenic geological processes just remold the Danxia Landform.

### Key words:

Red beds; Danxia Landform; Sedimentary facies; Nancheng county; Jiangxi province

## The Preliminary Research on the Pillar Stone Rockfall in Danxia Landform Area

### —A Case Study of Leipishi Rockfall in Mt. Langshan Hunan Province

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#### Abstract

a typical Danxia pillar stone Leipishi I in world natural heritage Mt. Langshan, collapsed on Sep 2, 2009. In order to throw some light on the mechanism of Leipishi I rockfall, experimental analyses of uniaxial compressive strength, tensile strength, resistance against sulfuric acid, and freezing and thawing properties were performed on 44 sandstone and conglomerate cores collected from Lanlong Formation, the unique formation in Mt. Langshan. In addition, 4 rock slices were collected for analysis under a polarizing microscope. The detailed reconstruction and rockfall process of the pillar stone geometry and of the actual restraint conditions acting before the rockfall permitted an estimation of the stress state by using 3D finite element code. The results show that the rapid retreat of soft intercalated rock layers due to weathering can profoundly change the stress state of rock body, and create compressive or tensile stress over its compressive or tensile strength in certain part of rock body, and cause part collapse or rockfall in unity. the compressive stress will decrease rapidly when it was put in acid solution, so the failure may related to the weakness of the rock body and the weakness of rock relate to the long term effect of the acid rainwater and freezing and thawing in winter. The acid rainwater and cold weather in winter caused the cycles of wetting and drying, and acid erosion, which accelerate the weathering of soft intercalated rock layers underneath. Geological setting often control the general shape of the dangerous rock, and may create discontinuity cracks, long term of fatigue the cracks continuous develop, decrease the strength of rock body, causing part collapse of rock body. Stress concentration happened in the edge of soft layer caused the part compressive stress which is over compressive strength, longtime acid rainwater and development of cracks on the top of the rock caused the decrease of tensile stress lower than the tensile strength. The two reasons may be two main triggering of rockfall.

#### Key words:

Rockfall; Danxia Landform; sandstones and conglomerates; 3D modeling; stress state; soft intercalated rock layers

## The Protection of Zhejiang Red-Beds and Danxia Landforms and the Construction of Environmental Education Model

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### Abstract

The distribution of Zhejiang red-beds and Danxia landforms has a high degree of correlation with the tectonic basin.

The low and undulate red-beds landforms develop in the center of basins, while Danxia landform which the crest is flat, steep slope, slow foothill develops in the edge.

By relevance analysis and the analysis of internal and external power to landforms forming, we can get the spatial distribution of red-beds and Danxia landforms, and know the protection scope of the site with typical value to establish corresponding protective measures.

Based on the red-beds and Danxia landforms (Jianglang Mountain) and the resources of science, technology, culture and education, we can build a stereoscopic environmental education model which is virtual and real (the New Media Communication and entities exhibition) with domestic and foreign partners (the comparison, communication and cooperation at home and abroad), with official and civil institutions (the communication and complement between the management and the folk organization), with the harmonious of red-beds landforms and sustainable ecology (humanistic ecology), with the combination of fashion, innovation and tradition.

By establishing the environmental education and training demonstration base to improve the red-beds landforms and protect Danxia landscape, we can raise public awareness and attention of the formation environment, geomorphological characteristics, ecological environment and the heritage protection of red-beds and Danxia landforms.

We need to conscientiously do the work of protecting ecological heritage protection and rouse the public's consciousness of natural environment. It's our duty to treat world natural heritages well while making moderate use of them.

### Key words:

Zhejiang; Red beds and Danxia landform; Protection; environmental education; model

## The Research Progress of Jiangxi Danxia Landform

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### Abstract

Jiangxi Province is one of the most widely distributive areas of danxia landform with 203 concentrated distribution area so far, and also is one of the provinces that have the highest scale of kind of danxia landform in national wide. The earliest research of danxia landform in Jiangxi Province could be traced back to the Tang Dynasty, many poets and scholars had written a lot of poems and articles to describe the beauty of the danxia natural scenery. Xu Xiake, the geographer of the late Ming Dynasty, had got a more comprehensive investigation to Jiangxi danxia landform from east to west, and left the famous travel notes of the Right of the Rive. The modern studies on Danxia landform in Jiangxi started in 1930s, Chen Guoda et al., the first generation of geologists in China, had given the name danxia landform to the landscapes developed in the red beds after researched the Cretaceous red beds of Gongshui basin in Jiangxi. Since 1960s, Huang Jin has investigated and studied successively many times to 175 distributive areas of Danxia landform in Jiangxi Province. Since the end of last century, especially in the last 10 years, many studier have used technological means including 3S Technology, IRSL, electron probe etc to research the distribution, formation mechanism and comparative study at home and abroad, in particular, the study of the sedimentary facies and structure of red beds have injected new vigor into the study of Danxia landform in China.

### Key words:

Jiangxi Province; Danxia Landform; Research Progress

## The Role of Subsurface Erosion in Shaping Sandstone/Danxia Landscapes

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### Abstract

Geomorphological evolution of sandstone terrains includes an important subterranean component, associated with groundwater movement along discontinuities and through the pores. Groundwater is capable of dissolving cement and detaching sand grains, being also able to carry this sand load to the surface. In this way, material is removed not only at the surface, but also in the subsurface, as in karst terrains on soluble rocks. The combined action of subsurface processes has various consequences for both the patterns of landscape evolution and the inventory of erosional and depositional landforms in sandstone areas. Small-scale depositional landforms below the cliff lines are most evident and take the form of sandy cones and sheets, grading into a veneer of sandy deposits draped over the mid- and lower slope. More spectacular are landforms indicative of material removal such as closed depressions (similar to karst dolines), troughs, open clefts and tunnel caves extending from cliff faces into the rock. However, the effects of subsurface erosion may also be spread over larger areas if removal of material along subterranean drainage lines is particularly efficient. In this way rock mass compartments above lose support and gradually settle into enlarging voids and cavities, rotating and disintegrating due to too high tensional stress. Chaotic boulder fills of channelless valleys are interpreted as the record of sand evacuation that was accomplished primarily in the subsurface. Examples of landforms and deposits resulting from these processes will be provided from the Stołowe Mts, Central Europe, and elsewhere.

### Key words:

sandstone; groundwater geomorphology; pseudokarst

## Inheritance and Innovation of Geography:

### Young Scholars in Action



Home

#### Oral

1. [Ecological Marginalization and Farmers-pastoralists Conflicts in Drylands of West-africa](#)  
Abdullahi Umar (Federal University Birnin Kebbi, Nigeria, Nigeria), Ismail Alfa Adamu (Usmanu Danfodiyo University, Sokoto Nigeria, Nigeria)
2. [Establishment and Application of Human Settlements Composite Index Based on Raster Data—A Case Study in Beijing-Tianjin-Hebei Region in China](#)  
Xue Yang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
3. [Research on Cooperativity and Spatial Heterogeneity of Human-Land System in Hubei Province](#)  
Wang Zhanqi; Yu Li (School of Public Administration, China University of Geosciences, China)
4. [Spatial and Temporal Changes of Traditional Salt Making Activities and Environmental Adaptation in Coast of Jiangsu Province, China](#)  
Junlin Bao; Shu Gao (School of Geographic and Oceanographic Sciences, Nanjing University, China)
5. [The Effect of Elevated Temperature on the Interspecies Competition Between Phragmites Australis and Spartina Alterniflora in the Salt Marsh of the Yangtze Estuary, China](#)  
Chao Zhang; Kaiyun Wang; Wei Gao (The School of Geographical Sciences, East China Normal University, China)

#### Poster

1. [Evolution of Global Vegetation Activity Trend from 1982 to 2011](#)  
Naiqing Pan; Xiaoming Feng; Bojie Fu (China, Research Center for Eco-Environmental Sciences)
2. [Impacts of Protected Areas on Local Livelihoods in China](#)  
Wei Duan; Yali Wen (China, Beijing Forestry University)
3. [Response of Freeze-thaw Processes to Experimental Warming in the Permafrost Regions of the Qinghai-Tibet Plateau](#)  
Shengyun Chen; Wenjie Liu; Lin Zhao (China, Cryosphere Research Station on the Qinghai-Tibetan Plateau, State Key Laboratory of Cryosphere Science, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)
4. [Study of Time-space Evolution of Social-ecological System Vulnerability of Hubei Province](#)  
Zhang Liguo; Wang Zhanqi (China, China University of Geosciences)
5. [The Vulnerability Evolution and Simulation of the Social-ecological System in the Semi-arid Area Based on the VSD Framework](#)  
Jia Chen; Xinjun Yang; Sha Yin (China, Northwest University)

## **Ecological Marginalization and Farmers-Pastoralists Conflicts in Drylands of West-Africa**

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### **Abstract**

Most of farmers-pastoralists-conflicts' (F-P-C) researches in drylands of Nigeria and Niger, West Africa are thematic in nature. There is need for a holistic approach in conducting research on conflicts essentially the one that focuses on the conflicts causality, generalizability and prediction which will help in proffering effective mitigation measures. The aim of this paper is to review and synthesize fragmented F-P-C works in drylands of Nigeria and Niger with a view of establishing trends in climate change, ecological marginalization and F-P-Cs as-well-as causality, generalizability and prediction of F-P-Cs. The findings of the research revealed an increasing drought, and aridity in the study area from 1970s to 1980s and 1990s. These trends helped by ecological degradation, political and socio-economic systems decay culminated into ecological marginalization which threaten the survival of farmers and pastoralists who prior were co-existing in a symbiotic living. These factors were responsible for the increasing trend in F-P-Cs as a mal-adaptive strategy from farmers and pastoralists to deteriorating environment. Finally we recommend that addressing ecological marginalization; increasing pastoralists' access to land, empowerment rural dwellers enhancing their participation and curbing corruption are some strategies of ameliorating the F-P-Cs in the study area.

### **Key words:**

Climate change; ecological degradation; ecological marginalization; farmers; pastoralist; conflicts

## Establishment and Application of Human Settlements Composite Index Based on Raster Data—A Case Study in Beijing-Tianjin-Hebei Region in China

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### Abstract

In order to evaluate regional human settlements environment more comprehensively, this article selects relief amplitude, climate index, hydrology index, vegetation index, night lighting index, air quality index and traffic access degree to construct human settlements composite index (HSCI) at provincial scale based on raster data. Then use HSCI to analyze the spatial distribution laws of natural environment, humanistic environment and composite index in Beijing-Tianjin-Hebei region. Finally, the relationship between population distribution and the human settlements environment has been discussed. The results show that: (1) the natural suitability decreases gradually from southeast to northwest in Beijing-Tianjin-Hebei region. On the other hand, areas with better social and economic conditions are all construction areas and the humanistic environment in urban district becomes worse gradually from center to periphery. Similarly, it shows that high-grade administrative regions are better than lower ones. (2) HSCI value presents a descending series from southeast to northwest in Beijing-Tianjin-Hebei area and the east of Taihang mountain is more human-friendly than the west. Besides, built-up areas are more preferable than uninhabited areas, and core is better than outside as well as high level administrative regions are better than the lower ones. (3) The population distribution has the strongest correlation with night light index while it has the weakest relationship with air quality index. Furthermore, about 70% of the population live in areas with HSCI value greater than 0.72. Equally important, HSCI value in the most densely populated areas is 0.74, which shows a remarkable regularity of negative skewness distribution.

### Key words:

human settlements composite index; grid; Beijing-Tianjin-Hebei region in China

## Research on Cooperativity and Spatial Heterogeneity of Human-Land System in

### Hubei Province

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#### Abstract

The population change in Hubei province has several extremely obvious characteristics, as the sustained rapid growth, the higher the level of urbanization and a very uneven spatial distribution. With increase in the city, township of the reduction in the trend of changes in the number of features is obvious. Population of industrial distribution by the "one-two-three" optimized to the "three-two-one", the number of the first industry declined rapidly, and secondary and tertiary industries increased clearly. Research proposed by introducing elastic coefficient, pressure index, contribution index and load, on Hubei Province with population density of the spatial differentiation, types of quantity change and spatial distribution of employment structure change and land use patterns, for collaborative research. According to the research results, the study area can be divided into three kinds of areas, namely the highly cooperative area, the progressive collaboration area and the contradiction area. By measuring and analyzing the driving factors of the human earth system, put forward the relevant policy recommendations based on the research.

#### Key words:

Cooperativity; spatial heterogeneity

## **Spatial and Temporal Changes of Traditional Salt Making Activities and Environmental Adaptation in Coast of Jiangsu Province, China**

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### **Abstract**

Sea salt production is important way of coastal resources use, which has a long history in China. The observation of the evolution history of sea salt production is a helpful perspective for studying the change of coastal human-earth relationship and environmental adaptation within global change research framework. In the present contribution, we use the historical archives/documents and adopt multidisciplinary methods, to reveal the historical evolution process and characteristics of salt making activities, and dynamic mechanism of its spatial and temporal changes in different coastal region of Jiangsu Province. The study indicates that Jiangsu coastal salt industry included three typical stages: leaching-brine and decocted salt, leaching-brine and solar salt, evaporated-brine and solar salt; from the 13th to 19th centuries, in distribution of the salt making technology, the decocted salt coexisted with solar salt for a long time, and formed a basic pattern that decocted salt making distributed in south coast but solar salt making in north, and there were different evolution stage of sea salt production in different coastal region; the production center migrated gradually from Huainan coast to Huaibei. Meanwhile, coastal natural environmental changes and economic policies were the main driving factors of the distribution changes and environmental adaptation of coastal salt production, especially the management policies for salt industry were the most important driving force which influenced the spatial and temporal variation of coastal salt making activities in the Ming and Qing Dynasties.

### **Key words:**

Jiangsu coast; historical period; distribution change; salt making; human-earth relationship

## The Effect of Elevated Temperature on the Interspecies Competition between *Phragmites Australis* and *Spartina Alterniflora* in the Salt Marsh of the Yangtze Estuary, China

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### Abstract

The effect of global warming on the invasiveness of invasive plants is now a high spot in the field of global change. *Spartina alterniflora*, a C4 species, is widely distributed in the Chinese coastal salt marsh, it put a high pressure to the native *Phragmites australis* (C3 species). Whereas little is known about the interspecies competition pattern between *Phragmites australis* and *Spartina alterniflora* under global warming? In this work, *Phragmites australis* and *Spartina alterniflora* in the salt marsh of Yangtze estuary were chosen, then open-top chambers were used for the elevation of temperatures (2 °C, 4 °C). We investigated the physiological traits, morphological traits, biomass accumulation, clonal growth and sexual reproduction parameters of these two species under elevated temperatures at monoculture and mixed community. We choose some biomass and reproduction parameters to quantitatively identify the interspecies competition pattern under elevated temperatures. Then physiological and morphological traits under elevated temperature were compared between these two species to understand the mechanisms behind the competition pattern. This work could provide basic data with respects to the population dynamics of *Phragmites australis* and *Spartina alterniflora* in the salt marsh of Yangtze Estuary under global warming, and provide scientific basis for the adjustment of present wetland management to adapt to the predicted global warming.

### Key words:

elevated temperature; *Phragmites australis*; *Spartina alterniflora*; growth; reproduction; Yangtze Estuary

## Evolution of Global Vegetation Activity Trend from 1982 to 2011

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### Abstract

Satellite-derived normalized difference vegetation index (NDVI) data have been widely used to monitor vegetation photosynthetic activity at various scales. Several methods for time series analysis have been proposed, however, most of them may not effectively reveal the nonlinear and nonstationary vegetation changes. In this study, by using the multidimensional ensemble empirical mode decomposition (MEEMD) method to analyze the NDVI satellite data from 1982 to 2011, we diagnosed the evolution of global vegetation activity trend during this period. And it was the first trial to apply this method in the area of remote sensing. According to the intrinsic trend extracted by the MEEMD method, we found that although global vegetation generally experienced a greening process during the entire study period, the trends in NDVI were spatially and temporally non-uniform. Global vegetation greening/ browning rates in 1986, 1990, 1994, 1998, 2002, 2006 and 2010 were mapped, showing that the vegetation activity trend and its rate in many places significantly changed over time. The area with monotonic greening and browning trends account for 26.9% and 3.6% of the total vegetated area respectively. For nearly 70% of the vegetated area, trends were found to change between greening and browning. The mid-high latitudes of the northern hemisphere experienced extensive greening-to-browning reversals from the late 1990s to the early 2000s, and the browning-to-greening reversals mainly occurred in low latitudes of the southern hemisphere from the late 1980s to the mid-1990s.

### Key words:

global greening and browning; trend shift; time series analysis; MEEMD method; NDVI

## Impacts of Protected Areas on Local Livelihoods in China

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### Abstract

Given the debates about whether PAs exacerbate local poverty or might contribute to poverty alleviation, there is a critical need for evidence to examine the impacts. In this study, we have conducted a household investigation of 712 rural households in 7 PAs of Sichuan province of China. We used matching method to value impacts of Protection Areas (PAs) on local livelihoods. The results showed that compared to the Average Treatment Effect (ATT), the results of traditional regression model exaggerate the negative impacts of the protected area. However, we should notice that the overall impact of PAs on local households' wealth was still negative. Households inside the PAs had more Non-timber Forest Products (NTFPs) gathering income, non-farm income and compensation, but fewer crop production income and forestry income. Better conservation policies need to be initiated to realize the harmonious and concurrent development of ecological objectives and livelihood objectives.

### Key words:

nature reserve; poverty alleviation; impact appraisal; matching

## Response of Freeze-Thaw Processes to Experimental Warming in the Permafrost Regions of the Central Qinghai-Tibet Plateau

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### Abstract

Examining the change in freeze-thaw processes triggered by climate warming is a crucial issue in further assessing variations of permafrost, alpine ecosystem and engineering infrastructure *etc.* However, the quantitatively systematic research is still lacking on effect of the warming on freeze/thaw index (FI/TI), soil hydrothermal properties, soil freeze-thaw processes (SFTPs) and active layer thickness (ALT) in the permafrost regions of the Qinghai-Tibet Plateau (QTP) up to now. Thus, the experimental warming using open top chambers (OTCs) was manipulated in alpine swamp meadow and alpine steppe ecosystems in the permafrost regions of the Beiluhe Basin of the central QTP during 2009-2011. Results showed that under OTCs treatment,  $T_a$  significantly increased in the daytime and decreased in the nighttime, whereas obviously increased at the mean daily, monthly, seasonal and annual scales. Meanwhile, diurnal and annual  $T_a$  range significantly enhanced, and mean annual  $T_a$  increased by  $\sim 1.4$  °C. Owing to the experimental warming scenarios, mean annual  $T_s$  at the depths from 5cm to 40cm was increased by approximately 0.2-0.7 °C in alpine swamp meadow and about 0.3-1.5 °C in alpine steppe. It showed that increase amplitude of  $T_s$  was greater in alpine steppe than in alpine swamp meadow, especially at 5-10cm depths. In addition, mean annual SM at 10cm depth decreased by  $\sim 1.1\%$  and  $\sim 0.8\%$ , and mean annual SS at 10cm depth significantly increased by  $\sim 0.3\text{g}\cdot\text{L}^{-1}$  and  $\sim 0.1\text{g}\cdot\text{L}^{-1}$  in alpine swamp meadow and alpine steppe, respectively. Further, FI was significantly decreased by  $\sim 410.7^\circ\text{C}\cdot\text{d}$  while TI was significantly increased by  $\sim 460.7^\circ\text{C}\cdot\text{d}$ . Likewise, the onset dates of shallow soil thawing at 5-40cm depths were advanced by 9 and 8 days while the onset dates of freezing were delayed by 10 and 4 days in alpine swamp meadow and alpine steppe, respectively. Moreover, soil frozen days were significantly decreased by  $\sim 28$  days and  $\sim 16$  days, but thawed days were increased by  $\sim 18$  days and  $\sim 6$  days, and frozen-



thawed days were significantly increased by ~10 days and ~10 days in alpine swamp meadow and alpine steppe, respectively. Furthermore, ALT had been significantly increased by ~6.9cm and ~19.6cm in alpine swamp meadow and alpine steppe ecosystems, respectively. However, the response differences in two types of alpine grasslands may be mainly controlled by vegetation coverage.

**Key words:**

freezing/thawing index; soil freeze-thaw processes; active layer thickness; experimental warming; Qinghai-Tibet Plateau

## Study of Time-Space Evolution of Social-Ecological System Vulnerability of Hubei

### Province

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#### Abstract

This paper use the municipal administrative region of Hubei province as research units, utilize PSR model, from two dimensions of Social System and Ecological System, building Social- Ecological System(SES) vulnerability analysis framework of Hubei province, to explore the fragility of the space-time distribution pattern and driving mechanism in various areas of Hubei province from 2000 to 2014. The results show that parts of Hubei province SES vulnerability showed a trend of rising and regional vulnerability gap larger. As the drive mechanism, human economic activities, policies and other social factors are the main driving factors, at the same time, regional climate conditions also play an important role. According to the analysis of results, this paper discusses each period's stage of SES adaptability circulation of different regions. Then put forward practical adaptive management countermeasures, to provide references for Hubei province's economic, social, ecological balanced and sustainable development.

#### Key words:

Hubei province; Social-ecological system; Vulnerability; Drive mechanism; Adaptive management

## The Vulnerability Evolution and Simulation of the Social-Ecological Systems in the Semi-Arid Area Based on the VSD Framework

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### Abstract

As an important proposition in the field of sustainable science, vulnerability assessment of social-ecological systems (SESs) still has obvious defects in the lack of effective framework and quantitative measurement methods. Taking the semi-arid area of the Loess plateau in Yulin City as an example, this paper improves the vulnerability assessment methods and techniques on the county scale using VSD (Vulnerability Scoping Diagram) assessment framework. Firstly, the vulnerability indexes were screen out by the SERV (Spatially Explicit Resilience-Vulnerability) model. Secondly, utilizing the space technology of RS and GIS, this study measured the spatial differentiation characteristics and evolution trend of the social-ecological systems in Yulin City during the period of 2000-2011. The results are as following: (1)The spatial pattern of Yulin City's SESs vulnerability is "high in northwest and southeast and low along the Great Wall", although the degree of system vulnerability reduced significantly during the period of 2000-2011 and the system development trend is better, there is a sharp distinction in the spatial distribution between the system vulnerability and exposure risk; (2)The evolution of system vulnerability is influenced by the risk factors of exposure, and the regional vulnerability and the spatial heterogeneity of exposure risk are affected by the social sensitivity, economic adaptive capacity and other factors. Finally, the future scenarios of regional vulnerability are simulated under different decision risks by taking advantage of the OWA multi criteria algorithm. This research will have significant implications for decision making of sustainable development.

### Key words:

Social-ecological systems (SESs); VSD assessment framework; vulnerability; Yulin City

## Area Development and Policy



[Home](#)

### Oral

1. [An Analysis of Growth Drag From Water and Land in China](#)  
Xue Junbo; Mengzhen Zhao (Institute of Policy and Management, China)
2. [Exclusionary Urban Growth and the Specter of Premature Deindustrialisation with Specific Reference to India](#)  
Amitabh Kundu (Institute for Human Development, India)
3. [How Do Regions Evolve in a Transitional Economy?](#)  
Canfei He (Peking University, China); Shengjun Zhu (Swansea University, United Kingdom)
4. [Hsinchu Technopolis: A Socio-technical Imaginary of Modernity in Taiwan?](#)  
Jinn Yuh Hsu (Taiwan University, China)
5. [Spatial Organization of the Electronics Production Network in East Asia and Its Impact on Regional Development](#)  
Peiping GONG; Weidong LIU (Institute of Geography Sciences and Natural Resources Research, China)
6. [The Rational Particularities of Chinese ODI](#)  
Lei ZHENG; Weidong LIU; Yi LIU (Institute of Geographical Sciences and Natural Resources Research, China)
7. [Unpacking China's Belt and Road Initiative](#)  
Weidong Liu; Michael Dunford (IGSNRR, Chinese Academy of Sciences, China)

## An Analysis of Growth Drag from Water and Land in China

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### Abstract

Resource is the necessities for human survival and development. According to the hypothesis of Romer's theory, growth drag is caused by the limitation of resource and land in fact. This paper considers the influence of excessive water using on Chinese economic and farther analyses the economic growth drag of China. The results show that the growth drag value for the water resource being excessively exhausted is 0.001397, and that for the land resource being excessively exhausted is 0.013201, and that for the water and land resource being excessively exhausted is 6 times as much as that of America. The growth drag is so strong, so we must rely on technology progress in order to plan human and nature as a whole and to realize the goal of economic growth. And technology progress is the only approach to resolve the question to the growth drag.

### Key words:

Growth Drag; Land Resources; Balanced Growth Path; Technological Progress

## Exclusionary Urban Growth and the Specter of Premature Deindustrialisation with Specific Reference to India

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### Abstract

Urbanization process in the Global South in general and South Asia in particular has been in favour of metropolitan and larger cities, with small and medium towns tending to stagnate. It is, therefore, not surprising that researchers here have looked at urban processes mostly through the prism of large cities. In fact, urban research on the entire Global South remains generally located in these cities. This is more so in South Asian countries where the share of cities with population above 5 million is 23 per cent compared to the global figure of 17 per cent only. In India, the figure is even higher.

The present paper attempts to make a departure from the paradigm of metropolis based urbanisation. This, it does primarily by shifting the focus of analysis to small and medium towns and *rurbanisation*. It is indeed true that a large part of contemporary urban growth occurs outside of the hegemonic power structure of globalisation, both politically and geographically. Therefore, instead of confining urban research to global and national market, state level institutions, formal programmes, missions and legal systems, the paper attempts to build a history of urbanisation from below. It is an attempt to put together the evidences from smaller places and construct a new narrative through an analysis of situations and processes that are considered of marginal importance within the framework of metro centric urbanisation. It is argued that simple dualistic models postulating categories such as rural and urban, small and big cities etc. are inappropriate to understand the dynamics of urban development in India.

Given the fact that Indian urban reality and its diverse manifestations stand up robustly as a refutation of the global models of explanation and prediction, the present paper begins by probing into the conceptual prism used for analyzing industrialization and urbanisation. It analyses the trend and pattern of urbanization in India, identifying the metropolitan bias in the dynamics of development. It then presents three alternate strands of urbanization, taking place in the country. In particular, it examines urban transformation processes operating around large cities. Subsequently, the dynamics of development or their absence in and around small and medium towns have been analysed. Finally, the process of rural urban transition in the distant rural hinterland is discussed. An attempt is made to analyse if the economic geography of urban growth in India simply reflects the hegemony of the global capital. To conclude, it speculates on the relevance of the thesis of premature deindustrialization in India, as evidenced in many countries in Global South.

## How Do Regions Evolve in a Transitional Economy?

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### Abstract

Regional diversification emerges as a path-dependent process as a region often branches into industries that are related to preexisting industrial structure, whereas industries that are not closely related have a high probability of exiting the region. This paper contributes to the ongoing debates on path dependence and path creation with a new analytical framework that emphasizes the need to bring in a wider range of factors. It suggests that regional industrial dynamics are not only conditioned by preexisting regional capabilities and technological relatedness, but also by the ways in which technological relatedness is interconnected with industry attributes and more importantly region's institutional context. In order to better understand regional industrial evolution particularly in a transitional economy like China, it seeks to incorporate a new strand of literature into current EEG literature—i.e., literature on China's constantly changing, variegated and fragmented institutional contexts, including local state corporatism, market preserve federalism, political tournament and regionally decentralized authoritarian system theories. Based on a firm-level dataset of China's manufacturing industries during 1998-2008, this paper has studied regional industrial evolution in China by examining the entry and exit of 4-digit industries at the prefectural level. By using a measure of co-occurrence based technological relatedness, this research shows that regional industrial development is a path dependent process in China, one that is also inflected by industry attributes and institutional embeddedness. Our results imply that EEG would profit from incorporating insights on institutional change and economic transition in explanations of regional industrial evolution.

### Key words:

Evolutionary Economic Geography; Transitional Economy; Technological Relatedness; China

## Hsinchu Technopolis: A Socio-technical Imaginary of Modernity in Taiwan?

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### Abstract

The Hsinchu Science-based Industrial Park (HSIP), or labeled as “a Silicon Valley of the East (John Mathews 1997)”, was established by Taiwanese government to host high-technology firms in 1979. To attract the experienced engineers and entrepreneurs back, the HSIP constituted the production facilities and even residential amenities as “the-world-as-exhibition”, an imitation after the Silicon Valley. The HSIP became a social-technical imaginary which was supported by the advance of technology to offer a publicly performed vision of desirable futures of employment and even lifestyle, or a dreamscape of modernity. But the success of the HSIP brings forth social and urban contradictions to the neighboring areas. To meet the challenge of “harmonization” between the old villages and the new technopolis, the government proposes successively the “Hsinchu Science City” (HSC) plan and the Unpolished Jade Project (UJP) to integrate the neighboring counties with the development of the HSIP. The socio-technical imaginary of modernity bred by the HSIP project engendered two critical issues for the future development. On the one hand, land speculation burst out under the imaginary of spread effect of the HSIP, even the housing bubble evaporated after the 2008 economic crisis. On the other hand, the desires of development, or the Utopia of modernity, that were both evoked and betrayed by the successive actual regional development projects among the local people had to be taken serious in the debates on the HSIP’s future. This paper concluded that instead of victimizing local people, the positive thinking of the desire of modernity could ethically take advantage of the development projects which could not deliver the long-lasting promise of equal development, and explore possibilities to move the region forward “real’ but never realized socio-technical imaginations.

### Key words:

Modernity; special economic zone

## Spatial Organization of the Electronics Production Network in East Asia and Its Impact on Regional Development

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### Abstract

For recent decades, the electronics industry has witnessed dramatic change in its spatial reconfiguration and the formation of a highly integrated regional production network in East Asia. In this regard, lots of work has been done with the perspective of global production network. While providing important insights into the mechanisms behind the reconfigurations of global production networks, the research above performs poorly in quantitative analysis and provides us lots of 'fragments' rather than a systematic macro overview of the networks. In this paper, we apply the multi-regional input-output model to relook into the electronics production network of East Asia in quantitative way. Specifically, by compiling a multi-regional input-output table of East Asia in 2010, we demonstrate the spatial linkages within the electronics production network in East Asia and evaluate their impacts on regional development with value-added trade measures. The results illustrate that regions in charge of the two ends of value chains, like Taiwan China, Korea and Japan, benefit the most from the current spatial organization of the regional electronics production network, while regions responsible for assembly production benefit the least. As the calculation results of value-added trade show, Taiwan, Korea and Japan are destinations of net inflows of valued added while the southern coastal region and eastern coastal region of mainland China are the main source of net outflows. We believe the proposed approach will have significant implications for strengthening quantitative analysis in global production network-based research.

### Key words:

electronics production network; value-added trade; multi-regional input-output model, East Asia

## The Rational Particularities of Chinese ODI

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### Abstract

In 2014, Chinese outward direct investment (ODI) surpassed its FDI and Japanese ODI, which made China an economy with a net capital outflow as well as the world second largest FDI investor just behind America. It is still a wonder to achieve that in no more than 15 years after China's "go abroad" strategy, despite of Chinese miraculous economic development. Subsequently, the rapid expansion of Chinese ODI caused fear and fever. Alarmists warn of another version of economic colonization, while realists see opportunities for dividend and interests. It also arouses doubts and debates among researchers, as exemplified by Chinese companies' lack of general ownership advantages, perverse reaction to risk, and hyperbaric role of government.

Therefore, this study firstly aimed to summarize unique features of Chinese ODI, including its spatial pattern of destinations and impact factors of location choice such as resource endowment, institutional environment and so on. Then we focused on the rationale of these particularities based on China's governance mode and its game against globalization. We concluded that Chinese ODI has significant natural resources-seeking and financial freedom-seeking but not reverse technology-seeking features, and imperfect institution of host countries and close bilateral government relations would enhance Chinese ODI. However, the impacts of these factors varied in space. The current achievement is consequent of domestic accumulative ODI demand and institutional profit. The characteristics of Chinese ODI are shaped by domestic governing logic which is featured by powerful government and regulated market and bargains with host countries.

### Key words:

Chinese ODI; spatial-temporal pattern; determinants; governance structure

## Unpacking China's Belt and Road Initiative

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### Abstract

In a world of significant geo-economic competition and collaboration, China's Belt and Road Initiative (BRI) is a result of the rise of China as a global economic power and its desire to demonstrate that it is a responsible stakeholder in a global multi-lateral system on the one hand and of its need to reform its development model and encourage development in potential markets/sources of goods and services on the other. The BRI highlights the role of the Silk Road as a shared part of the cultural heritage of many countries and civilizations and draws on it to promote mutually beneficial co-operation, while also reflecting the unsustainability of China's export-oriented growth model, its energy and resource needs, the rise of China as an outward investor and the role of infrastructure in creating the foundations for growth in less developed parts of the world.

### Key words:

silk road; globalization; the Belt and Road Initiative

## Round Table on Arctic



[Home](#)

### Oral

1. [International Research Initiative in the Russian Arctic \(ISIRA\)](#)  
Tishkov Arkadiy (Institute of geography, Russian academy of sciences, Russian Fed)
2. [New Silk Road and the Northern Sea Route: Is China Able to Combine Them?](#)  
Valerii Konyshev (Saint Petersburg State University, Russian Fed)
3. [On The Problem of Biodiversity Conservation of The Russian Arctic](#)  
Elena Belonovskaya (Institute of geography, Russian academy of sciences, Russian Fed)
4. [Sino-Russian Cooperation on the Arctic: Problems and Opportunities](#)  
Alexander Sergunin (St. Petersburg State University, Russian Fed)

## International Research Initiative in the Russian Arctic (ISIRA)

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### Abstract

After the collapse of the USSR and economic crisis, the extent of research and possibilities for monitoring of natural and social change in the Russian Arctic decreased. An issue about the scientific cooperation expansion in the region and the establishment of technical and financial conditions for this has arisen. In early 1990s here a sharp decline in the number of scientific expeditions, disrupting transport links to remote villages took place, some weather stations and research stationeries were closed. In addition, long-term series of observations of various components of the Arctic environment that previously were characteristic for the Russian Arctic science were interrupted.

After significant easing of requirements for the visit for foreign scientists to the Russian Arctic in the 1990s the real opportunities for planning international research projects and expeditions took their start. The idea of creating the International Arctic Science Committee (IASC) Working Group ISIRA was born in 1993, when an experience of bilateral contacts between scientists on the Arctic themes and plans for joint research in different areas of the Russian Arctic appeared.

25 years ago the priorities of the ISIRA have been identified:

- Initiating international research programs and projects;
- Search for partners in the countries - participants of the working group ISIRA;
- Prompt achievement of new knowledge and the avoidance of duplication;
  - Assistance of the ISIRA for foreign counterparts to participate in scientific research in the Russian Arctic;
- Consulting in the area of research financing and organization.

The first projects supported by ISIRA, were successful. Special attention to international initiatives in the Russian Arctic has arisen during the period of IPY 2007-2008, and after him. On the one hand, it is clear that there are those countries, scientific organizations and scientists for whom the internationalization of research in the Russian Arctic is a real way to study its nature, for the fruitful cooperation and win-win experience. On the other hand, the stories, when calls for scientific cooperation does not carry a positive start, are not aimed at useful for both scientific cooperation partners also took place. Unfortunately, this results in a few joint publications, in missing important for any joint research final stage of the synthesis. And after the fieldwork

their results (collected data) are in arms of foreign counterparts and the Russian partners do not have access to them. Therefore, our task is to make IASC and its working groups, including ISIRA, to be a platform for the development of mutually beneficial scientific cooperation in the Arctic. Arguments in favor of this thesis are as follows:

- Key role of scientific research in the Arctic for geopolitical security of the country and its security interests;
- Defining their role in strengthening and development of the resource potential of the Russian economy;
- Outstanding perspectives for the international use of the Northern Sea Route as one of the main infrastructure elements in the Arctic;
- Support of the global biosphere functions (climate-regulating, global carbon balance, biodiversity and habitat of indigenous peoples).

All this formed the basis of the tens of scientific international and hundreds of scientific projects in recent years after the IPY implemented in the Russian Arctic, primarily by the RAS institutes and Roshydromet. Currently, in the Russian Arctic 80 - 120 international projects involving more than 20 countries are come to practice every year. In addition to the eight Arctic states, South Korea, Japan, China, Spain, France show the activity in collaboration in Arctic. Also a number of Arctic countries (e.g., Finland, Norway, USA, and Germany) formed a special state program of expansion of bilateral scientific cooperation in the Arctic. Their perspectives and priorities could be the subject of discussion at the "round table" in the IGU in Beijing.

**Key words:**

Russia, ISIRA, Arctic cooperation, China

## **New Silk Road and the Northern Sea Route: Is China Able to Combine Them?**

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### **Abstract**

China and Russia achieved significant progress in mutually beneficial cooperation in the Arctic. However, given the emphasis on land transport corridors via the Central and South Asia as well as on southern maritime routes that the New Silk Road concept makes, it is unclear whether China still has an interest in the Northern Sea Route? And if yes, is China able to combine these transport projects? It is an ambition of this paper to demonstrate that in spite of refocusing of China's transport development strategy on the New Silk Road project the Northern Sea Route still remains a high priority for Beijing. Russia and China develop a number of joint projects in the Arctic Zone of the Russian Federation (for example, LNG plant on the Yamal Peninsula) that requires development of shipping via the Northern Sea Route. The Polar Code, recently adopted by the International Maritime Organization and which enters into force on 1 January 2017, on the one hand, provides both Russia and China with some additional incentives to jointly exploit the Arctic sea route, and, on the other, introduces some measures to protect the Arctic fragile marine environment. From strategic point of view, the Northern Sea Route provides diversification of the Chinese transport infrastructure given the prospects for the rise of competition or confrontation between China and the U.S. in the Asia Pacific region. There is also another project with Chinese participation that aims to connect - by railroad - the new deep water port near Archangelsk with the Ural industrial complex, Central Asia, and China.

### **Key words:**

The Northern Sea Route; Silk Road; China; cooperation

## On The Problem of Biodiversity Conservation of the Russian Arctic

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### Abstract

Russian Arctic occupies nearly 1/3 of the Circumpolar Arctic territory -21, 2 billion km<sup>2</sup>, of which the terrestrial part is only 7, 2 billion km<sup>2</sup>.

Here one can see all main arctic types and variants of tundra, shrubs, meadows ecosystems, soils and plant communities. Great variety of landscapes and ecosystems are the habitats for the unique arctic terrestrial flora and fauna. There are 2300 species of vascular plants, 900 mosses and 1600 lichens. 60 species of mammals, nearly 200 birds and 400 fishes are met in Russian Arctic.

Recently because of the increasing of the economic activities in the region anthropogenic impact on the extremely vulnerable arctic ecosystems are strengthen. That's why biodiversity conservation is one of the priority problems in the Russian Arctic.

There are nearly 450 federal and regional Specially Protected Natural Areas (SPNA), which is 13,1% of the whole area of the Russian Arctic region (94,6 billion ha). Conservation of rare and endanger of plants and animals species, and also ecosystems is carried out on these areas. Kamchatka, Yakutia, Murmanskaya oblast, Komi republic are notable for the quantity of the protected areas. Krasnoyarskiy krai and Yakutia are notable for the total area of SPNA.

Nowadays within the joint Program of the Council of Europe and European Union on the Pan European biological and landscape conservation strategy implementation of the Pan European ecological network development (so called Emerald network) is at work. The main purpose of this Program is to guarantee the adequate conservation status for species, ecosystems and landscapes of the European value. Russia is invited for the Program and nowadays 34 Areas of Special Conservation Interest (ASCI) were proposed for the Emerald Network in the European part of the Russian Arctic. In the future the process of ASCI's revealing is supposed to be prolonged for the arctic regions of Asia. Besides Eastern European tundra, Chukotian one, North- Uralian and West-Siberian forest-tundra, mountain pine thickets of North-Eastern Siberia could be considered as priority ecosystems for the Ecological network creation.



## Sino-Russian Cooperation on the Arctic: Problems and Opportunities

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### Abstract

The paper aims at examining the Sino-Russian relations on the Arctic. It argues that, on the one hand, Russia is interested in China's investment in the development of the Russian North's energy and mining sectors, Northern Sea Route's (NSR) infrastructure as well as in promoting cooperation with the PRC on the Arctic research (climate change, ice dynamics, environment, etc.). On the other hand, there are some residual areas of contention, such as Russia's reluctance to provide China with a privileged status with regard to the NSR, debates on financial conditions surrounding specific projects in Russia's Arctic sector, Moscow's concerns on a potential mass Chinese migration, etc. Moscow faces uneasy choices between the need to keep cooperative relations with its 'strategic partner' and protect its national interests in the Arctic when they diverge with those of the PRC.

### Key words:

China, Russia, Arctic cooperation



## The International Dean/ Chair's Forum on Geography Education

### Oral



Home

1. [International Education of Geography in China](#)

Lin Liu (Sun Yat-sen University, University of Cincinnati, China)

2. [Mapping a Bright Future: Building Capacity for Internationalization in Geography](#)

Sarah Bednarz (Texas A&M University, United States)



## International Education of Geography in China

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### Abstract

Globalization and global consensus is one of the main themes of 33rd International Geographical Congress. Internationalization of geography education can play a key role in promoting global consensus. To accelerate the development of geography and facilitate communication and cooperation among scholars and professionals of geography worldwide, this forum will focus on internalization of geography education. This forum is hosted by School of Geography and Planning, Sun Yat-sen University, located in Guangzhou, China. The School is originated from Department of Geography, established in 1929 as one of the oldest geography departments in China. It has recently become International School of Geography, as part of a new internationalization initiative of the Ministry of Education and State Foreign Expert Bureau of China. The goal of the School is to explore a mechanism for making geography education in China more online with that of the international mainstream.

### Key words:

Geography Education; International School



## Mapping a Bright Future: Building Capacity for Internationalization in Geography

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### Abstract

As president of the American Association of Geographers, I have focused on ways geography departments can thrive in a time of great disruption in higher education, both in the United States and globally. One of the key disrupters is the denationalization of post-secondary education, driven by the market forces of globalization. It is now a global marketplace for students, faculty, researchers, and key resources. Geographers seek ways to adapt to this condition and to enhance our contribution to the internationalization of our campuses. This paper focuses on strategies geographers may develop and adopt to maximize the opportunities presented by the globalization and internationalization of higher education. First I will present an overview of the evolving drivers for internationalization using the framework proposed by Biles and Lindley (2009). Next I will discuss the opportunities and challenges of transnational higher education. To conclude I will examine the unique position of geography as a discipline in this enterprise and highlight the advantages we have to capitalize on internationalization both educationally and institutionally.

### Key words:

Internationalization of higher education, geography education, healthy departments

## Earth Surface Processes and Landforms in East Asia - 17th Cross-Straits Symposium on Geomorphology



### Oral

1. [A Detailed Post-IR IRSL Dating Study of the Niuyangzigou Loess Site in Northeastern China](#)

Yi Shuangwen (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing 210093, China, China); Buylaert Jan Pieter; Murray Andrew (Nordic Laboratory for Luminescence Dating, Department of Geoscience, Aarhus University, DTU Risø Campus, DK-4000 Roskilde, Denmark); Lu Huayu (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing 210093, China); Thiel Christine (Leibniz Institute for Applied Geophysics, S3: Geochronology and Isotope Hydrology, Hannover, Germany); Zen Lin (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing 210093, China)

2. [A Typhoon-induced Flood, Sediment Characteristics and Heavy Metals: A Case Study from Yaojiang River Valley, Zhejiang Province, East China](#)

Xuerong DAI; Yuxin SHI; Ziyang WU; Jie ZHENG; Yajuan XI (East China Normal University, China)

3. [Chain Reactions from Rainfall Intensification to Streamflow and Sediment Discharge: The magnified Responses in Small Mountainous Watersheds](#)

Jr Chuan Huang; Tsung Yu Lee (Taiwan Normal University, Taiwan, China); Shuh Ji Kao (Xiamen University, China)

4. [Channel Planform Dynamics Monitoring and Channel Stability Analysis in Zhoushui River, Taiwan](#)

Cheng Wei Kuo; Chi Farn Chen (Center for Space and Remote Sensing Research, Central University, Taiwan, China)

5. [Chinese Deserts and Sand Fields in Last Glacial Maximum and Holocene Optimum and the Potential Dust Emission](#)

LU Huayu; CUI Menchun; YI Shuangwen; XU Zhiwei (School of Geography and Ocean Science, Nanjing University, Nanjing 210093, China); Zhou Yali (College of Tourism and Environment, Shaanxi Normal University, China); FENG Han; ZENG Lin; ZHU Fangying; DONG Lina; ZHANG Hongyan; ZHUO Haixin; YU Kaifeng (School of Geography and Ocean Science, Nanjing University, Nanjing 210093, China); MASON Joseph (Department of Geography, University of Wisconsin Madison, WI 53706, USA); WANG Xiaoyong; CHEN Yingyong (School of Geography and Ocean Science, Nanjing University, Nanjing 210093, China); LU Qi; WU Bo (Institute of Desertification Studies, Chinese Academy of Forestry, China); DONG Zhibao; QU Jianjun; WANG Xunming (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences,

- China); GUO Zhengtang (Institute of Geology and Geophysics, Chinese Academy of Sciences, China)
6. [Climatic Response of Larix Chinensis Radial Growth Using the Process-Based VS-Lite Model at the Tree-Line Forests of Mt. Taibai, China](#)  
Shuheng LI; Na GAO; Jun WANG; Hongying BAI; Jin QIN (Northwest University, China); Wei GUO (Xi'an Jiaotong University, China)
  7. [Coastal Geomorphologic Evolution and Human Impacts - The North Jiangsu Plain Coast as an Example](#)  
Yongzhan Zhang (Nanjing University, China)
  8. [Controls on Geomorphic Characteristics of Alluvial Fans in the Hexi Corridor, NW China](#)  
Xiaofei Hu; Ying Chen; Jinjun Chen; Miao Chen; Changsheng Gong (Lanzhou University, China)
  9. [Estimation of Total PM10 Flux from Tengger Desert and Mu Us Sandy Land, Northern China, through Integration of PI-SWERL and Meteorological Observations with the WESTDC 1.0 Land Cover Product](#)  
Mengchun Cui; Huayu Lu (Nanjing University, China); Mark Sweeney; Joseph Mason (University of Wisconsin Madison, USA); Vicken Etyemezian (Desert Research Institute, USA); Zhiwei Xu (Nanjing University, China)
  10. [Himalaya Evolution at Paleogene-Neogene Boundary Unraveled by Zircon Age Spectrum from Arabian Sea Sediments](#)  
Han Feng; Huayu Lu; Hanzhi Zhang (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing, China)
  11. [Landcover Change and Its Implication on Coastal Flood Hazards, Xiamen Island, China – An Analysis Based on Historical Photographs and Satellite Imageries](#)  
Ying Tong Lin; Su Min Shen (Taiwan Normal University, Taiwan, China)
  12. [Loess-Covered Paleolithic Sites along the Hanjiang River Valley, Southern Piedmont of the Qinling Mountains, Central China](#)  
Xuefeng Sun (School of Geographic and Oceanographic Sciences, Nanjing University, Nanjing, 210023, China)
  13. [Neogene Uplift in the Korean Peninsula Linked to Small-Scaled Mantle Convection at Singking Slab Edge: Implications on Earthquake Hazards](#)  
Jaeryul Shin (Department of Geography Education, Gyeongsang National University, South Korea)
  14. [Quantitatively Estimate Contribution of the Dust Sources to Chinese Loess Deposit Using Detrital Zircon U-Pb Age Patterns](#)  
Hanzhi Zhang; Huayu Lu; Xisheng Xu (Nanjing University, China); Xiaoming Liu (Northwest

University, China); Tao Yang (Nanjing University, China); Thomas Stevens (Uppsala University, Sweden); Anna Bird (Department of Geography, Environment and Earth Sciences, University of Hull, HU6 7RX, Hull, UK); Zhiwei Xu; Tian Zhang; Fang Lei; Han Feng (Nanjing University, China)

15. [Response Divergence of \*Abies Fargesii\* Tree-Ring Widths to Climate Variation in the Niubeiliang Nature Reserve of the Qinling Mountains](#)

Na Gao; Shu heng Li (College of Urban and Environmental Science, Northwest University, China)

16. [Storm Response of Sand Waves in the Taiwan Shoal](#)

Feng Cai (Island Research Center, SOA, China); Jingjing Bao (Third Institute of Oceanography, SOA, China)

17. [The Geomorphology and Active Structures of the Longmen Shan Fold-and-Thrust Belt](#)

Yiquan Li; Dong Jia (School of Earth Sciences and Engineering, Nanjing University, China)

18. [The Resilience of Natural Hazards under the Threaten of Climate Change in Taiwan](#)

Jiun Chuan Lin (Department of Geography, Taiwan University, China)

19. [Vegetation Variation in Sub-Humid to Humid Regions of China Recorded by Pleistocene Loess Deposit](#)

Hongyan Zhang (Nanjing University, China)

## Poster

1. [Aeolian Dust Records from the Central Japan Sea and its Palaeoclimate Significance](#)

Zhi Dong (China, Nanjing University&First Institute of Oceanography); Xuefa Shi (China, First Institute of Oceanography); Chendong Ge (China, Nanjing University)

2. [Application of River Longitudinal Profile Morphometrics to a Small Block Mountain in South China](#)

Zhiyong Han; Xusheng Li; Nairui Wang (China, Nanjing University)

3. [Extraordinary Flood Events Response to Holocene Climatic Variability along the Upper Hanjiang River valley, Middle Yangtze River, China](#)

Huang Chunchang, Guo Yongqiang (China, Department of Geography, Shaanxi Normal University)

4. [Geomorphic Processes in the Mu Us Dune Field, Northern China in Response to Climate Change](#)

Zhiwei Xu; Huayu Lu (China, Nanjing University); Joseph A. Mason (China, University of Wisconsin Madison)

5. [Geomorphoclimatic Processes and Characteristics in the Lower Reaches of the Heihe River Basin \(LRHRB\), NW China](#)

Bingqi Zhu; Jingjie Yu; Xunming Wang (China, Key Laboratory of Water Cycle and Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese

Academy of Sciences)

6. [Interlinks of Fluvial and Aeolian Processes in a Seimi-arid Environment, Recorded by Sediment Sequences of Yellow River Terraces during Last Glacial Period](#)  
Xianyan Wang; Shuangwen Yi; Junfei Ma (China, Nanjing University)
7. [Land Subsidence Studies in Port -Harcourt City, River State, Nigeria: Using Persistent Scatterers Interferometric \(PSI\) Method.](#)  
Mahmud Umar Mohammed; Tahir Yakubu; Olawale Oluwafemi (Nigeria, 1Centre for Geodesy and Geodynamics, National Space Research and Development Agency, NIGERIA)
8. [Landscape Patterns and Dynamic Landscape Connectivity of Urban Green Space at Wuhan City, Hubei, China](#)  
Qiaohua Huang; Hui Xiao; Wenyong Guo (China, Jiangsu Normal University)
9. [Luminescence Dating of Late Quaternary Fluvial Sediments in the Lower Gangetic Plain, India: Climate-Eustasy and Geomorphic Responses](#)  
Sujoy Bandyopadhyay; Subhajit Sinha (India, Department of Geology, University of Calcutta, 35 Ballygunj Circular Road, Kolkata, West Bengal, 700 019, India); Pradeep Srivastava (India, Wadia Institute of Himalyan Geology (WIHG), 33 GMS Road, Dehradun, Uttarakhand, 248 001, India)
10. [Luminescence Studies of the Zhang River Terraces in the northeastern Tibetan Plateau](#)  
Bai Shibiao; Qian Chen; Rui Hu (China, School of Geography Science, Nanjing Normal University)
11. [The Distribution of REE in Different Particle Size Fractions of Xiashu Loess and Its Implication For Provenance Tracing](#)  
Xusheng Li; Zhiyong Han; Yang Li (China, School of Geographic and Oceanographic sciences, Nanjing University, China)
12. [The Neotectonic Activity of Wanchuan Catchment in the Northeastern Tibetan Plateau, Reflected by Geomorphic Indices](#)  
Yan Dai; Xianyan Wang; Shengli Wang (China, Nanjing University)
13. [Vegetation Succession and Climate Change Revealed by Loess Deposit in Western Henan Province and Human Adaptation Since 20 ka B.P.](#)  
Yingyong Chen (China, College of Environment and Planning, Henan University)

## A Detailed Post-IR IRSL Dating Study of the Niuyangzigou Loess Site in Northeastern China

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### Abstract

In this study we develop a luminescence chronology for the S<sub>1</sub>-L<sub>1</sub> loess palaeosol sequence at Niuyangzigou, south of the Horqin dunefield in northeastern China. We report standard quartz SAR OSL and post-IR infrared (IR) stimulated luminescence (post-IR IRSL; pIRIR<sub>290</sub>) measurements made on sand-sized quartz and K-feldspar extracts, respectively. The quartz OSL characteristics are satisfactory. Over the dose range of interest, the measured pIRIR<sub>290</sub> D<sub>e</sub>'s do not vary with the first IR stimulation temperature between 50 °C and 260 °C, so all measurements were made using a first IR stimulation temperature of 50 °C. Extensive pIRIR<sub>290</sub> dose recovery tests were performed by adding doses on top of the natural dose. We found that the dose recovery ratios improve significantly when a large test dose is used (e.g. >20% of the measured dose) and good dose recovery can be obtained up to ~800 Gy. When small test doses (up to 10% of the measured dose) are used the dose recovery ratio is >1.10, and the D<sub>e</sub> values also depend on the test dose size; we conclude that the effects of the size of the test dose should be routinely considered in pIRIR dating. Long term laboratory bleaching experiments show that a constant residual pIRIR<sub>290</sub> signal is reached after ~300 h; it corresponds to 6.2±0.7 Gy. Quartz OSL and feldspar pIRIR<sub>290</sub> ages are in good agreement at least back to ~70 ka. Beyond this limit the quartz ages begin to underestimate.

### Keywords:

Northeastern China; loess; bleaching; test dose; post-IR IRSL

## **A Typhoon-induced Flood, Sediment Characteristics and Heavy Metals: A Case Study from Yaojiang River Valley, Zhejiang Province, East China**

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### **Abstract**

Induced by the 'Buffett' typhoon that happened on the October 7th, 2013, an extra-ordinary flood occurred in the lower Yaojiang river valley, Zhejiang province, east China. This flood was determined to have broken through the historical record of water level and caused a huge economic loss. Flood sediments along riverbanks and also in Yuyao city were taken to analyse the grain size, magnetic parameters and heavy metals. Results show that the sediments are composed mainly of silts (58.72%), clay (about 23.27%) and fine sand (18.01%), and their frequency curves were featured with twin peaks or multimodal peak, and positive bias, and the probability cumulative curves were relatively flat. These features seem much similar to the 'yellow silt' collected from the adjacent Hangzhou floodplain. Magnetic parameters show that the magnetic minerals in the sediments were mainly composed of ferri magnetic minerals. The heavy metal analysis showed that the average value of Cu, Zn, Cr, Cd, Pb, Ni, Mn, Fe were 175.2mg·kg<sup>-1</sup>, 400.7mg·kg<sup>-1</sup>, 145.3mg·kg<sup>-1</sup>, 0.8mg·kg<sup>-1</sup>, 43.7mg·kg<sup>-1</sup>, 32.1mg·kg<sup>-1</sup>, 564.3mg·kg<sup>-1</sup> and 4.4%, all beyond the local background values. The heavy metals also showed an increasing trend from upstream to downstream due to urban anthropogenic input. This work was supported by project of National Natural Science Foundation of China (No.41071134).

### **Key words:**

flood; sediments; grain size; magnetic parameters; heavy metals

## Chain Reactions from Rainfall Intensification to Streamflow and Sediment Discharge:

### The magnified Responses in Small Mountainous Watersheds

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#### Abstract

Streamflow and sediment discharge response to rainfall intensification under global warming is poorly discussed due to the limited data length and human alteration, particularly in the small mountainous watersheds. In this study, the historical runoff and sediment export from the Taiwanese rivers are investigated to illustrate the changes of both runoff and sediment export. Results showed that both rainfall and runoff in the 99.9-percentile have been significantly increasing in terms of frequency and intensity over the past four decades. The medians of the runoff depth and sediment yield extremes (99.0–99.9 percentiles) among the 16 rivers increased by 6.5%-37% and 62%-94%, respectively, reflecting the disproportionately magnified response of sediment export to the increased runoff. Taiwan is facing increasing event rainfall intensity which has resulted in chain reactions on magnified runoff and sediment export responses. As the globe is warming, rainfall extremes, which are proved to be temperature-dependent, very likely intensify runoff and trigger more sediment associated hazards. Such amplification should be a warning for other regions with significant rainfall intensification. Appropriate strategies are indispensable and urgently needed to maintain and protect the development of societies.

#### Key words:

Global warming; rainfall-runoff; rainfall intensification; sediment discharge

## Channel Planform Dynamics Monitoring and Channel Stability Analysis in Zhoushui River, Taiwan

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### Abstract

Patterns of river channel planform dynamics reflect a variety of flow and sediment regimes. Recurrent flood events induced by typhoons are powerful agents to modify channel morphology in Taiwan's rivers. Frequent channel migration reflect highly sensitive valley floors and increase the risk of infrastructure and residents along rivers. Therefore, monitoring channel planforms is essential for analyzing channels stability as well as improving engineering design. This study analyze annual channel migration along Zhoushui River in Central Taiwan, from 2008-2015 based on satellite images of FORMOSAT-2. Channel area were digitized from mid-catchment to river mouth (~ 90 km). Channel stability for reaches were assessed through analyzing the changes of river indices including net channel change, channel activity, braid index and active channel width. The boundaries of reaches were decided according the confluences of tributaries and changes of valley confinement. Data of flow discharge and sediment load were incorporate into analysis to understand the magnitude and effectiveness of flood events. In general, channel activity and braid index increase as valley width expands whereas braid index decreases slightly close to river mouth. This downstream pattern was interrupted by river weir which resulted in limited changes downstream the weir due to the lack of water and sediment supply. Typhoon Morakot in 2009 induced great changes (mostly erosion) in Zhoushui River. This study shows that satellite image monitoring accompany river indices analysis could be an effective tool to evaluate spatial and temporal changes in channel stability in highly dynamic river systems.

### Key words:

channel migration; channel stability; satellite images; typhoons

## Chinese Deserts and Sand Fields in Last Glacial Maximum and Holocene Optimum and the Potential Dust Emission

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### Abstract

Chinese deserts and sand fields are regarded as an important dust source in Asia. In this study, 400 optically stimulated luminescence (OSL) ages and more than 100 depositional records in the Chinese deserts and sand fields were obtained; on the basis of these data, we reconstruct spatial distributions of the deserts and sand fields during the last glacial maximum (LGM, 26-16 ka) and Holocene Optimum (HO, 9-5ka). Our results show that the sand fields of Mu Us, Hunshandake, Horqin and Hulun Buir in northern and northeastern China had expanded 25%, 37%, 38% and 270%, respectively, during the LGM; the sand fields of Gonghe in the northeastern Qinghai-Tibetan Plateau had expanded 20%, and the deserts of Badain Jaran, Tengger in central northern China had expanded 39% and 29% separately during the LGM; the deserts of Taklimakan, Gurbantünggüt and Kumtag in northwestern China had expanded 10%-20% respectively, compared to their modern areas. On the other hand, all of the sand fields were nearly completely covered by vegetation during the HO; the deserts in northwestern and central northern China were reduced by around 5%-20% in area during this time. We use a model of present as an analogue to calculate dust emission in the LGM and HO, the results show a significant change of dust emission under the natural climatic changes.

### Key words:

Chinese deserts; the last glacial maximum; Holocene Optimum; potential dust emission

## Climatic Response of *Larix Chinensis* Radial Growth Using the Process-Based VS-Lite Model at the Tree-Line Forests of Mt. Taibai, China

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### Abstract

Mt. Taibai is the highest mountain in the eastern mainland China. It is a typical region for dendrochronology study. Several researches have been conducted on the relationship between tree-ring indices and climatic factors using traditional statistical methods. However, few physiological analysis of tree growth has been reported on the dendroecological studies in Mt. Taibai. In this paper, the response of tree growth of *Larix chinensis* to climatic factors are discussed in the upper tree-line area of Mt. Taibai based on the process-based VS-Lite model. The conclusions are obtained as follows according to the analysis of *Larix chinensis* tree-ring samples that collected from both northern and southern slopes of Mt. Taibai with the elevation of 3000-3400 meters.

(1)Both elevation and aspect have influences on the simulation results of VS-Lite model of *Larix chinensis*. The optimal simulation is shown on the elevation of 3200m approximately. While the correlation of the simulated value and measured value is higher on the southern than on the northern slope. (2) The main climate factor limiting the *Larix chinensis* growth in Mt. Taibai is the temperature of the growing season during May to August. (3)The VS-Lite model has a better simulation result in Mt. Taibai area and provides more biological information of tree growth than the statistical methods.

### Key words:

climatic response; radial growth; *Larix chinensis*; VS-Lite model; Mt. Taibai

## Coastal Geomorphologic Evolution and Human Impacts - The North Jiangsu Plain

### Coast as an Example

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#### Abstract

The geomorphologic evolution is mainly controlled by the river-sea interactions in the North Jiangsu Plain coast along the South Yellow Sea, triggered by the sea level changes during the post glacial period. However, the human activities have still shown the dramatic impacts to it during the historic period.

In 1128 AD, to prevent an invasion from northwards, the lower bank of the Yellow River was excavated, which caused the Yellow River captured the local Huaihe River, shiftily entered into the South Yellow Sea as a disaster for more than 350 years. By the strong artificial flood control engineering since 1494 AD, the Yellow River flowed straightly into the Yellow Sea till 1855 AD. A large scale delta covered 7,160 km<sup>2</sup> area above the water level and even huge area underwater, called the Abandoned Yellow River delta (AYRD) was built. As the result, it formed a promontory in the coast, and the Jiangsu coast changed into the tide dominated tidal flat coast from the wave dominated sandy barrier bar – lagoon coast. Furthermore, the landscape along the coast has been totally changed, an artificial large lake, Hongzehu Lake with the surrounding lowland was formed, and a broad North Jiangsu Plain was built.

On the contrary, after the Yellow River returned back to enter into the Bohai Sea at 1855 AD, lost the huge sediment supply suddenly, the coastline of AYRD began to retreat rapidly suffering from the severe erosion. The high dyke along the coast was built with series engineering in 1970s, such as offshore breaks with groins. Even the regressive progress of the coastline stopped, the underwater part of the AYRD is still adjusting fast. The offshore slope is getting steeper changed from convex shape into concave shape, and -5 m and -10 m even -15 m isobaths regressed landwards paralleled. The wave dynamic process is becoming more and more active in the nearshore area. Meanwhile, -10m~-15m deep tidal channels have also been formed in the offshore area along the both sides of the AYRD. Obviously, the whole coast of AYRD is adjusting controlled by the wave and tide dynamics under the extreme condition without any terrigenous sediment supply. Because of the salt farmland reclamation and natural extending of the spartina along the coast, the coastline at the both ends of the AYRD stopped to retreat, but became to progress seawards.

#### Key words:

river-sea interactions; tidal flat coast; sandy barrier – lagoon coast; coast erosion; human activities

## Controls on Geomorphic Characteristics of Alluvial Fans in the Hexi Corridor, NW China

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### Abstract

It has been argued that alluvial fan morphologies, especially fan slopes are influenced by variety factors, such as the lithology, climates, the basin relief, fault activities and depositing processes. In explain this complicated system, much more efforts and work should be done and then a suitable dynamic model might be composed. In this study, we present the results of in-situ investigations of fan morphologies in the Hexi Corridor, NW China, and how the basin properties control fan slopes and fan channel hydraulics. We firstly chose 47 alluvial fans that draining 5 different mountain regions around the Hexi Corridor, including eastern Qilian Shan, middle Qilian Shan, western Qilian Shan, the Yumu Shan and the Longshou Shan, to extract their radial fan profiles, slopes, drainage basin areas and reliefs from DEMs and satellite images, and extracted lithology distribution for each drainage basin from local geology maps. By preliminary comparisons of fan slopes from different regions, we obtained similar power law relations of fan slopes with drainage areas as previous studies. Furthermore, we found that most of the fans have concave-up longitudinal profiles, and the slope is linearly decreasing downstream for all the fans. Another outstanding characteristic with the fan longitudinal profiles is that fans have different concavities in different regions, that the fans in Longshou and Yumu Shan have high concavities, the fans in middle Qilian Shan have relatively lower concavities, and the fans in eastern and western Qilian Shan have lowest concavities or close to straight longitudinal profiles.

In order to find out the controlling factors on this characteristic, we conducted field observations on 10 typical fans respectively distributing in front of the 5 mountain regions. Obtained field data include fan channel grain sizes, hydraulic radiuses, fan deposition properties, fan surface trenching information and old fan surfaces distributions. By comparisons on these characters and fan slopes, we found that the grain size has limited influence on the fan slopes, while the downstream fining of grain sizes is mainly controlling the hydraulic radiuses. With the fans draining granite rocks, fan heads have high medial grain sizes and downstream fining is significant, that hydraulic radiuses decreasing fast downstream; While with the fans draining sedimentary and meta-sedimentary rocks, fans have low medial grain sizes and downstream fining is weak, that hydraulic

radiuses slightly decreasing downstream. Other than grain sizes, the fan slope may be greatly controlled by the relations of water flux and sediment flux. The calculating results of bed load fluxes using the sediment transport model also indicate that the downstream decreasing rate of bed load fluxes are different with fans in different regions. For the eastern Qilian fans and large river fans, which formed single river channel on old fans by Holocene river incision, the fan slopes are weakly decreasing downstream, affecting that sediment fluxes are not decreasing downstream. For the fans with low concavities in western Qilian Shan, the slow decreasing of fan slopes is to adjust the decreasing of water flux caused by fast water infiltration on fans, at where the drainage basins have extremely low rainfall (<100 mm/yr). For the fans with high concavities in Yumu and Longshou Shan, where the rainfall is around 200 mm/yr, the downstream decreasing of fan slopes is corresponding the decreasing of sediment flux with lower water infiltrations. Thus, we can conclude that the fan slope change is the result of changing relations of water flux/sediment flux, but not sediment grain sizes.

**Key words:**

Alluvial fan; fan slope; Hexi Corridor

## Estimation of Total PM<sub>10</sub> Flux from Tengger Desert and Mu Us Sandy Land, Northern China, through Integration of PI-SWERL and Meteorological Observations with the WESTDC 1.0 Land Cover Product

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### Abstract

Northern China, encompassing spacious desert, sandy land and gobi, is one of the key sources of global dust emission, while the estimations of the total emission and contribution to North Pacific are still much disputed. In this study, a preliminary approach is made to estimate the total PM<sub>10</sub> (i.e., particle matter with aerodynamic diameter equal to or smaller than 10 $\mu$ m) emission flux from Tengger Desert and Mu Us Sandy land, through integration of observed data by PI-SWERL (standing for Miniature Portable In-situ Wind Erosion Laboratory) and ambient meteorological stations, with WESTDC 1.0 land cover product. During the observation, the gross PM<sub>10</sub> emission fluxes of Tengger Desert and Mu Us Sandy land lie in a range of 10<sup>3</sup>-10<sup>4</sup> ton/day, and the former is higher. Moreover, the potential of PM<sub>10</sub> emission from six common landforms in these regions has been investigated, including sand dunes, coppice dunes, dry lakes, dry washes, fluvial and grassland. The results indicate that the emission flux of coppice dunes is highest, followed by fluvial and sparse grassland, whereas that of the rest is relatively low. The spatial and temporal heterogeneities in different landforms of dust emission are greatly dependent on the surface characteristics, especially vegetation and soil moisture.

### Key words:

PI-SWERL; PM<sub>10</sub> emission flux; Heterogeneity

## Himalaya Evolution at Paleogene-Neogene Boundary Unraveled by Zircon Age Spectrum from Arabian Sea Sediments

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### Abstract

Although virtually all the intensive orogenic activities of Himalaya occurred in Neogene, the tectonic evolution of this high mountain range in Paleogene is poorly understood. Investigations of tectonic change pattern at Paleogene-Neogene boundary are important to better understand the interaction between mountain building and climate evolution. Here we present new U-Pb ages of zircon grains from Indus Fan sediments to constrain the orogenic history of Himalaya at Paleogene-Neogene boundary. 11 samples between late Oligocene and early Miocene from ODP 117 cores are dated by the zircon U-Pb technique. We calculate relative contributions of potential sources by counting zircon grains for each sample, and the quantized results indicate Himalaya contributed sediments to the coring site, and an extremely high input from Great and Tethyan Himalaya during late Oligocene-early Miocene. Four samples in Pleistocene are also dated for comparison, which indicates that high proportion of Lesser Himalaya has contributed to the sediment in Pleistocene. Our results suggest that the high contribution of Great and Tethyan Himalaya at Paleogene-Neogene boundary might correlate with the beginning of activity of MCT and extension of STD with leucogranite intrusion along Himalaya, which give rise to the extensive Great Himalaya exhumation. Our study demonstrates that zircon U-Pb dating technique is a good tool to reconstruct erosional history of mountain building on a tectonic timescale.

### Key words:

ODP; Himalaya; Indus Fan; zircon U-Pb dating; Paleogene-Neogene boundary

## Landcover Change and Its Implication on Coastal Flood Hazards, Xiamen Island, China – An Analysis Based on Historical Photographs and Satellite Imageries

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### Abstract

Xiamen island, a strategic port city along the southern Fujian Province coast, has developed dramatically since designated as one of the six Special Economic Zones in 1980 under China's Reform and Open Door Policy. Along with the rapid economic growth, the area of island has increased from 132.5 to 172 km<sup>2</sup> through land reclamation projects, led by the authority. Under the threat of the extreme climate regimes, this implies the increasing of coastal flood risks. Thus, this study intends to detect the coastline change and its landcover transformation and to reveal the hotspots under the coastal flood threats around the Xiamen island. Based on the analysis of aerial photograph taken in 1960 and the sequential Landsat satellite imageries from 1980 to 2016, it is found that the landcover/landuse has significantly intensified not only on the reclaimed land but also along the original coastline. Recent studies show that the extreme sea level and its frequency has risen around the Xiamen Bay (Feng et al., 2015 a, b); storm surges and typhoons will become more hazardous and increase coastal flood risks (Yu et al., 2015). Thus, those newly constructed villas standing just beyond the beaches may suffer the most during the extreme events. For mitigating coastal flood disaster, a comprehensive investigation of vulnerability along the coastline is essential.

### Key words:

Xiamen; landcover change; coastal flood hazards

## Loess-Covered Paleolithic Sites along the Hanjiang River Valley, Southern Piedmont of the Qinling Mountains, Central China

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### Abstract

China is a key area of early human settlement in eastern Old World with numerous palaeolithic localities indicating an early Pleistocene presence of hominins both in north and south China. Many searches are devoted to possible migration routes for hominins linking the two areas and here we report the discovery of several loess-covered Paleolithic sites in the Hanzhong and Ankang Basin, along the Hanjiang River, in the southern piedmont of the Qinling Mountains, central China. A chronology was developed for these sections using a combination of detailed magnetostratigraphic analyses and pedostratigraphic correlation with the well-dated loess-paleosol sequence of the central Chinese Loess Plateau. The results indicate that the age of the oldest lithic assemblage at Longgangsi locality 3 Paleolithic site in Hanzhong Basin could be ~1.20 Ma, and thus this locality would be probably one of the oldest in central China. Furthermore, our works indicate that hominin occupied the Hanjiang valley at several stages around ~1.2 Ma, ~0.9 Ma, ~0.6 Ma, and ~0.1 Ma. As many sites corresponding to these different phases were also discovered north to the Qinling mountains, we propose that Hanjiang River Valley was a probable hominin's route ways through the Qinling Mountains, and its future study is important for contributing the early human migration route hypothesis between southern and northern China.

### Key words:

Hanjiang River Valley; Paleolithic; fluvial terrace; loess-paleosol sequence; magnetostratigraphy; dating

## Neogene Uplift in the Korean Peninsula Linked to Small-Scaled Mantle Convection at Sinking Slab Edge: Implications on Earthquake Hazards

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### Abstract

This study provides quantitative constraints on Neogene uplift in the Korean peninsula using onshore paleo-shoreline records and seismic data. The eastern margin of Northeast Asia including Korea sits in the back-arc system behind the Western Pacific Subduction Zone, a complex trench triple junction of the Philippine Sea, Pacific, and Eurasian (Amurian) plates. An analysis of seismic data in the subduction zone shows that the pattern of uplift in the peninsula mirrors the extent of deep seismicity in subducting Pacific plate beneath. Combined with previous tomographic studies it is proposed that uplift is partly driven by asthenospheric upwelling caused by a sinking slab during the Neogene. In addition, the  $SH_{max}$  orientations of E-W and N-S trends in the peninsula are consistent with the prevailing *in-situ* stress fields in the eastern Eurasian continent generated by various plate boundary forces. The uplift in Korea during the Late Neogene is attributed, in part, to lithospheric failure relating to faulting movements, thus providing a link between dynamic effects of mantle upwelling at sinking slab edge and lithospheric responses driven by plate boundary forces.

### Key words:

epeirogenic uplift; the Western Pacific Subduction Zone; seismicity; asthenospheric upwelling; mantle convection; lithospheric failure

## Quantitatively Estimate Contribution of the Dust Sources to Chinese Loess Deposit Using Detrital Zircon U-Pb Age Patterns

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### Abstract

There is a huge loess deposition in Chinese Loess Plateau, but the origin or provenance is still hotly debated. In order to pinpoint the dust source, surface samples from the North Tibet Plateau piedmont, Gobi Altay Mountains piedmont and modern dunes from the Tengger desert and the Mu Us sand field were analyzed using detrital zircon dating method, aiming to study the provenances of the Chinese loess. In order to quantitatively discriminate content of different potential sources, zircon grains of different age are grouped into different origins according to the tectonic demarcation line. Zircon grains age at 542~1300 Ma are grouped as the North Tibet Plateau piedmont origin, grains at 0-145 Ma are grouped as Gobi Altay Mountains piedmont origin, grains age at 145- 542 Ma can be either from the North Tibet Plateau or Gobi Altay Mountains piedmont, or a mixture of the twos. Proterozoic and Archean zircon grains may be a mixture of the North Tibet Plateau piedmont, Gobi Altay Mountains piedmont or North China Craton. As evidenced by this calculation, sediment in the Tengger Desert, Mu Us sand field is mixture of the three origins. Sediment in the two deserts shows stark spatial variability in sources. Loess deposition in the CLP is also a mixture of sediments from the North Tibet Plateau piedmont, the North China Craton and the Gobi Altay Mountains piedmont, albeit with the North Tibet Plateau piedmont dominating sources. Our result, using the novel statistical provenance group analysis, shows that the loess deposit is a mixture from a broad area of north China.

### Key words

Detrital zircon; U-Pb age; Desert; Provenance; Loess

## Response Divergence of *Abies Fargesii* Tree-Ring Widths to Climate Variation in the Niubeiliang Nature Reserve of the Qinling Mountains

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### Abstract

The heterogeneity characteristics between tree-ring width of *Abies fargesii* and climate change in the Niubeiliang Nature Reserve of the Qinling Mountains was analysed by dendroclimatological methods, for two time periods of 1969 to 1992 and 1993 to 2013. The results showed that a divergence problem exists in the radial growth responses of *Abies fargesii* relative to temperature indicators in the study area. The characterization of *Abies fargesii* radial growth chronology (RES) series was explored by correlation analysis and response function analysis. During 1969-1992, the tree-ring widths of *Abies fargesii* did not correlate with the mean annual and seasonal temperature but had significantly negative correlations with the mean temperature of March and September and the precipitation of February and April in the current year. In addition, the tree-ring width of *Abies fargesii* showed a significant positive correlation with the mean temperature of May in the current year. During the period of 1993-2013, the tree-ring widths of *Abies fargesii* showed a significantly positive correlation not only with the mean temperature of the previous fall, especially in the previous October but also with the precipitation in February of the current year. Moreover, the tree-ring widths of *Abies fargesii* were negatively correlated with the average rainfall in the last winter during the two time periods. This study indicated that the *Abies fargesii* radial growth for the response characteristics of climatic variables and response patterns are different in the two time periods in the Niubeiliang Nature Reserve of the Qinling Mountains in the context of global warming.

### Key words:

tree-ring width; climate change; divergence problem; the Niubeiliang Nature Reserve of the Qinling Mountains

## Storm response of sand waves in the Taiwan Shoal

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### Abstract

Data from repeated multi-beam echo-sounder surveys were used to study the changes in sand wave profiles in the Taiwan Shoal immediately before, immediately after, and one-year after the storm “Talim” passed. The results showed that current speedup caused by storm wind stress at the sea surface enhanced the bottom stress over the Taiwan Shoal, disturbing the original dynamic equilibrium between currents and sand waves. Consequently, the shoal experienced significant erosion during the storm event. The pattern of sea currents determined the degree of erosion on both sides of the track of the storm center. After the storm event, the area with high erosion required more sediment to recover, and thus erosion hotspots were formed under the track of the storm center. The sand waves mainly experienced erosion of both crests and troughs during the storm event, and showed resuming into their normal conditions by crest reconstructing. When the sand source could not supply sufficient sediment to reconstruct the crest–trough system, self-regulation of deeply cut trough bottoms to reestablish the previous sand-wave crest height occurred over the whole sand wave system to maintain the equilibrium between sand-waves and currents.

### Key words:

sand waves; Storm response; erosion and sedimentation

## The Geomorphology and Active Structures of the Longmen Shan Fold-and-Thrust Belt

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### Abstract

The Longmen Shan shows the steepest relief in the Northeast margin of the Tibet plateau. Due to the little shortening measured by the geodetic and geological surveys, hot debate focuses on the cause of the topography. Two end member models are proposed, including the lower crust flow (Royden et al., 1997; Burchfiel et al., 2003) and the brittle upper crust shortening (Hubbard et al., 2009). The Wenchuan and Lushan earthquakes are the direct active manifestations of the shortening process. These related structures are the driver for the steep topography along the Longmen Shan thrust belt. We built the 3D co-seismic faults of these earthquakes and active structures in the adjacent Sichuan basin. The results show that the Yingxiu-Beichuan and the Pengguan faults are responsible for the Wenchuan earthquake and the Range Front Buried Thrust (RFBT) is responsible for the Lushan earthquake. In the 3D structural model, the differences between the southern and northern segments of the rupture are highlighted. The RFBT that generated the Lushan earthquake is linked to a detachment that extends into the Sichuan basin along the Triassic evaporite layer. The coulomb stress change simulation suggests that other faults linked to this detachment may have been loaded by the 2008 and 2013 earthquake, posing the risk of future earthquakes along the Longmen Shan and in the densely populated Sichuan basin. This study illustrates the importance of building 3D models to study active faulting and folding, as well as to assess earthquake hazard.

### Key words:

Active structure; topography; Longmen Shan; Wenchuan earthquake; Lushan earthquake; thrust fault

## The Resilience of Natural Hazards under the Threaten of Climate Change in Taiwan

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### Abstract

Taiwan is a hazardous region caused by typhoons, earthquakes. The climate change may make Taiwan in more “difficult” situation to recover from extreme events because of fragile geological background.

It has been 17 years after the Chi-Chi earthquake of 1999. The loss of the Chi-Chi earthquake was tremendous. This paper tries to demonstrate the impacts of earthquakes and typhoons and the (environmental) resilience as well as the adaptation of the study area out of earthquake and typhoon damages.

The study tried to analysis the impact of climate change and access the resilience of Tachia river catchment of central Taiwan from series of typhoons. The landscape changing from the adaptation works along the Cross Island Highway since the Chi-Chi earthquake in 1999 is continuously monitored. It is found that the study area is still not stable from Chi-Chi earthquakes. In comparison with the Kobe earthquake in 1995, the sedimentation load went back to normal in five year time, Taiwan need longer periods for resilience from the damages. Continuously heavy rainfall events are the main factor to cause the unstable situation in more difficult situation.

### Key words:

landslides; environmental resilience; Tachia River catchment; the Chi-Chi earthquake; adaptation

## **Vegetation Variation in Sub-Humid to Humid Regions of China Recorded by Pleistocene Loess Deposit**

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### **Abstract**

The sub-humid to humid region, located to the south of Chinese Loess Plateau (CLP), is characterized by densely farming and population. To understand relationship between the natural vegetation composition and the environment in this region help to ecological conservation and agricultural management. However, the vegetation composition changes in the past and its controlling environmental factors in this subtropical area remained unclear largely because of paucity of depositional records. In this study, we present  $\delta^{13}\text{C}$  records of bulk organic matter from four loess deposition sequences across the sub-humid to humid region respectively at Shangzhou (since 600 ka B.P.) and Luoning (since 56 ka B.P.) in Eastern Qinling Mountains, and Zhenjiang (since 128 ka B.P.) and Xuancheng (since 800 ka B.P.) at lower reaches of Yangtze River, to predict the relationship between vegetation composition and the environment. Our results show that the landform and soil structure in addition to the glacial-interglacial climate changes played important roles on the grass and woody plant distribution during Pleistocene.

### **Key words:**

Stable carbon isotope; loess deposit; subtropical zone; vegetation composition; environment changes

## Aeolian Dust Records from the Central Japan Sea and its Palaeoclimate Significance

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### Abstract

The sediment in the central Japan Sea which lies the downwind of westerly jet(WJ), is composed mainly of silt, mixed sandy silt that is typical aeolian dust. The grain-size of silt fraction has similar pattern with environmentally sensitive grain-size which is extracted by standard deviation/grain-size method and is used to reconstruct the palaeoclimate change since the last glacial period. The grain-size is sensitive to response the path changes of the WJ during both the glacial-deglacial and stadial-interstadial periods. During the stadial, the WJ most frequently appeared to the south of the Himalayas but also influenced the north attaining to 50°N, whose extent was boarder and wind speed was high. During the interstadial, provenance of the aeolian dust was composed of Taklimakan Desert because WJ migrated northward and concentrated in narrow band at north of the Tibetan Plateau, when the GS of the dust was smaller than the stadial in which has shorter distance from the Mongolian Gobi than Taklimakan Desert. We found the multi-millennial time scales variations during DOI 8, 12, 14, 16 between LV53-23 and Zhaosu Poma loess in Ili Basin in central Asia based on the results of core MD01-2407. We noticed the lowest grain size during the coldest phases during the LGM, which confirmed the northward extent of the WJ during the spring is an important prerequisite for the windstorms in Mongolian Gobi.

### Keywords:

Grain size of silt fraction; environmentally sensitive grain-size; D-O cycle; Windstorm; Westerly jet

## Application of River Longitudinal Profile Morphometrics to a Small Block Mountain in South China

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### Abstract

The stream power model was applied to Mt. Lushan in South China in order to verify its capability of interpreting the uplift of a small block mountain. On a log-log plot, the longitudinal profiles of 9 rivers derived from a 30-m DEM exhibit primary characteristics similar to those derived from a 5-m DEM; however, the 5-m DEM clearly reveals more minor knickpoints, and the positions of knickpoints are pinpointed more accurately. All of the studied rivers on the block mountain are in a transient state due to geological perturbations. Some of them exhibit two segments in steady state separated by a slope-break knickpoint. Such rivers generally develop in a longitudinal valley, which are less perturbed by substrate inhomogeneities. The similar heights of the slope-break knickpoints and the similar uplift rate indicated by the  $k_{sn}$  values demonstrate an almost simultaneous headward erosion induced by the fall in base level. This modelling result is consistent with the mode of formation of this particular block mountain. Our study demonstrates that the stream power model is applicable to a small tectonically-active massif only if the channel segments are in a steady state.

### Key words:

Knickpoint; river longitudinal profile; normalized steepness index; Block Mountain

## Extraordinary Flood Events Response to Holocene Climatic Variability along the Upper Hanjiang River Valley, Middle Yangtze River, China

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### Abstract

Regional hydro-climatic change in response to global warming causes serious disasters threatening human life and society. Flood data sets in a long-time scale are important in flood mitigation and hydrologic engineering. Extraordinary Holocene flood events recorded by slackwater deposits (SWD) were investigated by using an integrative approach of sedimentology, fluvial geomorphology, palaeoflood hydrology and chronology along the upper Hanjiang River valley. Palaeoflood SWDs, deposited at high stage from suspended sediment load in flood water, were found inserted in the loess-soil profile in the cliff riverbanks. They represent the geological records of actually occurred extraordinary floods during the Holocene and their peak stages and discharges could be reconstructed using hydrological models. The chronology of these palaeoflood events was established by OSL dating, archeological dating, and pedo-stratigraphic correlations with the other dated Holocene loess-soil sequences. The results indicate that these palaeoflood events occurred during the episodes of 3200–2800 a BP, 1900–1700 a BP and 1000–900 a BP, respectively, along the upper Hanjiang River valley. These extraordinary flood events occurred during storm-rains and the SWDs are sourced from the soil erosion induced by human land-using over the drainage basin during the climatic decline. This means the hydrological system are highly sensitive to climatic change over the Holocene. Climatic change has caused instability of the monsoonal climatic system over the region with both droughts and floods occur in a same episode. This study provides important insights into hydro-climatic changes and soil erosion in a long-time scale during the late Holocene.

### Key words:

Palaeoflood; palaeohydrology; climatic variability; Holocene, Hanjiang River, Yangtze River

## Geomorphic Processes in the Mu Us Dune Field, Northern China in Response to Climate Change

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### Abstract

The Mu Us dune field located at semi-arid region of north China, near the northern limit of significant summer monsoon rainfall, is sensitive to climate change and currently undergoing widespread stabilization by significant increases in vegetation since the 2000s. Landscape evolution in the Mu Us dune field since the Last Glacial Maximum was investigated by abundant geological evidence, precise dating technique (optical simulated luminescence dating) and analysis of paleoenvironmental proxy indexes. Reconstructed changes in dune field activity were then linked with past climate changes, and mechanisms about climatic forcing of dune field variations were discussed. Geomorphic evidence for recent dune field stabilization since the 2000s was also presented.

### Key words:

Aeolian geomorphology; dune activity; paleoclimate; East Asian monsoon; OSL dating; remote sensing application

## Geomorphoclimatic Processes and Characteristics in the Lower Reaches of the Heihe River Basin (LRHRB), NW China

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### Abstract

Environment of mid-latitude deserts in Central Asia is undergoing rapid changes, in which the Late Quaternary landform pattern was the most typical. What needs to be particularly emphasized is its geomorphogenesis. In this study, a geomorphological research in the LRHRB is carried out on the basis of climate geomorphology, with regard to identifying the landform characteristics and related geomorphic processes. Regarding to the recent five-decade climate data, the current LRHRB is dominated by physical processes such as desiccation-deflation and aeolian, while the observed landform system is controlled by variable structures under conditions by specific hydrodynamical processes that existed during glaciations. We infer an obvious linkage of desert gorges and pediments in the LRHRB to ancient humid phases, which provided high energy runoff for the formation of these landforms and were associated with erosional features under more humid and colder climate during the last glacial period. Desert plains and aeolian dunes are the related products of contemporary climate. This reflects the dynamics of landform evolution in the LRHRB are characterized by a very effective integration of tectonic and climate-driven morphogenetic processes. Landform inconsistency and landform instability are clearly presented in the LRHRB, implying the main geomorphic unit is experiencing transformation from alluvial plain to desert plain and then to aeolian dunes. The geomorphodiversity in the LRHRB should be a result of multiple surficial processes other than glaciation. Frost weathering, fluvial/alluvial action, desiccation-deflation and aeolian processes as well as climatic changes, have played important roles.

### Key words:

Landform; Geomorphogenesis; Climate geomorphology; multiple surficial processes; Glaciation; LRHRB; China

## **Interlinks Of Fluvial and Aeolian Processes in a Seimi-Arid Environment, Recorded by Sediment Sequences of Yellow River Terraces during Last Glacial Period**

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### **Abstract**

Sediment sequences of last glacial terraces of Yellow River in semi-arid environment was composed by the lower channel gravel and flood sand, the middle Aeolian sand dune and upper laminar flood loam. These sediment sequences dated by Optically stimulated luminescence (OSL) method, recorded the inter-link between fluvial and Aeolian process and their response to climate change. The channel gravel and flood sand deposited during cold period (e.g. MIS 4 and LGM). The river incised slightly during the transitions from cold to warm phases, and Aeolian dune developed over coarse grained cold phase fluvial deposits. After that, the floodplain accumulation continued and flood loam covered the Aeolian sand dunes during the subsequent warm period. Sediment structure and grain size analysis show the Aeolian dunes were formed by the deflation of local fluvial sands, while the regional dust silt provided a large material to thick flood loam units. The millennial-scale climate fluctuations related to SE Asian monsoon system during the last glacial period were the driving forces for the interaction between fluvial and Aeolian process, such as deflation of fluvial sands and the formation of aeolian dunes, in this semi-arid environment.

### **Key words:**

interaction of fluvial and Aeolian processes; fluvial terraces; aeolian dunes; optically stimulated luminescence dating; climatic impact; Yellow river

## Land Subsidence Studies in Port -Harcourt City, River State, Nigeria: Using Persistent Scatterers Interferometric (PSI) Method

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### Abstract

Land Subsidence defined as the vertical change in the surface of the Earth is usually caused by natural and human activities mostly in the coastal countries all over the world. Port Harcourt city is an administrative capital of River State, located in the coastal areas of Nigeria with massive oil and gas exploration activities and also high demand for underground water for industrials and domestics needs due to high population density. Interferometry Synthetic Aperture Radar (InSAR) which has the capability of detecting land subsidence in millimeter accuracy has been demonstrated in many countries of the world where land subsidence are occurring. This study applied Persistent Scatterer Inteferometry (PSI) method to determine land subsidence rates over Port Harcourt city from February, 2007 to May, 2009. The measurements points delivered are derived from the analysis of 18 descending passes from the processing of ENVISAT data using a customized InSAR processing Software. The analysis revealed that more than 58.83 % of the Port Harcourt city is undergoing low subsidence velocity of between -2.5 to -5mm/yr, while 20.66% of the area is experiencing high subsidence velocity of values of more than -5mm/yr. 26.36% indicates a stable ground of velocity values between -2.5 to 2.5mm/yr. 0.12% of the study area revealed a low uplift velocity between 2.5 to 5mm/yr and 0.02% of the study area indicates a high uplift with velocity value of more than 5mm/yr. The study concludes that policy makers should provide a framework for the control of surface deformation and improves coastal management.

### Key words:

Land Subsidence; Interferometry; PSI; Port Harcourt; Nigeria

## Landscape Patterns and Dynamic Landscape Connectivity of Urban Green Space at Wuhan City, Hubei, China

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### Abstract

On the basis of the green space distribution maps derived from 1991 TM, 2002 ETM+ , 2007 CBERS-02 and 2013 ETM+ images and taking urban Wuhan, which is located inside the Middle Ring, as the study area, we analyzed the dynamic changes of pattern metrics of the green space from 1991 to 2013 with the help of GIS, RS and Fragstats software. The integral landscape connectivity index and the importance of individual urban green space patch to landscape connectivity, and the effect of urbanization on the urban green space were investigated by using Conefor Sensinode 2.2 software. The results show that the area of urban green space and the mean proximity index of green space patches decreased from 1991 to 2013. Large patches were the dominant landscape type in terms of area, and small patches had the largest amount in 2002 and tended to decrease recently while middle-sized patches had the tendency to increase, and large patches were of the first magnitude for landscape connectivity. The integral landscape connectivity indexes kept lower for three years and the connection between patches trended to weaken in some parts of the study area. The most important patches are located in areas surrounding East Lake, South Lake and the southwest part of Hanyang.

### Key words:

urban green space; landscape pattern; landscape connectivity; patch prioritization; Wuhan

## Luminescence Dating of Late Quaternary Fluvial Sediments in the Lower Gangetic Plain, India: Climate-Eustasy and Geomorphic Responses

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### Abstract

We present here for the first time, quartz optically stimulated luminescence (OSL) ages from the western part of lower Gangetic plain (LGP) deposits and discuss its implications on the evolution of fluvial landscape. Ten OSL dates reported here are from the valley-fill and associated deposits. Luminescence ages are obtained by sampling the trenched section of Damodar (Barjora) and cliff section of the Ajay (Nelegarh) including drill core samples from some parts of the Ajay (Panduk) valleys. This has been supplemented by detailed field surveys, topographical analysis, geomorphometry data and shallow subsurface stratigraphic studies. Comparison with more than twenty published OSL or <sup>14</sup>C dates from Bengal Basin and Ganga-Brahmaputra Delta (GBD) plain shows that the sedimentary records in this area are significantly older. In the western LGP sediments 10 m below surface, yield an age varying between 10 and 29 ka whereas those occurring at a depth of 15-20 m are mostly 69 to 86 ka old. The data also reveals that during 90-82 ka (end of MIS-5), the LGP and associated deltaic plain experienced aggradational fluvial activities due to higher sea level and frequent climatic fluctuations and continued till 74-64 ka. In addition, the area experienced dry climate in the strata between 31-27 ka and that in turn has prompted the formation of pedocal soil and caliche nodules in this area. This complex interaction between environmental change and earth surface processes provides an important framework for examining the influence of the dynamic parameters that leads to landscape evolution.

### Key words:

Lower Gangetic plain; fluvial deposits; OSL dating; stratigraphic studies; Quaternary climate change; eustasy

## Luminescence Studies of the Zhang River Terraces in the Northeastern Tibetan Plateau

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### Abstract

Zhang River basin is located in the north margin of West Qinling in the northeast margin of Qinghai-Tibet plateau, which is a tributary of the Weihe River. Through the field detailed and DEM technique, the spatial distribution of the four terraces of the Zhang River are established. The depositional age of the four terraces were calculated using optically stimulated luminescence (OSL) dating of terrace sand. Fluvial incision rates were generated by integrating the terrace depositional ages with terrace heights.

### Keywords:

OSL dating; fluvial terraces; incision rates; northeastern Tibetan Plateau

## The Distribution of REE in Different Particle Size Fractions of Xiashu Loess and Its Implication for Provenance Tracing

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### Abstract

Differences in Rare earth element (REE) content between Different Particle-size fractions of sediments make it more complex for geochemical tracing, thus affecting the reliability of using REE characteristics of a whole-rock sample as an indicator in provenance study. Moreover, by far the knowledge about geochemical characteristics of REE in loess relative to particle size fraction is very limited, and so is that about restraining factors of the particle-size effects, and influences and significance of the effects on and in tracing of the parent materials of loess in provenance. In this paper, systematic fractionation of the northern loess and the Xiashu loess samples collected separately in particle size was performed and REE contents of the samples were measured, so as to better understand REE distribution among different particle-size fractions of the loess and its affecting factors.

Samples of Xiashu Loess (XL) collected from Nanjing and Zhenjiang and loess from the Loess Plateau (LP) in Lingtai of Gansu Province were pretreated with the quiescent sedimentation method for fractionation in particle size, separately, into six fractions, i.e.  $<4\ \mu\text{m}$ ,  $4\sim 8\ \mu\text{m}$ ,  $8\sim 16\ \mu\text{m}$ ,  $16\sim 32\ \mu\text{m}$ ,  $32\sim 64\ \mu\text{m}$  and  $>64\ \mu\text{m}$ , and then REE contents in the six fractions of loess soil and the whole-rock samples were measured.

Results show: 1) significant differences in  $\Sigma\text{REE}$  existed between the two types of loess soils and in REE content between fractions of the soils, which indicates that obvious particle-size effect does exist on REE distribution. In practical terms, the effect is the most obvious in the fractions  $<4\ \mu\text{m}$  and  $>64\ \mu\text{m}$ . In LP, REE accumulates in Fraction  $<4\ \mu\text{m}$ , but not in Fraction  $>64\ \mu\text{m}$ , while in XL, it does in both fractions and particularly in Fraction  $>64\ \mu\text{m}$ ; REE content does not vary much between the fractions in the middle, i.e.  $4\sim 8\ \mu\text{m}$ ,  $8\sim 16\ \mu\text{m}$ ,  $16\sim 32\ \mu\text{m}$  and  $32\sim 64\ \mu\text{m}$  and so the particle-size effect therein is not obvious; 2) the accumulation of REE in the fractions of  $<4\ \mu\text{m}$  of both of the soils is characterized mainly by that of heavy REE (HREE), which is possibly governed by weathering-based soil formation and attributed to specific adsorption of HREE by Fe-Mn oxides in fine particles; and 3) in Fraction  $>64\ \mu\text{m}$  of Xiashu Loess accumulates mainly LREE (light REE), which may be possibly related to the high content of titanite and some other minerals typical of nearby regions in the parent material of XL and suggests that the materials coarse in particle size in XL may come mainly from nearby regions through short distance transportation.

All the findings in this study suggest that Fraction  $>64\ \mu\text{m}$  may be the most sensitive one that can be used to distinguish XL from LP in REE content. Whether or not Fraction  $>64\ \mu\text{m}$  has an apparent accumulation



of LREE is an effective indicator of the distinction. This study also demonstrates that the researches in the past used to analyze whole rock samples for REE, thus possibly glossing over the important tracing information, whereas REE analysis by fraction has a greater potential as indicator in provenance study of loess and therefore can be used to expeditiously in depth internal differences between particle size fractions and between heavy and light REE and to provide more accurate evidence for provenance study.

**Key words:**

Rare earth element(REE); Different particle size fraction; Xiashu Loess; Geochemical characteristics; Provenance tracing

## The Neotectonic Activity of Wanchuan Catchment in the Northeastern Tibetan Plateau, Reflected by Geomorphic Indices

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### Abstract

Wanchuan River, located in the northeastern Tibetan Plateau, is one of the tributaries of the Yellow River. This area has witnessed many earthquakes of magnitude 6 on the Richter scale. Based on DEM data, this paper discussed the characteristics of neotectonic activity by analyzing the drainage networks and calculating geomorphic indices. It turns out that the mountain front sinuosity index is between 1.03 and 1.18 to the north of Wanchuan River (NWR) and from 1.83 to 2.88 in Xinglong Mountain (XLM); while the valley floor height-to-width ratio index is about 0.36- 2.34 in NWR while it ranges from 0.55 to 13 in XLM. The values and distribution of the mountain front sinuosity index and the valley floor height- to-width ration indicate that neotectonics are still active in the study area, and the movements in the north of Wanchuan River catchment are more active. The abnormal AF index in the southeast part means that there should be tilted fault block and folds in the northwest of Wanchuan River catchment. There exists a strike- slip fault in the southeast of the northern Wanchuan River valley, indicated by analyses of the distribution of knickpoints and off- set valley.

### Key words:

geomorphic indices; river longitudinal profiles; regional tectonic; fault; Wanchuan River

## **Vegetation Succession and Climate Change Revealed by Loess Deposit in Western Henan Province and Human Adaptation since 20 Ka B.P.**

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### **Abstract**

Western Henan province located in southern part of loess plateau, human activities since late pleistocene were very frequent, earth has experienced a mediaeval warm period and a extremely cold period in recently 20 ka. Further study of loess and environmental change in this area is helpful to understanding the relationship of human activity and environmental change. Loess organic carbon isotope composition has widely applied to paleovegetation and paleoclimate reconstruction. In this study, we sampling five representative loess sections in the western Henan province, then establish time scale by optically stimulated luminescence(OSL). Combined with investigations of organic matter  $\delta^{13}C$ , pollen, grain size, organic matter content and magnetic susceptibility we reconstruct the paleovegetation and paleoenvironmental changes since 20 ka. On this basis, we collection information of ancient human activities in this area, and comparative analysis with reconstructed paleovegetation and paleoenvironmental records. The results above provide theoretical basis for understanding the relationship between human activity and environment.

### **Key words:**

loess deposit; organic carbon isotope; paleovegetation; paleoclimate; human adaptation

## Forum on Remaking the Global Economy:

### GPN Research in Geography

#### Oral



Home

1. [As Honey as Arsenic? Interpreting Value Production in China-Africa Encounters](#)  
XIAO HAN (University of Melbourne, China)
2. [Production Network Knowledge as a Basis for Successful Resistance – Workers Influence on a Chinese Acquisition in Germany](#)  
Kai Bollhorn (Philipps Universität Osnabrück, Germany); Martin Franz (Osnabrück University, Germany)
3. [The Dynamic Relationship among the Central Government, Local Authorities and Firms in Strategic Coupling: A Case Study of the China's Automotive Industry](#)  
Jie Huang; Weidong Liu (Institute of Geographic Sciences and Natural Resources Research, China)
4. [Transnational Labour Migration and the Reorganisation of Global Production Networks – the case of a German automotive company in Turkey](#)  
Philip Müller; Martin Franz (Osnabrück University, Germany)
5. [Ugrading of Intermediaries in Fresh Food Supply Networks Dynamics in the Emerging Economy of Turkey](#)  
Inka Gersch (University of Osnabrück, Germany)

## As Honey as Arsenic? Interpreting Value Production in China-Africa Encounters

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### Abstract

Since the nation's going out, China has been increasingly significant in boosting Africa's infrastructure projects, particularly the building of railways, large dams, and airports. Thus a "China-Africa" complex has attracted multi-disciplinary researches. Yet little has been studied from the economic geographical perspective with on-site investigation. Not to question the projects' political rationality, this paper is firm-actor centred and enquires about Chinese corporate behaviour in Africa, illustrated with Chinese engaged Bui dam project in Ghana. It departs from a material accident during construction concerning "waste-or-commodity" which agitated especially the Chinese engineering-procurement-construction (EPC) contractor and local Ghanaian authorities, to unfold the nexuses of actors and their relations in processing the accident's dynamics. Embracing value theories in "waste" literature and the global production networks (GPN) frameworks, the paper argues first that multi-scalar frictions in not only actor networks but also intra-actor networks are playing critical roles in shaping value generation and transformation; second that to perform the firm-actor's capacity for value activities across temporal-spatial contexts, prior to the organization of production there must be integration and adaptation to heterogeneous but relational determinants - in the case study to technological recognition, transnational standardization and institutional influences in territorial governance hierarchies. The work is based on fieldwork in Ghana and China respectively, including on-site observations and interviews with a variety of Ghanaian and Chinese participants.

### Key words:

Circuit of value; capacity; governance; China-Africa; large dam project

## Production Network Knowledge as a Basis for Successful Resistance – Workers Influence on a Chinese Acquisition in Germany

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### Abstract

'No Experiments' ('Keine Experimente') or 'No Sell Out' ('Kein Ausverkauf') were slogans of the protest of workers against the potential carve-out of the rubber and plastics department of the German automotive supplier ZF Friedrichshafen AG to Chinese based Zhuzhou Times New Material Technology Co., Ltd. in 2013. Such acts of resistance are a response to the global phenomenon of a rising number of acquisitions by emerging market firms in developed economies. The paper analyses how workers in Germany's automotive industry developed power in the process of the above mentioned transnational carve out. The workers council decided against a strategy of pure co-operative co-determination but implemented a strategy of resistance. The worker's actions were successful because they used their production network knowledge to identify those spots in the production network where their collective action can have the strongest impact on the involved companies. We define production network knowledge as the specific knowledge about the architecture of a production network. The case study shows that production network knowledge can be utilized by the labor representatives to strengthen the impact of collective action also in those industries that are not consumer orientated. The study is based on qualitative interviews, participatory observations of workers events and a press analyses.

### Key words:

labor; global production networks; collective power; acquisitions; emerging market firms; Germany



## The Dynamic Relationship among the Central Government, Local Authorities and Firms in Strategic Coupling: A Case Study of the China's Automotive Industry

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### Abstract

Since 1978, China has gone through the processes of open-up policy, decentralization of power and industrial restructuring which put forward its rapid economy growth. The 'obligated-embeddedness' theory effectively explains the role of strong state in strategic coupling of global production networks which is based on the study of geography of China's automobile industry before 2000. However, since 2000, the dynamic relationship among central government, local authorities and firms has become more complicated and should be studied further. As most transnational suppliers entering into China since 2000 and China becoming the first largest country of automotive industry, China is playing more and more important role in global production networks of automotive industry. By reviewing the central and local automobile industrial strategies in China since 2000 and studying the bargaining between local governments and firms, this paper discusses (1) how the central government sets policies of industry development, (2) how local authorities and different enterprises like joint ventures, exclusively foreign-owned enterprises and local enterprises react. And the top 10 largest provinces and municipalities including *Jilin, Hubei, Shanghai, Guangdong, Zhejiang, Jiangsu, Beijing, Chongqing, Anhui* and *Shandong* and the top 10 largest firms of suppliers and assemblers. The results showed that in except for the embeddedness of transnational corporations and deregulation by the Chinese government, the institutional innovation and the training of native enterprises are advanced as the new two major factors that shape the car industry's geographic distribution in China.

### Key words:

Strategic coupling, automotive industry, local authorities, firms, China, GPN

## Transnational Labour Migration and the Reorganisation of Global Production

### Networks – the case of a German automotive company in Turkey

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#### Abstract

Even though labour has been an important research topic in the field of economic geography for many years, up to now, only little is known about labour migration of the highly-skilled in global production networks. Taking a German automotive original equipment manufacturer (OEM) as an empirical case, this paper analyses the role and the impacts of transnational IT-professionals in the reorganisation process of sophisticated IT-services. As many other multinational companies, such as General Electric and General Motors, the German automotive OEM has been moving away from extreme IT-outsourcing and insourced back a wide range of IT-services. We found that the new IT-strategy has been highly related to shifts in human resource management. To create an effective collaboration across Germany and the newly established offshore IT-centre in Turkey, a large number of German educated IT-professionals of Turkish origin were hired at the IT-centre in Turkey. Their personal societal embeddedness facilitated the reorganisation process by managing knowledge transfers between the German subsidiaries, external IT-suppliers and the Turkish IT-centre. The exploration of highly-skilled labour migration from a transnational perspective, contributes to the discussion about the role of labour in global production networks. The case study is based on qualitative interviews.

#### Key words:

transnational migration; labour; global production networks; knowledge transfer; information technology; automotive

## Upgrading of Intermediaries in Fresh Food Supply Networks - Dynamics in the Emerging Economy of Turkey

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### Abstract

The dynamics of the food retail sector in developing and emerging markets, driven by accelerating foreign direct investments, have caused deep modifications of the corresponding domestic production networks of fresh fruits and vegetables (FFV). Transnational retailers, and domestic retailers imitating their processes, increasingly coordinate and consolidate supply networks in order to improve cost efficiency, economies of scale and product quality. In this context significant challenges but also upgrading possibilities for supplier companies and market intermediaries open up. They can realize the modern retailers' high demands regarding quality, quantity and prices within often traditional and fragmented production structures. Using the example of the emerging economy of Turkey, the presentation analyzes upgrading processes of FFV suppliers and intermediaries, corresponding information and knowledge transfers as well as the transforming power relations in the context of retail "modernization". The analysis shows that, due to shortcomings of required products, retailers have significantly promoted upgrading of their FFV suppliers, includes functional upgrading. However, sourcing strategies of big retailers and power relations are recently changing. It can be observed that a (1) based-market form of coordination during the entry phase of the transnational retailers transformed into a (2) relational form of governance with mutual dependencies and is now becoming (3) increasingly captive. This shows that functional upgrading can lead to a mutual dependency of supplier and buyer in the middle term but a high level of dependency of the supplier on the lead firm in the long term, which is contrary to the assumption from the literature.

### Key words:

agri-food networks; upgrading; intermediaries; Turkey

## Joint session with China-Japan-Korea

### Joint Conference on Geography



Home

#### Oral

1. [A Role of Japan-Korea-China Joint Conference on Geography, as The Communication for the Young Geographers](#)  
Masatoshi Motoki (Tohoku University, Japan)
2. [A Study of Push Car Railway – Evolution of Local Transportation System in Colonial Taiwan](#)  
HIRONO Satoko (Waseda University, Japan)
3. [Analysis and Simulation on Metro Interchange: A Case Study of Zhujiang New Town Station](#)  
Jiabin Zhang; Qiyu Huang; Yuqing Hu; Yifan Chen; Zibo Jin; XIAOYUE CHEN (Guangzhou University, China)
4. [Analysis of the Source Area and Moving Path of Dust Storms in the China-Mongolia Border Area](#) Yong Mei; Teri Gele; Bao Yuhai (College of Geographical Science Inner Mongolia Normal University, China)
5. [Assessing the Impacts of Affordable Housing Policy from a Residential Satisfaction Perspective: The Case of Mei-He-Yuan Project in Beijing](#)  
Zhilin LIU (Tsinghua University, China); Xuejie CHENG (Renmin University of China, China); Yan ZHANG (Beijing Union University, China)
6. [Characteristics of Employment Structure in Rural Inland Region of China: Case Study of Liangshan in Sichuan Province](#)  
Lin Chen (Hiroshima University, Japan)
7. [Cross-City Convergence in Urban Green Space Coverage in China, 2002-2012](#)  
Zilong Zhang (Lanzhou University, China)
8. [Firm Migration Based on Agent Modeling](#)  
Yutian Liang (Sun Yat-sen University, China)
9. [Freshwater Fisheries under Changing Natural and Social Environment in Lake Kasumigaura](#)  
Satoru Yusa (University of Tsukuba, Japan)
10. [Global Economy, Local Landscape: Compare the Ethnic Economies of Japanese and South Korean Expatriates in China](#)  
Yungang Liu (Professor/ Sun Yat sen University, China); Wenting ZHOU (post doctor, China); Jiyoung JEON (Research fellow, Others)
11. [Household Strategy, Gender and Activity pattern: Evidence from Beijing, China](#)

Na Ta (East China Normal University, China); Zhilin Liu (Tsinghua University, China); Yanwei Chai (Peking University, China)

12. [International Migration of Skilled Labor in Cambodia~ The Case of ITC \(Institute of Technical of Cambodia and PPS \(Phare Ponleu Selpak\)](#)  
Ayumi Shirai (The University of Tokyo, Japan)
13. [Market Transition, Access to Housing and Home-work separation: Evidences from Low Income Neighborhoods in Beijing](#)  
Yan Zhang (The Institute of Beijing Studies, Beijing Union University, China); Zhilin Liu (School of Public Policy and Management of Tsinghua University, China)
14. [Modeling Trade-Offs among Forest Structure, Biomass, and Timber Production under Long-Term Forest Management Alternatives for Plantations in South China](#)  
Xiaofan Wang; Erfu Dai; Quansheng Ge; Weimin Xi; Qing Tian (Institute of Geographic Sciences and Natural Resources Research, CAS, China),
15. [Mutual Construction of Resettled Rural Residents' social space and identity from the Perspective of Everyday Life](#)  
WANG Yuan; ZHANG Min (Nanjing University, China)
16. [Regional Revitalization and Countryside Regression in Japan: A Case Study of Kamiyama Town in Tokushima Prefecture](#)  
Takayuki Oishi (Okayama Shoka University, Japan)
17. [Research on City Square Space from the Human Living Environment Perspective](#)  
Jiaji Gao (Liaoning Normal University, China)
18. [Research on Wetland Eco-Environmental Early Warning of Nansihu Lake](#)  
Songbo Li (Liaoning Normal University, China)
19. [Structural Changes of Economy and Perspective for Industrialization of Agriculture in Japan](#)  
Toru SASAKI (Sapporo Gakuin University, Japan)
20. [The Characteristics and Sustainability of Theatrical Drama Performance in Fukuoka City, Japan](#)  
Kenta Yamamoto (Kokugakuin University, Japan)
21. [The Development of Mountaineering Booms in the Northern Japanese Alps](#) INOMATA Yasuhiro (University of Tsukuba, Japan)
22. [The Distance Effect in Spatial Interaction and Spatial Similarity: a Big Data View of Tobler's First Law](#)

Di Zhu; Yu Liu (Institute of Remote Sensing and Geographical Information Systems, Peking University, China)

23. [The Limit of Wireless City: Spatial Distribution of Public Wi-Fi Access in Shanghai](#)  
Mingfeng Wang (East China Normal University, China)
24. [The Potential of “Soundscape” in Terms of Community Development –A Case Study of the Chirping of Bell Cricket in Matsukawa Village, Japan](#)  
Yuki SAKAMOTO (University of Tsukuba, Japan)
25. [The Relationship between Urban Form and Medical Facilities Visiting: A Comparative Study of Beijing and Shanghai](#)  
Yue Shen (East China Normal University, China)
26. [The Strategy and Influence of How the Rural Areas in Japan Attract the Foreign Tourists](#)  
Wu Chenghung (Waseda University, Japan)
27. [Tourism of Mt. Fuji in the Chinese Group Tours](#)  
REN Hai (Nihon University, China)

## Poster

1. [Based on the Analysis of Community Scale Urban Ecological Vulnerability in Time and Space Differentiation - Was Ganjingzi in Dalian City as an Example](#)  
Yingying Guan (China, Liaoning Normal University)
2. [Based on the Disequilibrium Model of Global Urbanization Paths and the Study of Space Organization Form - in 286 Chinese cities, for Example](#)  
Yanhua Ju (China, Liaoning Normal University)
3. [Modeling the Species Composition, Age Structure and Biomass of pine-fir plantations in South China under Different Harvesting Intensities](#)  
Erfu Dai; Xiaofan Wang; Du Zheng (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
4. [Quantifying the Influence of Sea Level Rise, Land Subsidence and Estuarine Topography Change on Storm Flooding in a Coastal Mega-city: A Scenario-based Study in Shanghai, China](#)  
Jun WANG; Si YI; Chengcheng SONG (China, East China Normal University)
5. [Research on Grid System of Intelligent Community Public Opinion Agency](#)  
Ruimeng Yang (China, Liaoning Normal University)

## **A Role of Japan-Korea-China Joint Conference on Geography As The Communication for the Young Geographers**

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### **Abstract**

Japan-Korea-China Join Conference on Geography intends to give geographers from these three countries a place of international announcement and academic exchange between scholars, and specifically emphasize the contributions and development of younger academics. The purpose of this study is to consider the significance of Japan-Korea-China Join Conference on Geography and its possibility. This conference doesn't have an immobilized secretariat, and is the unique conference the young geographers volunteer manages. It's interesting that the chance to talk with a researcher in China and Korea aggressively is being made with a Japanese young geographer. And, difference between the interest and the angle of the same generation is also offered in a round of inspection as well as an announcement at this meeting. This conference has a possibility that it's possible to build an exchange by the research aspect beyond the field by an Asian structure as a geography in this meeting. A study group exists a lot in a Japanese geography, and an exchange of art and science is developed. The chance to touch China and Korean researcher for the young geographers is limited, and it's difficult to expand a network. But an exchange beyond a university and a specialized field is becoming little in recent years. The participant who carries the next generation would like to expect that one utilizes a JKCC aggressively to make a geography develop in the structure called Asia from now on.

### **Key words:**

Japan-Korea-China; young geographers; geography; intercultural communication

## A Study of Push Car Railway— Evolution of Local Transportation System in Colonial Taiwan

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### Abstract

The purpose of this research is to understand the Push Car railway system between 1910~1937 involved in tourism and transportation, and by analyzing the condition of its operation, background and process of its route, conclude and organize the overall context of the Push Car railway system at the time. After the preliminary analysis, handcar rails can be divided into three types. The first type is the connects between city streets or industrial railway stations to Taiwan Trunk Line Railway. The second type is an industrial railway to connect the plantation or sources of raw materials and factories to the Taiwan Trunk Line Railway. The third type is to connect local towns and/or cargo distribution areas to Taiwan Trunk Line Railway and make a local area transport network. In its early stages, almost all Push Car Railway trackage had been the first or the second types. Push Car Railway was a small capitalized business, so local gentries entered Push Car Railways business gradually and it had been a good relations with local economy or industry. Growing a local economy, Push Car Railway companies expanded Push Car Railway lines more locally areas and made a transport network. Although the use of Push Car railways has been declining after 1930's, many of the routes have been transformed to bus routes nowadays and are still in use. In conclusion of this research, it proves the significance of Push Car railways to local transportations and development in Taiwan during Japanese colonial period.

### Key words:

Push Car Railway; local transport network; colonial period; local gentry; narrow gauge railway



## **Analysis and Simulation on Metro Interchange: A Case Study of Zhujiang New Town Station**

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### **Abstract**

Public rail transportation such as metro system is playing an important role in urban public transportation system for citizens' daily traveling. However, problems such as crowding and congestion have been observed in many interchange station of Guangzhou. This paper tried to simulate and analyse passenger flow in the Zhujiang New Town Station, which is one of the largest interchange stations of Guangzhou metro system, using Anylogic Software based on the Social Force Model. Some improper arrangement was discovered according to the simulation results. The suggestions were also given for the improvement and optimization of the flow control of passenger in existing stations and the layout design and construction of future metro stations.

### **Key words:**

Metro Interchange Station; Simulation; Passenger Flow

## Analysis of the Source Area and Moving Path of Dust Storms in the China-Mongolia Border Area

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### Abstract

The Gobi desert area in southern Mongolia is an area with a high incidence of dust storms. It is also one of the key sources of dust storms in East Asia. Gobi and the desert area in the southern part of Mongolia represent a vast area with a fragile ecological environment and frequent natural disasters, which directly affect the northern region of China. Research on the cross-border movement path of sandstorms in this region is the common demand of disaster prevention, mitigation, and resilience, both in China and Mongolia. In this paper, which focuses on the period 1981–2014, data representing sandstorm days at 70 ground stations in the China-Mongolia border region was used. Spatial and temporal variation characteristics were statistically analyzed with sand/dust storms occurring at 5 sites, 10 sites, and 20 sites, which were divided into three different scales. The cross-border movement path and intensity of the dust storms in Mongolia were further discussed. The results show that in terms of temporal change, the frequency of dust storms in Inner Mongolia showed a decreasing trend during the period 1981–2014. The peak periods for the above two scales of five stations and 10 stations all appeared in the period of 1985–1988 and 2000–2006. Moreover, large-scale dust storms show an increasing trend. The number of dust storms of different scales in Mongolia are far greater than in Inner Mongolia, but there is no significant downward trend. In terms of spatial change, the high dust storm incidence area from 1981–2000 was Hai Li Su, in the west; 2000 years later, a high incidence of dust storms was concentrated in Hai Li Su, Guai Zi Hu, and Xilingol League. The number of sandstorms during 2000–2005 in the above three regions accounted for 90% of the frequency of occurrence, of which, 12 sites in Xilingol League's sandstorm days accounted for more than 50%. After 2000, all the sandstorms recorded in Xilingol League originated in the territory of Mongolia. This source area is mainly near the border between China and Mongolia Tooroi and Zamin-Uud, two high-incidence areas.

### Key words:

dust storm; source area; moving path; China-Mongolia border area

## Assessing the Impacts of Affordable Housing Policy from a Residential Satisfaction Perspective: The Case of Mei-He-Yuan Project in Beijing

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### Abstract

In the past decade, the Chinese government has dramatically expanded its affordable housing programs, with the aim to solve the housing difficulties for medium to low-income urban households. However, many affordable housing units were located in the urban fringe area with inconvenient access to services and amenities. Previous literature from the western context also has warned of the possible negative impacts of large-scale affordable housing projects in terms of poverty concentration and social exclusion.

This paper presents a case study of Mei-He-Yuan Community, the first affordable housing project constructed in Beijing since the major over-haul of affordable housing policy in 2007. We specifically investigated the change of quality of life (QoL) of medium to low-income households after moving into affordable housing units from a residential satisfaction perspective. Preliminary analysis found that, although medium to low-income residents did see significant improvement in their housing conditions after moving to affordable housing units, their overall level of residential satisfaction did not change significantly. In particular, whereas residents tend to be more satisfied with their housing conditions, they are less satisfied with other aspects of quality of life such as accessibility and neighborhood social interaction. We further conduct multivariate regression analysis to investigate the extent to which residential satisfaction of affordable housing dwellers is determined by the change in housing conditions, public service accessibility, distance of residential relocation, controlling for socio-demographic characteristics.

### Key words:

Affordable housing; residential satisfaction; low-income households; Beijing

## Characteristics of Employment Structure in Rural Inland Region of China: Case Study of Liangshan in Sichuan Province

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### Abstract

This paper aims to clarify the features of employment structure and agricultural land management in rural inland region of China. I selected a village in the southern region of Sichuan Province as a case study. This village located at a region where was considered as one of the poorest areas in Sichuan Province. Therefore, to understand the employment situations of villagers is an important approach to solve the poverty issue in the region. Through the field works conducted in 2015, we can conclude that the villagers are mainly engaging in four types of jobs. The first one is on-farm work that is been done by most of the villagers. They are playing very important role in maintaining the agricultural land in the village. The second one is family-operated businesses nearby the village. Those who engaged in this type of work have a tendency to leave farming or do farming only for self-sufficiency. The third one is informal off-farm jobs outside the regions. These jobs are mainly engaged by younger generation those have a low education background. It is very difficult for them to get urban *Hukous*. The fourth one is formal jobs such teachers and public workers inside or outside the region. These works are very various employment opportunities for villagers who belong to the elite group with a highest education background in the region.

### Key words:

employment structure; rural inland regions; on-farm work; family-operated businesses; formal jobs

## Cross-City Convergence in Urban Green Space Coverage in China, 2002-2012

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### Abstract

The paper explored the pattern of convergence in green space coverage (GSC) of a group of 285 Chinese cities over the period 2002-2012 by using the non-parametric estimation technique, unconditional  $\beta$ -convergence model, and conditional  $\beta$ -convergence model. The results indicate that (1) the GSC in most of cities has been substantially improved; (2) The regional variations amongst the eastern, central, and western cities reduced remarkably. (3) The most rapid increase in UGSC in the places with relatively low GSC levels, indicating a city-wide tendency towards convergence of GSC rates; (4) the more compact, faster sprawling and wealthier cities are likely converge to higher level of GSC; (5) the economic growth has very limited influence on the changes in GSC; the urban sprawling leads to the decrease in GSC; spatial scale expanding results in increase in GSC; compactness of city shows negative impact on GSC.

### Key words:

Green space coverage; Cross-city convergence; spatial disparity; Socio-economic factors

## Firm Migration Based on Agent Modeling

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### Abstract

Firm Migration is one of the common phenomena in regional economic development, and a large number of firm migration activities will reconstruct the spatial patterns of regional industry. Spatial decision of firm migration is a very complex system involving the interaction among companies, governments, geography environment and social economy. Aiming at the lack of traditional research of firm migration, this paper mainly discuss about the using of the firm migration theory, the industrial location theory, the territory functional theory and the complex systems theory in the spatial decision-making process of firm migration, propose a method based on multi-agents proceeding to the comprehensive integration of the firm migration's spatial decision-making theory, and built a spatial decision-making behavior analysis framework of firm migration based on the comprehensive integration of the firm migration's spatial decision-making theory, the simulation of computer, the model of multi-agents and geographic information science. And taking Guangdong Province as the study area, simulating Industrial spatial variation pattern of the firm located in the Pearl River Delta, which migrate to the east and west wings of Guangdong Province and the mountainous areas of northern Guangdong. The simulation results of spatial patterns are pretty close to the practical situation, the firm migration trend has gradient and hierarchy, the preferred locations of firm migration are the counties near the Pearl River Delta region and the municipal district in the province, the other counties in the mountainous areas of northern Guangdong hold the worst potential to undertake the firm migration. Modeling of using the multi-agents thought to analyze the spatial decision behavior of the firm migration, which can provide a new idea to simulate the firm migration spatial pattern, and provide a scientific basis for reasonable guidance of firms migration and policymaking of industrial transfer.

### Key words:

agent-based modeling; firm migration; spatial decision-making

## Freshwater Fisheries under Changing Natural and Social Environment in Lake Kasumigaura

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### Abstract

It is obvious that changing natural and social environment in lakes have certain impacts on fishing industry. However, only a few attention has been paid to the relationship between structural changes of fisheries and environmental changes in recent decades. To better understand the transitional process of fisheries under changing natural and social environment, I focused on the fishery culture in Lake Kasumigaura Japan. By field interview survey to fishermen and statistics analysis, I found the characteristics of this process. The commercial fisheries of Lake Kasumigaura has faced environmental and social problems over a long period of time. The environmental changes have started in 1960s, with the construction of Hitachigawa-river floodgate. This construction changed the water quality from brackish water to freshwater. Also the population growth in the basin caused water pollution. Moreover, nonnative species, embankment and over-fishing have influenced the ecological system. Each of these changes lead to the decrease of the fish population. On the other hand, the development of transportation system brought social changes. Those systems facilitate the access to saltwater fish, causing a decrease of freshwater fish demands. The decrease of demands and the fish population resulted in a decrease of the fishermen number. However, some fishermen got through these problems by adopting a trawling method instead of a set-net fishing. Also, some of them have been trying to transform fisheries in a sixth industrialization. These findings suggest that environmental changes bring about selection and development of specific fishing technology on the fishery in Lake Kasumigaura.

### Key words:

fisheries; environmental changes; nonnative species; lake Kasumigaura; Japan; fishing technology

## Global Economy, Local Landscape: Compare the Ethnic Economies of Japanese and South Korean Expatriates in China

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### Abstract

As economic growth in China, the number of Japanese and South Koreans who expatriate to China has soared during the last decade. China has become the second largest destination for Japanese Transmigrants (JTs) and the third largest destination for South Korean Transmigrants (SKTs). However, as a non-immigrant receiving country, China did not provide fundamental public services for these transmigrants, educational and medical services in particular. This study is done to find out how the transmigrants solve these problems so that they could adapt to the local society easier. Using Wangjing area of Beijing, Gubei area of Shanghai and Tianhebei area of Guangzhou as cases, this study examines the establishment and development of Japanese and South Korean ethnic economies in China. Based on the data collected through onsite surveys and interviews conducted from December 2007 to March 2015, we found that transmigrants started to cluster since the 1990s, and the ethnic enclaves have established in the 2000s and undergone ongoing expansion. The residents in these enclaves include not only high-skilled transmigrants, but also overseas businessmen, self-employed people and locally hired people. According to the survey, the businesses within the enclaves are mainly co-owned or co-operated by the expatriates, and their daily services are mainly provided by people have multicultural background, such as Korean-Chinese and the Chinese have experience of study or work in Japan. Compared to the ethnic economies of other foreigners in China, the Japanese and South Korean economies are unique because of the participation in these multicultural background people.

### Key words:

Transmigrants; Ethnic Enclave; Ethnic Economy; Japanese; Korean; China

## Household Strategy, Gender and Activity pattern: Evidence from Beijing, China

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### Abstract

The increased participation of women into labor market has abstracted extensive attention, leading to increasing interest in the conflict between employment and household responsibility by women in dual-earner household. There are a number of household strategies can be used to deal with these problems. However, most research has only focused on negotiating strategy in nuclear household whereas other strategies like getting extra help from extended family or domestic helpers are under-examined. Based on the concept of household strategy, this paper studies the influence of extra helpers on gendered activity pattern in terms of time use by distinguishing three household strategies including nuclear families, extended families, and families with hired helpers. Draws upon a dataset from a GPS tracking survey conducted in Beijing in 2012, this paper compares the gender differences in time use among the three household types. The findings indicate gender differences in the division of household labor can be reduced by living with extended family and hiring helpers. And getting extra helpers mainly help women to cope with the pressures of juggling paid employment and household responsibilities, thus helping them in labor market. The impact of household strategy on social-leisure activities are very limited.

### Key words:

Gender; Household strategy; Activity pattern; Household responsibility; China

## International Migration of Skilled Labor in Cambodia~ the Case of ITC (Institute of Technical of Cambodia and P.P.S (Phare Ponleu Selpak) ~

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### Abstract

In 2015, ASEAN (Association of Southeast Asian Nations) decided to admit that it would aim at realizing “ASEAN Community” and allow skilled labor to move freely within the regions of “ASEAN Economic Community”.

This announcement has reviewed the change which has happened to the international movement of natural persons by using the technical colleges and technical high schools in Cambodia as examples under the acknowledgement that the leading force of globalization has moved from developed countries to emerging countries around Asia since the beginning of this century.

As a result, it has been found 1) that there is a trend which the movement of human resources from Asia to European and American countries has gradually been replaced by the movement between Asian regions, 2) that the mismatching between supply and demand on the labor market has increasingly expanded and the movement between Asian regions has increased due to declining birth rates and higher academic backgrounds of Asian countries and that 3) the Japanese companies need the management reform to exploit active power of various human resources in Asia partly because of the structural differences between the Japanese labor market and the Asian labor market.

In addition, the enhanced trend which Asian human resources return from Japan in East Asia to Asian countries advantageous to economic growth and increase in employment opportunities has been viewed as a sign. At the same time, the number of international students moving from emerging countries in Asia to developed countries including Japan continues to be on the increase due to effects of declining birth rates and higher academic backgrounds developing in Asia.

Thus, Japan has to build the strategies to catch the information of the movement which human resources return from European and American countries to Asian countries, also induce human resources to return to Japan from European and American countries and make Japan a hub for development of human resources and movement in the regions while promoting the systematic economic integration in Asia-Pacific Region. Japan thereby needs the long-term efforts for that purpose because it is idealistic that Japan should collaborate with the economic partnership of Asia-Pacific and promote development and circulation of human resources in the regions.

### Key words:

ASEAN; Skilled labor; Human recourse; Cambodia

## Market Transition, Access to Housing and Home-work separation: Evidences from Low Income Neighborhoods in Beijing

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### Abstract

In developed and developing countries alike, scholars have endeavoured to theorize and test the impacts of urban spatial restructuring on individual commuting and daily travel behaviour, especially for low-income residents. Based on a 492 household surveys of nine typical low-income housing neighbourhoods in Beijing, we specifically address that in the context of suburbanization, to what extent limited residential mobility may exacerbate the commuting burden of low-income residents? Firstly, we explored the residential mobility pattern of the low-income residents and identified five relocation types. Then we further compared home-work links, commuting pattern and subjective satisfaction evaluation of above low-income groups, using the measurement of home-work distance, commuting time as well as travel mode. Specifically, we uses regression models to examine the impacts of institutional factors (such as housing reform, affordable housing policy, and urban sprawl) on low-income residents' job accessibility.

The results indicate that those low-income residents who relocated only because of government housing programs tend to endure longer commuting distance and time. As we expected, those who relocated under the Work unit welfare housing allocation system seem to enjoy more home-work closeness. Yet, the impact of dilapidated redevelopment on the low-income resident's home-work link is inconsistent. Finally, we pointed out that the factors which caused the spatial mismatch in Chinese cities are quite different from U.S. cities. Mixed institutional and structural forces impact differently on jobs-housings mismatch of the urban poor. Special attentions should be paid to the spatial implications of low-income residents' job accessibility and employment outcomes after passive residential relocation.

### Key words:

Market Transition; Access to Housing; Home-work separation; urban low-income; Beijing

## Modeling Trade-Offs among Forest Structure, Biomass, and Timber Production under Long-Term Forest Management Alternatives for Plantations in South China

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### Abstract

Forests are facing serious problems such as degradation on structure and function at global to local scales. Focusing on plantation ecosystems, it's useful to know how to achieve the most appropriate comprehensive benefits through a sustainable forest management approach. Setting the forest management scenarios under human influence, including forest protection, forest regeneration, timber production and sustainable forest management, the effect of different strategies will be investigated, to propose a more suitable management strategy for plantations. LANDIS-II model was adopted to simulate the dynamics of structure, biomass and timber production under four strategies that meet actual conditions. Then a standardized difference method was used to investigate trade-offs on different ecological functions. As harvest intensity increases, timber production increases at the same pace, while forest areas and aboveground biomass decrease. Harvest strategies will improve forest age composition. A sustainable approach can achieve the optimization of overall ecological benefits through trade-offs on timber production and biomass. To achieve sustainable forest management in the long-term, a strategy that is based on forest type classification showed an indispensable advantage. It can fulfil the requirement of timber production without damaging other ecological functions, especially on plantations in South China.

### Key words:

Forest structure; aboveground biomass; timber production; trade-offs; sustainable forest management; plantations in South China

## Mutual Construction of Resettled Rural Residents' social space and identity from the Perspective of Everyday Life

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### Abstract

With the development of China's industrialization, urbanization and the new urbanization, resettled rural residents, a borderline group, has received more and more attention. Resettled rural residents who have experienced great changes of their political identity, life and production mode generally face the reconstruction of identity; the social space based on the resettlement community become the main field to reconstruct their identity. Taking Pingchang New City in Zhenjiang, Jiangsu Province as the case, based on qualitative research methods including questionnaire survey, semi-structured interview and text analysis, this paper investigates the mutual construction relations between identities of resettled rural residents and the social space based on the resettlement community. This findings show (1) Drawing on the “my group and his group” theory in social categorization, resettled rural residents have produced multi-identity cognitive, including “the landless peasant identity compared with city people and country people”, “the local people identity compared with outsiders”, the non-agricultural labourers identity compared with traditional farmers” and “acquirements of the citizen identity towards urban lifestyle”. (2) Rooted in everyday life, living, work, leisure, consumption these four different kinds of social spaces selectively reinforce multi-identities of resettled rural residents. (3) The process of space reconstruction under multi-identity cognitive mainly displays in the spatial performance basing on multi-identity cognitive, the inclusion and exclusion of space, the resistance and negotiation of space, and the reconstruction of space meaning.

### Key words:

resettled rural residents; resettlement community; identity; social space; everyday life

## Regional Revitalization and Countryside Regression in Japan: A Case Study of Kamiyama Town in Tokushima Prefecture

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### Abstract

Japan, from 2010, turned to population decline. And industry of decline in rural areas led to the outflow of the urban population in rural areas. These, to the problem of population decline and aging in rural areas, from 2014, "regional revitalization (*Chihou sousei*)" - policy to try to the creation of the autonomous and sustainable society that makes full use of the characteristics of the region- has come to be promoted in the government-led. Currently, Japan has been addressed a variety of activities related to regional revitalization. In particular, activities in rural areas is attracting attention. As a result, the younger generation of 20-30 years of age began to migrate actively in rural areas. Such a phenomenon, Odagiri (2014) is referred to as "countryside regression (*Den'en kaiki*)". This study takes the Kamiyama town in Tokushima Prefecture. This town was a significant area of declining population, but is migrants increased by NPO activities, social population began to increase in 2011. Whether this is seen as one of the "countryside regression, or should be interpreted in a different perspective? The purpose of this report, from activities in Kamiyama town, is to clarify the significance of "countryside regression".

### Key words:

regional revitalization; countryside regression; Kamiyama town; rural; urban

## Research on City Square Space from the Human Living Environment Perspective

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### Abstract

This paper mainly study squares in four downtown districts of Dalian, which analyzes the influence of urban square on human living environment from four aspects: the lifestyle, living environment, transportation and living way in the living environment. On this basis to design an evaluation index system to study the urban square space differentiation and its formation mechanism. Spatial differentiation is mainly by building a new index system, using ArcGIS Spatial Distinction platform for the analysis of the spatial differentiation, and finally comprehensively evaluate the city square combined with questionnaire survey.

Through the spatial differentiation and data analysis, the author deepens understanding of Dalian city square. Through the micro and macro aspects, combined with the nature of the landscape design of square function value and the law of development, promote square related facilities and the layout, this paper put forward countermeasures for square internal space and external environment construction, adjust good coordination with the surrounding areas, in order to better serve the society, and provides the reference basis for the urban construction in Dalian.

### Key words:

Dalian; city square; human living environment; evaluation index system



## Research on Wetland Eco-Environmental Early Warning of Nansihu Lake

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### Abstract

Lake wetland eco-environmental early warning is the key to lake monitoring. It is the further work which is based on ecosystem vulnerability and health assessment as well. Remote sensing data, land use and environment monitor data in 1982, 1992, 2002 and 2012 were chosen as data base. Then, an index system combine of organization structure, whole function and social economic environment was established. Every index was divided in five grades which include non-alert, light alert, middle alert, heavy alert and giant alert. The fuzzy synthetically judgment model was used as assessment and the conclusions were as follows: (1) As chemical fertilizer and pesticide issue in agriculture activities and industrial emission were over the environmental capacity. Nansihu wetland was in heavy alert state in 2012; (2) The whole wetland has been deteriorating while the social economic environment indexes were getting even worse. In the coming 10 years, either indexes or the whole warning state is getting better because of the increasing investment in ecological restoration. (3) The degradation rate of nearly 10 years was slower than it of earlier 20 years while the social economic environment indexes always keep a high speed, which can be explained by the negative disturb from human beings activities. This research is significant to the environment management of Nansihu wetland.

### Key words:

Warning; Lake wetland; Eco-environment; Fuzzy synthetically judgment model; Nansihu Lake

## Structural Changes of Economy and Perspective for Industrialization of Agriculture in Japan

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### Abstract

Since the mid-1990s, economic structure in Japan has changed. In terms of trends, the current account and trade surpluses have continued to shrink, while net foreign assets have grown, the interest derived from these expanding the income surplus. Therefore, Japan seems to be evolving from “immature creditor nation” into “mature creditor nation”.

In response to such structural change, Japanese agriculture has pressed for reorganization. The structural reorganization of Japanese agriculture into large-scale farming was planned so that agriculture could be established as an industry that increases its productivity through expanding the scale of individual operations. This directional movement of the reorganization has today become the mainstream. However, the characteristics of the development of large-scale farming are that, in addition to moving toward an expanded scale of cultivated farmland, it also moves toward consolidation by expanding investment in labor and toward increased diversified management by expanding the scale of operations. That is to say, Japanese agriculture is expected to improving productivity and creating of added value through promotion of industrial competitiveness.

The purpose of this report is to examine the characteristics of structural change in Japanese economy and to clarify status of agricultural problems it is currently facing. First, I analyze the changes of Japanese economy, including a look at the trends in Japan's trade balance and income balance, current account after 1990s. In the second, I explore the characteristics of Japanese agriculture, from the view point of labor productivity and land productivity. Finally, I prospect industrialization of Japanese agriculture from an investment trend to East Asia.

### Key words:

Economic Structure; Japanese Agriculture; Productivity; Industrialization; East Asia

## The Characteristics and Sustainability of Theatrical Drama Performance in Fukuoka City, Japan

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### Abstract

This presentation reports the characteristics and sustainability of theatrical drama culture in Fukuoka City, Japan. The live performances typified by theatrical drama are dominantly agglomerated in metropolitan regions, Tokyo being the only such place in Japan. Nevertheless, there are some groups based in other urban centers and regional centers. What is sustaining their activities in these local cities?

In the case of Fukuoka City, a regional center, an affiliate organization of the city government leads promotion projects. Performance groups based in the city apply for a grant funding project and perform in the city. There are many more theaters other than those in regional centers, and a large proportion of them are sponsored by private enterprises. These theaters are concentrated around the central business district of the city because of accessibility to the market. However, the theaters are inadequate for the needs of performance groups in the city because of their excessive capacity and costly rent fees.

In Fukuoka City, enterprises operating the theaters also host a theatrical drama festival annually with a Non-profit Organization. Only groups screened on the basis of artistry or which are invited from outside the city to attract audiences can perform in the festival. Although groups based and acting in the city are generously supported by the public sector, groups without sponsors lack opportunities to perform in the city. The city will have difficulty developing a performance culture without considering the imbalance between these supports and practices.

### Key words:

regional center city; patronage; cultural industry; urban culture; live performance

## The Development of Mountaineering Booms in the Northern Japanese Alps

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### Abstract

In Japan, tourism oriented specific mountaineering has been gradually popularized since around 1900. For the last two decades, as there is the mountaineering boom among old and middle aged people, it becomes much popular than before. This study clarifies the process how mountain region accepts the several mountaineering booms, through the analysis of mountain huts in terms of changes in management and function. The case of Northern Japanese Alps is investigated, which contain Mt. Yarigatake (3,180 m), one of the most famous mountain peaks in Japan. Over 360,000 hikers visited in this area in 2014. There are 15 mountain huts, which stand at interval about 5 km along trails. Major mountain huts opened around 1920 and enlarged its management scale around 1960, because the number of hiker rapidly increased. The maximum lodging capacity of some huts reached 650 persons. Since 1980, although the number of hiker gradually decreased to approximately half of the peak, many huts have tried to maintain their profit through the improvement of its services reflected the demands of the old and middle age mountaineers, and through the putting up price per customer. This profit is used for environmental conservation which is needed in massive using. Because mountain huts flexibly corresponded to mountaineers whose preferences are changing both quantitatively and qualitatively, this area seems to be able to develop sustainably. In recent years, some other improvements are required for new comers such as foreign mountaineer or extreme beginner.

### Key words:

mountain; mountaineering; mountain huts; Northern Japanese Alps; tourism

## The Distance Effect in Spatial Interaction and Spatial Similarity: a Big Data View of Tobler's First Law

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### Abstract

Distance is an essential topic when considering spatial problems, as was stated in Tobler's First Law (TFL) that "everything is related to everything else, but near things are more related than distant things." Spatial heterogeneity and spatial interaction are two typical phenomena in the complicated real world. Classic studies focused on models in spatial interaction and geostatistics based on spatial heterogeneity, while neglected the general nature of distance-decay in the two geographic process. The arriving of big data era brings us plenty of spatio-temporal data that can be used in geography fields, provides us an opportunity to revisit the distance effect in geography. Our research indicates that the power-law distance-decay in spatial interaction implicates a long-range effect, a slower attenuation and higher possibility for distant interaction activities. However, spatial similarity is a localized phenomenon, of which the short-distance effect can be characterized by an exponential-based distance-decay. The main objectives of our study were to emphasize the research area about the different distance effect in spatial similarity and spatial interaction via a big data perspective. A case study of Beijing taxi trajectory data was used to verify our view.

### Key words:

Distance-decay; Spatial interaction; Spatial similarity; Tobler's First Law



## The Limit of Wireless City: Spatial Distribution of Public Wi-Fi Access in Shanghai

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### Abstract

Wireless communication technologies is changing the social life of people, and promoting the emergence of the mobile communication society. Especially, wireless technology is making an increasingly marked effect toward urban spaces. Most literature on the development of wireless cities focuses on cities in Western countries, and few have discussed how Chinese cities have adopted wireless technologies in their urban infrastructure development efforts. This article discusses urban internal differences in wireless infrastructure arrangement in the construction of smart cities which bucks the trend of digital divide. Using Shanghai as a case, we adopt Shanghai CMCC's public wireless local area network (WLAN) hotspot data, and analyze the spatial distribution features and dynamics of wireless network access devices. The spatial distribution of WLAN hotspots reflects the network operator's choice of facility location, which provides a new micro view to understanding the new trend in the alteration of urban spatial structure. Based on the results of case analysis, this article also provides some recommendations for the development and planning of wireless and smart cities.

### Key words:

wireless city; digital divide; Shanghai

## The Potential of “Soundscape” in Terms of Community Development –A Case Study of the Chirping of Bell Cricket in Matsukawa Village, Japan

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### Abstract

In Matsukawa village, Nagano prefecture, a project named “village of the bell cricket” is being undertaken by a community organization to determine the potential use of bell cricket sounds (chirping etc.) in community development. Conventional community development is biased towards visual resources. However, the elements constituting a local area should not be limited to visual impacts only. This study focuses on the sense of hearing, which humans use as a second sense in interacting with the environment. The study determined Matsukawa village is one of rare natural habitats of bell crickets. Some community organizations worked on the protection of the bell cricket’s natural habitats and they decided to send live bell crickets throughout Japan. Therefore, comprehensive environmental protection has been realized through these activities, for example, the prohibition of crop-dusting and road maintenance. Moreover, the bell cricket sounds delivered to people outside the village reminded them of natural scenery and projected a positive image of the natural environment in Matsukawa village. Therefore, the utilization of auditory resources in community development can facilitate comprehensive understanding of local areas, which cannot be grasped and understood only by visual interaction.

### Key words:

community development; soundscape; comprehensive environmental protection; bell cricket; Matsukawa village; Japan

## **The Relationship between Urban Form and Medical Facilities Visiting:**

### **A Comparative Study of Beijing and Shanghai**

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#### **Abstract**

People's behavior of visiting medical facilities reflect their demand and utilization of the health care services, which is also highly related to people's health and life quality. However, existing studies on people's behavior of visiting medical facilities in China paid more attention to institutional factors, while the spatial factors are rarely considered sufficiently, which is partly because the complex medical security system.

Based on the "space-institution-behavior" research framework, and the dynamic monitoring data of floating population collected by National Health and Family Planning Commission in 2014, this study analyzed the spatial pattern of people's behavior of visiting medical facilities, and compared the patterns of floating population with registered population, Beijing samples with Shanghai samples. Using ordered logit model, this study focused on the effects of spatial factors such as the accessibility to hospital on people's intention of visiting doctor, after the socio-economic attributes and the institutional factors are controlled for, and compared the results of Beijing samples with Shanghai samples. Trying to reveal the relationship between urban form and people's behavior of visiting medical facilities, and provide related suggestions to optimize the distribution of public health care facilities in mega-cities of China.

#### **Key words:**

medical facilities; health; urban form; Beijing; Shanghai

## The Strategy and Influence of How the Rural Areas in Japan Attract the Foreign

### Tourists

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#### Abstract

In recent years, Japan is committed to tourism industry development via loose Visa restriction, the depreciation of Japanese yen and other policies; a substantial growth of foreign tourists arrivals. But the surged visitors is still focus on the conventional tourist areas and routes, yet extend to other internal traditional tourism areas in Japan, which leads the shorts of accommodation and transportation in certain areas. Even so, the local governments in Japan still have high expectation in the economic benefit from the foreign tourists. Therefore, how to spread the tourists and benefit all the areas in Japan has become a major issue for the government. Meanwhile, the studies of relative subjects have rapidly increased in Japan. However, the research still focus on the traditional tourist area, which is difficult to be a reference for the area which lack of tourist resource or difficult to access. Although there are some areas has successfully attracted foreign tourists to visit through utilize the local resources and provide variety of “experience”. But this is a new way to attract foreign tourists, so the research and investigation are still in the accumulation. This report will analyse lide (Yamagata), and summarize how the remote town attracts foreign tourists successfully and the influence of the international tourism toward this town.

#### Key words:

foreign tourists; lide town; snow park; farm-inn

## Tourism of Mt. Fuji in the Chinese Group Tours

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### Abstract

In recent years, tourism industry has been attracting attention in Japan. Particularly inbound tourism has been emphasized as a pillar of economic development. In the other hand, China has become the largest outbound tourism market in the world. Against this background, Tourists from China, as a potential source of inbound visitors for Japan, that aims at promote the tourism industry. There are many famous tourist attractions in Japan. Among of that, Mt.Fuji has very good name recognition in China. Most Chinese will go to visit Mt.Fuji, when their first visit to Japan. This study used the data on package tours of Japan from Shanghai, to clarify the characteristics of Chinese group tourist visiting the Mt.Fuji.

The results of analysis show that, the destination in tour schedule of package tours, were concentrating on the north side of the Mt.Fuji, region of Fuji Five Lakes. And group tourist from China, have to follow a planned schedule and spend a certain amount of time at every famous lookout points, only 30~40 minutes average. And although 90% of package tours went to the mountain's fifth station, but the residence time was brief, only 38 minutes average. Another result is that the tour schedule could be changed, with the change of seasons or climate.

### Key words:

Chinese; Group Tours; Stationary time; Shizuoka Prefecture; Mt.Fuji

## Based On the Analysis of Community Scale Urban Ecological Vulnerability in Time and Space Differentiation- Was Ganjingzi in Dalian City as an Example

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### Abstract

The research based on the principle of urban ecological vulnerability, was seated in dalian city as an example, using a certain evaluation method, to the community as the research scale, was seated in dalian from 1998 to 2013, urban green space changes impact on the urban ecological vulnerability evaluation analysis. The results show that: (1) with the continuous development of urban construction, urban green space area is gradually reduced, the negative effect of urban environment, is the important cause of urban ecological fragile degree aggravating. (2) was seated 15 years the ecological fragility of change quickly before they are slow, clear difference was seated between community ecological vulnerability, the ecological vulnerability of the community in different regions of the evolution also presents different features.

### Key words:

urban greening; Urban ecosystem vulnerability; dalian

## Based on the Disequilibrium Model of Global Urbanization Paths and the Study of Space Organization Form - In 286 Chinese Cities, for Example

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### Abstract

Research on China's 286 cities as unbalanced global coordination issue in the development of urbanization and global urbanization paths for research first established population, economic, social and ecological index system of the five systems, analysis, besides economic urbanization development level decreased population urbanization development level, social and ecological system has a rising trend, secondly using ARCGIS spatial analysis technology, it is concluded that the cities as population, economy, society and ecology coordination on the space of global urbanization development level is less and less, finally put forward from the population transfer, urban development layout, urban comprehensive carrying capacity, ecological check and measures to deal with the environment, politics and so on five aspects to promote the implementation of global urbanization path.

### Key words:

unbalanced development; Global urbanization; Coordination; Prefecture level; Realize the path

## Modeling the Species Composition, Age Structure and Biomass of Pine-Fir Plantations in South China under Different Harvesting Intensities

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### Abstract

In China, plantations have been developed for decades to ensure timber requirement, while leading to poor quality, simple structures and weak ecological functions. Sustainable forest management strategies are indispensable approaches for structure optimization and function improvement. This study aims at determining the optimal harvesting management approach. We used LANDIS-II and PnET-II models to simulate long-term changes in species composition, age structure and aboveground biomass (AGB) of the plantations under a factorial experiment. We simulated structure and function on plantations at landscape scale of Taihe County over 100 years considering major controlling factors. Results show that the harvesting age and cut-block size have little impacts on forest area, while great influence on AGB. The harvesting area ratio and frequency are the most important factors influencing both forest area and biomass. For the most appropriate forest management in our study, following aspects should be adopted, including 20% harvesting area ratio, 5ha cut-block size and 10year harvesting frequency. And on harvesting ages, different species should be harvested at 21-year-old on Chinese fir, 26-year-old on pine and 41-year-old on broad-leaved forest. On practical viewpoint, this study provides a feasible harvesting strategy for plantation management in red soil hilly region of South China.

### Key words:

Harvest intensity; aboveground biomass; landscape pattern; plantations; LANDIS-II; red soil hilly region of South China

## Quantifying the Influence of Sea Level Rise, Land Subsidence and Estuarine Topography Change on Storm Flooding in a Coastal Mega-City: A Scenario-Based Study in Shanghai, China

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### Abstract

This paper focuses on the evaluation of anthropogenic impacts on storm flooding in Shanghai, a coastal mega-city of China. We used a scenario-based approach to examine how sea level rise (SLR), land subsidence (LS) and estuarine topography change (ETC) would affect the evolution and impacts of a super typhoon storm in three target years (2010, 2030 and 2050). A two-dimensional hydrodynamic model (MIKE 21) was used to simulate the storm flooding associated with each scenario. Considering the extensive damage in history, we selected TC9711, TC8114, TC0012, TC0205 and TC1109 as references to design case typhoon events causing storm surges with three categories of paths (SHLD, ZNLD and GNS). Results demonstrate both the individual and the combined influences of SLR, LS and ETC relevant to anthropogenic impacts on storm flooding possibly striking Shanghai within the next four decades. Apparently, storm flooding formed in the compounded scenarios was much serious than that in each single scenario. In addition, the influence of the three impacting factors is quantified to determine the key factor. During 2010-2030, estuarine topography change (ETC) has major impact on the projected storm flooding, while during 2010-2050, the impacts of sea level rise (SLR) and land subsidence (LS) was larger due to their complex spatial and temporal interaction.

### Key words:

Storm Surge Flooding; Scenario Analysis; Influencing Factor; Model Simulation; Shanghai



## Research on Grid System of Intelligent Community Public Opinion Agency

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### Abstract

The grid system of intelligent community and public opinion agency based on diary and public opinion management, Used Visual Studio 2010 as system integrated development environment ,combined with WebGIS and realized the 8 types of social conditions and events of acceptance, transfer, processing, verification and completion function, is an auxiliary tool to carry out democratic scientific decision making. In this paper, the overall structure of the social situation and public opinion system, the realization of technology, the main function of the design and implementation are described in detail. This system is mainly based on the modular structure, and it can get the data information produced by the community residents in a timely manner, which is helpful to solve the residents' suggestions and interests of public affairs.

### Key words:

Social situation and public opinion system; diary of public; the demands of public opinion; WebGIS

## Symposium on Ecological Security of the Poyang Lake



Home

### Oral

1. [Developing a Vegetation-Based Index of Biotic Integrity to Assess the Ecological Health of Poyang Lake Wetland, China](#)  
Wenjing Yang; Liting Xu; Yanping Wu; Yeqiao Wang (Jiangxi normal university, China)
2. [Poyang Lake-Yangtze River Interaction and Its Influence on Lake Hydrology](#)  
Qi Zhang (Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China)
3. [Remote Sensed Study on Eco-environmental Dynamics in the Poyang Lake, China](#)  
Xiaoling Chen (Wuhan University, China)
4. [Study of Lake Ecosystem Integrity and Its Variation Using the LEI Index in the Middle-To-Lower Reaches of the Yangtze River, China](#)  
Junfeng Gao (Key Laboratory of Watershed Geographic Sciences, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China); Qi Huang (Key Laboratory of Poyang Lake Wetland and Watershed Research, Ministry of Education, Jiangxi Normal University)
5. [Virtual Geographic Environments Based Integrated Simulation Service System for Water Pollution Management](#)  
Yulin Ding (ISEIS, CUHK, Hong Kong SAR, China)

### Poster

1. [Evaluating Runoff Variability Using SWAT Model in the Ganjiang River Watershed of Jiangxi Province and a Comparison with IHACRES Model](#)  
Guihua Liu; Shuhua Qi; Naiqian Xu (China, School of Geography and Environment, Jiangxi Normal University)
2. [Preliminary Study on Benthic Macro invertebrate Index of Biotic Integrity \(B-IBI\) for the Health Assessment in the Poyang Lake, China](#)  
Qi Huang (China, Key Laboratory of Poyang Lake Wetland and Watershed Research, Ministry of Education, Jiangxi Normal University); Lizhen Liu (China, Poyang Lake Research Center, Jiangxi Academy of Sciences); Junfeng Gao (China, Nanjing Institute of Geography & Limnology, Chinese Academy of Sciences)
3. [Separating Different Fractions of Soil Organic Carbon in a Poyang Lake Wetland](#)  
Qiwu Hu; Qi Jin; Mingyue Chen (China, School of Geography and Environment, Jiangxi Normal University)



University)

4. [Study on the Variation of Bacteria and its Water Environmental Response Mechanism in River-lake ecotone of Poyang Lake](#)

Xiaolan HUANG (China, School of Geography and Environment, Jiangxi Normal University); Baoqing HU (China, Ministry of Education Key Laboratory of Environment Change and Resources Use in Beibu Gulf); Qiuping GUO (China, School of Geography and Environment, Jiangxi Normal University)

5. [Wetland Feature Extraction in Poyang Lake from Multi-sensor and Multi-temporal Images](#)

Li Zhang; Chaoyang Fang; Shuhua Qi (China, Jiangxi Normal University)

## Developing a Vegetation-Based Index of Biotic Integrity to Assess the Ecological Health of Poyang Lake Wetland, China

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### Abstract

Ecological health assessment can provide indispensable information for wetland protection and management. Poyang Lake is the largest fresh-water lake in China. The wetland is recognized as one of the most important wetlands in the world because it provides habitats for many unique species and its great ecological and economic importance to millions of people in the middle and lower Yangtze region. Currently, there is no indicator framework to determine the status and trends of Poyang Lake wetland condition at a basin scale. The index of biotic integrity (IBI) is the most widely-used method for wetland monitoring in North America. Plants are well-suited as indicators of ecological health because they are immobile, relatively easy to sample and identify, and respond to anthropogenic disturbance on an ecological time scale. In the study, we aim to develop a vegetation-based index of biotic integrity (V-IBI) and assess the health condition of Poyang Lake wetland. V-IBI was based on samples at 30 sites that were randomly selected. Least disturbed sites defined the reference conditions. Water and soil chemicals, habitat quality, and land use were used as criteria to identify reference sites. Metrics related to plant richness, composition, life form and disturbance tolerance were screened by sensitivity and redundancy tests. Five metrics (species richness, % cover of annual species, number of non-native species, % number of monocots, % number of sensitive species) were finally used to construct the V-IBI. The V-IBI scores were obtained by combining the rating categories (excellent, good, fair, poor, and very poor). The ecological status was then evaluated based on the V-IBI scores. The results indicated that the general ecological status of Poyang Lake wetland was rated lower than “good”. Sites located in nature reserves were rated as the best, while those close to intensive farming lands and big cities were the worst. The V-IBI scores showed a significant negative response to an increasing gradient of disturbance, indicating that it is a useful tool for ecological monitoring in Poyang Lake wetland.

### Key words:

ecological health; index of biotic integrity; plant diversity; wetland; Poyang Lake

## Poyang Lake-Yangtze River Interaction and Its Influence on Lake Hydrology

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### Abstract

Lake hydrology is largely dependent on its connection with surrounding rivers. Poyang Lake, the largest freshwater lake in China, is one of the few lakes that remain naturally connected to middle reach of the Yangtze River. The past decade saw an increasingly frequency of floods and droughts in Poyang Lake, causing great threats for 12.4 million inhabitants and 3.9 million hectares of arable lands in the lake region. In addition to the impacts of climate changes in the lake catchment, the interaction between the Lake and the Yangtze River was found to have played an important role in affecting the Lake water balance. Strong human activities in the upper Yangtze River, e.g. the operation of the Three Gorges Reservoir located some 955 km upstream, were found to alter significantly the hydrological connection of the Lake and the River. This talk presents the latest research work on the Lake-River interaction, and how the modification of the interaction influences Lake hydrological and hydrodynamic processes. Contributions of the Yangtze River on the occurrence and severity of floods and droughts in the Lake are explored and discussed. Research outcomes are expected to provide scientific support for Lake-River integrated management.

### Key words:

Lake-River interaction; Lake hydrological and hydrodynamic processes; Poyang Lake

## Remote Sensed Study on Eco-environmental Dynamics in the Poyang Lake, China

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### Abstract

Poyang Lake, the largest freshwater lake in China, is one of the most important wetland in the world considering its critical ecological functions. The lake inundation area by remote sensing showed a significant decreasing trend in the time series from 2000 to 2010. Water budget with RS and hydrological measurements demonstrated that the impoundment of the Three Gorges Dam (TGD) in June 2003 has led to a loss of 7864.5 million m<sup>3</sup> of water from the lake in a short period. The decrease of inundation area has caused rapid changes on the Poyang landscapes, vegetation area in dry seasons increased by 16.6% of the lake area from 2001 to 2013. The relationships between the water levels and vegetation coverage also showed two regimes in both dry and wet seasons for the pre-TGD period (before 2003) and post-TGD period (after 2003). The water quality of the Poyang Lake also experienced significant spatio-temporal variation over the past decade. TSS was low in wet seasons and much higher in dry seasons, and quantitatively TSS showed generally higher turbidity of the north lake, an evidently increased turbidity was found after 2002. The Chl-a concentrations also showed apparent spatio-temporal gradients, but no significant trend was found in recent years.

### Key words:

Remote Sensing; Wetland; Inundation; Water level; TSS; Chl-a; Three Gorges Dam; MODIS; Landsat; NDVI

## Study of Lake Ecosystem Integrity and Its Variation Using the LEI Index in the Middle-To-Lower Reaches of the Yangtze River, China

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### Abstract

The evaluation of the lake ecological integrity and its variation provide the basis for environmental management of lake ecosystems and its basin. In this study, we built a multi-scale lake ecological integrity (LEI) index system including natural ecosystems health (NEH) and ecosystem service (ES). Metrics of physical, chemical, and biological integrity were developed and calculated to assess natural ecosystems health, and metrics of water supply, flood control were developed and calculated to assess ecosystem service. The final scores for the LEI index were divided into five categories. We applied the method to evaluate the lake ecological integrity of lakes in the middle-to-lower reaches of the Yangtze River in 2012 and 2014. The result indicated that the LEI scores ranged 0.62 to 0.73 in 2012 and 0.63 to 0.72 in 2014 respectively, rated as good. Moreover, the NEH scores ranged 0.57 to 0.71 in 2012 and 0.58 to 0.69 in 2014 respectively, rated as fair to good, and ES ranged 0.67 to 0.75 in 2012 and 0.69 to 0.75 in 2014 respectively, rated as good. The comprehensive scores show a descending tendency in Poyang Lake and a rising tendency in Taihu Lake and Chaohu Lake, these differences demonstrated how the effects of global environmental change and human activities on the lake ecological integrity of different aspects in the three large lakes during the 3 years. Consequently, the LEI index system can provide a scientific basis for Lake Ecosystem restoration and protection not only in natural ecosystems health but also ecosystem services.

### Key words:

Ecological integrity; shallow lake; variation; assessment, middle-lower Yangtze River



## Virtual Geographic Environments Based Integrated Simulation Service System for Water Pollution Management

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### Abstract

With the rapid economic development and the enhancement of human activities, water pollution has been one of the most serious environmental problems. However, as exist environmental management systems operate in a typical passive data-centric mode, the accumulated resources cannot be fully utilized. Data-centric environmental management systems were designed and implemented by a software house for their specific purposes, and these systems often will not fit the needs of the actual environmental management tasks of other user communities. This impediment is being partially addressed by the increasingly complex application requirements from multiple-levels of users, as well as by the growing availability of diverse resources, including data, models, geo-tools, software packages, monitoring sensors, mobile terminals, and highly efficient hardware resources. In practice, trivial and time-consuming operations to integrate various resources have cost most the manual resources rather than improving the decision-making. This is why most existing environmental management systems have been of limited use until now. To overcome the shortcomings of a centralized, isolated, passive data-centric environmental system, we propose a novel Virtual Geographic Environments (VGE)-based integrated simulation service system, which is capable of scheduling and allocating multiple resources to dynamically generate collaborative and on-demand information services in a holistic way. We focus specifically on how to convert the existing heterogeneous and distributed related resources into services. Through the seamless integration, collaboration and reuse of existing environmental resources, the system could provide on-demand services for stakeholders from multiple levels to perform their water quality management tasks in a holistic and efficient mode.

### Key words:

virtual geographic environment (VGE); Resource integration and collaboration; Water pollution simulation

## Evaluating Runoff Variability Using SWAT Model in the Ganjiang River Watershed of Jiangxi Province and a Comparison with IHACRES Model

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### Abstract

Water supply availability has significant impacts on the Poyang Lake watershed. As the largest river of Poyang Lake basin, the hydrological regime changes of Ganjiang River had an effect on water ecosystem health of Poyang Lake Basin. The SWAT (Soil and Water Assessment Tool) model and IHACRES (Identification of unit Hydrographs and Component flows from Rainfall, Evapotranspiration and Stream flow data) model were used for modelling runoff variability in Ganjiang River watershed to determine the applicability of hydrological models to the Poyang Lake basin. Both SWAT and IHACRES models represented observed runoff well that R<sup>2</sup> (coefficient of determination) and NS (Nash-Sutcliffe) were both greater than 0.7 and PBIAS (percent bias) was smaller than 25. IHACRES model was easy to be used for less data-preparation in primeval times of 1955-1979 while performed unfavourable during 1980-2010. This would attribute to climate change and human activities experienced in the watershed recent decades which had significantly impacts on hydrological cycle. By contrast, the complex, processes-based SWAT was a better choice to simultaneously simulate runoff variability and evaluate the effects of land use change and human activities in the basin where agricultural activities are intensive. It was possibly suitable for water resource planning and management.

### Key words:

Hydrological modeling; Ganjiang River watershed; runoff variability; SWAT model; IHACRES model

## Preliminary Study on Benthic Macroinvertebrate Index of Biotic Integrity (B-IBI) for the Health Assessment in the Poyang Lake, China

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### Abstract

The water and habitat quality in Poyang Lake are being degraded by the global environmental change and anthropogenic impact. Thus, the need for standards, especially those examining the biological attributes of lake systems, are urgently required. A preliminary benthic macroinvertebrate index of biotic integrity (B-IBI) was developed to evaluate the ecosystem health of Poyang Lake in winter by means of the data that were collected from 15 sites in October and January in 2012 to 2014 in the central of Poyang Lake. The method of the least disturbed condition was used to find the reference sites. Four metrics were selected from five categories (50 metrics). We then calculated the total MMI scores by summing metrics for each site after transformation by 0-1 scaling system. The final B-IBI include the total taxa number, (Crustacea+Mollusca) taxa, the Berger-parker's index and biotic index. Then the ecological conditions of the sampling sites were evaluated based on the B-IBI scores, which were transformed into a uniform score by ratio score method and summing up. Overall, the ecological conditions of references sites were "Good", B-IBI scores were significantly reduced at impaired sites, where affected by anthropogenic impact. Health condition of center region in the Poyang Lake was found to decline gradually from 2012 to 2014. Sand mining and water pollution were suggested as the major factors affected B-IBI. Our results suggest that long-term data would benefit the development of a robust B-IBI and its use in practice of Poyang Lake health assessment.

### Key words:

benthic macroinvertebrate; index of biotic integrity; Poyang Lake, ecosystem health assessment

## Separating Different Fractions of Soil Organic Carbon in a Poyang Lake Wetland

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### Abstract

Separating different fractions from total organic carbon pools could help to improve modeling variations in soil organic carbon stock and its feedback to global climate change. Poyang Lake is the largest freshwater lake in China. In this study, soils at a depth of 0-15 cm and 15-30 cm were sampled along water table gradient in a typical wetland of Poyang Lake. Subsequently, total soil organic carbon (SOC), heavy fraction organic carbon (HFOC), light fraction organic carbon (LFOC), microbial biomass carbon (MBC) and dissolved organic carbon (DOC) were measured, respectively. The objectives of this study were to quantify the contribution of various organic carbon fractions to the total organic carbon, and explore the response of different organic carbon components to water table and vegetation variation. Our results showed that the ranges of SOC, HFOC, LFOC, MBC and DOC were 4.92~48.14 mg·g<sup>-1</sup>, 4.66~41.42 mg·g<sup>-1</sup>, 0.46~6.52 mg·g<sup>-1</sup>, 124.22~419.23 mg·kg<sup>-1</sup> and 33.17~153.63 mg·kg<sup>-1</sup>, respectively. The organic carbon fractions varied significantly with plant communities and among soil layers. Each of the soil organic carbon fractions under various plant communities decreased from the top soil to the deeper soil profile. The contribution of HFOC and LFOC to total soil organic carbon varied from 86.46% to 96.39% and 3.61% to 13.54%, respectively. The MBC/SOC and DOC/SOC ratios ranged from 0.28% to 3.44%, 0.16% to 2.16%, respectively. The distribution patterns of LFOC, MBC and DOC were not spatially consistent, suggesting that these active organic carbon fractions were not controlled by the same environmental factors.

### Key words:

Poyang Lake; Wetlands; Soil organic carbon; Microbial biomass carbon; Dissolved organic carbon

## Study on the Variation of Bacteria and Its Water Environmental Response

### Mechanism in River-Lake Ecotone of Poyang Lake

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#### Abstract

Using next-generation DNA sequencing techniques to exploring the genetic information of microorganisms, the paper studies the diversity and abundance of river-lake ecotone of Poyang lake basin, and the difference of the microbial population distribution, and studies the interaction between the river and lake water of river-lake ecotone from bacterium view. In addition, in combination with the hydrological geology and chemical ion methods, Research on the key environmental factors that affecting ecosystem of river-lake ecotone, the paper further expounds the mechanism of the difference of the microbial population distribution in river-lake ecotone, attempts to reveal the differentiation characteristics of bacteria response to environmental variation at different underlying surface, and studies the ecological change of river-lake ecotone, which can be wide used in disease control and city water resources plan.

#### Key words:

Poyang Lake; River-lake ecotone; Bacteria; Water environment; Mechanism

## Wetland Vegetation Feature Extraction in Poyang Lake from Multi-Sensor and Multi-Temporal Images

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### Abstract

Feature description of Poyang lake herbaceous wetlands vegetation is not easy to be described by one source or one time phase image. Time-series Sentinel 1A (C-band) for Radar images and for multi-spectral optical satellite data Sentinel2 and Spot 5- take5, are combined to investigate the spatial-temporal variation of wetlands object in autumn and spring growing season. Normalized different vegetation index (NDVI), soil-adjusted vegetation index (OSVAI), Simple Ratio (SR) and Modified Normalized different water index (MNDWI) will be extracted from optical images to study the vegetation variation trends during the two periods for different vegetation types. Backscattering coefficients, Shannon Entropy (SE) and H/Alpha wishart classification value will be selected from the Sentinel 1A to study the scattering scheme and structure information of the wetland vegetation. The results showed that NDVI will be saturated or not sensitive to each other when the value get to 0.7. Variables discriminating reed marshes from other land covers were the NIR band between March and June, the OSAVI of January, and the MNDWI of September. Submerged macrophytes beds were discriminated with the shortwave-infrared band of January, the NDVI & NDWI of September, the red band of September and the SR index of April and August. For Sentinel 1A data, VH polarization is better to investigate the wetland vegetation data than VV polarization. Spatial-temporal Shannon Entropy and H/Alpha classification values could be a good way for the dual-polarization Radar to describe the different scatter scheme of the wetland vegetation during different growing statues of vegetation communities.

### Key words:

Feature extraction; Wetland vegetation, Sentinel; Multi-sensor; Multi-temporal



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## Forum on Local Studies: Theory and Practice



Home

### Oral

1. [A Study on the Correlation between Local Studies and Local Development](#)  
Kyu Tae Lee (Catholic Kwandong University, South Korea)
2. [An Analysis on the Discipline Attributes of Local Studies](#)  
Zhu Yongjie (Beijing Union University, China)
3. [An Experience of Yamaguchi-Gaku Project of Yamaguchi University](#)  
Hitoshi Araki (Yamaguchi University, Japan)
4. [Direction of Local Studies in China](#)  
YAO Huasong (Guangzhou University, China)
5. [Fujiology: The Worship of Holy Mt. Fuji and Mt. Fuji Sightseeing](#)  
Mitsuru SANO (NIHON University, Japan)
6. [Place, Placeness, Place Identity: Concepts Inspiration for Local Studies](#)  
Zhifen Cheng (Beijing Union University, China), Baoxiu Zhang (Beijing Union University, China)
7. [Role of Geography in the Theory and Practice of Local Studies](#)  
Baoxiu ZHANG (Beijing Union University, China)
8. [The Land Use Change by Urban Design and the Conservation of Urban Agriculture](#)  
Ena Komno (Japan Livestock Industry Association, Japan)
9. [The Transforming Processes of Kyoto, the Millennium Capital of Japan](#)  
Aki Yamamura (Kyoto University, Japan)

## A Study on the Correlation between Local Studies and Local Development

### - Focusing on the Case of Korea "Gangneung Study"

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#### Abstract

As local studies grow in Korea, a variety of discourses on objectives, scopes, and research methods of local studies have been presented, and ways of their theorization also have been explored. In general, local studies focus on history and culture, but it is also true that local studies should contribute to the local development. For instance, local governments of Korea support local studies at present with the aim to explore the local identity through local studies and to seek local characterization based on the local identity. In other words, local governments support and organize local studies because they expect that studies on the local history and culture would contribute significantly to the local development. Still, how local studies focusing on history and culture can affect the local development is quite controversial. Specifically, the issue of the academic nature and policies of local studies is open to dispute. This study aims to analyze discourses on the correlation between local studies and local development based on the case study of 'Gangneung Study(江陵学), a local study of Gangneung that is a local city in Korea. The major contents are as follows: 1) Theoretical discussion of the correlation between local studies and local development; 2) Korean local governments' policies of supporting local studies; 3) Gangneung Study and Gangneung City's supporting policies; and 4) discourses on the correlation between Gangneung Study and the development of Gangneung City.

#### Key words:

local studies; Gangneung Study

## An Analysis on the Discipline Attributes of Local Studies

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### Abstract

This paper not only points out the research area coverage of Local Studies and its relationship with Capital Studies, but also mainly discusses the discipline attributes on Local Studies. Local Studies is a subject studying the formation and evolution law of the regional complex which is composed of the natural and human environment of a region. Capital Studies is a type of many local studies, and there is a certain relationship between Capital Studies and Local Studies. If Local Studies is an independent subject, according to study objects, it is an integrative discipline linking physical science and social science. According to the analytical methods of discipline attribute in Sociology, Local Studies is a “soft” discipline with extensive “application” and a discipline with higher “divergence” but lower “urbanization”. Therefore, it is significant to strengthen relation between local Studies and other disciplines, to broaden research area coverage, to take many study modes, to enhance applied theory research, to increase the chances of critical communication.

### Key words:

Local Studies; research area coverage; discipline attributes

## An Experience of Yamaguchi-Gaku Project of Yamaguchi University

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### Abstract

Yamaguchi University is located in Yamaguchi City, Yamaguchi Prefecture, Japan and I would like to introduce Yamaguchi-Gaku (山口学) project in Yamaguchi University as a case of local studies in Japan. It was set up in 2002 as an interdisciplinary research team by 11 initial members including 3 geographers in the faculty of Education in our university. Since then Yamaguchi-Gaku members had conducted monthly meeting and annual symposium/forum. For example, the theme of symposium in 2002 was *Sagiryu Kyogen*, a traditional drama like *No* carried on in Yamaguchi and the theme in 2003 was *Sumie* (ink painting) and Sessyu who was a famous artist living in Yamaguchi. That in 2007 was Japanese Sake and that in 2008 was Japanese sword, the both were major products of traditional industry of Yamaguchi. Since 2009, Yamaguchi-Gaku reorganized as a collaborative project with Tamkang University, near Taipei. Tamkang University also had a local study project named Tamsui Xue(淡水学) and Tamsui is a place-name of the university. We are continuing mutual visit by project members of the both universities every year and have launched a new journal named "Journal of East Asian Identities" in this year.

### Key words:

Yamaguchi-Gaku; local studies; interdisciplinary approach



## Direction of Local Studies in China

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### Abstract

As a responsive outcome of outward globalization, local studies developed rapidly also caused by self-introspection of local history and culture. Firstly, this paper mainly compared local studies in mainland china with that in Taiwan. Then, we focused on nature of local studies and related theoretical questions, taking Guangzhou studies as an example. Lastly, two suggestions on theoretical and practical sides were put forward.

### Key words:

local studies; locality

## **Fujiology; The Worship of Holy Mt. Fuji and Mt. Fuji Sightseeing**

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### **Abstract**

Fujiology (FUJI-GAKU) is the synthetic and interdisciplinary study which makes a research area Mt. Fuji and the foot of Mt. Fuji (related area in Mt. Fuji in a broad sense). It is a comprehensive field of knowledge, including natural science, humanities and social science. 40 million people who are 1/3 of population of Japan can see Mt. Fuji as a landmark. It was listed in UNESCO's World Culture Heritage catalogue in 2013. The holy Mt. Fuji is a graceful mountain, a symbol of Japan. And there is also an object of mountains worship. As a form of nature-worship, Mountain climbing began from the 14th century, and in the 17th century (Edo period), the Mt. Fuji climbing boom of the public for the purpose of sightseeing started. This boom became the origin of the present-day Mt. Fuji sightseeing mountain climbing.

For the past few year, tourism business is more and more being paid attention to in Japan. And for this reason, there are many foreign tourists Visit Japan, and go to visit Mt. Fuji. As a result, there were 200,000-300,000 sightseeing mountaineers climbed the Mt. Fuji, in the summer of 2015 (July to August). At the same time, mountaintop and the trail to the mountaintop become crowded. This presentation will introduce the cultures, such as nature-worship, of Mt. Fuji in general, and attempts to carry out a preliminary discussion of the tourist behaviour in Mountain climbing.

### **Key words:**

Fujiology; nature-worship; sightseeing mountain climbing; World Cultural Heritage; holy Mt. Fuji; visit-to-Japan foreign tourists

## Place, Placeness, Place Identity: Concepts Inspiration for Local Studies

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### Abstract

In recent years, the researches for local studies in China are ascendant and show vigorous development trend. However, these researches are still too heavily weighted in local culture's practices. And theories researches are still sorely lacking. Place, placeness, place identity are the core concepts and the theoretical perspectives for cultural geography, and they can provide academic nutritions for local studies. This paper adopts literature analysis and comparative analysis methods, and it combs the concerned research fruits about place, placeness and place identity at home and abroad, then it presents the suggestions. First, local studies' research should be guided by the cultural geography's core concepts: place, placeness and place identity, excavate deeply each place's placeness. Second, local studies' research should analyze the changes of place identity from the local residents. Third, they should explore ways to strengthen the identity of local residents to the place.

### Key words:

place; placeness; place identity; local studies

## Role of Geography in the Theory and Practice of Local Studies

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### Abstract

Geography is a field of science devoted to the study of the Earth's surface (space), as well as the regional system of man-land relationship. The science of local studies, with local name knowledge, is an interdisciplinary and comprehensive research area relating to the place, which studies the local characteristics, evolution, and their relationship of the various local elements of a regional complex, and predicts the development law and future trend. "Localology" maybe used as the academic term in English to refer to the modern local studies. Its mission is to study the local place, mine its culture, inherit its cultural context, and serve the local development. Geography and local studies have both similarities and differences. The role of Geography in the theory and practice of local studies is the first important, which, especially Historical Geography and Cultural Geography, can give the local studies some knowledge of theories and research methods. In China, the early local studies refer to such three major studies as the Dunhuang Studies, the Hui Studies, and the Tibet Studies. After the reform and opening up to the outside world since 1978, especially in recent years, the local studies in China have been flourishing rapidly and many institutes of local studies have appeared. The Institute of Beijing Studies is one of them, which is the present executive chairman of the Association of Chinese Local Studies now. We need more theory knowledge and research methods from Geography.

### Key words:

Geography; theory and practice; local studies; Localology; Beijing studies

## The Land Use Change by Urban Design and the Conservation of Urban Agriculture

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### Abstract

Urban design is effect to change the land use and industry, especially agriculture. 37 kinds of vegetables and spice were planted in 23 wards that is the capital sphere. But, in 1968, new urban design was enforced, and farmers who live in, and produce in the urbanization promoting area are difficult to continue the agriculture. Because, some area in the urbanization promoting area is set down as the production green land area, and the other area set down as housing land. Around 1990s, most local people rethink to prevent the production green land area with the objects of food safety, food and agriculture education and relaxation. 4% of Tokyo is the agriculture field, and most farmers produce vegetables, fruits and flowers. If the farmers have animals that are cows, pigs and so on, they have to deal with the disposal of excreta and bad smells. So that, they should pay huge cost for these facilities, therefore they are difficult to maintain the management. When we keep urban agriculture in and around Tokyo, we should think about the methods how to ride on the strength of urbanize feature. For example, the land use which utilize the rooftop terrace and narrowing area, high technology which is like the plant factory, the relationship between producers and consumers, and recreation farm which is picking vegetable and fruit.

### Key words:

Urban Agriculture; Urban design; land use; the production green land area; Tokyo



## The Transforming Processes of Kyoto, the Millennium Capital of Japan

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### Abstract

From 794 to 1869 Kyoto remained the capital of Japan. This presentation outlines the geographical change of Kyoto as the capital, from the end of the 8th century to the beginning of the 17th century. The capital started as a preplanned city. It modeled Changan, the capital of Tang, which was the Chinese dynasty at that time. Like Changan, the city streets had a grid pattern, which we can still find in the central part of Kyoto. However, unlike Changan, it did not have city walls. Even before a century had passed since its construction, the density of buildings within each grid got uneven. And as it was not surrounded by city walls, the city easily extended its areas into the suburbs. These new urban areas developed like clusters around temples and shrines. The resulting medieval Kyoto consisted of the remaining ancient city and these clusters. In the war-torn eras from the 15th to the 16th century, each cluster was surrounded by city walls, and became more cohesive within itself. From the late 16th to the early 17th century, gradually a unified power emerged and the battle of warlords ceased. In that process, Kyoto was surrounded by big city moats called "Odoi." A castle was built within the moats, and Kyoto thus became a large castle town.

### Key words:

Historical Geography; Kyoto; Transforming Processes

## Geocomputation in the Cloud Age: Recent Advances

### Oral



Home

1. [A Cyber Platform for Predictive Mapping](#)  
A-Xing Zhu (University of Wisconsin-Madison, United States)
2. [A Dynamic Method to Evaluate the Reliability of Crowdsourcing Sample data in Geospatial Modeling](#)  
Liu Jing (Santa Monica College, United States)
3. [A GIScience Hybrid Cloud Service to Advance Geographical Studies](#)  
Chaowei Yang (NSF Spatiotemporal Innovation Center, George Mason University, United States)
4. [A Modular and High-Performance Framework for Distributed Hydrological Modelling](#)  
Junzhi Liu (Nanjing Normal University, China)
5. [Accelerating Spatial Aggregation Query for Large-scale Moving Objects](#)  
Luo CHEN (National University of Defense Technology, China)
6. [Advancing Dust Storm Simulation and Analytics by Leveraging Advanced Computing Resources](#)  
Taylor George (George Mason University, United States)
7. [An Automatic Approach to Prototype-based Derivation of Fuzzy Slope Positions](#)  
Liangjun Zhu (IGSNRR, China)
8. [Computation of Massive Spatial ABM Driven by Dynamic Data: Challenges and Solutions](#)  
Huayi WU (Wuhan University, China)
9. [Improving Computation Efficiency of Geospatial Modeling Forest Landscape Change at Regional Scales](#)  
Hongshi He (University of Missouri, United States)
10. [Landscape Builder: Software for the Creation of Initial Landscapes for LANDIS](#)  
William D. Dijak (USDA Forest Service, United States)
11. [Real-time Parallelization of Spatial Interaction ABMs with High Velocity of Spatial Big Data](#)  
Jean-Claude Thill (University of North Carolina at Charlotte, United States)
12. [Toward Easier Geographic Computing using the Parallel Cartographic Modeling Language](#)  
Eric Shook (University of Minnesota, United States)

## A Cyber Platform for Predictive Mapping

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### Abstract

Predictive mapping (such as digital soil mapping, landslide susceptibility mapping and habitat suitability mapping) involves complicated inference models and tedious data preparation processes. Recent demands and trends calls for an ease-of-use and high-performance software platform for predictive mapping. This paper presents a novel predictive mapping platform, CyberSoLIM, which provides a heuristically driven, visually assisted, high performance computing enabled cyber environment for digital soil mapping. CyberSoLIM consists of one knowledgebase, two databases and five modules. The knowledgebase contains the knowledge on DSM modeling processes and knowledge on data processing. The two databases, one contains the web services which wrap parallel computing enabled programs of inference model and data preparation algorithms, and the other contains field samples and the spatial data describing the environmental covariates. The five modules include visualization of model building, heuristic model building, workflow execution, information publish and display, and data management. CyberSoLIM was applied to infer the silt content in top soil (0-20 cm) in Anhui Province of China as a form of evaluating its ease-of-use and high-performance capability. This case study shows that CyberSoLIM is easy in user experience and efficient in mapping productivity. Of course, the accuracy of the product depends on the inference method used.

### Key words:

predictive mapping; digital soil mapping; high performance computing

## A Dynamic Method to Evaluate the Reliability of Crowdsourcing Sample data in Geospatial Modeling

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### Abstract

It is an emerging interest to use crowdsourcing sample data in geospatial modeling. Since sample data from various sources were collected in different levels of quality, and legacy data may become outdated, it is necessary to dynamically evaluate sample reliability. The study developed a method to evaluate and update the reliability of crowdsourcing sample points in digital soil mapping (DSM). Based on the assumption that similar environmental conditions correspond with similar soil, the reliability of a soil sample point is defined as the repeatability of the Soil-Environment relations at the sample location. The reliability of a sample point was first initiated with a middle value (i.e. 0.5); if the value of targeted soil property of the sample point can be replicated at other environmentally similar sample locations (i.e. supportive points can be found), its reliability was increased; otherwise, the reliabilities of both the point and the conflicting point were reduced. The method was tested in Anhui Province, China. 570 soil sample points from four sources were collected since 1970s. The reliabilities of sample points were evaluated and updated in a temporal order. A reliability threshold was set to select the sample points used in DSM methods. At any point in time, the predicted soil property maps were more accurate if only using reliable sample points; the prediction uncertainty was also more indicative to prediction accuracy. It is concluded that the method is effective in evaluating the reliability of crowdsourcing sample data and can be used in other geospatial modeling applications.

### Key words:

crowdsourcing; reliability evaluation; dynamic; digital soil mapping



## A GIScience Hybrid Cloud Service to Advance Geographical Studies

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### Abstract

Cloud Computing becomes a paradigm shift for providing computing support to scientific research and engineering developments. Geographical study started to benefit from this innovation and join in the advancement of cloud computing in the past few years. To best leverage cloud computing for geographical studies, we built a hybrid cloud computing facility at the Spatiotemporal Innovation Centre, the first NSF innovation center chartered to the GIS domain with base at George Mason, Harvard, and UC-Santa Barbara. The facility includes over 500 computing nodes, over 6000 CPU cores, ~2 PB storage, and networking of two 20Gbps internal and one 10Gbps connection to the Internet 2 backbone. It has enabled many research including the big data container and planetary defense studies for NASA, EarthCube Integration and Testbed Environment for NSF, Semantic Testbed for ESIP, deep learning and user profile mining for ocean and land sciences, and many others. As the largest of its kind dedicated to GIScience and Geography studies, we expect the hybrid cloud service to provide leading service to our domain in the next 5 to 10 years. We are opening its usage for the general geographical domain. Application to use the hybrid cloud service can be submitted at <http://cloud.gmu.edu/>.

### Key words:

spatiotemporal computing; hybrid cloud; geographical study; GIScience

## A Modular and High-Performance Framework for Distributed Hydrological Modelling

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### Abstract

Modular hydrological modelling has become an important trend in recent years, and numerous modular modelling frameworks such as OMS and OpenMI have been developed. However, existing hydrological modelling frameworks seldom consider the use of parallel computing techniques. This has hindered their application in high-resolution hydrological modelling over large watersheds. In this paper, a modular and high-performance framework for one common type of distributed hydrological models was proposed. In this type of model, routing is performed sequentially from upstream simulation units to downstream simulation units. Firstly, the modular architecture was designed. A set of standard interfaces for each module was proposed and the data structure used to store the information of spatial simulation units and the interactions among them was defined. Then, a two-level parallel computing framework oriented to this type of hydrological models was constructed, in which parallelizability at both the sub-basin level and the basic simulation-unit level (e.g., the grid-cell level) can be utilized simultaneously. Finally, this framework was tested in two real-world applications using different types of spatial simulation units (i.e. grid-cells and irregular polygons) and model structures (i.e. one for long term daily simulation and the other for high temporal-resolution storm simulation). The framework proposed in this paper illustrated how to achieve high-performance parallel computation in a modular modelling framework, and can provide a methodological reference for analogous studies.

### Key words:

Hydrological modelling; modular; parallel computing; framework

## Accelerating Spatial Aggregation Query for Large-scale Moving Objects

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### Abstract

Spatial temporal aggregation (STA) query is a common but very important functionality in many emerging geo-spatial applications. Given a spatial temporal data set  $R$  and a user-defined spatial temporal query window  $(q, t)$  in certain scale  $s$ , STA aims to retrieve the statistical information of all records overlapping with  $(q, t)$  at  $s$ . A typical STA operation is “present the distribution of the number of taxis with speed less than 5 kilometers per hour in Changsha City during a given day at current viewport and with 5 minute intervals”.

The fast progress of location acquisition technologies have led to an explosion of spatial temporal datasets, which brings new challenges in efficiently answering exploratory STA queries in large spatial temporal databases. Exploratory STA may emit the query at multiple spatio-temporal scale to investigate the general or detailed knowledge of the observed dataset; this leads to heavy computational and space cost and requires expensive aggregate operations.

The works studied so far can roughly be classified in two categories: one is to improve the query performance with hierarchical disk-based data structures, such as aR tree, MR-tree, MRA-tree, aP-tree, aRB-tree and nano-cube index. These methods use a top-down manner to answer the aggregation query with high level index nodes and avoid accessing the raw spatial temporal data as far as possible. The other approach is to take the advantage of modern parallel computing infrastructure, such as multi-core CPU and many core GPU, MapReduce. All the above works aim to produce the exact answer to the STA query, which takes very high computational cost. We observe that in many cases, the approximate query is more useful to the application, especially in exploratory query scenario with time-critical response requirements, which provides approximate but meaningful answers.

In this abstract, we make the investigation to the problem of accelerating exploratory STA query with approximate answer for massive moving object data streams. Our works are summarized as follows: 1. We introduce a hybrid quad-tree/B-tree based cube pyramid structure to set up the multi-scale indexing of spatial temporal domain for massive moving objects, and to facilitate the updating of the spatial temporal locations. 2. We develop a scale-adaptive algorithm to quickly answer the STA query at any exploratory scale with bounded error estimation. 3. To further improve system performance, we propose a parallel strategy for multi-core CPU clusters to process large scale STA queries.

### Key words:

pyra-cube; spatial temporal aggregation; scale-adaptive algorithm

## Advancing Dust Storm Simulation and Analytics by Leveraging Advanced Computing Resources

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### Abstract

Dust storm represents a serious hazard to health, personal property and the environment. To mitigate the hazard, dust models simulate and predict upcoming dust storm events and assess the uncertainty. The simulation of dust storms is intrinsically computing intensive because it utilizes massive data inputs from ground and atmospheric conditions and conducts numerous iterations of the same set of numerical calculations. If higher spatial and temporal resolution is needed, the execution time to generate a simulation result is unacceptably long. To provide real time simulation results for decision-making purposes, advanced computing resources (e.g., High Performance Computing, Cloud Computing) are utilized accelerate the computing process. A framework of Big Data management, processing and visualization is developed based on advanced computing resources. This proposed framework benefits dust storm simulation and analytics in three ways: (i) integration of real-time observations as initial conditions on the fly, resulting in more accurate and complete simulations; (ii) effective management of large input and output datasets, with high-performance selective queries *via* progressive streaming techniques on distributed data storage; and (iii) advancement of three-dimensional visualization and analytical capabilities of simulation outputs. The leveraging of advanced computing resources in dust storm studies fosters interdisciplinary collaborations involving expertise in atmospheric sciences, public health and public policy.

### Key words:

dust storm; simulation; advanced computing; big data; high performance computing; cloud computing

## An Automatic Approach to Prototype-based Derivation of Fuzzy Slope Positions

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### Abstract

Fuzzy characterization of slope positions (e.g., ridge, backslope, and footslope) can provide important terrain information for geographic modeling. Among existing methods to deriving fuzzy slope positions, the prototype-based inference method is more reasonable because of not only its inference in both spatial and attribute domain, but also its use of the typical locations as prototypes, which inherently contain the characteristics of the slope position distribution in a study area. However, the practicability of the prototype-based method is currently limited due to the manual operations and parameter-settings, such as preparing topographic attributes as input, finding prototypes of slope positions, and setting parameters for fuzzy inference. This study proposes an approach to automate the whole workflow of the prototype-based method. Instead of being determined totally by user in the original method, in the proposed approach the typical locations and the fuzzy inference parameters for each slope position type can be automatically determined based on the frequency distribution of topographic attributes and a rule set of prior expert knowledge. Furthermore, the preparation of necessary topographic attributes is automated, which means that the proposed automatic approach needs only one necessary input, i.e. the digital elevation model (DEM) of the study area. The proposed approach is implemented as a configurable Python script to organize the workflow, when all of the compute-intensive procedures are speeded up by parallel computing based on message passing interface (MPI). A case study shows that this approach can derive fuzzy slope positions reasonably and efficiently.

### Keywords:

digital terrain analysis; slope position; fuzzy membership; automation; parallel computing

## Computation of Massive Spatial ABM Driven by Dynamic Data: Challenges and Solutions

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### Abstract

Significant computation challenges occur when agent-based models (ABMs) become extensively complicated and dynamic observation data are as part of the input of the model. For example, best route is subject to change on the run while dynamic traffic information of the road network is considered. More accurate simulation results with less computing time are desirable. Here are two fundamental problems for this computation: 1) How to integrate near real-time observation data into spatial-explicit ABMs effectively? 2) How to address the problem of massive data storage and intensive computing demand?

A distributed dynamic-data driven simulation and analysis system (4D-SAS) was proposed for massive spatial agent-based modeling to support real-time representation and analysis of geospatial phenomena. 4D-SAS consists of three components: distributed spatiotemporal database (DiSTDB), distributed ABM simulation engine (DiSIME), and visualization & online analysis UI (VAUI). The DiSTDB adopts an object-oriented spatiotemporal data model to support real-time observations data warehousing through powerful streaming channels, which is the foundation for DiSIME to query up-to-date information to update agent context. The DiSIME employs high performance computing to improve simulation performance. It can automatically decompose simulation tasks and distributes them among computing nodes following two common schemes: order division or spatial decomposition. The VAUI was developed to help clients understand model execution and model outputs efficiently, including animated display, spatial-temporal statistics tools.

Two ABM examples, an en-route choice model and a forest fire propagation model, were created on 4D-SAS to evaluate the system's efficiency and scalability. Simulation results illustrate that 4D-SAS provides an efficient platform for dynamic data-driven geospatial modeling, e.g. both discrete multi-agent simulation and grid-based cellular automata, demonstrating efficient support for massive parallel simulation.

### Key words:

Agent-based model; Distributed simulation; Dynamic-data driven; online visualization

## Improving Computation Efficiency of Geospatial Modeling Forest Landscape Change at Regional Scales

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### Abstract

Geospatial modeling has benefited greatly from ongoing advances of computer technology and software engineering. However, computer memory overhead and run time efficiency are primary limiting factors when applying spatially explicit forest landscape models (FLMs) to simulate large region with fine spatial resolutions. We introduce LANDIS PRO, a landscape model that simulates forest succession and disturbances on a wide range of spatial and temporal scales. LANDIS PRO improves on existing FLMs with new data structures and algorithms (hash table and run-length compression). The innovative computer design enables LANDIS PRO to simulate very large (>200 million ha) landscapes with a 100-m spatial resolution, which to our knowledge no other raster forest landscape models can do. We demonstrate model behavior and performance through applications in the U.S. Central Hardwoods. The simulation results showed significant and variable effects of changing spatial extent on simulated forest succession patterns. Results highlighted the utility of a model like LANDIS PRO that is capable of efficiently simulating large landscapes and scaling up forest landscape processes to a common regional scale of analysis. The programming methodology presented here may significantly advance the development of next generation of forest landscape models.

### Keywords:

Geospatial modeling; forest landscape models; LANDIS Pro; U.S. Central hardwood forests

## Landscape Builder: Software for the Creation of Initial Landscapes for LANDIS

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### Abstract

Landscape Builder is used to create spatially explicit landscapes as starting conditions for LANDIS Pro 7.0 and LANDIS II landscape forest simulation models from classified satellite imagery and Forest Inventory and Analysis (FIA) data collected over multiple years. LANDIS Pro and LANDIS II models project future forest landscapes by simulating tree growth, tree species succession, disease, insects, fire, wind, and management disturbance. Landscape Builder uses inventory plot attributes from the FIA inventory database, FIA unit map, National Forest type map, National Forest size class map, land cover map, and landform map to assign FIA plot attributes to raster pixels representing a real forest landscape. In addition to creating a detailed map of current (initial) forest landscape conditions, the software produces specific files required for use in LANDIS Pro 7.0 or LANDIS II format. By restructuring forest inventory plot data sets, the software can be used to create initial forest maps and associated files for other countries. Other tools include the ability to create a dominant species and age-class map from previously created LANDIS maps, a tool to create a dominant species and age-class map from a stand map and field plot data, and a tool to convert between Esri ascii rasters and Erdas file format types. The program is stand-alone software with a user friendly interface written in Visual Basic and Ansi C and is available as a free download.

### Key words:

Geospatial modeling; Landscape Builder; Landis; initial landscape

## Real-time Parallelization of Spatial Interaction ABMs with High Velocity of Spatial Big Data

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### Abstract

Spatial interactions are omnipresent in a wide range of geographic phenomena from individual communication and information exchange to transportation flows and human migration at a more aggregated level, and from trading between regions and countries on the earth to the gravitational interaction between celestial bodies at the largest scale. Agent-based models (ABMs) are well suited to capture the complexity of spatial interaction systems, because they characterize the spatiotemporal dynamics of global patterns emerged from local processes involving spatially distributed entities and the feedbacks of global emergent to the development of local interactions. Previous research has been dedicated to improving the scalability of spatial ABMs fed with big spatial data by taking advantage of various parallel computing resources in the emerging cyberinfrastructure (Gong et al., 2013; Gong et al., 2015). Specifically, the special parallel paradigm of Non-Uniform Memory Access (NUMA) has been proposed to tackle the uneven distribution of computing overhead due to the heterogeneous patterns of spatial interactions. The known structure and its constancy of interaction patterns is presumed, so that the optimized decomposition and allocation of spatial domains across computing resources can be performed to minimize the data access cost and enhance scalability. However, big spatial data feature not only large data volumes but also high velocity, such as real-time traffic information, meaning that data streams come in so fast with ever-changing patterns that are almost impossible to be predicted. This new challenge points out the deficiency of existing parallelization paradigms or approaches whose performance gain stems from determining the optimal parallelization strategy given an interaction pattern; yet, it cannot keep up with the pace of pattern change of incoming data. In this study, we propose to employ a new many-core co-processing platform, Many Integrated Core (MIC) coprocessors, to resolve the real-time parallelization of spatial interaction ABMs with high velocity of spatial big data. The MIC platform provides dedicated enhancement for non-homogenous data access patterns without the interference of external optimization strategies for data access cost. This allows the external parallelization strategy to focus on domain decomposition and load balance. By comparing the proposed paradigm applied to an ABM of spatial interactions with the previous NUMA paradigm, we demonstrate the superiority of the MIC platform over others with respect to the scalability of parallel processing of real-time spatial interaction data.

## Toward Easier Geographic Computing using the Parallel Cartographic Modeling

### Language

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#### Abstract

Leveraging cloud and high-performance computing (HPC) environments for geospatial information processing is challenging. Geographers and geographic information scientists (GIScientists) must gain deep understanding of both parallel computation and geospatial analytics to develop effective parallel methods that balance computational workloads amongst multiple processing cores and handle big spatial data. Eliminating the need for deep understanding of parallel computation will make it easier for GIScientists to exploit these computational environments leading to advances in geocomputation and new scientific discoveries. To achieve this goal, a new domain-specific language is established called the Parallel Cartographic Modeling Language (PCML), which is designed to be easy to use, easy to develop, and scalable for handling big spatial data. PCML extends the well-known Cartographic Modeling Framework to make it easy for GIScientists to use. PCML is developed in the Python programming language to make it easy to develop new methods. PCML supports automatic parallelization to enable scalable geographic information processing without requiring deep understanding of parallel computation. This paper will discuss how PCML achieves automatic parallelization through the use of a novel methodology for parallelizing spatial data processing called parallel cartographic modeling. Using several examples ranging from processing spatially-explicit social media data to digital elevation models, the paper highlights current challenges and potential opportunities in leveraging HPC from both parallel computing and geospatial analytics perspectives with specific focus on usability and automatic parallelization for geographic information processing.

#### Key words:

Geocomputation; parallel computation; cartographic modeling; PCML

## IGU Project Our Sustainable Cities/Oursus: International & Chinese Experiences



Home

### Oral

1. [A Method of High Resolution Urban Region Remote Sensing Image Segmentation](#)  
Shu Zhu; Shaoda Li; Ronghao Yang (College of Earth Sciences, Chengdu University of Technology, Chengdu, 610059, P.R. China, China)
2. [Analyzing Sustainable Cities by Comparing Two Chinese Experiences: Beijing versus Changsha](#)  
Li Qiu; Xiao Ma (Hunan University, China)
3. [Evolution of Spatio-temporal Association Structure of Urban Coordination Degree in Shaanxi Province](#)  
Jinhui JIA (College of Tourism and Environmental, Shaanxi Normal University, China)
4. [From Fragmental Knowledge to Integrated Issues in Sustainable Development Communication-- Rethinking the Popularization of Science for Geographers](#)  
Li Qiu (Hunan University, China); Ton Dietz (Leiden University, the Netherlands)
5. [Mapping, Sharing and Networking of Amsterdam Sustainable Initiatives](#)  
Lianne Hulsebosch (University Of Amsterdam, Netherlands)
6. [Sustainable City Initiatives in Africa: An Exploration and Comparison with the OURSUS Approach](#)  
A.J. (Ton) Dietz (African Studies Centre, Netherlands)
7. [Sharing Economy: A New Idea for Chinese New-type Urbanization](#)  
Wanling Huang; Chunshan Zhou (School of Geography Sciences and Planning, Sun Yat-sen University, China)
8. [Solar Is The Way –Directions For Future Ready India](#)  
Jag Mohan Arya (Bhim Rao Ambedkar College, Delhi University, India)
9. [Strategies to Improve the Urban Sustainability: Case Studies from Germany](#)  
Dietrich Soyey (Inst. of Geography, University of Cologne, Germany)
10. [Sustainable Development Projects in the City of Riyadh, Saudi Arabia](#)  
MohammadShawqi Makki (SGS, Saudi Arabia)

### Poster

1. [Evaluation on Construction Land Intensive Use in Guangzhou City](#)  
Jialiang Zhong (China, Guangzhou University)

## A Method of High Resolution Urban Region Remote Sensing Image Segmentation

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### Abstract

Sustainable urban development is the fundamental guarantee for the sustainable development of human society. With the popularization and cutting-edge researches of high resolution (HR) remote sensing image and its application, HR image is gradually and widely employed in urban planning and construction which contribute to sustainable urban development. Taking diversity and complexity of HR image, especially urban region into consideration, as well as advance in image resolution resulting in more abundant surface feature details and diverse scale processing requirements, a new method was design to split HR urban region remote sensing image. The new method integrated region growing algorithm with Gray-Level Co-occurrence Matrix (GLCM) from the perspective of multiscale. To improve original growing principle, it calculated GLCM and corresponding texture statistical features of R, G and B bands respectively then adopted their average values. To acquire global and local information of the image, it employed multiscale segmentation idea that assigned a proper scale parameter described by pixel and texture feature values to various ground objects like buildings and green areas to achieve a better division. The experimental result manifested the usage of RGB image GLCM and its statistical features rather than homogeneous gray level information as growing criterion raised splitting accuracy and precision in region growing process. Moreover, scale parameter was propitious to abstract diverse urban features with distinct spatial and spectral dimensions.

### Key words:

sustainable urban development; high resolution remote sensing image; region growing; gray-level co-occurrence matrix; multiscale segmentation

## Analyzing Sustainable Cities by Comparing Two Chinese Experiences: Beijing versus Changsha

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### Abstract

Generally speaking, a sustainable city is an eco-friendly, balanced and intensive human settlement. Nowadays, many cities have taken initiatives to achieve more sustainable development or to become sustainable cities. However, no standard definition of sustainable city is widely accepted and few efforts have been made to actually measure achievements in these so-called sustainable cities. This paper adopts seven sustainable cities' dimensions to definite what sustainable cities are. The methodology is based on an over view of these dimensions though reviewing different reference of sustainable city index and analysis the data via OURSUS project which is a data base has collected possible open access knowledge of the two cities by volunteers' devotion. And then describe the degree of Beijing and Changsha's sustainable development, using these dimensions and analysis. The study concludes that Beijing and Changsha are making great changes towards sustainable development but they often focus on only a few dimensions of the development. Based on data and text collected from the two cities, we can analyze and learn from these experiences for developing the sustainable cities of the future. Meanwhile, both of them face some unsettled problems and should be constructed on the basis of its weak points to achieve healthier and optimum development.

### Key words:

sustainable city; sustainable development; Beijing; Changsha; sustainable policies

## Evolution of Spatio-temporal Association Structure of Urban Coordination Degree in Shaanxi Province

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### Abstract

This paper selects Shaanxi Province as empirical area, uses each county of Shaanxi Province statistical data, based on a comprehensive coordination index system of town development which has four parameters of population, economy land, society, through entropy method, integrated comprehensive evaluating, spatio-temporal autocorrelation techniques and Arcgis spatial analysis methods, uses four time sections (from 2000, 2005, 2010, 2015), study the spatio-temporal association structure and evolution of county coordination degree. There are some conclusions about this paper: ①The coordinate index in cities and towns of Shaanxi Province is on the rise and coordination of regional difference is larger. Its space distribution is related to the Shaanxi three geographic area; ②The distribution difference and its change of local spatio-temporal association types of county potential are obvious. The spatio-temporal HH type units are larger and begin to appear new Spatio-temporal LL type units. The spatio-temporal heterogeneity area changes significantly. ③Economic development level, people's income level and urbanization level are the important reasons for the coordinated development of Shaanxi towns. And the low utility efficiency of urban land resources and unreasonable industrial structure are the key factors restricting the coordination development of Shaanxi towns.

### Key words:

coordination degree; spatio-temporal autocorrelation ; spatio-temporal association structure; Shaanxi Province

## From Fragmental Knowledge to Integrated Issues in Sustainable Development Communication

### --Rethinking the Popularization of Science for Geographers

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#### Abstract

Sustainable development (SD) communication is one of the most important elements in general education, which helps to construct sustainability cognition and ecological behavior in being a sustainable society. With the rapid development of internet communication technology, such as we-media, blog, internet publication, more and more SD knowledge are produced by different individuals or agencies. It is possible for the public to accept massive knowledge in understanding the reality, changing cognitions and devoting actions for free or low cost. While in the fact, most of the open SD knowledge is fragmented into different pieces because of its diversification and flooded under the internet by other more attractive information such as entertainment or shock news. The public are limited to benefit from the open access and be cultivated into public awareness of SD. To solve this problem, some nonprofit organizations are attempting to build up platforms to attract experts and volunteers to share SD knowledge and do the popularization of science; some pioneer governments from the top to bottom way to collect SD knowledge and build up experts' network or sustainable cities network. All the attempts are helpful for the public to get the holistic view of SD and construct understanding by themselves.

The geography discipline covers or contains most sustainability issues, and geographer is the natural General Educator to sustainable development. International Geography Union (IGU) as the biggest organization of geographers has its mission to fulfill the responsibility in improving the depth and breadth of the popularization of science in sustainable development. Since 2012, during the 32th international congress in Cologne, IGU committee reached a consensus to try a platform named OURSUS in the brief meaning of Our Sustainable Society, with two websites named OURSUS.org in English and oursus.org.cn in Chinese, purposing on mobilization of knowledge-sharing from geographers and help them to integrate knowledge into different issues to assist general education or popularization. To obtain the purpose, we have continued experiencing on system design, open data collecting and testing based on volunteers' devotion. Until now, we have built up a functional system and collected thousands of articles from open access and produced 120 'special issues' of SD. We invited 20 undergraduate volunteers who are very interested in sustainable development to evaluate the issues. The research results showed that the platform is very strong with helping users (might be geographers) to collecting interesting SD knowledge by individual tags and producing structure knowledge blocks by making 'special issues'. We believe that if geographers would use this platform to learn by themselves, prepare lessons or popular science, it will exert a great effect in SD communication and education.

#### Key words:

Sustainable Development Communication; Knowledge Sharing; Popularization of Science; General Education

## Mapping, Sharing and Networking of Amsterdam Sustainable City Initiatives

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### Abstract

The strive for higher levels of urban sustainability constitutes one of the most important priorities for city administrations, politicians and citizens all over the world. At the local level of individual cities multiple initiatives are taken place. The chosen approaches vary considerably between cities, due to, among others, geographical and cultural settings, governance issues, funding and network possibilities. As such, developers of sustainable city initiatives can learn much from other experiences elsewhere or within the same context. This makes the exchange of information about achievements, challenges, and failures highly desirable.

This paper focuses on Amsterdam, the Netherlands. In Amsterdam there are many actors involved in developing sustainable initiatives, such as the Amsterdam Investment Fund (municipality), the Urban Cycling Institute (University of Amsterdam) and the Dakdokters (Private sector). Initiatives such as these require time, funds and energy for developing, exploring, learning, implementation and improvement. In this paper, we search how developers can learn from other experiences elsewhere or within the same context. Collecting and sharing information on successful or less successful cases and understanding of communication within and across disciplines is therefore crucial. In addition the paper aims to search for strengthening the links between various Amsterdam-based actors in the field of urban sustainability, including the municipality, private commercial sector, informal non-profit initiatives and academia.

### Key words:

Sustainability Initiatives; Platforms; Mapping and Sharing; Multidisciplinary communication



## Sharing Economy: A New Idea for Chinese New-type Urbanization

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### Abstract

As Mobile Internet, cloud computing and virtual social network are becoming more and more popular in the cities at all levels and even in rural areas, the sharing economy has gained widespread attention around the world. Also, it was included in the 13th Five Year Plan put forward by the Chinese Government. Sharing Economy is based on the idea of using rather than possession. It takes full advantage of the market platform established by the third-party to integrate idle resources. And then it provides customers in need with these resources at a cost, by which it allocates resources evenly and improves the use efficiency of assets, skills, time, etc. The process of China's urbanization has seen the allocation of resources excessive concentration, environmental resources bearing capacity, unbalanced regional development and other issues. Thus, Chinese new-type urbanization was put forward as a mode of urbanization to solve these problems. The sharing economy has exerted significant enlightenment on Chinese new-type urbanization in all aspects. By improving the resource sharing and collaborative efficiency in the process of China's urbanization through sharing economy, traditional thinking and mode of economic growth can be changed, stimulating domestic demand. Moreover, it can promote business innovation and tertiary industry development, improve the urban and rural residents' quality of life, promote the coordinated development of regional economy, save resources and reduce energy consumption and optimize the structure of labour force. Besides, the extension of sharing economy can provide fresh ideas for urban planning and management.

### Key words:

sharing economy; Chinese new-type urbanization; sustainable development;

## Solar Is the Way –Directions for Future Ready India

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### Abstract

According to the International Energy Agency India will add between 600 GW to 1,200 GW of additional new power generation capacity before 2050. The technologies and fuel sources India adopts, as it adds this electricity generation capacity, may make significant impact to global resource usage and environmental issues. Traditionally electricity in India has been produced using coal. Smoke from thermal power plants and from burning of fuelwood, agricultural waste and biomass cakes for cooking and general heating needs by the poor households releases high levels of smoke, PM10 particulate matter, NOX, SOX, PAHs, polyaromatics, formaldehyde, carbon monoxide and other air pollutants into the atmosphere. Solar electricity sector may help find a sustainable alternative to traditional fuel burning, requiring zero input and one time investment in equipment. According to WHO, 300,000 to 400,000 people in India die of indoor air pollution and carbon monoxide poisoning every year. Fuel burning releases pollutants 5 to 15 times higher than industrial combustion of coal, thereby affecting outdoor air quality, haze and smog, chronic health problems, damage to forests, ecosystems and global climate. Burning of biomass and firewood will not stop, unless electricity or clean burning fuel and combustion technologies become reliably available and widely adopted in rural and urban India. A Solar City aims at minimum 10% reduction in projected demand of conventional energy at the end of five years, through a combination of enhancing supply from renewable energy sources in the city and energy efficiency measures. The basic aim is to make residents adopt renewable energy technologies and energy efficiency measures in their daily lives- for cooking, water heating, running electrical gadgets etc. In a Solar City all types of renewable energy based projects using solar, wind, biomass, small hydro, waste to energy are installed and supplied to the local population. 48 Cities are being presently developed into solar cities. Zero production of thermal power is sure to lower the air pollution levels. Solar cities are the cheapest and smartest solution for sustainable green energy development of urban areas in developing countries in the energy deficient future.

A survey of the households using solar power to light their homes bring forth interesting facts: the people using solar power naturally become more sensitive towards environment, the carbon footprint of such cities decreases naturally; people become more inclined towards adoption of eco-friendly technology like LED etc.

### Key words:

energy efficiency; solar city; green energy

## Strategies to Improve the Urban Sustainability: Case Studies from Germany

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### Abstract

'Sustainable City' has become a buzzword in Germany as in many other countries, thus possibly serving more to hide what the strategies and the objectives are actually about than providing valuable explanations. A closer look into what is going on in different fields, however, is intended to be enlightening for observers from abroad.

The aim of the paper is to present paradigmatic achievements and issues at three levels in Germany: (1) Department level geographical research at the cutting edge of sustainability with examples from urban and periurban agriculture in Germany and Africa; (2) City level themes and issues from one of Germany's 'green model cities', where urban sustainability projects have become touristic 'sustainability destinations' for researchers, bureaucrats and practitioners from all over the world, and, finally, (3) National association level joint endeavours to create forms of interaction and experience exchange between hundreds of German cities and towns.

### Key words:

Urban sustainability strategies; German case studies

## Sustainable City Initiatives in Africa: An Exploration and Comparison with the OURSUS Approach

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### Abstract

Africa's cities have grown very fast. In 1960, during a period when most African countries became Independent, Africa's urban population was just 20%: 65 million out of the Continent's 325 million inhabitants. Currently the urban population has grown to almost 500 million out of 1.2 billion, and soon more than half of Africa's population will be living in cities, and many among them in metropolises of more than one million inhabitants. Demographic predictions show a rapid further growth and it is not unlikely that Africa in 2050 will have 1.2 billion urban people, out of its expected 2 to 2.4 billion. Many African cities can be found along its coasts, and in other vulnerable places. Africa's cities cope with huge demands and challenges, with many unplanned residential areas, and many dangerous working and living conditions. Coping with climate change is only one of their problems. However, also African cities try to be or become 'green cities', and promote changes in urban design and lifestyles that try to become more sustainable. In this paper the results of an exploration will be presented, based on information on websites and digitally available scientific and other types of publications. Special attention will be given to the African Green City Index (by the Economist Intelligence Unit, sponsored by Siemens), and its approach will be compared with the OURSUS approach, developed under the umbrella of IGU.

### Key words:

sustainable cities; oursus; Africa



## Sustainable Development Projects in the City of Riyadh, Saudi Arabia

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### Abstract

The paper attempts to consolidate the architectural heritage in the Kingdom of Saudi Arabia by giving examples of the components of urban civilization dating back to ancient times, then move to the gaps and discontinuity between the authenticity of this heritage and urban updated strange combinations on the local environment and that created some disharmony in cities components. There is an attempt to identify the causes of this disharmony.

This paper also exposed to modern efforts formal and informal to create a kind of harmony in the cities combinations by undertaking several policies to maintain the architectural heritage. In spite of these efforts, it seems that there is a lot of work required to achieve balance in the urban growth that combines conservative and modernity for the benefit of human and place.

### Key words:

Saudi Arabia; heritage; development; tourism



## Evaluation on Construction Land Intensive Use in Guangzhou City

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### Abstract

China is one of the countries which of land resources is shortly and urban construction land are used extensively and inefficiently in the preliminary stages of the urbanization process. Taking the central urban area of Guangzhou City as an example, this text use an evaluation index system of land intensive use, which is reasonable, and can be easily manipulated, to evaluate the level of land for urban construction use. Meanwhile, evaluate the construction land in city quantitatively, and communicate its intensity and potential by the software such as ERDAS2010, SPSS and so on. Finally, combined with the actual situation in Guangzhou city , put forward that the ways to promote land intensive use.

### Key words:

construction land; evaluation of land intensive use; Guangzhou city



## IGU Project Our Sustainable Cities/Oursus : The Way Forward

### Oral



[Home](#)

1. [The Political Geography of Urban Sustainability](#)

Virginie Mamadouh (University of Amsterdam, Netherlands); Takashi Yamazaki (Osaka City University, Japan)

## The Political Geography of Urban Sustainability

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### Abstract

Political geography can shed lights on the politics of urban sustainability. We'll discuss three domains. First political geography can help analyse the dynamics of local government. It should be stressed that this is not limited to the study of how a local government 'governs' a locality but that it also included research into the ways cities are involved in (multiscalar) networks of governance in many guises: cooperation between local governments in an agglomeration, policy networks between local and supralocal governments, regional and national governments and beyond with the European Union and international organisations such as the UN, as well as urban networks (i.e. networks of cities) over great distance and across state borders. Second political geography can help analyse grassroots actions engaged with sustainability issues. Finally in the subfield of critical geopolitics, it can help analyse and question the geographical imaginations and geopolitical representations of sustainability, including main threats and opportunities, key actors (state and non-state), and preferred strategies. A better understanding of the different facets of the politics of urban sustainability is necessary to enhance the circulation of (new) knowledge and (innovative) practices to create, maintain and improve sustainable cities.

### Key words:

urban sustainability; political geography; critical geography

## Forum for Think Tank of International Scientists Union of “the Belt and Road Initiative”



Home

### Oral

1. [Agricultural Development Pattern and Research Cooperation Mode along ‘The Belt, the Road’ Region](#)  
Fujia Li (The Institute of Geographic Sciences and Natural Resources Research, China)
2. [Data Sharing and Collaborative Innovation Information Network Platform in OBOR Area](#)  
Wang Juanle; Jiulin Sun (Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, China)
3. [Development Patterns and Countermeasures of the Construction of the Silk Road International Ecotourism Zone](#)  
Dong SC; Zhao MY (Institute of Geographic and Natural Resources Research, Beijing, 100101, P. R. China); Guo P (National Tourism Administration, Beijing 100740, P. R. China); Li Y; Li ZH (Institute of Geographic and Natural Resources Research, Beijing, 100101, P. R. China)
4. [Ecological-Economical Estimation of Ecosystem Services Demand in the Baikal Region](#)  
Anna Mikheeva (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
5. [Environmental Vulnerabilities and their Adaptation Strategies in Mongolia](#)  
WANG Qinxue (Center for Regional Environmental Research, National Institute for Environmental Studies, Japan, Japan)
6. [Features and Prospects of Transborder Tourist Sevelopment in the Zone of Influence of the Silk Road and Tea Road](#)  
Ludmila Maksanova (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
7. [Geographical Factors of Urbanization and Communicative Processes between Russia and China within the Area of Potential Impact of the Great Silk Road](#)  
Leonid Bezrukov (Sochava Institute of Geography, Siberia Branch, Russian Academy of Sciences, Russia)
8. [Green Development Modes of “One Belt One Road” Initiative](#)  
Dong Suocheng (IGSNRR, China)
9. [Is there an Environmental Kuznets Curve for the Silk Road Economic Belt Countries?](#)  
Fei Li (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of

Sciences, China)

10. [Structure and Ecological Potential of Baikal part of Siberia's Geosystems](#)  
Igor Vladimirov (Sochava Institute of Geography, Siberia Branch, Russian Academy of Sciences, Russia)
11. [The Great Silk Road: History, Problems and Prospects](#)  
Arnold Tulohonov (Federation Council of the Russian Federation, Russia)
12. [The Infrastructure of the Russian-Mongolian Cross-border Area](#)  
Valentin Batomunkuev (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
13. [The Prerequisites and Priorities of Increase of Competitiveness of Border Regions of Russia in the Conditions of Globalization and Integration](#)  
Lubov Khandazhapova (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
14. [The Problems and Prospects of Development of Green Economy in Border Regions of Russia](#)  
Natalia Lubsanova (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
15. [The Transformation of Substances in Adaptive Reactions of Artemisia Species Plants, Growing in the Countries along the "Belt and Road Initiative"](#)  
Larisa Radnayeva (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)
16. [The Transformation of the Natural Environment in the Tea Road Corridor](#)  
Endon Garmaev (Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences, Russia)

## Poster

1. [Comparative Analysis of Traffic CO<sub>2</sub> Emissions on Different Grades Urban Road at Different Time Scales](#)  
Li Yu (China, IGSNRR, CAS)
2. [Current Situation and Suggestions to Promote Further Cooperation of Sino Russian Oil and Gas Cooperation](#)  
Yang Yang (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
3. [Informatization Patterns and Strategy of the Silk Road Economic Belt](#)

Hao Cheng (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

4. [Native Interpretation Attract Tourists Understanding Tibetan Conservation in Potatso National Park, China](#)

Minyan Zhao; Suocheng Dong (China, Institute of Geographic Sciences and Natural Resources Research)

5. [Study on China's Geopolitical Strategy Based on the Theory of Externality](#)

Huilu Yu; Suocheng Dong; Yu Li (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

6. [The Infrastructure Resources of Development of Border Areas](#)

Selmega Dagdanova (Russia, Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences)

7. [The Social Resources and Social Risks of Border Territories of Russia in New Economic Conditions](#)

Sembrika Dagbaeva (Russia, Baikal Institute of Nature Management, Siberia Branch, Russian Academy of Sciences)

## Agricultural Development Pattern and Research Cooperation Mode along ‘The Belt, the Road’ Region

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### Abstract

‘The Belt, the Road’ region, is connecting Europe, Asia and Africa, the route area of it with vast area and complicated ecological environment, which have rich agricultural resources and agricultural countries. Strengthening the agricultural cooperation of countries in ‘the Belt, the Road’ region can promote trade and the optimal allocation of production factors, which is great significance to the world food security, to social stability and economic development. But in recent, the studies are less on the time-space distribution of agricultural resources of the Belt, the Road Initiative, on international agricultural products trade, on the difficult situation of agricultural development in countries, on exploring the main demand of international agricultural cooperation, which is enough far from to provide support of science and technology, with strategic consulting for countries developing the future large-scale agricultural cooperation in the Belt, the Road Initiative.

Therefore, this study promote innovation mode and related policy for green agricultural cooperation in the Belt, the Road Initiative, with approach of advanced applicable technology, equipment and exports as the way, with gripper ‘high-tech’ green agriculture parks, with organizational mechanism of ‘international cooperation and development of national alliance for a green agriculture in the Belt, the Road Initiative’, which is based on the spatial pattern of national agricultural resources, advantages and difficulties of agricultural development, agricultural bilateral trade situation of cooperation for Chinese and major agricultural countries. The suggestion have strong theory value and realistic significance to promote optimal allocation of agricultural resources, to the discussing, sharing and building cooperation, to promote sustainable of economic and social development in the Belt, the Road region.

### Key words:

‘The Belt, the Road’; agriculture; cooperation



## Data Sharing and Collaborative Innovation Information Network Platform in OBOR

### Area

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### Abstract

One Belt and One Road (OBOR) area is involved in many countries, with large amount of population, unbalanced economy development level, fragile ecological environment, and diverse cultures. Under the dual stresses of environmental change and human activities, OBOR faces a serial of challenges, like global change, ecological deterioration, energy crisis, poverty, etc. Thus, it does need the decision support for the regional sustainable development. Data is the blood of research. Geo-science data sharing will contribute to the research and collaborative innovation in resource and environment field. The international scientist alliance of OBOR is ready for initiating to providing a platform for geo-data sharing and innovation generation. Universal standard system and data sharing mechanism was designed firstly. Second, huge geo-science data were accumulated in the alliance. These background data indicators included geographic location, administration division, landforms, soil, climate, lake and river, water resource, land resource, biology resource, mineral resource, tourist resource, nationality and religions, economy and social development, etc. Lots of science expedition data in the area were integrated in the platform as well, including Mongolia plateau land cover change and aridification monitoring, water resources and environment situation in Selenga river basin, etc. Third, a prototype of collaborative innovation information network platform is developed. One of the main purposes of this platform is to push the think tank development and support the decision of stakeholders along OBOR.

### Key words:

One Belt & One Road; data sharing; scientist alliance; collaborative innovation platform

## Development Patterns and Countermeasures of the Construction of the Silk Road

### International Ecotourism Zone

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#### Abstract

The international tourism cooperation of Silk Road began in the 90's of the last century, and strengthening tourism cooperation and expanding the scale of tourism has become the highlights of the cooperation of the "One Belt One Road " strategy. The Silk Road international ecotourism zone based on natural and cultural ecotourism resources, even point into line strung along the Silk Road International Eco tourism area network, and develops green industries which forest ecotourism as the leading factor. These will not only to promote the overall development of tourism resources, but also can solve the dilemma of ecological fragmentation and economic backwardness. Implementation of ecological civilization tourism model and comprehensive tourism model will realize the overall goal which constructs of two point four belts seven areas, and will become a new growth of strategic leading industry, will promote China's forest ecological economy and tourism industry transformation and upgrading strategy.

#### Key words:

Silk Road; international ecotourism zone; green industry

## Ecological-economical Estimation of Ecosystem Services Demand in Baikal Region

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### Abstract

For the Baikal region an integrated assessment of ecosystem services is due to the need to substantiate recommendations on improving environmental management, to put in place infrastructure facilities, construction of industrial complexes and tourist and recreational zones.

Currently, in the Baikal Lake region, important ecosystem services, for which markets are created, are the services to ensure high quality water, timber and non-timber forest products, biodiversity conservation and the services associated with the aesthetic properties of landscapes.

The main economic instruments are environmental fees for the maintenance of ecosystem services, which are charged with economic entities for the use of natural resources and provision of the negative impact on the environment. However, the collection of payments for ecosystem services is limited and predominantly associated with higher rates of water tax and fees for use of water bodies located in the basin of Lake Baikal.

The assessment of demand for water services has revealed a consistently high level of needs and peculiarities of the market, due to the observance of standards of maximum permissible harmful effects on the ecological system of Lake Baikal, and also showed the structural features of formation of cost and tariff rates for the enterprises of the regions under consideration.

The calculations showed that the highest valuation of ecosystem services is for biological resources, which is due to the implementation of the most important habitat-forming and security functions.

## Environmental Vulnerabilities and Their Adaptation Strategies in Mongolia

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### Abstract

Because a significant part of the country's population depends on climate-dependent sectors for livelihood, especially on pastoral livestock husbandry, Mongolia is one of the countries vulnerable to climate change. The objective of this study is to evaluate the vulnerabilities of ecosystems caused by climate change in Mongolia and put out some proposals on climate change adaptation strategies. The historical records show that the average annual temperature of Mongolia increased by 2.1°C since 1940. However, annual precipitation has decreased. Model results predict that further warming will continue if emissions of greenhouse gases continue. Area averaged mean annual temperature and precipitation of Mongolia predicted by five CMIP5 models (MIROC-ESM of Japan, NCAR-CCSM4 and NOAA-GFDL-CM3 of USA, BCC-CSM1.1 of China and MPI-M-ECHAM6 of Germany) from 2006 to 2100 shows a gradual increasing trend in both temperature and precipitation. Another significant feature is that climate system will become more and more unstable. This might indicate that the inter-annual variability of precipitation might be increasing, and the intensity of extreme event (drought, dzud, flood and heat wave duration) might be strengthened in the future.

Our research shows that Mongolia's fragile steppe ecosystems are being affected not only by rapid warming, but also by increased grazing pressures from livestock husbandry. Meanwhile, various sectors can also contribute to climate change, for example, loss of vegetation cover means a decreased absorption of CO<sub>2</sub>. Mining sectors, livestock husbandry and arable farming synergistically affect land use and land cover, and further deteriorating habitat quality, land productivity and ecosystem services. Our research also shows that different geographic regions are burdened with different sets of risks. Usually, this country was divided into five regions: Western, Khangai, Central, Eastern and Ulaanbaatar. Water-related changes associated with climate change will affect people in the arid and semi-arid regions more than Khangai region. Arable farming is limited to north central regions in Mongolia, which will be stressed by water shortage due to the increase of evapotranspiration. Desertification is the most important challenge in southern regions and surrounding areas of Ulaanbaatar City. Northern part of the country is vulnerable to permafrost melt because increased depth of thawing with its seasonal thaw-and-freeze cycle affects structural integrity of infrastructures.

To against these climate-related risks, we put out some strategies for climate change adaptation as follows:

- 1) To improve the monitoring capacity of climate and strengthen the early warning system with regard to extreme climatic events and weather conditions.
- 2) To improve the construction technologies to withstand permafrost melting, because the increased seasonal thawing depth (active layer) of permafrost makes a challenge to build a basic infrastructure in northern areas of Mongolia.
- 3) To train herders to keep suitable livestock number according to local grassland productivity. Alternative means, such as more productive livestock breeds, apiculture or orchard business should be explored.
- 4) To formulate legislative baseline (perhaps using a tax-based approach) to regulate pasture use and arable farming management. Grazing pressure will be disbursed with more water supplies for herders and livestock, thus creating more wells and water points in remote areas may decrease competition over pasture.
- 5) To develop and transfer more renewable energy technologies, such as the Film-solar Power System for Gel, Solar Powered Well Pump System, Permafrost Refrigeration System, may contribute to decreasing GHG, smog, and other pollutants are important for sustainable development and human health concerns.

## Features and Prospects of Transborder Tourist Development in the Zone of Influence of the Silk Road and Tea Road

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### Abstract

In modern conditions among the most important factors of international tourism development there is the implementation of cross-border tourism projects based on common historical, cultural and economic interests, and implemented under a single brand. The most significant international project is the "Silk Road", the implementation of which is being carried out for 20 years as part of the UNWTO Silk Road Programme for the 30 member states in Europe, Asia and the Middle East. In June, 2015 in Ufa at the tripartite meeting of the BRICS summit, the Russian President Vladimir Putin, the Chinese President Xi Jinping and the President of Mongolia Tsakhiagiin Elbegdorj noted the importance of international tourist route "The Great Tea Road" and supported a launch of a tourist train on this route.

The features and tendencies of the development of cross-border tourist routes unambiguously confirm that the tourist exchange between the peoples will never stop, and in matters of development we must take into account the characteristics that determine the current geopolitical and economic situation in the world and events in the international tourism market. In today's economic realities, "The Silk Road" and "The Great Tea Road", which are the longest transcontinental tourist routes, can be an effective tool in the context of co-development of "Belt and Road" new forms of international politics and economics.

In connection with this of high relevance are complex economic-geographical study of the processes of tourist development areas, the integration processes in the field of international tourism, the study of potential prospects and assessment of the impact of cross-border tourism projects and programs in the area of influence of the Great Silk Road and Great Tea Road.

## Geographical Factors of Urbanization and Communicative Processes between Russia and China within the Area of Potential Impact of the Great Silk Road

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### Abstract

We generalized the experience of geographical study of urban settlement and, in particular, of urban agglomerations formation within the Eurasian transboundary area (Russia, China, Kazakhstan, Mongolia), which can become a zone of the Great Silk Road's influence. The comparative analysis of the urban settlements dynamics and of agglomerations of model territories in Asiatic Russia and northern China is performed against the background of urban changes in Russia and China. It is shown how agglomerations use the economy-wide benefits as a result of the general capital, labor, real estate, information and consumer goods markets.

From the transport and logistics point of view we analyzed the competitiveness of the main international rail corridors, designed to provide latitude transit traffic between East Asia and Western Europe. We consider the development of optimal interaction schemes of the Trans-Siberian Railway and the Northern Corridor of the Great Silk Road to be effective in order to maximize the reduction of transport costs and efficient maintenance of cargo flows in the enormous large Eurasian region. Both transport corridors should help to intensify transboundary economic co-operation between the related parts of Russia, China and Kazakhstan, which is a promising direction of weakening unfavorable consequences of their inland location. The paper materials have been obtained during the joint Chinese-Russian expedition, made in August 2015 in northern China and in September 2015 in the Irkutsk agglomeration (Russian Federation), on the subject "*Economic-geographical analysis of urban agglomerations of Russia and China under the formation of New Silk Road*" (Project RFBR 15-56-53037-GFEN\_a (Russia) and the Project number in China ... ..)

## Green Development Modes of “One Belt One Road” Initiative

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### Abstract

Chinese President Xi Jinping raised the initiative of jointly building the Silk Road Economic Belt and the 21st-Century Maritime Silk Road (hereinafter referred to as one Belt one Road) in 2013, which has been supported by over sixty governments and heads of countries in the world. This paper analyzed the patterns of resources, environment and economy of about one hundred countries along “one Belt one Road” through spatial analysis by GIS and regional horizontal comparison method, and depicted the rule of territorial differentiation of one Belt one Road, as well as the characteristics of resources, environment and economy. As far as resources are concerned, countries along the Silk Road have inherent advantages in resources cooperation and huge development potentialities in resources market, due to their geographical adjacent features, close historical relationship, and the areas of resources consumption are not coupled with that of production. It is showed obviously characteristics that ecological environment of the eastern and western part of one Belt one Road are in relatively higher quality and partial regions are heavily polluted, but the central part is drought and ecologically fragile, there being an remarkable feature of atmospheric pollutants transporting cross-border from Europe in the west to Asia in the east, throughout the whole areas, affected by westerly, as well as human activity and global climate change. Economic pattern can be depicted as "saddle", with high level in Europe and East Asia, but low in middle of one Belt one Road, showing that industries of these countries are highly complementary. Based on empirical analysis of the main scientific problems, the authors put forth green development frame work of one Road one Belt, including the modes of ecological civilization, circular economic development fitting to developing countries with Chinese characteristics and experiences, eco-city construction from six aspects, jointly building the international ecological tourism belt along silk road, and international collaboration in treating cross-border ecological environment problems, to coordinate the relationship between man and nature, enforce the capability of sustainable development and fulfill the green development goal, and provide a green development model for the other regions.

### Key words:

Green Development Modes; One Belt One Road; Ecological Civilization and Circular Economy

## Is there an Environmental Kuznets Curve for the Silk Road Economic Belt Countries?

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### Abstract

The present study concentrates on the Silk Road Economic Belt countries and China context and attempts to explicitly examine the impacts of economic growth and urbanization on energy and CO<sub>2</sub> through investigation of the existence of an Environmental Kuznets Curve. Within the Stochastic Impacts by Regression on Population, Affluence and Technology framework, this is a fresh study to simultaneously explore the income/urbanization and energy/CO<sub>2</sub> nexus, using heterogeneous panel cointegration methods in this significant area. We find evidence in support of an inverted U-shaped curve relationship between economic growth and emissions, and examined the income and urbanization elasticity of energy consumption. These findings contribute to advancing the emerging consensus on the income/urbanization- energy/CO<sub>2</sub> nexus.

### Key words:

Environmental Kuznets Curve; Silk Road Economic Belt; China

## Structure and Ecological Potential of Baikal part of Siberia's Geosystems

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### Abstract

The Baikal part of Siberia is a complex region as regards its natural environment and landscape characteristics; it is endowed with immense reserves of various natural resources, the industrial development of which is steadily progressing, thus posing challenging ecological problems.

For assessing the ecological potential of geosystems, the landscape-typological map of the Baikal part of Siberia was generated. The classification of geosystems was carried out on the basis of the taxonomic system of hierarchical units of natural environment as developed in the Sochava Institute of Geography SB RAS. Cartographic analysis determined the most informative units of geosystems of regional dimension which made it possible to carry out a classification separation of the landscape structure of the Baikal part of Siberia.

The investigations into the ecological potential, the factors and the conditions having influence upon its formation used: SRTM data, WorldClim global climate data; data on Net Primary Production; Normalized Difference Vegetation Index, Enhanced Vegetation Index.

The main principles of GRID modeling and the Analytic Hierarchy Process technique were used to assess the ecological potential of the Baikal region's geosystems which made it possible to represent the set of natural conditions needed to satisfy the requirements of the population for all the necessary primary means (merely ecological, unassociated with production). The evidence obtained concerning the ecological potential provide a natural scientific basis for a reasonable regional ecological policy, an improvement of the population distribution pattern and the social sphere, a rational organization of labour and recreation, and for the protection of human health.

### Key words:

Landscape structure; ecological potential; geosystem; SRTM; NDVI; Baikal; Siberia

## The Great Silk Road: History, Problems and Prospects

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### Abstract

Traditionally, the Silk Road is regarded as a trade route linking commercial markets in Europe and Asia. Meanwhile, in the new conditions of globalization the Silk Road should be considered first of all as the contact zone between the two great civilizations of East and West, the three world religions: Buddhism, Christianity and Islam. At the same time this way is not the direct distance between two points of production and marketing. During the whole period of its existence there were natural and historical processes, which significantly changed the trade routes.

Given that the general population of the Great Steppe were nomadic people, whose economy was largely determined by the productivity of steppe landscapes, we can assume that migration, the emergence of new states have been linked to global climate change, droughts. This factor applies equally to the emergence of the empire of Genghis Khan, the resettlement of the Xiongn-nu, blossoming and fading of the Central Asian khanates.

In contemporary history a significant impact on the effectiveness of economic relations affect the geopolitical instability in the Middle East, South Asia, which covers practically the possibility of entering transport systems in the Indian Ocean. Moreover, the events in Nagorno-Karabakh, Kurdistan, Turkey can become a real barrier to trade routes through Asia Minor.

The development of the Silk Road infrastructure primarily involves the common interests of all countries located in its area. From this point of view, relatively little attention is paid to environmental problems. This primarily includes water supply areas. Moreover, the majority of these regions relates to the centers of agricultural production.

Meanwhile, there is a sparse river network which also crosses borders of the countries that have their own interests in the use of water resources. The Ural and the Irtysh relate to cross-border category. The Amu-Darya and the Syr-Darya have practically no effect on the level of the disappearing Aral Sea.

Therefore, one of the most important conditions for the effectiveness of the Silk Road is a balanced water policy of all neighboring countries.

Another specificity is the mountainous terrain in many countries of Central Asia, in China it was created by the latest tectonic processes. The disastrous earthquakes at the beginning of the last century in Bishkek (Frunze), Ashgabat in 1948, Tashkent in 1966 are still fresh in the memory of the population. According to the laws of seismicity after a certain seismopauzy these events should happen again. Meanwhile, seismic service in most of these countries is ineffective and requires restoration.

A fundamentally new transport system factor of the development along the Silk Road area is the construction of high-speed railways, the number of which is increasing especially rapidly in China.

Diversification of traffic while crossing many national borders requires the unification and standardization of customs and border regulations, which sometimes significantly hamper the development of transit. There is another problem with the fact that in the absence of state regulation, road, rail, pipeline and water transport even begin to compete with each other. Meanwhile, each of them has its own economic niche.

Global climate change, including the melting of polar ice opens up another opportunity for the cheapest maritime transport along the Northern Sea Route. At the same time the reduction of the ice cover in the ocean can significantly reduce the transportation time due to displacement of trade routes to the pole. According to the laws of spherical geometry, it is not only the shortest distance here, but also, large depths do not require pilot support. In addition, here in the international swimming area there is no need of registration of border documents.

Even this short list shows the complexity of the efficient use of the Silk Road and the need for scientific substantiation of the various options for its development.

## The Infrastructure of the Russian-Mongolian Cross-Border Area

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### Abstract

The article deals with the infrastructure sector of the Russian-Mongolian cross-border area. Infrastructure of the two countries are essential to tell the system to the Russian-Mongolian transboundary cooperation. The peculiarities of the conditions of functioning and development of infrastructure facilities of the two countries. The level of infrastructure development of adjacent regions of Russia and Mongolia at the present stage is a reflection of the socio-economic and political processes taking place in the past two decades. Existing infrastructure stable relationship and the urgent need for the development of infrastructure facilities on both sides of the Russian-Mongolian border create the preconditions for a detailed study of the subject.

The findings based on comparable for the two countries quantitative indicators on the infrastructure of the two countries are the basis for zoning in terms of infrastructure development, taking into account environmental factors. Natural and infrastructure zoning of the Russian-Mongolian cross-border area will assess the level of infrastructure development, highlight the core, peripheral areas at the international level to develop effective schemes of spatial distribution of infrastructure, taking into account the physical and geographical conditions on the basis of ecologically and energy efficient technologies. Actualization of the information is aimed at creating a closer forms of cross-border cooperation, functional zones of advanced development or economic favor.

The accumulated material is the basis for the creation of a GIS system "infrastructure of the Russian-Mongolian cross-border area.

### Key words:

infrastructure; border areas; the Russian-Mongolian cross-border area

## The Prerequisites and Priorities of Increase of Competitiveness of Border Regions of Russia in the Conditions of Globalization and Integration

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### Abstract

The paper deals with the basic prerequisites and priorities of improving the competitiveness of the border regions of Russia in the conditions of globalization and integration. Particular attention is paid to issues of evaluation of the competitive advantages of the region in the conditions of activation of integration ties. The method of estimating the region's competitiveness is given.

There is the comparative analysis of the competitive advantages of the border regions of the Siberian Federal District on the basis of rating indicators of infrastructure development, the state of the business environment, human capital, the region's attractiveness for investment and living, readiness of the region to compete with other regions. The results showed that at the present time in the border regions the competitive advantages (proximity of the border, cross-border infrastructure, etc.) are not used. The factors of border regions complicate the economic situation in many regions.

The work proved the main directions of improving the competitiveness of the border regions of Russia for a strengthened role of the state in investment in transport logistics and social infrastructure through public-private partnership, the formation of the business environment, the formation of innovative environment. The paper assesses the economic security of border regions in the context of globalization.

## The Problems and Prospects of Development of Green Economy in Border Regions of Russia.

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### Abstract

The paper is devoted to the problems of development of the green economy in the border regions of Russia. The author believes that in the current economic conditions, the basic principles of the green economy - green taxation, promotion of ecological production, environmental infrastructure investments,- should be one of the main conditions for sustainable development of all regions of Russia. Particular attention is paid to the analysis of environmental and economic problems of the border regions. Border regions are different in many unresolved environmental and economic problems, including problems of transboundary water pollution, problems of waste production, as well as the low level of production technology.

The paper assesses the environmental safety of Russia's eastern regions. Estimation technique uses the following indicators: emissions from stationary sources, the number of vehicles, discharge of pollutants from sewage into water bodies, waste production and consumption.

The basis for improving environmental security worldwide are green technologies being introduced in the fields of energy, transport, construction, agriculture and waste management of production and consumption. This paper gives the results of calculations of innovative security of regions of Russia. The eco-innovations in Russia were aimed at reducing material costs for the production (53.6%), reduction of energy consumption (58.3%), the reduction of emissions in the atmosphere of carbon dioxide CO<sub>2</sub> (43.6%), the replacement of raw materials to a safe or less dangerous (44.1%), reduced pollution (83.7%), the implementation of recycling waste products (49.8). In the paper there is the critical analysis of the legal framework of stimulating environmental innovation in the regions of Russia, justified suggestions for changing this framework.

## The Transformation of Substances in Adaptive Reactions of *Artemisia* Species Plants, Growing in the Countries along the "Belt and Road Initiative"

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### Abstract

We have jointly studied 15 species of the *genus Artemisia* plants growing on the territory of Russia and China. *Artemisia* L. (*Compositae*) is one of the largest and widely spread genus with more than 400 species. Species of the genus are herbs or small shrubs, with special organoleptic characteristics. Their species are used in traditional folk medicine, particularly for the treatment of malaria. They are mainly found in Asia, Europe and the North America (Mucciarelli & Maffei, 2002). About 186 species of the genus are widely spread in China, including 82 endemic species. *Artemisia hedinii* Ostenf. et Pauls is an annual herb, which grows in Qinghai-Tibetan Plateau (QTP), on altitude between 1000m to 4000m, extended to Kashmir and Tajikistan (Shi et al., 2011). In current study, for the first time we reported the composition of *A. hedinii* essential oil to provide more information for potential applications of *Artemisia* in QTP (Zhigzhitzhapova et al., 2014). *Artemisia vulgaris* is widely spread species. We analyzed the VOCs extracted from *A. vulgaris* using two different methods (hydrodistillation and headspace extraction) and tested the impact of climate of the regions where the plant grows on the composition of VOCs (Zhigzhitzhapova et al., 2016).

### Key words:

*Artemisia hedinii*; *Artemisia vulgaris*, essential oil; chemical composition; chemotypes

## The Transformation of the Natural Environment in the Tea Road Corridor

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### Abstract

An analysis of the meteorological series of air temperature and precipitation in the whole Lake Baikal basin carried out that based on the initial data of meteorological stations and global geospatial meteorological database of Climate Research Unit – CRU (spatial resolution of  $0.5 \times 0.5$  angle degree). A statistically significant trend of increasing temperature and decreasing rainfall was installed. Two humidification periods were allocated: the period 1980-1998 years – wet; 1999-2015 years – dry. The wet period is characterized by positive trends of precipitation totals for almost the whole lake Baikal basin, with the highest growth rate observed for ridge Khamar-Daban – 14 mm/yr, and the area of Middle Baikal – 10 mm/yr. There is a negative trend in the number of precipitation for Lake Baikal basin during the dry season 1998-2015 years. Extreme reduction in moisture is marked for ridge Khamar-Daban and makes -30 mm/yr. The rate of decline in basins of the Upper Angara and the Barguzin rivers reaches -18 mm/yr. At the long-term fluctuations of river flow rather the effects of precipitation than other elements of the water balance affect.

Thus, the average annual precipitation decreased by 41.4 mm, and the mean annual air temperature in the Selenga river basin increased by 2.29 °C (let us note that simultaneously the annual average temperature throughout the world increased by 1.2 °C) over the past 75 years. The increase in temperature is observed for the whole pool area of Lake Baikal, while areas with low growth of surface temperature rates are interspersed with areas with high growth rates, both in latitudinal and longitudinal directions.

According to gauging stations and dendroclimatic stations, a spatio-temporal reconstruction of river flow parameters in the Selenga river basin has spent. As a result, water flow model reconstruction of Selenga river and its tributaries – rivers Uda, Khilok, Chikoy, Dzida, Orkhon and Kharaa – was obtained. For individual watercourses the time-series until 1666 has been restored. This allowed to reveal regularities of moisture fluctuations in Baikal Asia in retrospect. The obtained statistical model reconstruction of runoff of Selenga river basin represents to 55% of the average annual flow variations.

The history and problems of regulating of the level of Lake Baikal were considered. The analysis of changes of water level, fluctuation range and useful inflow over the observation period (1898-2015) were carried out. In this study the main causes and effects of extreme water shortage in the basin of the lake in the 2014-2015

biennium are discussed.

The analysis of the inflow of water into the Baikal is made. The minimum and maximum water flows, the volume flow of major rivers of Lake Baikal basin were considered. The formation of water resources in the catchment area of Mongolia which accounts for 67 % of the watershed district Selenga was considered.

Land degradation and desertification processes are widespread in natural and economic territories of Russia and Mongolia. Over 85% of the Mongolian territory is located in dry climate zones: dry sub-humid, semiarid, arid, and extra-arid. The vegetation is the first experience the impact of desertification, and that's why investigation of its changes have a particular importance. Our research deals with vegetation dynamics of dry climatic zones of Russia and Mongolia from Landsat NDVI time series analysis (1989-2015) and field investigations. A number of model monitoring polygons has been established in different latitudinal zones of the Mongolian territory according to the longitudinal transect (105°-107° E, 51°-44° N). These polygons include a wide range of territories with dry climate conditions. This work revealed the main factors, agents, and trends of development for desertification processes in different climate zones. Almost the entire territory of the emphasized polygons of vegetation digression during this period is traced. At the present time in different climatic zones of Central Asia there are different trends of desertification processes are associated with both climatic fluctuations (mainly aridization) and anthropogenic impact.

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## Comparative Analysis of Traffic CO<sub>2</sub> Emissions on Different Grades Urban Road at Different Time Scales

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### Abstract

Metropolises are the main area of global CO<sub>2</sub> emissions. Transportation is one of the most important metropolitan terminal CO<sub>2</sub> emission sources, and traffic CO<sub>2</sub> emissions will increase rapidly along with the dramatic economy development. Chinese government promised that by 2030 CO<sub>2</sub> emissions will reach peak and will reach peak as early as possible in the Paris Conference. In the face of the heavy CO<sub>2</sub> emission reducing pressure, urban road transportation has become an important aspect to achieve the low-carbon target. This paper takes two urban road sections of different degree, beltway-the 5th Ring Road and arterial roads intersection – Datun-Beichen intersection, in the Olympic Central Area, Beijing, China. Based on the KM model, define the estimate area of the two road sections. On the basis of the bottom-up method, use the localized MOVES model, the traffic volume video data collected in the field work and the visual interpretation statistical data of different vehicle types to estimate the traffic CO<sub>2</sub> emissions of the two case area for every 30 minutes in 2014. Meanwhile, this paper compares the change characteristics of the traffic CO<sub>2</sub> emissions of the two case area in at different time scales, and analyzes the traffic CO<sub>2</sub> emissions of the two case area in the condition of traffic volume control especially. The results show that the traffic CO<sub>2</sub> emissions of the 5th Ring Road case area and Datun-Beichen intersection area is 44391.51t and 4045.36t, respectively. The annual traffic CO<sub>2</sub> emissions of the 5th Ring Road case area are much higher than Datun-Beichen intersection area. At day and night scale, the traffic CO<sub>2</sub> emissions change trend of the two different grades urban road sections are both “trough-peak-trough-peak-trough” from 6:00am to 1:00am of the next day. There are differences on the start time and duration of the two peaks. The traffic CO<sub>2</sub> emissions change trend and the peak time of workday and weekends are significantly different. At month scale, the traffic CO<sub>2</sub> emissions of the two case areas both exhibit fluctuating uprising tendency from January to December in 2014. And the traffic CO<sub>2</sub> emission of February is the highest, while October is the lowest.

## Current Situation and Suggestions to Promote Further Cooperation of Sino Russian Oil and Gas Cooperation

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### Abstract

Supply and demand condition of oil and gas resources in China and Russia have fundamentally determined the necessity to develop Sino Russian oil and gas cooperation; Long time bilateral cooperation and communication between China and Russia have laid certain political foundation for Sino Russian oil and gas cooperation, and has paved way for both countries; China and Russia's energy policies are highly complementary, which provides important opportunities for Sino Russian oil and gas cooperation; China and Russia are geographically adjacent, the favorable geographical conditions provides conveniences for carrying out cooperation; increasingly close cooperation of oil and gas between China and Central Asia, and upheavals in Ukraine are catalyst of Sino Russian oil and gas cooperation, which accelerates the cooperation process between the two countries. Developing Sino Russian oil and gas cooperation has great strategic significance to both of the two countries, it will reduce energy's external dependence of the two countries, reduce restraint of other countries to the two countries, improve energy security and furthermore guarantee national security. Up to now, China and Russia have signed a series of oil and gas cooperation agreement, which shows that the Sino Russian oil and gas cooperation has entered the fast lane, but it still faces many uncertain factors. To promote further Sino Russian oil and gas cooperation, following suggestions are given: standing on long-term and overall coordination, highlighting strategic perspective; deepen Sino-Russian Strategic and Cooperative Partnership, enhance political mutual trust; improve China and Russia's energy cooperation mechanism, establish energy security mechanism, reduce cooperation risk; strengthen policy communication, based on "the Belt and Road Initiative", deepen cooperation; improve China's energy price system, strengthen exploitation and utilization of domestic resources.

### Key words:

Sino Russian oil and gas cooperation; strategic significance; mutual benefits; promote further cooperation



## **Informatization Patterns and Strategy of the Silk Road Economic Belt**

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### **Abstract**

“Silk Road Economic Belt” and “The 21st Century Marine Silk Road” are the major strategic concepts of China to build a new and sustainable international political and economic order, facing the complex and changeable international geopolitical economic patterns and against the global economic crisis. The wide range informatization covering Asia, Europe and Africa is the condition and basis for the strategy of “One Belt One Road”. Through the study of existing literature and data, the author researched the informatization infrastructure and trade development patterns of the countries along the silk road, analyzed the informatization develop patterns, proposed the strategic measures of information industry. It will provide reference for building a new informatization pattern to boost the construction of Silk Road Economic Belt.

### **Key words:**

informatization; development patterns; development strategy and measures; Silk Road Economic Belt

## **Native Interpretation Attract Tourists Understanding Tibetan Conservation in Potatso National Park, China**

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### **Abstract**

Native interpretation connects regional resource, local people and tourist background. Most Tourists thought the native experience as their primary visiting purpose. Based on the investigation of interpretive resource and tourists, the research team proposes “native interpretation” in Potatso National Park which is the first national park in Yunnan’s Shangri-la County, China. It is located in one of the most biodiversity regions of the world. The local Tibetan people preserve natural fauna & flora in their ethnic value and approach. Eight treasures of Tibetan program provide tourists with opportunities to understand local natural conservation, through legends, ceremony, construction and ethic logo. The satisfaction of native interpretation was practical and dire able.

### **Key words:**

Interpretation; Tourists Understanding; Tibetan Conservation; Potatso National Park

## Study on China's Geopolitical Strategy Based on the Theory of Externality

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### Abstract

Based on the review of present geopolitical theory, this paper analyzes the shortcomings of these theories which include too broad macroscopic perspective, lack of the foundation of international ethics, and considers that these theories cannot adapt the evolution trends and characteristics of international geopolitical pattern under the backdrop of globalization and cannot provide sufficient theoretical guidance for the formulation of China's geopolitical strategy. This paper puts forward the concept of externality geopolitical strategy, and considers that: in the era of globalization, country's geopolitical strategy would produce externality which will increase with increase of this country's scale and international influence. The minimization of minus externality, which should become the goal of optimization of geopolitical strategy, can help to realize the maximization of state's interests. Based on the guiding principle of minimization of minus externality, this paper analyzes the geopolitical strategies of hegemonic country and China, and summarizes some key issues to which China's geopolitical strategy should pay attention: firstly, strengthen systematic study of the geopolitical patterns of the world and China's surrounding areas in order to achieve the minimization of minus externality and maximization of state's interests. Secondly, respect America's interests and international status, strive to establish a new type of win-win relationship between two countries in which they can live in friendship and develop in parallel, strengthen official and folk communication in order to decrease the probability of conflict because of strategic miscalculation. Thirdly, enhance the right to speak in the field of working out international regulations, improve China's cultural soft power, and increase the number of levels of geopolitical system which is established in the leading role of China and the number of peripheral countries, but never pursue positive externality. Fourthly, learn from China's successful experiences of "crossing a river by feeling the way over the stones" of reform and opening up and construction of economic zones, increase the reserve of geopolitical policies, prepare sufficient emergency plan for future possible geopolitical crisis.

### Key words:

geopolitical strategy; externality; minimization of minus externality; hegemonic country; emerging powers

## The Infrastructure Resources of Development of Border Areas

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### Abstract

The work deals with the basic problems of infrastructure development of border regions of Russia. Particular attention is paid to the study definition of infrastructure limitations and risks of economic development in the region. The international and interregional competition of markets for goods and services grows in modern conditions of the activation of integration processes in the society and in all sectors of the economy. A method for evaluating the effectiveness of the region's infrastructure is given. The method is based on the definition of the integral infrastructure indicators, including indicators of group transportation, communications, electricity, finance and credit, education, health, housing and communal services. It discovers that the most significant constraint on the economic development of the region is the lack of development of transport system, which has close links with all sectors of the economy and social sphere.

In the paper the conclusions need the improving regulatory mechanisms for financing, selection of infrastructure projects, monitoring of infrastructural constraints.

## The Social Resources and Social Risks of Border Territories of Russia in New Economic Conditions

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### Abstract

The paper deals with the main trends and patterns of development of the social resources of the border regions of eastern Russia. Particular attention is paid to the analysis of changes in the structure, the level and quality of life in recent years.

The analysis of the main state social and economic programs that affect the formation of the social potential of Russian regions is given. The results of evaluation of health system development, education, culture, housing and utilities of the border regions are given.

The modern problems of formation of social resources of the border areas of Russia are obtained on the basis of a sociological survey of the population. The technique involves the analysis of the survey population of subjective indicators of social well-being of the population, the definition of social risks. The following conclusions are drawn: solutions of problems of social development of the border regions of Russia need social initiatives to attract Russian and foreign investors in the sphere of trade, provision of household and other services to the population of cross-border territories of Russia.

## Hydrological regime and water consumption: changing facts, causes and projected trends



Home

### Oral

1. [Analysis of the Temporal and Spatial Variation Characteristic of Precipitation in the Lancang River Basin over the Past 55 Years](#)  
Suqing Chen (University of Chinese Academy of Sciences, China), Lijuan Li (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
2. [Application of SSIM and PNSR in Comparison of precipitation spatial distribution from the different databases](#)  
Hao Xiuping; Zhonggen Wang; Changming Liu; Yanfang Sang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
3. [Groundwater Numerical Simulation in Un-Gauged Areas in China](#)  
Kang Liang; Chang ming Liu (Key Laboratory of Water Cycle and Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
4. [Hydrologic Alterations in the Crisscross River Network in the Pearl River Delta, South China](#)  
Yongqin David Chen (Department of Geography and Resource Management, the Chinese University of Hong Kong, China)
5. [Hydrological Nonlinear System and Water System Approach](#)  
Jun Xia (Research Institute for Water Security (RIWS), Wuhan University, China)
6. [Impacts from Human activities on Sediments Budget in Poyang Lake during 1955-2010](#)  
Shuhua Qi (Key Laboratory of Poyang Lake Wetland and Watershed Research, Ministry of Education, Jiangxi Normal University, Nanchang 330022, P. R. China, China); Mengya Xiong (School of Geography and Environment, Jiangxi Normal University, Nanchang 330022, P. R. China); Fuqiang Liao (.Jiangxi Provincial Key Laboratory of Poyang Lake Comprehensive Management and Resources Exploitation, Jiangxi Normal of University, Nanchang 330022, P. R. China)
7. [Intra-City Variations in Water Supply in NCT Delhi: Problems and Inequalities](#)  
Arkpratik Changdar; Anuradha Banerjee (Jawaharlal Nehru University, New Delhi, India)
8. [Parallel Calculation in Simulating Water Movement of Bioretention System](#)  
Kaiwen Wang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China); Xiaohua Yang (State Key Laboratory of Water Environment Simulation, School of Environment, Beijing Normal University, China); Changming Liu (Institute of Geographic Sciences

and Natural Resources Research, Chinese Academy of Sciences, China)

9. [Precipitation Variability and Response to the Changing Indian Monsoon in the Yarlung Tsangpo River Basin, China](#)  
Tongliang Gong (Water Conservancy Department of the Tibet Autonomous Region, China); Yan Fang Sang (Institute of Geographic Sciences and Natural Resources Research, China); Vijay P Singh (Texas A&M University, United States)
10. [Quantitative Analysis of Groundwater Dynamics in Riparian Zone of the Lower Heihe River, Northwestern China](#)  
Ping Wang; Jing Jie Yu (Key Laboratory of Water Cycle & Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China); Sergey P. Pozdniakov; Sergey O. Grinevsky (Department of Hydrogeology, Lomonosov Moscow State University, Russia)
11. [Response of Vegetation to Climate Change in the Qinghai-Tibet Plateau over the Past Three Decades](#)  
Xiaolin Liu; ChangSen Zhao; Shengtian Yang; Chunbin Zhang (Beijing Normal University, China)
12. [Similar Weather Conditions \(SWC\) Analysis in Distinguish the contribution of Impact of Human Activities and Climate Variability to Runoff and Sediment Load of River](#)  
Fei WANG; Xingmin MU; Guangju Zhao; Peng Gao (Institute of Soil and Water Conservation, Chinese Academy of Sciences and Ministry of Water Resources, China)
13. [Spatiotemporal Variability of Precipitation Extremes and Dryness/ Wetness Patterns in Southeast Coast Region of China, 1960-2014](#)  
Ren Wang; Jianyao Chen; Tao Jiang; Kun Li (Sun Yat-sen University, China)
14. [Spring Peak Flow Variation under Climate Warming in the Kaidu River Watershed](#)  
Feiyun Zhang; Lanhai Li (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
15. [Summer Runoff Generation Investigation Based On Tracer Technology \(A Case of Mountain Catchments, Monsoon Zone of Pacific Russia\)](#)  
Vladimir Shamov (Pacific Institute of Geography, Russian Fed)
16. [Synoptic Factors Analysis in Evaporation Prediction of East Juyan Lake in the Hyper-Arid Environment, Northwest of China](#)  
Xiao Liu; Jingjie Yu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
17. [The Spatial Distribution and Quantitative Calculation of Soil Legacy Phosphorus by the Remote](#)

## Sensing Approach

Hezhen Lou; Shengtian Yang; Changsen Zhao; Zhiwei Wang (Beijing Normal University, China);  
Liu Hua Shi (Department of Environmental Health, Harvard T.H. Chan School of Public Health, USA);  
Yue Wang (Department of Geography, University of Wisconsin, Madison, USA)

18. Topographic Controls on Spatial Patterns of Vegetation Transpiration and Net Primary Productivity in the Taihang Mountains

Hui Peng (Key Laboratory of Marine Environment and Ecology, Ministry of Education, Ocean University of China, China); Yangwen Jia; Cunwen Niu (State Key Laboratory of Simulation and Regulation of River Basin Water Cycle (SKL-WAC), China Institute of Water Resources and Hydropower Research (IWHR), China)

19. Variability of hyporheic water exchange of the Weihe River in Shaanxi province, China

Jinxi Song; Junlong Zhang; Yongqing Long; Guotao Zhang; (College of Urban and Environmental Sciences, Northwest University, China)

20. Water and Vapor Transfer in Vadose Zone of Gobi Desert and Riparian Zone in the Hyper Arid Environment of Ejina, China

Chaoyang Du; Jingjie Yu; Ping Wang; Kai Lu (Key Laboratory of Water Cycle and Related Land Surface Process, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing 100101, China; University of Chinese Academy of Sciences, Beijing 100049, China)

## Poster

1. A new Method on Evapotranspiration Data Assimilation Based on Hydrological Models

Chesheng Zhan (China, Institute of Geographic Sciences and Natural Resources Research, CAS);  
qingqing dong; Huixiao Wang (China, College of Water Sciences, Beijing Normal University)

2. A Study on Characteristics of Drought-Flood Based on Precipitation Data in Yunnan Province over the Past 61 Years

Jiaxu Liu (China, 1.Key Laboratory of Water Cycle and Related Land Surface Process, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences; 2.University of Chinese Academy of Sciences); Lijuan Li (China, Key Laboratory of Water Cycle and Related Land Surface Process, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

3. An Analysis of Blue and Green Water Conversion in View of Alleviating Ecological Water Shortages in Karst Regions

Ke Chen; Shengtian Yang; Changsen Zhao (China, School of Geography, Beijing Normal University)

4. [Analysis of the Spatial and Temporal Heterogeneity of Vegetation Coverage Based on Google and UAV Images](#)

Chunbin Zhang; Shengtian Yang; Changsen Zhao (China, School of Geography, Beijing Normal University)

5. [Coupling A Distributed Hydrological Model and MUSLE to Simulate Sediment Yield](#)

Juan Bai; Guotao Dong; Shengtian Yang (China, Beijing Normal University)

6. [Coupling of Multi-Species' Ecological Flow Velocity in the Calculation of Eco-flow by AEHRA](#)

Yuan Zhang; Changsen Zhao; Shengtian Yang (China, State Key Laboratory of Remote Sensing Science, School of Geography, Beijing Normal University)

7. [Elaboration of a Scientific Preamble for the Hydrological Study of Galicia \(Spain, NW Iberian Peninsula\)](#)

Jesus Horacio (Spain, Department of Geography (University of Concepcion), Concepción (Chile));  
Dominic Royé (Spain, Department of Geography, Urbanism and Spatial Planning (University of Cantabria), Santander (Spain))

8. [Joint Simulation of Evapotranspiration from Non Uniform Underlying Surface in Semi-arid Environment Based on the Combination of Remote Sensing Model and Hydrological Model](#)

Yin Jian (China, Key Laboratory of Water Cycle & Related Land Surface Processes, Institute of Geographical Sciences and Natural Research)

9. [Simulation of Peak Flow in Small Watershed based on the LCM Model in Beijing Mountain Area](#)

Yu X.Y.; Bai J.; Zhang Y.C. (State Key Laboratory of Remote Sensing Science, School of Geography, Beijing Normal University, Beijing 100875, P. R. China)

10. [Study on Vegetation Coverage and its Dynamic Change in the Ten Tributaries of Yellow River in Inner-Mongolia by Remote Sensing](#)

Yabing Guan; Shengtian Yang; ChangSen Zhao (China, School of Geography, Beijing Normal University)

11. [Water Environment Change in Extreme Arid Region Indicted by Vegetation Dynamics](#)

Yichi Zhang; Jingjie Yu; Ping Wang (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

12. [Water Supply Problems in the National Capital Territory of Delhi: Some Policy Considerations](#)

Anuradha Banerjee; Arkapratim Changdar (India, Jawaharlal Nehru University, New Delhi)

## Analysis of the Temporal and Spatial Variation Characteristic of Precipitation in the Lancang River Basin over the Past 55 Years

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### Abstract

Based on the monthly precipitation data of 30 meteorological stations in and surrounding the Lancang River basin, we analyzed the temporal and spatial characteristics of precipitation from 1960 to 2014 using the climate tendency rate and Mann Kendall trend test, Morlet wavelet analysis, interpolation co-Kriging, and the gravity center model methods. The results showed that (1) in the analysis period, the precipitation in region, northern and central showed rising trend, but decreasing trend in southern precipitation occurred. The region, northern, central and southern precipitation showed an increasing trend in spring, while in summer showed a decreasing trend. In autumn, there was a decreasing trend of precipitation in the region and in the south. The northern and central parts of the region were increasing. The precipitation in the region, the middle and the southern showed a downward trend in the winter except the northern. (2) There were 29 years, 22 years and 5~10 years cycles in the region including northern, central and southern precipitation in the past 55 years. The three cycles in the analyzed period performance was very stable, with a domain-wide. There were still significant period of about 13 years in the region, north and south. Before the middle of 1975, and after 1995 there was also a period of about 13 years in the central area. In the north area before 1975 and 1995 years later, there was a 7~10 year cycle. The first main period of precipitation was 29 years, and the second main cycle was 22 years. (3) The average annual precipitation decreased in the Lancang River basin from the south to the north. The precipitation in the southern basin was most, with average precipitation in more than 1200mm. The average annual precipitation in the middle was 800~1100mm, while the average annual precipitation in northern part was usually less than 800mm, mostly in 400~800mm; the annual and monthly precipitation gravity center of the Lancang River Basin were concentrated in the central region. The precipitation gravity center of November had the largest migration distance, which migrated to southeast with 131.82km. From the seasonal point of view, spring, summer and autumn precipitation gravity center migrated to the southeast, while, migrated to the northwest in winter. The precipitation gravity center in rainy season relatively concentrated, the situation in dry season was relatively dispersed.

### Key words:

Lancang River; precipitation; M-K test; Morlet wavelet; gravity center model

## Application of SSIM and PNSR in Comparison of precipitation spatial distribution from the different databases

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### Abstract

The collection of Precipitation database is a basic work for hydro meteorological research and water resources management, whose quality has important implications for watershed hydrological simulation and water resources evolution analysis. The density and location of precipitation monitoring stations largely determines the quality of database. To assess the impacts of the rain gauges amounts and distribution, taken Jinghe basin as the study area, this paper analyzed three different sets of precipitation database including the observed data from 8 national basic and benchmark ground meteorological observatory (WS) (total 756 sites), the grid-processed data from high-density national meteorological station (GS) with 28 grids (total 2472 sites) and the observed data from rain gauges of hydrology stations (RS) with the 180 sites in and around the basin.

Spatial described ability were also comparatively evaluated. With the 180 sites, the precipitation data from RS can describe the spatial distribution in detail, while with fewer meteorological stations, the data from WS and GS has a lower representation of the rainfall distribution, especial for some abundant-rainfall area; such as, GS data were generally lower than WS and RS in the center of basin. With the index of PSNR and SSIM, the ability and discrepancies of three sets of database to measure the spatial distribution were calculated, the results showed that PSNR and SSIM of WS-RS is higher than others, which means the data from WS has much more similarity with the RS than GS data. The differences and similarities analysis can provide effective information to achieve the long-time and high-accuracy precipitation data with the reasonable fusion technology, thus reduce rainfall input to the model brings uncertainty.

### Key words:

PNSR,SSIM; ,Jinghe basin

## Groundwater Numerical Simulation in Un-Gauged Areas in China

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### Abstract

Protection of groundwater resources and environment is very important for safeguarding China's water security and construction of ecological civilization. A large number of industrial construction projects in China, especially the energy and chemical projects, generally located in the regions with lack of hydrogeology data (called as un-gauged areas), may have a remarkable impact on groundwater environment. It is necessary to study that how to accurately evaluate the impact on groundwater environmental problems caused by the construction projects lied in un-gauged areas. Groundwater numerical simulation is the most commonly used tool for quantitatively evaluating the impact of climate change and human activities on groundwater resources and environment. But there is a big contradiction between the fact that most of construction projects were built in un-gauged areas and the other fact that numerical simulation has a high demand for hydrogeological data. This paper systematically summarizes the process to construct stratigraphic model, groundwater flow model and pollutant migration model, simultaneously analyzes the main data required and how to obtain the data, and at last does a detailed explanation taking the two typical un-gauged areas as examples. This paper draws a conclusion that collecting the previous research works can make up the problem of scarcity of regional-scale data, and as far as the local scale data of the specific study area, we can obtain the first-hand data and hydrogeological information in order to construct a well conceptual model and use a reasonable model parameters on the basis of detailed fundamental hydrogeological field work.

### Key words:

un-gauged areas; water security; groundwater environment; groundwater numerical simulation

## Hydrologic Alterations in the Crisscross River Network in the Pearl River Delta,

### South China

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#### Abstract

Hydrologic regimes fluctuate in response to climatic variations and human influences. Over the past three decades, the Pearl River Delta (PRD) has been the fastest developing region in China. Human activities mainly associated with urbanization and industrialization in the region have been rapidly changing the environment, making the PRD crisscross river network an ideal area for studying human-induced hydrologic alterations. In this study, we first used linear regression method to systematically evaluate the long-term variations of extreme water levels defined as exceeding/falling below certain thresholds ( $\text{mean} \pm \text{std}$ ) across the delta. It was found that the low water level has been significantly dropping in the upper PRD while the opposite situation has occurred in the lower PRD. Secondly, we used Mann-Kendall trend test and Kriging interpolation method to detect the spatial and temporal patterns of the trends of the extreme high and low water levels related to different magnitudes of streamflow. The results indicate that the high (low) water level along the Pearl River estuary has been increasing and the inner delta region is characterized by decreasing high (low) water level in high and normal streamflow periods, but by increasing high (low) water level in the low stream periods. This phenomenon can be attributed to more significant impact of tidal process on water level in dry season than in flood season. Finally, we applied Beyes model and Lepage test to detect change point(s) of water level time series and analyzed the associated statistical properties of high/low water levels in summer (Jun, Jul, Aug) and winter (Dec, Jan, Feb). With respect to winter mean low water level, 14 out of 19 stations had two change points. The first abrupt change occurred around 1980 and the second abrupt change in the early 1990s. As for summer mean high water level, 12 out of 19 stations have only one change point. The timing of change points of summer mean high water level is similar to that of winter mean low water level. Identification and analysis of the causes for the hydrologic alterations in terms of water level will help us understand the impacts of human activities and thus provide important scientific evidence for managing the water environment in the PRD region.

#### Key words:

hydrologic alterations; water level; trend analysis; change detection; Pearl River Delta

## Hydrological Nonlinear System and Water System Approach

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### Abstract

This paper introduced a hydrological nonlinear approach based on Volterra Functional Series theory, namely Time Variant Gain Model (TVGM), proposed during early Galway International Workshop of River Flow Forecasting organized by Prof. J.E.Nash in 1989, and new development on PUBs issue and distributed TVGM and applications on climate change and water resources management in China. This paper also addresses relative a new advantage on catchment water system approach based on integrated hydrological process, biochemical & biological processes and human component, and its application in integrated water quality and water quantity management in Hui River Basin. Results show that hydrological system approach still plays a key role on solution of water problem, particular in developing countries in the world.

### Keywords:

Hydrology; nonlinearity; system approach

## Impacts from Human activities on Sediments Budget in Poyang Lake during 1955-2010

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### Abstract

Poyang Lake is the largest fresh water lake in China. The sediments disposition is important in providing medium for wetland grassland and benthic animals. In this paper, the water discharge and sediment content gauged by the hydrostations in the main five tributaries (named as Gan River, Fu River, Xin River, Rao River and Xiu River) in Poyang Lake watershed were used to investigate the sediment budget in Poyang Lake. The following results was showed: (1) The total sediments loaded into Poyang lake from the main five tributaries was about 811.687Mt during 1955-2010, in which Gan River accounted for 59.7%, Xin River accounted for 13.7%, Xiu River accouted for 10.2%, Fu River accounted for 9.7 and Rao River accounted for 6.7%; (2) The annual input Poyang lake was mainly decided by water discharged into Poyang Lake. And the inputted sediments were synchronized to the water discharge seasonally. (3) The input sediments decreased sharply caused by reservoir interception, though forest coverage changes also contribute to the decrease of sediments; (4) The total output sediments from Poyang Lake to Yangtze River was about 560.103Mt during 1955-2010. And it showed a decreasing trend during 1955-2000, but the trend was interrupted by the practice of sand dredging in the new century; (5) The sediments budget in Poyang Lake was changed by sand mining. Sediments deposit was estimated about 1.408mm/a during 1955-2000, but outputted sediments showed greater than the inputted sediments during 2001 to 2010 because of the practice of sand dredging.

### Key words:

Poyang Lake; Sediments budget; Reservoir; Sand dredging

## Intra-City Variations in Water Supply in NCT Delhi: Problems and Inequalities

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### Abstract

Water supply problems are rampant in NCT Delhi. Water supply data exhibits inequalities in different parts of Delhi. In this paper, the average water supply timings per day, number of tube wells and wells installed by Delhi Jal Board, ground water depletion records throughout Delhi and waterworks which are supplying water to Delhi have been considered. From these data sources water supply problems have been analysed and inequalities measured with the help of Coefficient of Variation. The ground water depletion during 2002-2014 has been shown, in terms of five major regions in the National Capital Territory. There are a total 7 waterworks which are supplying water in Delhi, though; there are total 17 waterworks near Delhi but out of them only 7 are catering to the water supply in Delhi. From the calculation of CV inequalities of water supply in different areas of Delhi NCT has been shown. Total number of tube wells and wells in Delhi, installed by Delhi Jal Board and District Advisory Committee shows that the north eastern part of Delhi has the least number of tube wells and wells. Chatterpur area has been found as the most problematic area in terms of water supply as complaints related to water supply, registered from Chatterpur has increased considerably from 2012 to 2013. Southern Delhi has the worse ground water scenario than northern Delhi.

### Keywords:

Water supply problems, Inequalities, Ground Water depletion

## Parallel Calculation in Simulating Water Movement of Bioretention System

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### Abstract

With the quickening of the urbanization process, the original natural surface of city is replaced by buildings and impermeable pavements, which increase the risk of urban water logging. Chinese government put forward the ideas of “sponge city”, an important content of which is increasing the area of bioretention system. In order to estimate the influence of this policy on urban water cycle, it is necessary to use Richards equation to simulate the water movement in bioretention system. Because of the large area of a city and the accuracy requirement of calculation, it's essential to improve the computational efficiency. In this paper, we design a parallel algorithm to solve the semi-analytical solution of Richards given by Parlange. The result shows that parallel algorithm can significantly improve the calculative efficiency. And the operation efficiency will improve with the increasing number of calculation.

### Key words:

Sponge city; bioretention system; Richards equation; water movement; parallel algorithm

## Precipitation Variability and Response to the Changing Indian Monsoon in the Yarlung Tsangpo River Basin, China

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### Abstract

This study investigated the spatiotemporal variation of precipitation over the last four decades in the Yarlung Tsangpo River basin, China, and the impact thereon of the changing Indian monsoon. Results reflect the spatial variability in the seasonal distribution of precipitation. From downstream to upstream, the rainy season is delayed and becomes shorter, and the ratio of rainy season precipitation to annual precipitation increases but the absolute amounts of rainy season and annual precipitation decrease. All the precipitation series have similar scaling characteristics, reflecting similar climatic condition in the basin. The effect of the Indian monsoon strengthens from downstream to upstream, and on this basis the basin is roughly divided into three regions: east, mid and west. Annual precipitation has been exhibiting a downward trend since 1998, which is mainly caused by the decrease in the rainy season precipitation. The dipole mode index, which describes the pattern of Indian Ocean dipole (IOD), has positive values in all months in positive IOD years, and causes a decrease in the rainy season precipitation compared with that in negative IOD years, during which time the dipole mode index has negative values in all months. The dipole mode index shows a negative relationship with rainy season precipitation at the inter-annual scales. Especially, the continuously positive phase of IOD has caused an obvious decrease in rainy season precipitation after 1998. Effective adaptation strategies should therefore be implemented to cope with the unfavourable water situation likely to be in the future.

### Key words:

precipitation variability; climate change; water safety; Indian monsoon; Tibet

## Quantitative Analysis of Groundwater Dynamics in Riparian Zone of the Lower Heihe River, Northwestern China

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### Abstract

Shallow groundwater is an important source of water for the maintenance and restoration of ecosystems in arid environments, which necessitates a deeper understanding of its complex spatial and temporal dynamics driven by hydrological processes. This study explores the dominant hydrological processes that control the shallow groundwater dynamics in the Gobi Desert-riparian-oasis system of the lower Heihe River, a typical arid inland river basin located in northwestern China. The dynamic behaviour patterns of the groundwater level at most sites are characterized by a declining trend during the period from spring to autumn and a slightly increasing trend in the winter months. The seasonal variations of the water table are determined by the rate of evaporation and lateral groundwater recharge via riverbank filtration. Further, a water table fluctuation (WTF) method was used to investigate groundwater evapotranspiration (ET<sub>g</sub>) processes at two sites dominated by phreatophytes (*Tamarix ramosissima* and *Populus euphratica*). The average ET<sub>g</sub> rate during the summer months (June–August) of 2010-2012 was estimated to be 0.63-0.73 mm/d at the site dominated by *Tamarix ramosissima* and 1.89-2.33 mm/d at the site dominated by *Populus euphratica*, depending on climatic conditions, vegetation status, and depth to water table. Additionally, a coupled river-aquifer numerical model was used to calculate the river leakage in the main stream of natural rivers from April 20, 2010 to April 21, 2012. The results showed that the amount of river water leakage was about 2.51×10<sup>8</sup> m<sup>3</sup>, which accounted for approximately 32% of the amount of river flow. The river filtration rate is mainly determined by the streambed vertical hydraulic conductivity, which is highly dependent on the river water temperature that varies from 0 to 20 °C.

### Key words:

groundwater dynamics; evapotranspiration; riverbank filtration; arid area

## Response of Vegetation to Climate Change in the Qinghai-Tibet Plateau over the Past Three Decades

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### Abstract

Global climate change has significantly affected vegetation variation in the third-polar region of the world – the Qinghai-Tibet Plateau. As one of the most important indicators of vegetation variation (growth, coverage and tempo-spatial change), the Normalized Difference Vegetation Index (NDVI) is widely used to study the response of vegetation to climate change. So the spatio-temporal variation characteristics of vegetation and the response patterns of vegetation to climate change were analyzed in the Qinghai-Tibet Plateau from 1981 to 2014 by NDVI acquired from GIMMS. It is found that the spatially averaged NDVI slightly increased over the past 34 years with a rate of 0.001/10a, however in a short time scale the value increased by 0.006/10a from 1981 to 1999 and decreased by -0.004/10a from 1999 to 2014. So the 1999 year seemed like a turning point when the vegetation influenced by climate. While linear trends of NDVI showed a high degree of spatial heterogeneity based on per-pixel analysis. The pixels showing increasing trends were mainly in southwest or southeast with 59% of total area and decreasing trends were mainly in north or middle with 41% of the total area. In the different altitude the value and trend of NDVI also showed different characteristics. The NDVI values were mainly about 0.75 below altitude of 2000m while the values became smaller as the altitude became heighten above altitude of 5000m. The increasing trend of NDVI mainly distributed between the altitude of 3000m and 5000m. These indicated the vegetation distribution and variation in the Qinghai-Tibet Plateau.

### Key words:

NDVI; Vegetation; Climate Change; the Qinghai-Tibet Plateau

## Similar Weather Conditions (SWC) Analysis in Distinguish the contribution of Impact of Human Activities and Climate Variability to Runoff and Sediment Load of River

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### Abstract

Distinguishing the impacts of climate variability and human activities would improve our knowledge of water resources, climate change and variability and its adaptation, and watershed or river basin management. The mainstream methods are discussed from different criteria of principle and process to compare their functions and shortcomings, especially focusing on how to treat the interplay function of climate variability and human activities. A new simple and robust method to determine the impact of human activities within paired datasets under the same or similar weather conditions (SWC) is put forward to improve the precision of assessment when setting of same climatic backgrounds of 2 stages (single-year pairs or several-continue-year pairs) to avoid the impact of climate variability. These weather conditions cover the main meteorological elements of precipitation and ETO (the reference crop evaporation transpiration), and ETO relating to all other weather factors. If there are two or more periods with similar weather conditions but different runoff, the relative runoff and sediment load changes can be deduced the result of human impacts. The method could describe the net impacts of human activities as a whole, and it could be extended when more detailed data are available.

### Key words:

Assessment of environment impact; human activity; climate variability; similar weather condition (SWC)

## Spatiotemporal Variability of Precipitation Extremes and Dryness/ Wetness Patterns in Southeast Coast Region of China, 1960-2014

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### Abstract

Changes in precipitation extremes potentially have severe influence on hydrological regimes, human society and natural ecosystem. Based on daily precipitation records at 73 meteorological stations in southeastern coast region of China during 1960-2014, the spatial and temporal changes in 9 extreme precipitation indices and its regional differences were analyzed in 4 climate zones. Furthermore, this study employed standardized precipitation index (SPI), rotated empirical orthogonal function (REOF) and wavelet analysis methods, to assess the characteristics of dryness/wetness patterns as well as its correlations with El Niño/Southern Oscillation (ENSO). For precipitation extremes, most of the indices exhibited an increase trend in regional scale, especially the PRCPTOT, R95p and R99p experienced a upward slope of 2.26 mm/decade, 2.15 mm/decade and 0.78 mm/decade over the past 55 years. On the contrary, a decreasing trend in CWD was detected approximately in over 50% of the stations except in north subtropical zone. As for regional differences, the increase trends in PRCPTOT, R95p, R99p, CWD, RX1day, RX5day, R10mm and R20mm all showed a concentration in north and coastal area, which generally are north subtropical zone, mid-subtropical zone and the coastal area of south subtropical zone, while the stations with increasing trend in the CDD mainly located in south subtropical zone and tropical edge zone. Additionally, three dominant dryness/wetness spatial modes were identified in southeastern coast region of China, namely northeast of Guangdong Province (EOF1), north of Zhejiang Province (EOF2) and northwest of Fujian Province (EOF3), respectively belongs to south subtropical zone, north subtropical zone and mid-subtropical zone. As temporal variation in each spatial model (EOFs), there is no trend in EOF1, while an increasing trend in EOF2 and an decreasing trend in EOF3 was detected over the past 55 years. Furthermore, the variation in dryness/wetness existed a 4 to 12 years period in these three spatial models, and their time coefficients (PCs) exhibited a significant correlation with ENSO especially when the lag time are 6 to 12 months. The results of this study suggest that the frequency of heavy precipitation and the risk of flood is increasing in north subtropical zone (i.e. Zhejiang Province), while reduced water resources amount and increasing drought risk maybe exist in south subtropical zone (i.e. Guangdong Province), so adaptive water resource management and flood/drought mitigation measures should be considered separately for different regions in southeastern coast of China.

### Key words:

Extreme precipitation; Dryness/wetness patterns; Spatiotemporal variability; Southeastern coast region of China

## Spring Peak Flow Variation under Climate Warming in the Kaidu River Watershed

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### Abstract

Climate change has great influence on spring peak flow which may cause serious damages in arid and semi-arid areas. Spring peak flow is mainly contributed by snowmelt water and rainfall in alpine regions. In order to analyze the change of spring peak flow under climate warming, the temperature and precipitation outputs based on the scenarios of RCP2.6, RCP4.5 and RCP8.5 from CNRM-CM5 were used as the inputs of modified SDHydro model to simulate the streamflow and peak flow in the Kaidu River watershed. The results indicated that the spring peak flow increased while the summer peak flow decreased under climate warming condition in which the summer peak flow is predominance than the spring peak flow. The beginning time and the occurring time of the spring peak flow occurred earlier under climate warming scenarios. However, the beginning time of spring peak flow is more sensitive to climate warming than the occurrence time of spring peak flow. The reaction of spring peak flow to climate warming is not as sensitive as that of the beginning time of spring peak flow also. Because the beginning time of spring peak flow is controlled by  $>0$  °C temperature while the occurrence time and magnitude of spring peak flow is influenced by the increasing rate of temperature and rainfall in spring. The results of the study may provide useful information for water resource managers to manage and allocate the limited water resources, and provide more useful suggestions to prevent damages of spring flood.

### Key words:

Spring peak flow; Climate warming; Kaidu River watershed

## Summer Runoff Generation Investigation Based On Tracer Technology

### (A Case of Mountain Catchments, Monsoon Zone of Pacific Russia)

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#### Abstract

Extremely high variation in rainfall rates (up to 200–300 mm per day as typical for monsoon zone in Asian Russia) brings as usual 10-20 times range of discharge values in river flow, with flood specific discharges sometimes higher than 200 l/s·km<sup>2</sup>. How and how fast does atmospheric water reach the streams? The authors discuss their recent (2011–2015) experience in the present-day chemical tracing techniques application to summer runoff generation research, and offer a sort of methodology named as Mobile Research Watershed (MRW). It is illustrated by case short-term studies from some small research catchments in Sikhote-Alin Mountains, the Ussuri/Wusuli River headwaters. The properties and limitations of use of concentrations as natural tracers in water are discussed, and the available methods of intensive monitoring of precipitation and flow, and chemical features of atmospheric, soil (subsurface), low stream and flood stream water and, also, laboratory analysis of water samples to reveal tracers of stream flow sources, are presented. Combined hydrological and hydrochemical monitoring results in discrete concentration–time series and continuous discharge series, which allow to obtain some detailed information about stream flow generation and flow paths mostly based on the EMMA modelling. The use of tracers provides indications in estimating the volume of contributions of the slope conduits, shallow groundwater and event water to the stream flow. Believable, the proposed MRW–approach seems to have significant implications for short-term hydrological and environmental research in vast scarcely studied areas of North and Central Asia.

#### Key words:

runoff generation; small catchments; chemical tracers; EMMA; Pacific Russia

## Synoptic Factors Analysis in Evaporation Prediction of East Juyan Lake in the Hyper-Arid Environment, Northwest of China

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### Abstract

East Juyan Lake is the terminal lake of Heihe River and is significant in preventing desertification. An official project was launched to convey water from the upper and middle reaches to the lake in 2001 as severe environmental problem occurred due to reduced inflow in the 1990s. Quantifying actual lake evaporation and performing future prediction will provide reference for better regional water resources management. Synoptic factors are crucial in lake evaporation: air temperature reflects the actual thermal conditions and, along with wind speed, drives evaporated vapor diffusion. Relative humidity reflects the available capacity of evaporated vapor and restrains the evaporation process when vapor is accumulated in the air. Wind speed helps to intensify horizontal turbulent diffusion and the transportation of evaporated vapor to nearby atmosphere. Because of extreme weather conditions and high costs in in-situ experiment, reliable data is lacking. In this research, we placed a floating E601 pan to measure daily lake evaporation and conducted simultaneous bankside synoptic observation in 5-min intervals from 2013 to 2015. Single factor correlation analysis indicated the synoptic factors governing lake evaporation are air temperature, wind speed and relative humidity. A semi-empirical daily lake evaporation model was established and validated with moderate accuracy (RMSE and MRE of 0.63 mm, 8.6% (calibration); 0.73 mm, 9.8% (validation)), and we analyzed each factors' sensitivity using this model. Obtaining daily evaporation time series and its relationship with governing factors enable us to better understand regional hydrological cycle and comprehend how climate change affects hydrological processes.

### Key words:

Ejina Delta; Lake evaporation; Floating E601 pan measurement; Governing synoptic factors; Sensitivity analysis

## The Spatial Distribution and Quantitative Calculation of Soil Legacy Phosphorus by the Remote Sensing Approach

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### Abstract

Legacy phosphorus in soil is being paid more and more attentions world widely, because it is a grand potential of phosphorus resource as well as a key factor for eutrophication prevention. However, there are three difficulties in recent soil legacy phosphorus research that include its spatial distribution, accurate quantitative calculation and the variation in the long term. These three questions can't be resolved by the conventional soil chemistry methods. In this study, a remote sensing driven model EcoHAT (Ecohydrological Assessment Tool) is applied to obtain the spatial distribution, accurate quantitative calculation at the regional scale and the variation in 15 years (2000-2014) of the soil legacy phosphorus. Remote sensing is used due to it can obtains multi spatio-temporal scales continuous earth information, and the results from the remote sensing driven models can better describe the soil P concentration and the cycle and transportation of soil phosphorus. Our results show that the soil legacy phosphorus have different contents in spatial, the old cultivated land has more legacy phosphorus than new arable land; the total soil phosphorus content in the cultivated land has an increasing trend in the 15 years; the wetland in this area has more legacy phosphorus than before. Our research supplies a useful approach to calculate and detect the spatial distribution of soil legacy phosphorus accurately at regional scale. In future, this approach can gives a good help to explore the potential phosphorus resource in agricultural areas world widely, and gives implications to the phosphorus limitation countries.

### Key words:

legacy phosphorus; remote sensing; EcoHAT; spatial distribution; quantitative calculation

## Topographic Controls on Spatial Patterns of Vegetation Transpiration and Net Primary Productivity in the Taihang Mountains

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### Abstract

Topography is an important influence on water and energy of ecosystem in mountains. Vegetation water use and productions are important ecosystem indicators. In this study, we tried to evaluate the topography control on vegetation water use and productions in a mountain area of North China (the Taihang Mountains) by using ecosystem model. The model we used is BIOME-BGC. The model was verified by field data in two experimental sites. Three basins in the Taihang Mountains were chosen for the evaluation. We divide the three basins into 4247 calculate units. The division is based on contours in sub-basins to present topographic and hydrological variability. The results illustrate that in the study area, topography has a significant influence on spatial patterns of transpiration and net primary productivity (NPP) for trees, shrubs and grass. The diversity of transpiration and NPP are larger in high elevation area than those in low elevation. NPP in low elevation is larger than that in high elevation. We believe our results can provide scientific basis for ecosystem recover in the Taihang Mountains.

### Key words:

The Taihang Mountains; Topographic controls; ecosystem model; transpiration; net primary productivity

## Variability of Hyporheic Water Exchange of the Weihe River in Shaanxi Province, China

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### Abstract

Accurate estimation of hyporheic water exchange is of critical importance in integrated management of groundwater and surface water bodies and in maintenance of ecosystem health of a river catchment. As a case study of the Weihe River in Shaanxi Province, China, stream water and groundwater are inherently connected and water quality is strongly interacted. Therefore, the patterns and magnitudes of hyporheic water exchange and their variabilities of the Weihe River along five sites during different seasons are investigated. Using a self-made tube stick containing inside several temperature sensors with slotted holes, the sediment temperatures of different depths are measured synchronously. Then, the temperature profiles with depths are illustrated and the patterns of stream water and groundwater exchange are determined by a simple thermal mapping method. Furthermore, the volume of the hyporheic water flux is estimated by one-dimensional steady state heat-diffusion-advection equation. And the changes of magnitudes of hyporheic water exchange either along test sites or during different seasons are analyzed. The results indicate that the patterns and magnitudes of water exchange in hyporheic zone vary among different seasons in one year even in the same season of different years, and have large differences among test sites from upstream to downstream as well. Distinctive spatial and temporal variabilities of hyporheic water exchange occur in the Weihe River.

### Key words:

hyporheic water exchange, thermal method, variability, the Weihe River

## Water and Vapor Transfer in Vadose Zone of Gobi Desert and Riparian Zone in the Hyper Arid Environment of Ejina, China

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### Abstract

To reveal how water and vapor transfer in vadose zone affect evapotranspiration in Gobi desert and riparian in hyper arid region is important for understanding ecohydrological process. Field studies and numerical simulations were imported to evaluate the water and vapor movement processes under non isothermal and lower water content conditions. The soil profiles (12 layers) in Gobi desert and riparian sites of Ejina were installed with sensors to monitor soil moisture and temperature for 1 year. The meteorological conditions and water table were measured by micro weather stations and miniDivers respectively in the two sites. Soil properties, including particles composition, moisture, bulk density, water retention curve, and saturated hydraulic conductivity of two site soil profiles, was measured. The observations showed that soil temperatures for the two sites displayed large diurnal and seasonal fluctuations. Temperature gradients with depth resulted in a downward in summer and upward in winter and became driving force for thermal vapor movement. Soil moistures in Gobi desert site were very low and varied slowly with time. While the soil moistures in riparian site were complicated due to root distribution but water potentials remained uniform with time. The hydrus-1D was employed to simulate evapotranspiration processes. The simulation results showed the significant difference of evaporation rate in the Gobi desert and riparian sites.

## A New Method on Evapotranspiration Data Assimilation Based on Hydrological Models

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### Abstract

A comprehensive review of evapotranspiration data assimilation based on hydrological model is provided. The difficulty and bottleneck for ET is elaborated to construct data assimilation relationship as a non-state variable, with a discussion and analysis about the feasibility of various hydrological models to assimilate ET. Based on this, a new evapotranspiration assimilation scheme is proposed. The scheme presented is an improved data assimilation system that uses distributed time-variant gain model (DTVGM) which contains evapotranspiration- soil humidity nonlinear time response relationship. Moreover, the evapotranspiration mechanism in DTVGM is adjusted to perfect the ET data assimilation system. The new method on evapotranspiration data assimilation based on DTVGM has been applied in lots of river basins successfully in China.

### Key words:

evapotranspiration; data assimilation; hydrological model; non-state variable

## A Study on Characteristics of Drought-Flood Based on Precipitation Data in Yunnan Province over the Past 61 Years

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### Abstract

Analyzing the characteristics of spatio-temporal variability of droughts and floods are very important to reduce losses and costs. Based on monthly rainfall data from 1954 to 2014 collected from 32 meteorological sites in Yunnan province, the spatio-temporal variability and periodicity of drought-flood were analyzed using SPI, EOF, RBF spatial interpolation, wavelet analysis. The results show that there is a tendency of drying in Yunnan province during the last 61 years (the slope of SPI is  $-0.0091/\text{year}$ ), and the SPI series indicate a great fluctuation and a high frequency after 2000. General flood year, normal year and general drought year account for 88.52% in the 61 years, and great drought year, extreme drought year and great flood year account for 4.92%, 3.28%, and 3.28%, respectively. Since 2003, what's more, the occurrence of drought event is more often and the impact is more remarkable with the aggravating drought degree. There are two regions that droughts come more often than other regions in Yunnan province, and they are Jinghong-Simao-Yuanjiang and the northeast of Zhanyi site. In addition, there are three regions where floods come frequently, and they are the west of Lincang-Dali-Huaping line, northern Zhaotong site, and the southeast of Yunnan province. The probability of drought and flood events have a good correspondence, but the probability of drought is slightly higher than flood. The first modal of EOF analysis reveals that Yunnan province present the consistency of flood or drought, moreover, this modal may be affected by the large-scale climate characteristics. The second modal may be controlled by topographical factor, and the third modal may result from comprehensive function of multiple factors, such as longitude, monsoon. Furthermore, the time coefficient of first three modals also confirm the trend of drought in Yunnan province. Finally, the periodic oscillation of SPI series is concentrated in expectant 2 years, 6 years, 8 years, 18 years and 28 years, and especially in expectant 28 years which has the strongest energy.

### Key words:

Drought-Flood; Standard Precipitation Index; EOF Analysis; Wavelet Analysis; Yunnan Province; China

## An Analysis of Blue and Green Water Conversion in View of Alleviating Ecological Water Shortages in Karst Regions

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### Abstract

Ecological water shortages in karst regions are mostly due to significant losses of hard-to-use leaked blue water, and thus transforming leaked blue water into green water is the key to solving the problem of ecological water shortage. We used the RS-SVAT model and remote sensing data to simulate the spatial distribution of blue and green water in the Guiyang City suburban area<sup>3</sup> and found that: (1) In 2013, the green water in the area accounted for less than 50% of rainfall, which is well below the world average of 65%, while leaked blue water accounted for 15.16% of blue water and 7.62% of rainfall, suggesting a large volume that could be adjusted; (2) Once vegetation coverage increased by more than a percentage, the contribution of vegetation to reducing infiltration decreased sharply; (3) Increasing the soil thickness by 20 cm greatly decreased infiltration by converting blue water into green water, suggesting that increasing soil thickness is the most effective way to convert blue water to green water; (4) In dry years when the soil thickness increased to 20 cm, the infiltration decreased more than in normal and rainy years so that the order of infiltration reduction from lowest to highest was: dry year scenario > normal year scenario > wet year scenario, effectively alleviating the ecological water shortage for vegetation. Therefore, this study suggests that the ecological water shortage in karst regions would be best alleviated by increasing soil thickness.

### Keywords:

karst; blue water; green water; SPAC; SVAT

## Analysis of the Spatial and Temporal Heterogeneity of Vegetation Coverage Based on Google and UAV Images

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### Abstract

Vegetation coverage is an important input parameters of hydrological models. It impacts on the runoff of hydrology confluence process. Usually, the vegetation coverage values is acquired by the different band of remote sensing satellite image. This article is related to the vegetation typical single class (farmland, forest and grassland) and synthetically, to compute vegetation coverage under the different height of Google's RGB image. In the meantime, we verify the accuracy of vegetation coverage by UAV images. By spatial analysis of vegetation coverage value, the result shows: First, within the scope of a certain height, the vegetation coverage remain unchanged basically to single class. Second, it remain the same rule between comprehensive classes with a single class. Third, with the increase of altitude of UAV images, the vegetation coverage showed a trend of decline. Within the scope of a certain height of Google images, the resolution of images remain unchanged. It show that vegetation coverage based on Google cannot serve as input parameters of hydrological model.

### Key words:

Vegetation Coverage; Google Images; UAV Images;

## Coupling a Distributed Hydrological Model and MUSLE to Simulate Sediment Yield

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### Abstract

Sediment yield is one of the most important factors in environmental degradation assessment and the main carrier for nutrients' transportation. The modified universal soil loss equation (MUSLE) is often used to estimate the sediment yield for watershed. However, it is difficult to obtain the daily runoff data which is one of the key factors in the MUSLE model in ungauged regions. In this paper, we combined MS-DTVGM (Multi-Spatial data-based Distributed Time-Variant Gain Model) with MUSLE to simulate the Sediment yield in Sanjiang Plain in China from 2000 to 2010. MS-DTVGM was used to calculate surface runoff volume for the region and the results were calibrated by three years' daily discharge data from two gauges, the daily  $R^2$  is 0.69 and 0.54, and the daily NSE is 0.49 and 0.28. Then runoff data were applied to simulate the sediment yield in Sanjiang Plain. The results revealed that: (1) the model has simulated the runoff volume within a range of acceptable accuracy; (2) the soil erosion modulus in Sanjiang Plain mainly belongs to micro soil erosion, namely less than 200 t/km<sup>2</sup>\*a, and the erosion intensity change slightly during 2000-2010; (3) the sediment loads experienced temporal and spatial variations, with strong correlations existing between the land use and the precipitation; (4) the coupled model is driven purely by data from common platforms, thus it can be used in other ungauged area.

### Key words:

Sediment yield; MUSLE; MS-DTVGM; Sanjiang Plain

## Coupling Of Multi-Species' Ecological Flow Velocity in the Calculation of Eco-Flow

by AEHRA

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### Abstract

Ecological water demand is a hot field of the ecology, hydrology and science of water resource, scholars from different points of view put forward a variety of methods to calculate ecological water demand, and based on these methods study on ecological water requirement calculations for different scale area. However, in the conventional calculation methods how the flow rate of the demand for multiple species coupling together is an unresolved issue, which affects the reliability of calculation results, and thus affect the regulation of water resources. In this paper, we introduced dominance index as weight to coupling each species' eco-velocity, improved the method of Adapted Ecological Hydraulic Radius Approach (AEHRA), established a multi-species eco-velocity coupling model. This provide a new general solution--which is more in line with the objective, less hydrological data needs and high feasibility--for multi-species ecological water demand computing. Through the application in Xiaoqing River Basin we found that, this method is effective for multi-species eco-velocity coupling calculation, the monthly calculation result of ecological water demand show difference between seasons in water demand--the spawning season of fish needs more water compared with non-spawning period less. The result describes the objective situation more accurately, reveals ecological water requirement of seasonal differences in Xiaoqing River Basin and provides reference for the watershed regulation of water resources.

### Key words:

Xiaoqing River Basin; Ecological Water Demand; Multi-species; Dominance Model; Adapted Ecological Hydraulic Radius Approach

## Elaboration of a Scientific Preamble for the Hydrological Study of Galicia (Spain, NW Iberian Peninsula)

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### Abstract

The effective management of water requires an integrated approach with a balance between socio-economic development and protection of natural ecosystems. It is therefore essential to know the real availability of water in order to develop management measures that, from a holistic perspective, help to strengthen natural and anthropic systems. From this perspective, the aim of the authors is to stimulate a discussion in the scientific community that serves as a preamble to lay the foundations for a further hydrological study of a region of the NW of the Iberian Peninsula (Galicia, Spain).

Galicia has an area of ~30,000 km<sup>2</sup>, containing a drainage system with more than 100 rivers of a length greater than 20 km (scale 1/25,000). In total, they amount to ~4,800 km of river, of which currently more than 560 km are dammed (~11.7% of the total). Hydrologically, Galicia is organized into four hydrographical confederations that operate independently. However, there is a large network of gauging stations and weather stations that provide abundant data.

It is urgent to establish a line of research that characterizes the hydrological variability and addresses the issues raised by a spatiotemporal analysis approach. In addition, hydrological mapping provides the population with easy and concise access to information. This also represents significant added value in decision making about water use and conservation, allowing us to confidently face the social, economic and environmental challenges of the coming years.

### Key words:

Galicia; hydrology; scientific preamble; management; geography; discussion

## Joint Simulation of Evapotranspiration from Non Uniform Underlying Surface in Semi-Arid Environment Based On the Combination of Remote Sensing Model and Hydrological Model

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### Abstract

The evapotranspiration from non-uniform land surface reflects the water consumption of vegetation in the basin, and quantitative estimation of evapotranspiration has been an international frontier in water sciences for a long time. Hydrologic models are usually capable of simulating time-continuous evapotranspiration processes at daily time steps, but the accuracy of such models is poor when compared with remote sensing evapotranspiration models. Meanwhile, the applicability of remote sensing evapotranspiration models based on the surface energy balance is restricted by the lack of high-frequency and high-resolution thermal data. We build a remote sensing evapotranspiration model including three parts: inversion of the evaporation ration using double layers model, calculation of total daily net radiation, and estimation of daily evapotranspiration. Compared with the data of flux measurement equipment, remotely evapotranspiration shows a high accuracy in the case study area in semi-arid environment. The remotely data used as a observation to optimize a hydrological model based on data assimilation structure. The results shows that the integrated method is proved better, and improves the hydrological modeling accuracy by nearly 10%. After the assimilation, the evapotranspiration process achieves a better probability. Data assimilation improves the shortcomings of the hydrological simulating the impact of human activities to the water cycle process. The study develops a new evapotranspiration modle which can simulate regional evapotranspiration with high accuracy and continuous time series. The new land surface evapotranspiration model not only follows the surface energy balance, but also meets the regional water balance, and has more perfect water thermal coupling mechanism.

### Key words:

evapotranspiration; remote sensing; hydrological model; double-layer model; data assimilation; semi-arid environment



# 33rd International Geographical Congress

21-25 August, Beijing, China

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## Simulation of Peak Flow in Small Watershed Based on the LCM Model in Beijing Mountain Area

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### Abstract

According to the runoff characteristics in Beijing mountain area, the distributed hydrological LCM model, combining with multi-source remote sensing data, we simulated the runoff process of design rainstorm for the return period of 1 year, 3years and 10 years under present conditions of the Huaijiu River Basin and validated with site data. The result shows that, (1) if antecedent soil water content increases from 10mm to 20 mm, the peak flow of three types of design rainstorm each increased by 6.5%, 26.0% and 12.2%. When the antecedent soil water content increases from 20mm to 30 mm, the peak flow of three types of design rainstorm increased by 6.1%, 32.8% and 11.0%.(2) In drought conditions (antecedent soil water content is designed 10mm), the peak flow for the return period of 1 year is 39.0797m<sup>3</sup>/s, at the same time peak flow for the return period of 3 years is 169.597 m<sup>3</sup>/s while for the return period of 10 years is 694.992m<sup>3</sup>/s. The results provides a theoretical reference for small watershed comprehensive management.

### Key words:

LCM model; peak flow; design rainstorm; Huaijiu River Basin

## Study on Vegetation Coverage and its Dynamic Change in the Ten Tributaries of Yellow River in Inner-Mongolia by Remote Sensing

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### Abstract

A significant change in vegetation cover has occurred in the ten tributaries of Yellow River in recent decades, the authors adopted dimidiate pixel model based on NDVI to calculate the vegetation coverage in 1980, 1998, 2010 and 2014 by using multi-source remote sensing data, and analyzed the spatial and temporal variation of vegetation coverage in the ten tributaries. Some conclusions can be drawn as follows: (1) During 1980-2014, the vegetation coverage in the ten tributaries showed a consistent growth trend, from 18.66% in 1980 to 52.17% in 2014. The increasing rate of vegetation coverage was significantly faster in the whole basin after 1998, the area ratio of medium vegetation coverage increased was the main feature of the vegetation restoration. (2) In the past 35 years, complete recovery type and recovery type were the main vegetation change types in this basin. Complete recovery, recovery and slight recovery types have accounted for 90.26% in the whole basin; the total areas of serious degradation, degradation and slight degradation types accounted for 7.36%. (3) The increasing rate of vegetation coverage was significantly faster except downstream after 1998. In 1980, the order of vegetation coverage in different typical geographical units of the ten tributaries was the Western upstream > Eastern upstream > Downstream > Eastern midstream > Western midstream. During 1998-2014, the order changed to be the Eastern midstream > Eastern upstream > Western upstream > Western midstream > Downstream. The implementation of returning farmland to forest and grass project was the main reason for vegetation restoration.

### Key words:

vegetation coverage; dimidiate pixel model; dynamic change; the ten tributaries basin

## Water Environment Change in Extreme Arid Region Indicted By Vegetation Dynamics

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### Abstract

With increasingly intensified water resource exploitation along with climate change, the arid inland areas of northwestern China have experienced serious environmental deterioration and ecosystem degradation since the 1950s, which was especially remarkable in the lower basins. As this situation had severely threatened local and regional human society, exploratory measures were successively undertaken to increase water supply in order to restore the ecosystems in several basins after 2000. How the hydrological regime change has abstracted much attention, while extensive observation is unpractical due to complex natural environment and human activity. Due to the limited precipitation, vegetation growth is primarily dependent on the combined effect of surface water flow and shallow groundwater in arid inland areas. It is possible to study region hydrological regime change by vegetation dynamics. In this study, we firstly investigated the relationships between vegetation condition and the surface /groundwater dynamics (river flow, depth to groundwater table) in the Ejina Oasis, a typical hyper-arid region of northwestern China, by combing remote sensing with surface/groundwater observation data. The results showed that the natural vegetation was distributed where the depth of groundwater ranges from 1 to 4 m, and the change in NDVI was highly related to the groundwater depth, such that the vegetation NDVI increases with the depth to water table, reaching its maximum at the depth to water table of approximately 3 m; then the vegetation NDVI starts decreasing with depth to water table. And then, combining this result and gridded NDVI, hydrological regime in the Ejina Oasis was investigated. The results suggested that past water resource management improved the groundwater level in most areas, while resulted in remarkable decline in some regions at the same time.

### Key words:

Arid areas; NDVI; Groundwater depth; the Ejina Oasis

## Water Supply Problems in the National Capital Territory of Delhi: Some Policy

### Considerations

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### Abstract

NCT Delhi is not only the largest urban agglomeration in India, but is also the fastest among others in terms of population growth. The region receives considerable migrants some of whom settle down in informal settlements. Also, spurt in industrialization in the region has led to massive demand for water in a water scarce region. Another imminent problem is heavy industrialization and this can be viewed in the light of release of harmful substances vis-à-vis the existing very poor sewage system. Water distribution pattern in Delhi is also quite fluctuating and irregular.

In the light of these facts, the present paper is focused on analyzing the existing water related problems in NCT, Delhi. An attempt has also been made to critically review the policy issues of the water supplying agencies, viz the Delhi Government and Delhi Jal Board. Delhi Jal Board has started comprehensive distribution of water throughout Delhi through outsourcing of water supply in two operational zones. Pilot projects were planned to improve water supply services to poor people. This project was called as Phase-I. Delhi Government and Delhi Jal Board kept some approaches in a workshop in 2011. Recently, Dwarka Water treatment plant has been commissioned to improve water supply at Dwarka sub city. Delhi Jal Board is taking measures to improve all the working waterworks. To stop water contamination, old pipeline systems in Delhi are being totally altered by new. During last year, throughout Delhi, total 4400 major pipeline faults have been repaired.

### Key words:

Comprehensive distribution of water, Ground water recharge

## IGC special session-Global Environment



Home

### Oral

1. [The 6<sup>th</sup> Global Environment Outlook Report \(GEO-6\)](#)  
Jinhua Zhang (Science Policy Officer, United Nations Environment Programme (UNEP))
2. [The Power of Indicators to Track Environmental Performance and the SDGs](#)  
Robert Chen, Robert S. Chen, Alex de Sherbinin, Marc Levy (Center of International Earth Science Information Network (CIESIN), Columbia University, USA)
3. [Global Ecosystem and Environment Observation: Annual Reports from China](#)  
Liao X.H (Institute of Geographic Sciences and Natural Resources Research, CAS, 100101, P. R. China, liaoxh@igsrr.ac.cn), Li J.H (National Remote Sensing Center of China, MOST, 100036, P. R. China)
4. [GlobeLand30 and its Utilization](#)  
Jun Chen (National Geomatics Center of China (NGCC) and President of International Society of Photogrammetry and Remote Sensing (ISPRS))
5. [GCdataPR: Data Publishing and Sharing for Global Change in Local Places](#)  
Chuang Liu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences and Co-Chair of CODATA PASTD Data Publishing Subgroup)

## The 6<sup>th</sup> Global Environment Outlook Report (GEO-6)

Jinhua Zhang

SciencePolicy Officer, United Nations Environment Programme (UNEP)

### Abstract

Unprecedented economic growth has lifted millions out of poverty in Asia and the Pacific but is putting heavy pressure on ecosystems and the climate. The GEO-6 report looks at the state of play in key areas, highlights drivers of environmental impacts and looks at ways to address them.

Increasing unsustainable consumption patterns have led to worsening air pollution, water scarcity and waste generation and threaten human and environmental health. Increased demand for fossil fuels and natural resources - extensive agriculture, palm oil and rubber plantations, aquaculture and the illegal trade in wildlife – are causing environmental degradation and biodiversity loss. The situation is exacerbated by adverse climate change effects and an increasing number of natural disasters, which are causing devastating human and financial losses in the region. Extreme climate events are projected to become the new normal.

Meanwhile, countries are taking action towards a green growth path, with regulations, policies and programs. They make increased investments for example in renewable energy, along with enhanced environmental awareness of emerging middle class. A few national examples to mention include China's Circular Economy Promotion Law, Republic of Korea's Framework Act on Low Carbon Green Growth and India's Jawaharlal Nehru National Solar Mission program. Important policy pathways for countries' considerations to charter socio-economic development that is environmentally sound include:

- Greater emphasis is required for developing *regional* and *local* level climate change adaptation policies for increased resilience to climate change impacts.
- More sustainable production and consumption patterns, increased resource efficiency and a decoupling of economic growth from resource consumption are needed.
- Low-emission development pathways delivers significant national co-benefits, such as improved energy security and resilience to energy price shocks, improved health due to lower local pollutant emissions, and increased agricultural and land-use productivity.
- The region's shift towards green energy is currently held back. Countries in the region are encouraged to work more closely to enhance financing and energy market regulatory reforms, and to reduce fossil fuel subsidies.



## 33rd International Geographical Congress

21-25 August, Beijing, China

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- Building stronger institutions, governance and stricter monitoring are especially important, including mainstreaming the environment in other policy areas, to close the widening gap between policy formulation and its implementation.
- Strengthening international cooperation underpinned by national commitments provides another way forward, for example The ASEAN Agreement on Transboundary Haze Pollution, signed by all ASEAN countries, strengthens cooperative action to control smoke haze caused by wildfires.



## The Power of Indicators to Track Environmental Performance and the SDGs

Robert Chen, Robert S. Chen, Alex de Sherbinin, Marc Levy

Director, Center of International Earth Science Information Network (CIESIN), Columbia University, USA

### Abstract

In the year 2000, CIESIN, a center at the Earth Institute of Columbia University, and the Yale Center for Environmental Law and Policy launched the Environmental Sustainability Index (ESI), a pioneering effort to develop the best available indicators to measure the relative environmental sustainability of each country. Recognizing that policy makers needed more tailored information on environmental performance in order to ground decisions, CIESIN and Yale launched the Environmental Performance Index (EPI) in 2006, and have published the EPI biennially since then. In the 16 years since the launch of the ESI, much has changed. The Millennium Development Goals (MDGs) demonstrated the power of monitoring systems and indicators to drive policy changes and improvements in human wellbeing, but included few environmental indicators. The Sustainable Development Goals (SDGs) are much more comprehensive, including 17 goals with 169 targets covering human and environmental aspects of sustainable development. This paper reviews the CIESIN and Yale experience in developing the ESI and EPI, providing valuable lessons for implementation of the SDGs.

## Global Ecosystem and Environment Observation: Annual Reports from China

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### Abstract

Recently the global ecological environmental problem is becoming increasingly acute because of the consumption of Earth resources and damage to the environment by humankind, the ecological environmental problems such as global climate change, water shortages, pollution, decreasing biodiversity, desertification etc have effected the global economy and the society sustainable development. Retrieving the ecological environmental parameters at global scale through available technology is very important to the research on global changes and to the international collaborations on responding to the environment problems.

Earth observation technology has grown rapidly in recent years in China, and an integrated Earth observation satellite system has been created to include satellites of land and resources, meteorological, marine, high-resolution and commercial ones. There are over 30 Earth observation satellites are in orbits. Great progress has also been made in remote-sensing technology research with active international co-operation. Through an inter-governmental collaboration mechanism of China GEO, an effort has been made to work on an annual report on global ecosystem and environment was produced since 2012. This work is led by the National Remote Sensing Center of China (NRSCC) and jointly carried out by various institutes and universities. The report focuses on the global monitoring of land cover, growth of agriculture, changes of land surface water, vegetation, wetlands distribution by remote-sensing observation. Analysis of global environment is the primary element but a focus was also given each year for a particular region. Regional reports for Africa, Southeast Asia and “the Belt and Road” areas have been produced. The reports are released annually on the World Environment Day by the NRSCC each year. The reports and data sets are available on the web. The work is treated as an important contribution by China to the GEO progress and the work is endorsed by the GEO secretariat. Primary users are domestic governmental agencies, research organizations and international organizations like GEO, FAO, UNESCAP etc.

### Key words:

earth observation; ecosystem; annual reports; data sharing



## GlobeLand30 and its Utilization

Jun Chen

Chief Engineer, National Geomatics Center of China (NGCC) and President of International Society of Photogrammetry and Remote Sensing (ISPRS)

### Abstract

GlobeLand30 is the world first wall-to-wall 30-m global land cover (GLC) data products ([www.globeland30.org](http://www.globeland30.org)) in 2000 and 2010, which were developed by NGCC team with a POK (Pixel-Object-Knowledge)-based operational mapping approach. It consists of ten land cover classes in the two time periods. On Sept. 22, 2014, GlobeLand30 was donated to United Nations by Chinese government and has now more than 6,000 users from 118 countries. This presentation will give a brief introduction of GlobeLand30 and its applications, as well as future developments. The major contents include: the operational production and on-line service of GlobeLand30, the geographical and domain analysis of users, its current and potential applications in supporting sustainable development goals (SDGs), as well as its validation and updating.



## GCdataPR: Data Publishing and Sharing for GlobalChange in Local Places

Chuang Liu

Professor, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences and Co-Chair of CODATA PASTD Data Publishing Subgroup

### Abstract

Millions of scientists, professors, policy makers, private sectors and even citizens are involved in the global change observations and studies. Most of them are focusing their efforts on the local places instead of global scale. How to make these local experiences and products worldwideshareable is challenging to all of us. The solution of the Global Change Research Data Publishing and Repository (GCdataPR) is to recognize and credit the data authors' contribution to the global change studies by peer review data publishing and worldwide openly available, free access these products. More than 300 data authors from 10 countries published 150 datasets, more than 15,000 IP end users from 53 countries downloaded the data since June 2014. The GCdataPR solution makes so diverse data both in spatial and temporal, scale and author, content and format on global change in local places into easily accessible platform. The reliable, repeatable, re-useful data as resources may make more opportunities for both end users (such as more than 15,000 end users) and value added services (such as GEOSS Portal, DCI) in the big data age.

# JOINT COMMISSIONS

[IGU COMMISSIONS](#)

[FORUMS, SYMPOSIUMS & SPECIAL SESSIONS](#)

[JOINT COMMISSIONS](#)

[KEY TOPICS](#)

[PLENARY LECTURES](#)



## C12.07 & C12.14 Cultural Approach in Geography / Geography of the Global Information Society

### Cultural Geographies of the Digital

#### Oral



[Home](#)

1. [Historical GIS Approach for Mapping the Open Space Transformation of Nanjing](#)  
Zhen Xu (Nanjing Forestry University, China), Lingyun Han (Jiangsu Second Normal University, China)
2. [Investigating Chinese “Shanzhai” \(copycat\) Fever: Towards a Perspective of Cultural Economy](#)  
Junwanguo Guo, Junxi Qian, Hong Zhu (South China Normal University, China)
3. [Online Social Networks as Sources to Discover Cyberspace Geographies: The Examples of a Hungarian Social Media Site](#)  
Akos Jakobi (Eötvös Loránd University, Hungary)

## Historical GIS Approach for Mapping the Open Space Transformation of Nanjing

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### Abstract

Since the beginning of the industrial era the relationship between human beings and nature has changed greatly. This is reflected in the morphology of urban open space. This has not been paid enough attention in either planning practice or academic research.

Through the analysis of historical maps and other archives, the present authors investigate the transformation of open space in Nanjing in the Twentieth Century. With the GIS platform, four main elements, i.e. streets, parks, waters and historical relics, are analyzed for they constitute the framework and utilization of open space. Streets system is analyzed in their impacts on the urban morphology and parks' accessibility. Parks and plazas are analyzed at city scale to find the networks change, and key types and processes. The waters are found decreased extremely, and the consequential change of naturalness and connectivity are illustrated. The historical relics, especially the city walls, are analyzed in its relation to open space and townscape change in the fringe belt.

Understanding these problems is pertinent to appreciation of the city's present ecological health and citizens' access to nature. The authors also found it's important to establish a Historical GIS which integrate the spatial and temporal data such as the maps, old photos, social value, historical events and collective memory. The Historical-GIS framework for open space will have potential in social and historical and ecological study, as well as in planning evaluations, which will offer valuable knowledge for more sustainable landscape management.

### Key words:

open space; transformation; landscape management; historical GIS; Nanjing

## Investigating Chinese “Shanzhai” (copycat) Fever: Towards a Perspective of Cultural Economy

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### Abstract

This paper argues that Shanzhai (copycat) in contemporary China is not merely the embodiment of China's fake industries, but the burgeoning economy of grassroots culture in China, and a form of indigenous innovation, which plays a great role in low-end globalization. To substantiate this claim, I probe into why shanzhai appeared and widely spread around the world; how the manufacturers of shanzhai manipulate cultural discourse (advertisements and so on) to influence the consuming conception of customers, especially those with low social status and incomes. While studies on shanzhai have examined intensively in the dynamics of appearance, its influences in innovation, and the disputes of intellectual property, less attention has been paid to interpreting shanzhai as a localizing cultural phenomenon responding to the dramatic globalization; what is the cultural meaning underlying emerging shanzhai economy and how it participates into the globalization process, especially the low-end globalization are still under explore. This study is based on detailed analyses of exhibitions of advertisements, and in-depth interviews with both producers and consumers regarding the meaning of shanzhai. Overall, this paper argues that the understanding of shanzhai should not embed in the binary opposition (negative or positive): it is not just a phenomenon economic production, but represents a complicated process of the localization of global culture and construction of meanings of culture. Because of the shanzhai, China enables at least some of the fruits of science and technology goodness, even if copied, to be spread all over the world.

### Key words:

Shanzhai; low-end globalization; culture locating; indigenous innovation

## Online Social Networks as Sources to Discover Cyberspace Geographies: The Examples of a Hungarian Social Media Site

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### Abstract

Online social networks (OSNs) are basically virtual creations, which stand for expressing real life friendships in forms of virtual space acquaintance. They serve also as major platforms of ICT-enabled communication, supporting place-independent social life, however, recent findings suggest that geographical location of users strongly affect network topology. As a matter of fact, OSNs may be related to locations, since the users themselves could be at large geographically located as well. By retrieving geolocated data from the network-database of an OSN it becomes possible both to visualise and to analyse geographical relations of users.

This study attempts to introduce how online social network connections are following geographical rules by the assistance of geovisualisation and analytical techniques. Examples of iWiW, the once largest Hungarian social media site, are applied to show that such networks are evolving and are structured not independently of spatial constraints. Different maps and analytical outcomes of network topology lead us to a conclusion that proximity-driven processes have been predominant in the network formation. Also maps of settlement level aggregated data have been applied to reflect user rates, connectivity and space-time diffusion patterns of the Hungarian OSN in order to understand how cyberspace relations are attached to geographical conventions.

### Key words:

online social networks, proximity, network geography, cyberspace, Hungary

## C12.07 & C12.14 Cultural Approach in Geography / Geography of the Global Information Society

### Mega Events

#### Oral



[Home](#)

1. [Exploring The Perception of Mega Events Through Images, Mind Maps and Itinerant Soliloquies: The Case of Expo Milano 2015](#)  
Anzoise Valentina (Ca' Foscari University of Venice / Hangzhou Normal University, Italy), Lorenzo Natali (University of Milano Bicocca, Italy), Cristiano Mutti (Independent researcher / ImagoEditor, Italy)
2. [Fair Cities: Can World's Fairs Build a Better City?](#)  
Mark Wilson, K. Irene Shim (Michigan State University, United States)
3. [Making the Event-City: Urban Image Construction From Beijing to Rio](#)  
Anne Marie Broudehoux (University of Quebec at Montreal, Canada)
4. [Perception Dimensions of Local Mega-events from the Perspective of Urban Memory: A Case of Qinhuai River Lantern Festival in Nanjing](#)  
Wei Zhou (Nanjing Institute of Industry Technology; Nanjing University, China)
5. [Race and Urban Policy in Rio De Janeiro's Olympic Games Process](#)  
Renato Emerson Santos (State University of Rio de Janeiro, Brazil)
6. [What Future For Mega Events](#)  
Anna Maria Pioletti (University of Aosta Valley, Italy), Donatella Carboni (University of Sassari, Italy), Rosalina Grumo (University Aldo Moro Bari, Italy), Guido Lucarno (University of Sacro Cuore Milano, Italy), Donatella Privitera (Università Degli Studi Di Catania)

## Exploring the Perception of Mega Events through Images, Mind Maps and Itinerant Soliloquies: The Case of Expo Milano 2015

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### Abstract

This contribution explores the potentialities of a method (i.e. PAK MAP: Photo Apperception Knowledge Map - <http://pakmap.net>) that proposes the combination of different visual and participatory techniques to collect qualitative data on the social perception of Mega Events and on the material and immaterial transformations they produce. Such a method - first experimented for the Expo Milano 2015 - adopts a programmatically open and interdisciplinary approach that sees the dialogue between researchers, visual artists and a variegated constellation of social actors (inhabitants, tourists, etc.) as a crucial component of the whole research process. More specifically it avails itself of the construction of "mind maps" within the setting made available by "photo-elicitation interviews" (i.e. in particular a photographic composition on the past-present cityscape of Milan) and of a peculiar declination of what radical interactionism calls "soliloquy". Moreover, in PAK MAP also the temporal dimension assumes a decisive consistency in methodological and content terms, both for the techniques employed and for the different timing considered of the phenomenon observed, i.e. 1) the "before" tied to the expectations about the event; 2) the "here and now", represented by the opening of the Universal Exposition (1st May - 31st October 2015); 3) the "post" event, and the effects perceived in the following months. In this way the research process is articulated, as a whole, through the different visual, multisensory and narrative itineraries that the actors develop of the social world and places that, from various angles, intercept the "fleeting" cosmos represented by a Mega Event.

### Key words:

perception; participatory techniques; visual techniques



## Fair Cities: Can World's Fairs Build a Better City?

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### Abstract

Mega-events—the Olympics, World's Fairs, and World Cup--offer opportunities for the remaking of their host cities and regions. The excitement, prestige, and glamour of the event brings together many interests that wish to use the event to achieve goals of profit, social change, urban development and city branding. Mega-events are often seen as ephemeral, yet the change to the built environment associated with them must be recognized and understood if the legacy is to be useful to the city. Usually, hundreds of hectares are redeveloped for the site of the events, accompanied by large scale infrastructure projects to serve the needs of participants and visitors. While often popular, these events do not always receive the critical evaluation such major projects deserve. With hundreds of cities planning bids to host large scale events, it is essential that planners and policy makers develop a clear understanding about what mega-events can do to improve cities, and how they can avoid making poor investments for their residents. This study examines the experience of sixteen world's fairs held between 1980 and 2020 as a way to identify the factors associated with successful regeneration, as well as the causes of poor investment decisions by host cities.

### Key words:

Mega-events; world's fairs; urban regeneration; tourism

## Making the Event-City: Urban Image Construction From Beijing to Rio

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### Abstract

This paper analyses the mechanisms of urban image construction deployed at the occasion of mega-events such as the Olympic Games. It draws upon over twenty years of empirical research in both Beijing and Rio de Janeiro, which each embraced a particular image construction paradigm, defined as the city as spectacle, which rests upon a Deborian vision, and the city of exception, inspired by Agamben's thought. The paper contrasts the strategies used by both cities to conceive and project a particular place image, dividing these approaches into their mediated, physical and social dimensions. The paper discusses the highly selective and political nature of this process, that draws upon seduction to build a consensual, if illusionary image, while also resting upon strategies of exclusion, to limit what is to be shown to the world. The paper concludes with discussions of the concrete impacts of such practices and the diverse resistance strategies used by groups excluded from these representations.

### Key words:

Mega-events; Beijing; Rio de Janeiro; Olympic Games; urban image construction; city branding; city marketing; spectacle.

## Perception Dimensions of Local Mega-events from the Perspective of Urban Memory: A Case of Qinhuai River Lantern Festival in Nanjing

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### Abstract

Owing to the social functions of distinctive local characteristics, historical- cultural connotation and urban excellent cultural image of local Mega-events, the paper selects Qinhuai River Lantern Festival in Nanjing as a typical case to construct a theoretical model of the perception dimensions of local Mega-events from the perspective of urban memory, with a qualitative research method of the grounded theory. The research suggests that Bi-directional Dimensions of the visitors and tourists' perception constitute the statically real memory and dynamically activating memory elements, open coding and axial coding reveals the main category of a specific place of historical architectural landscapes, former residence sites and old leisure places, wherein the main category of celebrity masterpieces constitutes historical celebrities and literary works, the main category of experiencing the taste Chinese New Year constitutes Lantern Festival amusements, local delicacies and folk handicrafts, which categories of rich historical-cultural connotation and distinctive local characteristics prove to be the spotlight of perception and memory of the visitors and tourists. The cultivation and development of local Mega-events, as an important component of the urban cultures, should be paid more attention and support from the academic communities and social circles.

### Key words:

urban memory; local Mega-events; perception dimensions ; Qinhuai River Lantern Festival in Nanjing

## Race and Urban Policy in Rio De Janeiro's Olympic Games Process

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### Abstract

In the last decades, the Olympic Games have been meant as opportunities for positive urban changes. Beyond political marketing, these meanings often are basis for politic and economic coalitions which defines new material and immaterial contents for the cities. In Rio de Janeiro's case, project of Olympic Games (2016 edition) as a possibility for achieve a global city status has been purposed and accorded since 1992. Several changes on urban structure are happening, and one of the most important projects, going on the central area, is called Porto Maravilha Project, a public-private partnership that seeks a urban renovation of the old port zone. Covering a five million square meters of a centrally located waterfront area, it seeks to stimulate new buildings and renovations, increasing the occupation from 28 to 100 thousands habitants. One highlight is the creation of a "Historical and Archaeological Circuit of Celebration of the African Heritage". For the first time in the history of urban change operations in Rio, a project brings any positive value about the afro-Brazilian presence, culture and heritage as contents of urban space. By other side, the changes involves removal of poor and predominant black population, and undercounting of important cultural goods (the circuit is only six points, while the protected goods are almost forty, and more than sixty sites related to samba's schools - a restrictive concept of this culture and heritage, as archaeological, touristic and elitized). This paper seeks to discuss the ambiguous roles of race issues on this urban project.

### Key words:

Racism and urban planning; City project and Racism; Olimpic Games and urban project; Rio de Janeiro.

## What Future For Mega Events

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### Abstract

The issue of tourism development, related with sport events, is an aspect of growing relevance for its impact in terms of economic regeneration, but also for its impact on the quality of life. Extraordinary and global mega-events, such as the Olympic Games, or local events such as city marathons are achieving a growing importance in positioning the localities in the touristic market, improving their image, endowments and territorial infrastructures in general. In particular, considering sports mega-events, cities like Barcelona grew their touristic attractiveness thanks to the Summer Olympics in 1992; also the case of Turin 2006 seems interesting from this point of view, even if the actual time span is too little to understand whether there could be a stable growth in the tourism sector (Dansero, Puttilli, 2009).

The mega events can also be of a cultural nature and food and wine performance as the Expo 2015 held in Milan. However it is interesting to consider the relationship between cultural heritage and popular events in Italy not versus mega events but in a symbiotic harmonious and productive relationship.

### Key words:

mega events; sport; territorial infrastructures; economic regeneration cultural heritage; food and wine

## C12.07&C12.20 Cultural Approach in Geography / History of Geography

### Geographical Imaginations, Practices and Stories of Finisterrae and Border Spaces



[Home](#)

#### Oral

1. [Beyond Nature: Patagonia as Utopian Expression of Ecological Well-Being.](#)  
Enrique Aliste (Department of Geography, University of Chile, Chile), Andrés Núñez (Institute of Geography, Catholic University of Chile, Chile)
2. [Community- Based Tourism: Between A Colonial Experience and A Territorial Resistance.](#)  
Sandra Fernandez (University of Concepcion, Chile)
3. ["Continental Rift": Geographical Confine and Shelter of the Indigenous from Huasco Alto, Chile](#)  
Raúl Molina Otarola (Fondecyt 1150876, Chile)
4. [Disciplining the Borderlands. Representations of Iberian Border Areas in Boundary Delimitation Processes Between Spain, Portugal and France \(1750-1900\)](#)  
Jacobo García Álvarez (Carlos III University of Madrid, Spain), Puyo Jean Yves (University of Pau, France)
5. [Documentation of Cultural Heritage and Interactive Network Based Information Service](#)  
Chongcheng Chen, Lei Hua, Hui Fang (Fuzhou University, China)
6. [Evolution in The Perception and Treatment of the Border Western Sahara-Ifni-Tarfaya](#)  
Jose Antonio Rodriguez Esteban (Universidad Autónoma de Madrid, Spain)
7. [From The "Cursed Land" to The "Reserve of Life": The Influence of the Myth Over the Evolution of the Territorial Imaginary of AysÉN \(Chilean Patagonia\).](#)  
Sofia Pérez (Ecole des Hautes Etudes en Sciences Sociales (EHESS), France)
8. [Geographical Imaginations and Scientific Practices of Argentina and Brazil Through the Resolution of Misiones/Las Palmas Boundary Conflict \(1881-1889\)](#)  
Perla Zusman (University of Buenos Aires, Argentina)
9. [German Templers Colony Saronas as finisterrae in Today's Israel Preservations for Remembrance and Recreation as Touristic Attraction under Historical Burden](#)  
Haim Goren (Tel Hai College, Israel)
10. [Imagining Chile's Northern Frontier: 150 years of Practicing the Border](#)  
Cordelia Freeman (University of Nottingham, United Kingdom)
11. [Out of Place. Migration as A Process of Disorientation and Reorientation](#)

Marcella Schmidt di Friedberg (University of Milano Bicocca, Italy)

12. [Patagonia-AysÉN as Life Reserve: The Value of the End of the World and The New Capitalist Utopia](#)  
andres nunez (Pontificia Universidad Católica de Chile / Instituto de Geografía, Chile), Enrique Aliste  
(Universidad de Chile / Departamento de Geografía, Chile)
13. [Pilgrimage to Finisterrae \(Galicia, Spain\): New Meanings and Territorial Implications](#)  
Rubén Camilo Lois González (University of Santiago de Compostela, Spain), Lucrezia Lopez, Yamilé  
Pérez Guilarte (University of Santiago de Compostela, Spain)
14. [“Repoblar El Territorio”: Territorial Imaginaries, Rural Development, And New “Border Spaces” Of  
Global Capitalism in Castilla Y LeÓN, Spain.](#)  
massimiliano farris (Universidad de Chile, Chile)
15. [Représenter le Kansas Lake au 19ème siècle, vie et mort d’un objet géographique imaginaire dans un  
finisterrae central, l’Ouest américain.](#)  
Quentin Morcrette (Université Lumière Lyon 2, France)
16. [The Treatment of Frontier Closed Area in Hong Kong SAR, China: Towards an Integrated Borderscape?](#)  
Chiu Yin Leung (Department of Geography and Resource Management, The Chinese University of  
Hong Kong, Hong Kong SAR, P. R. China, HongKong SAR, China)
17. [The Vicious Circle of Systematic Poaching in the Context of the Information Phenomenon. Principles,  
Solutions and Prospects](#)  
Svyatoslav Gorbunov (Peoples' friendship university of Russia, Russian Fed)
18. [To Incorporate Amazonia: Cartographic languages and Geopolitical Projects for Brazilian Territory](#)  
André Novaes (State University of Rio de Janeiro, Brazil)

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## **Beyond Nature: Patagonia as Utopian Expression of Ecological Well-Being.**

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### **Abstract**

The production of images representing the ecological ideal in the world, has taken several scenarios to create an important part of this kind of representation. In this context, Patagonia has occupied an important place as full of a sense of pristine nature associated with the place, inhospitable and untouched geography.

These ideas, largely have been strengthened from the notion of margins, borders or distance, all these topics around the idea of disadvantage that led to these spaces as a neglected territory, but today become a site of interest whose value is it has positioned precisely from its status as distance.

In this communication, we seek to reflect on the condition that has been mobilized by an imaginary ecological ideal, which has relied on the photographic, cinematographic, literary and geopolitical production, which together defined a geography marked by the idea of boundary, inmensity and pristine, thus appearing as a possible utopia for ecological dream of the planet.

The consequences of this production of space, show a process of social, economic and political reorganization of the social and cultural geography, where new interests and strategies start to look around this new source of value and in this sense, created a new sociological morphology around this territory. (Abstract presented with the support of Chilean fund for scientific research, project FONDECYT 1141169).

### **Key words:**

Patagonia; ecology; conservation; imaginary; geopolitics; Chile; nature; sustainable development; cultural approach in geography

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## Community- Based Tourism: Between A Colonial Experience and A Territorial Resistance.

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### Abstract

The debate on the role of tourism as a development tool plays an important role in the investigation. In this context, we examine the growing emphasis on promoting public policies in order to present tourism as a major engine for development. The different types of tourism, also triggered different responses from local communities who experience the effects of this socio-cultural practice; thus, we can see how the arrival of travelers may lead to consolidation of stereotypes; promote cultural dialogues; or to a re-appropriation of local heritage. Conceptually, this paper addresses the "social construction" of touristic spaces; both culture and the place it manifests, become a commodity where the emphasis fall to on the production of tourist goods that would satisfy the demand of visitor. Furthermore, we found a strong contradiction in the social construction of "beauty" associated with wilderness, the exotic and untouched – both places and people. We illustrate the ambiguity of these processes with experiences of community- based tourism carried out by small producers in an area inhabited by indigenous people in south-central Chile; these experiences may be considered as a result of a colonial perspective, but also as a tool of resistance that encounter all discourses of development arisen along with the "invention of the third world".

### Key words:

Community- based tourism; commodification; exoticism; territorial resistance; Chile

## "Continental Rift": Geographical Confine and Shelter of the Indigenous from Huasco Alto, Chile

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### Abstract

In 1840, the naturalist Ignacio Domeyko in his trip to northern Chile, commented: "... *in a continental rift remains from pre-Columbian times the Indian redoubt Guasco Alto, whose inhabitants preserve the color and the features of the early Americans*". The Huasco Alto was a confine, something beyond what the eye can see, and an earthly plus ultra, one land beyond the known. This land located between mountains, in the 19<sup>th</sup> Century geographical maps the routes and places were drawn by the "Río de los Naturales" (River from the Natives); It was inaccessible to foreigners and visitors who traveled from the central valley or from the littoral paths. This continental rift is only accessed by narrow traces that snaking the route through the mountains. Was a mythical place where indigenous subsisted, meanwhile the Republic believed extinct since they were literally wiped off the map in the years 1826 and 1830 when the State orders to suppress the Indian villages which remains from the Colonial period. However, the Huasco Alto was a place that Domeyko enhanced with surprise, by asserting that it was a place of refuge, where ideas and customs from the past are preserved.

This paper discusses the geographical categories of confine, earthly plus ultra and geo-cultural and social invisibility, from the study of cartography and historical documents, making a counterpoint with current processes of the Huascoaltinos indigenous ethno genesis, which become visible by their pre-Hispanic attributes from an unknown geographical territory. Follow a discussion related with theories of "imaginary spaces" (Rojas Mix 2006, Manguel & Guadalupi 2014), "legendary lands" (Eco 2013) and geographical imaginary (Hiernaux & Lindón 2012), and the emergence of spaces of ethno genesis, considered indigenous shelters. (Abstract presented with the support of Chilean fund for scientific research, FONDECYT Project N°1150876).

### Key words:

geographical confine; indigenous; ethno genesis.

## **Disciplining the Borderlands. Representations of Iberian Border Areas in Boundary Delimitation Processes Between Spain, Portugal And France (1750-1900)**

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### **Abstract**

The period roughly between 1750 and 1900 was crucial for the modern delimitation of boundaries between Spain, Portugal and France. During this period, the governments of these States set up several bilateral agreements in order to define and fix as accurately as possible their respective demarcation lines, both in the colonial and metropolitan domains. In the case of the Iberian Peninsula, the Boundary Treaties will mainly seek to strengthen state control over the borderlands and their local communities and mitigate problems related to smuggling, as well as to end the territorial conflicts existing at a local level among the populations of both sides of the borders. The major tasks involving the preparation and the execution of those Treaties were carried out by International Joint Boundary Commissions, made up by diplomats and military officers trained to complete the necessary technical tasks, which included geographical description and cartographic survey of the border areas, as well as the demarcation of the boundary line. The field reports provided by boundary commissioners and other central government actors on certain border areas convey an image of disorder, social conflict and violence which served to legitimate the intervention of state authorities: the accurate delimitation of boundaries is presented as an essential device for achieving a stable peace and harmony both among local populations and among the central governments themselves. This paper aims to summarize the key features of these images by focusing on some case studies from within the Spanish-Portuguese and French-Spanish borderlands.

### **Key words:**

Iberian Peninsula; border regions; boundary delimitation; boundary commissions; geographical representations



## Documentation of Cultural Heritage and Interactive Network Based Information Service

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### Abstract

Heritage and culture are two important components in life of societies. Conservation of culture heritage is a major issue for modern societies. In this scenario, documentation of cultural heritage and network information service are increasingly emerging which availably provide interactive user experience and obtain initiative protection for culture. Taking this assumption into account, this paper presents a novel information technique architecture, including documentation of cultural heritage, distributed cloud storage and on-demand service, multidimensional realistic recovery and reconstruction, organization management and real-time rendering of large scale virtual scenes, Network sharing and location based service, 3D geographic information system and linkage of video image, context-aware information push service, creative design and animation production and any other technologies. Then several common key technologies in the field of cultural heritage documentation and information services are condense out, to aim at providing technical support for the development and improvement of China's cultural industry, promoting the integration of technology and culture in depth, and serving the overall target of the national culture and technology innovation project.

### Key words:

cultural heritage; network based information service; documenting; geographic information system; distributed cloud storage; virtual scenes



## Evolution in The Perception and Treatment of the Border Western Sahara-Ifni-Tarfaya

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### Abstract

The different positions on border limits of Western-Ifni-Tarfaya Sahara (Northwest Africa) and the changing contexts in which agreements are signed and proceeds to final survey and demarcation by Spanish-French and Spanish-Moroccan joint committees, reflect both colonial policies as conflicts created after decolonization.

### Key words:

border demarcation; amojonamiento; Sahara; colonization; decolonization

## From The “Cursed Land” to The “Reserve of Life”: The Influence of the Myth Over the Evolution of the Territorial Imaginary of AysÉN (Chilean Patagonia)

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### Abstract

The stories that travellers transmitted about Patagonia during the early days fed the myth about a legendary land; of a paradise on earth at the very end of the world, and built an imaginary about Patagonia with exoticism of the unknown. But since Charles Darwin made a detailed description of Patagonia in his book “The voyage of the Beagle” (1839), this imaginary vision changed, marked by the idea of a sterile and cursed land. This most recent vision would prevail for years as the perception of Patagonia, and profoundly blind the Chilean government about the geostrategic importance of its natural richness. Even if Patagonia itself has become a geo-mark as much in Chile as in Argentina, exporting the image of unique landscapes as the perfect destination for nature lovers, the life of its inhabitants is far from idyllic. On the contrary, the weight of “the cursed land” is carried by them still today. After analysing the interviews conducted on field, two main question arises: Are the ayseninos really living in reserve of life as the political discourse proclaim? Is it Patagonia lived as the exported touristic image claims to be?

### Key words:

Patagonia; Aysén; foundational myths; territorial imaginaries

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## Geographical Imaginations and Scientific Practices of Argentina and Brazil Through the Resolution of Misiones/Las Palmas Boundary Conflict (1881-1889)

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### Abstract

During the period of State formation in the Southern Cone of Latin America, the area of Misiones shared by Argentina, Brazil and Paraguay, was subjected to different enterprises of exploration and occupation. The area of Misiones claimed by Argentine, underwent a similar treatment to that of other parts of the country conceived as the “otherness” of the nation. After Brazil organized two military colonies in the border, the Misiones region was recognized by the Argentine State as “national territory” (1881). This recognition meant that the area should be under the direct control of the State in order to prevent it from being occupied by Brazil. Within this framework, the northwestern boundary of Argentina with Brazil was set based on criteria established by treaties and demarcation commissions arranged between Spain and Portugal in the second half of XVIII century. However, the borderland between two rivers (San Antonio and Pepirí Guazú for Argentina, Chapeco and Chopim for Brazil) was not cleared defined in the XIX century, and the new States incorporated in their own political agenda the definition of the boundary in this area. The paper aims to analyze discussions and criteria developed around the Misiones / Las Palmas frontier conflict. We believe that the arguments put forward by diplomats and technicians provide insights not only about the geographical imaginations that guided the incorporation of this area into Argentina’s territory but also about the most appropriate ways to define the boundary between both States as well.

### Key words:

boundary; Brazil; Argentina

## German Templers Colony *Sarona* as *finisterrae* in Today's Israel: Preservations for Remembrance and Recreation as Touristic Attraction under Historical Burden

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### Abstract

The map of Israel contains many names originating in the period of intensive German settlement between 1840 and WW1. Though there was significant Protestant and Catholic activity, most of the over one thousand structures, many of them monumental, were built by the only European non-Jewish group to establish successful 'colonies' in Palestine, the *Tempelgesellschaft*. The Templers, a sect founded in Württemberg, established four settlements between 1868 and 1875, and three more in the early twentieth century.

During the last two decades, the Israeli government selected these 'German Colonies' and other monuments for conservation and restoration. Considering the highly burdened history beginning in the 1930's, and the fact that a significant number of Templers joined the NSDAP, this might be surprising. However, the structures are of historical importance in the story of modern settlement of the country. This restoration decision impacts upon 'circles of remembrance', both intimate and national.

The best example of this undertaking is the restoration of the Templer 'colony' Sarona, established in 1871 northeast of Jaffa, in present-day Tel-Aviv. When established as an agricultural settlement in Palestine, Sarona was a real *finisterrae*, although not literally 'the end of the world'; and so, too, were its later transformations to early state governmental offices, a military center, and a recreational area attracting thousands of visitors. This site of history and consequence was already part of the country's narrative, but the project has given the historic colony dual meaning, of recreation and remembrance, in the heart of Israel's largest city.

### Key Words:

Templers; Palestine; Israel; restoration; remembrance; Sarona history changes; recreation center

## Imagining Chile's Northern Frontier: 150 years of Practicing the Border

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### Abstract

Chile in the nineteenth century had expansionist aspirations. Hemmed in by the Andes to the East and the Pacific Ocean to the West, expanding North was a logical plan. This aspiration was realised in the War of the Pacific (1879-1883) when Chile took swathes of territory from Peru and Bolivia. What then follows is decades of constructing this territory as Chilean through imaginative geographies, violence, and propaganda.

This paper will focus on the contentious provinces of Tacna and Arica, held 'captive' by Chile from the War of the Pacific until 1929 when Tacna was awarded to Peru and Arica to Chile. This was a long and complex process that began with an attempted plebiscite but ended with international diplomacy. I will map how Chile was able to construct Chilean sovereignty in the Atacama Desert since the nineteenth century in spite of liminality and harsh conditions and how it has continued to do so into the twenty-first century. The process of border-making did not end with the demarcation of Chile's northern border in 1929 but is an ongoing practice made real through cultural performance, economic schemes, and violence.

The paper will question how the narrative of the extreme north helped to make that territory Chilean, why this territory was so valuable culturally and in respect to Chile's nascent neoliberal aspirations, and how in recent years Chile's ownership of Arica has come under threat by certain social movements.

### Key words:

Borders; Chile; Peru; imaginative geographies; violence



## Out of Place. Migration as A Process of Disorientation and Reorientation

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### Abstract

Getting lost invariably represents a radical discontinuity that impacts on how we perceive our overall being in the world and on our habitual system of reference. Border spaces and the need to negotiate for a new belonging are part of the experience of migration: "Migration could be described as a process of disorientation and reorientation: bodies as "move away" as well as "arrive", as they reinhabit spaces" (Ahmed, 2006, p. 9). The disorientation and reorientation process of migrants may be more or less dramatic depending on the historical and political contingencies, social skills, economic or simply from the body of the subject. This experience is now entered in the literature with an incessant decomposition and re-composition of places and languages. In the writings of authors such as Sarah Ahmed, Edward Said, Gloria Anzaldua, Rachid Boudjedra, Zadie Smith, Abigail G.H. Manzella, we will consider experiences of disorientation in different border spaces.

### Key words:

Disorientation, reorientation, migration, border spaces

## Patagonia-AysÉN as Life Reserve: The Value of the End of the World and The New Capitalist Utopia

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### Abstract

Geographical imaginaries have a relevant component of both history and memory and, for the same reason, they are also mobile and changeable. Since the 1990s, after being considered throughout the 20<sup>th</sup> century as a territory colonised by livestock, imagined in a similar fashion to the American “Far West”, Patagonia-Aysén (Chile) began to be interpreted as a zone essential for conservation and environmental protection. In fact, Patagonia-Aysén started to be promoted under the slogan ‘Aysén, Reserve of Life’, indicating a territory not suitable for extraction and exploitation of natural resources, an inescapable and inevitable neoliberalist platform that had been used in Chile for decades. Thus, the ideas of Patagonia-Aysén and capitalism appear to be representing two very different discourses and are, in many ways, opposed. However, as we have demonstrated in our research, capitalism and ‘green’ discourse are more closely related than it would appear from first glance. In other words, ‘green’ arguments have become the utopian discourse underpinned by a technology of power that radically impacts the local spaces in which capitalism operates through land property. To this end, the ‘green’ discourse ends in the capitalist discourse, in parallel with the exploitation of natural resources elsewhere and the new emerging development discourse

### Key words:

capitalism, end of the world, utopia, discourses, conservation, Patagonia-Aysén.

## Pilgrimage to Finisterrae (Galicia, Spain): New Meanings and Territorial Implications

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### Abstract

Galicia is located at the Northwest of the Iberian Peninsula, thus being a border region between Europe and the Atlantic Ocean. Its history as an edge of the world has old roots and it is linked to three geographic facts: 1) the region is peripheral; 2) there is a town called Finisterre; 3) Cape Finisterre is the last stage of the Way to St. James for many pilgrims upon arrival at Santiago.

Looking back in time, despite the geographical distance, precisely this condition of Finisterre allowed the consolidation of the Jacobean phenomenon. This situation, together with other geographic environmental conditions, has represented its distinctive value during centuries, thus leading to cultural representation and imagination of a land border thanks to narratives and historical practices, still in force and mainly linked to the Way.

This paper discusses how these territories have taken on new meanings that have helped spreading an image of this mythical peripheral region (named *Coast of Death*). However, the region has survived on the international stage becoming a tourist destination and promoting the village of Finisterre as the goal of the Way to St. James or a mandatory visit for tourists. We analyze the regional changes paying attention to the movements of tourists and pilgrims, who are redefining new territories and geographic imaginaries. We investigate the appeal of heritage (natural, cultural, immaterial, etc.), as a basis for socio-economic development, as well as the implications of regional relationships and alliances between pilgrims, business, public institutions, associations and the population.

### Key words:

Finisterrae (Galicia); Way to St. James; Movements; Heritage; Geographic Representations; Socio-economic Development.

## **“Repoblar El Territorio”: Territorial Imaginaries, Rural Development, And New “Border Spaces” Of Global Capitalism In Castilla Y LeÓN, Spain.**

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### **Abstract**

Castilla y León is a region located in the center of Spain. However, its spatial location does not imply a centrality in socioeconomic terms. Rather, it is considered a “marginal region”, included in the Objective 1 of the European Union territorial cohesion policy due to demographic (aging and depopulation) and economic (GDP below UE’s 75% average) problems. Consequently, it has been granted several public policies for development, such as the LEADER Initiative (*Liaison Entre Actions de Développement de l’Economie Rural*) for rural development, from 1992 to the present day.

This paper focus on showing how this region was a “boundary” during “*Reconquista*” and how this past is used today to define the contemporary territorial imaginary. This imaginary is built by means of assessing Castilla y León’s geographical “roughness” (castles, ruins, churches, etc.), agricultural peculiarities (local products with DO) and forest resources.

The hypothesis is that, thanks to the European policies for rural and local development—whose goal is to “repopulate the territory”—, a territorial marketing operation is carried out, which may imply a new “colonization”. Marginal rural territories would be a new “boundary” that is necessary to include functionally in global capitalism processes.

Then, it is analyzed whether and how local development, sustainability and tourism discourses contribute to a commoditization of rural territories, specifically highlighting which are the inclusion strategies and power relations between the different local actors.

### **Key words:**

Rural development; LEADER approach; rural tourism; territorial marketing; sustainability; commoditization of territory; European Union; Castilla y León; Spain.

## Représenter le *Kansas Lake* au 19<sup>ème</sup> siècle, vie et mort d'un objet géographique imaginaire dans un *finisterrae* central, l'Ouest américain.

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### Résumé

L'histoire de la cartographie est ponctuée d'inventions de lieux imaginaires, dont la présence sur les cartes se fait plus rare à partir du 19<sup>ème</sup> siècle (Laboulais, 2004). Ces inventions cartographiques sont liées à une connaissance seulement partielle des territoires représentés (Harvey, 1980). En ce sens, on peut dire que la cartographie des *finisterrae* (par définition, mal connus) est particulièrement propice à l'expression de l'imaginaire géographique (Pelletier, *dir.*, 1998).

Cette proposition de communication souhaite revenir sur un exemple tardif de lieu imaginaire, le *Kansas Lake*. Ce lac, dont on trouve des occurrences sur les cartes à partir du 19<sup>ème</sup> siècle, est localisé au bout de la *Republican River* (affluent de la rivière Kansas), dans l'actuel Colorado. Il représente un cas singulier d'expression de l'imaginaire géographique, dans un territoire qui, bien que central, a longtemps constitué une frontière : l'Ouest des Grandes Plaines américaines

Trente-cinq cartes américaines ont été recensées (entre 1812 et 1870) représentant de manière plus ou moins formelle le *Kansas Lake*. En exploitant les données issues de ces cartes, le propos sera développé vers trois directions principales. D'un côté, on étudiera la sémiologie et les modalités de représentation du lac (expression de la certitude ou du doute cartographique), de l'autre, la dimension culturelle et le rôle particulier de l'eau dans l'imaginaire cartographique (Burnett, 2000), enfin, l'évolution des levés scientifiques et le recul de la *frontier*. Cette communication proposera finalement une tentative d'explication de l'apparition de ce lac sur les cartes américaines, en lien avec des éléments naturels et historiques.

### Mots-clés :

Imaginaire géographique ; Lac – Sémiologie ; Cartographie ; Frontière ; Exploration ; Emigration

## The Treatment of Frontier Closed Area in Hong Kong SAR, China: Towards an Integrated Borderscape?

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### Abstract

This research investigates the changing treatment of border in Hong Kong. In the context of globalization and territorial restructuring, borders not only delimit the power of states but they also ensemble contingent processes, polysemic landscape, and contested imaginations across cities and regions. Due to the unique status of Hong Kong as a Special Administrative Region of China, its border with mainland is still fenced after the 1997 handover. The various bordering practices and policing regimes often lead to uncanny questions of access, citizenship, and identities over the neighboring places. In Hong Kong, the border zone of immediate contact has been imposed with restricted access as the Frontier Closed Area. The remoteness and barrenness in the virgin territory is contrasted across only one river with the compact, skyscraper filled landscape in Shenzhen, which has developed massively and quickly as a pioneer city of reform in China. Since after the relaxation of the Frontier Closed Area and a heightened socio-economic interaction between Hong Kong and mainland China, however, there emerges a tremendous land commodification and place-remaking at the border zone. Ethnographic fieldworks suggest that differential and conflicting perceptions are intensely heated among the local communities but also across other levels. All these socio-political struggles are then further entangled by the politics of scale, which are constitutive of competing discourses and future imaginations about the borderscape that continues to both divides and bridges the self/other in everyday life.

### Key words:

border; cultural landscape; politics of scale

## The Vicious Circle of Systematic Poaching in the Context of the Information

### Phenomenon. Principles, Solutions and Prospects

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#### Abstract

This short communication analyses the current picture associated with the direct destruction of wildlife, defined by the term poaching. It presents the idea of a typology of poaching: review this practice as a sporadic or systematic phenomenon, depending on the motivational basis. Based on the example of large African mammals, this article provides statistics on dynamics in the poaching industry over the last decade. The argument about the root cause of poaching practices presented in this paper is based on the balance and interaction of economic indicators of supply and demand. This paper offers a critical look at the proposal for artificially compensating for existing demand for poaching products through the target breeding of rare species of living organisms. We present the idea of the cyclical development of the poaching industry, including addressing the problem of developing such a system in conjunction with the information phenomenon. Based on these assumptions, argument ensues regarding the most effective anti-poaching measures, recognising poaching as a vicious phenomenon currently taking place. As a result of analysis, the author concludes that the most effective would be a complex combination of "soft" and "hard" measures. In this "flexible" measures are in the long term more effective.

#### Key words:

Poaching; Sustainability; Conservation; Biodiversity; Economy; Information

## To Incorporate Amazonia: Cartographic languages and Geopolitical Projects for Brazilian Territory

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### Abstract

Amazonia is a constant concern in Brazilian geopolitical narratives. After the resolution of most border conflicts in the *La Plata* basin during the 19th century, the Amazon region was the new *finisterrae* to be protected and occupied. The debate on public policies for the region was one of the main themes in the Brazilian geopolitical thought during the twentieth century. This paper is the result of a broader research project in which I study the cartographic language used by Brazilian geopolitical authors in order to present the history of national borders. My specific aim in this paper is to identify the cartographic practices used in maps made to propose public policies for the Amazon region. The maps studied here were made to convince the government and the society on the urgent actions to be taken to occupy the "vast and empty area". By comparing maps produced in very different periods during the twentieth century, such as those produced by Backheuser (1926) and Mattos (1979), it is possible to identify not only a constancy of the Amazonia as a central issue in the Brazilian geopolitical thought, but also a certain concordance on what kind of public policies should be adopted. Through this specific example, this study aims to contribute to understanding the role of cartography in the construction of imaginative geographies on *finisterrae*. Maps are privileged tools to locate, classify, and act on these regions, and can be studied in their own visual language.

### Key words:

Amazonia, Brazilian geopolitics, cartographic language, borders, *finisterrae*

## C12.07&C12.39 Cultural Approach in Geography / Urban Geography

### Cultural Aspects of Sustainable Urban Development



[Home](#)

#### Oral

1. [Assessing Sustainable Neighborhoods: Cultural Approaches](#)  
Claire Doussard (Université Paris 1 Panthéon Sorbonne, ENSAPLV, France)
2. [Folk Festivals to the Reconstruction of Chaoshan Rural Community: A Case Study on God-Welcoming Festival in Chaozhou, China](#)  
Geng Lin, Xiaoxuan Chen (School of Geography and Planning, Sun Yat sen University, China), Xiaoru Xie (The Design Institute of Landscape and Architecture, China Academy of Art, Hangzhou, Ch
3. [Sustainable Neighborhoods' Assessment: From Standards to Cultural Practices](#)  
Claire Doussard (Université Paris 1 Panthéon Sorbonne, UMR AUSSER 3329, France)
4. [What Is to Be Sustained? a Comparative Perspective on Generations, Consumption and Environmental and Socio-Cultural Sustainability](#)  
Chen Liu, Kristina Diprose (the University of Sheffield, United Kingdom), Katie McQuaid (University of Leeds, United Kingdom), Gill Valentine (the University of Sheffield, United Kingdom), Robert Vanderbeck (University of Leeds, United Kingdom)

## Assessing sustainable neighborhoods: cultural approaches

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### Abstract

The evaluation of green neighborhoods' performance relies mostly on Neighborhood Sustainability Assessment (NSA) tools, which mainly originate from western developed countries. However, these relatively standardized tools not only rate projects in the countries they were designed, but also abroad. This is consequently contradictory to sustainability principles advocating for developments adapted to a specific local context and urban culture. In this paper, we present first how NSA tools, while relying on standards, get adapted to a specific context, and second what constitute their cultural specificities. We analyzed five international NSA tools, the LEED-ND rating system (US), the HQE-A and EcoQuartier labels (France), the AQUA-Bairros e loteamento assessment system (Brazil), and the HKTS green project award (Vietnam), and evaluated how they were used for the projects they assess at the national and/or international scales. The confrontation of those systems shows that a minority of parameters, essentially related to environmental resources and livability, constitutes the common ground on which most of the certification systems are based. More culturally specific parameters contribute however to adapt those tools to particular contexts and projects according to different strategies exposed in this paper.

### Key words:

neighborhood sustainability assessment; assessment culture; standards; rating tool.

## Folk Festivals to the Reconstruction of Chaoshan Rural Community: A Case Study on God-Welcoming Festival in Chaozhou, China

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### Abstract

As the most solemn and specific festival in Chaoshan areas, God-Welcoming Festival is a folk belief as well as regional culture closely linking to the life of rural community. From the social constructivism perspective, this thesis explores the ritual changes, parade routes, organization, power relations and local people's emotion and identity of God-Welcoming Festival, the folk belief which is different from religious beliefs. By investigating the spatial practice in the sacrifice circle in urban areas of Chaozhou's traditional folk ceremony God-Welcoming Festival, the local knowledge treated as 'the other' under the view of modernity, we intend to deeply analyze the traditional beliefs power and modernity to the rural reconstruction process and its shaping mechanism to Chaozhou community order which play an important role on the sustainable urban development. Results show that God-Welcoming Festival is a kind of cultural practice of self-adjustment for which Chaozhou people living in city are looking in the period of rapid modernization and transformation. The shared community and cultural connotation tied by geographical and the clans relationships shaped by folk beliefs power are not dispelled by modernity. Instead, it proceeds to a long-term resistance and negotiation with the modernity by the ways of inheriting and innovating the ritual, reconstructing the cultural landscape, standardizing organization and the wide variety of informal dialogues from internal and external powers to seek the reconstruction and regression of rurality constantly for the sustainable urban development.

### Key words:

folk belief; rural community; reconstruction; modernity; sustainable urban development; Chaoshan areas

## Sustainable Neighborhoods' Assessment: From Standards to Cultural Practices

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### Abstract

The technical assessment of sustainable neighborhoods' performance is today mostly based on international standards. This is however contradictory to sustainability principles advocating for developments adapted to a specific local context and urban culture. In this paper, we present first how certification systems, while responding to international standards, get adapted to a specific context, and second what constitute their cultural specificities. We therefore analyzed four international certifications systems, LEED-ND rating system (US), the EcoQuartier Label (France), the AQUA-Bairros e loteamento assessment system (Brazil), and the HKTS green project award (Vietnam). The confrontation of those systems shows that a minority of standardized environmental parameters dealing with resources management and habitat design constitute the common ground on which most of the certification systems are based. On the other hand, social and economical parameters that relate to a country's peculiar context are more culturally specific, while being less utilized by the studied assessments.

### Key words:

Sustainable neighborhoods; certification systems; assessment's culture; urban standards; urban planning and design culture.

## What is to be Sustained? A Comparative Perspective on Generations, Consumption and Sustainability

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### Abstract

This paper, based on multi-method research ongoing in three mid-sized cities in China, Uganda and the UK, explores the relationship between consumer cultures of different generations, everyday experiences and ordinary people's understanding of urban sustainable development. In particular, it is concerned with thinking comparatively about both environmental and socio-cultural sustainability across the Global North and South and de-centering debates about consumer culture and sustainable development, which has overwhelmingly been researched from the Western, in particular Anglophone, perspective. The paper will consider how changing consumption values and practices relate to and/or impede the production of intergenerational solidarities, and how generational discourses on consumption and sustainability are intersected by race, class, gender and other forms of socio-cultural difference. This research employs cross-disciplinary techniques including intergenerational theatre, discourse analysis and narrative and family interviews, to explore generational views on entitlement to consumption, how people in different socio-cultural contexts understand obligations to contemporary and future generations, how daily consumption is shaped and changed by people's concerns of sustainability, and how generational and lifestyle groupings influence attitudes towards both environmental and socio-cultural sustainability.

### Key words:

generation; consumer culture; sustainability; China; Uganda; UK

## C12.10&C12.39 Gender and Geography / Urban Geography

### A Woman's Place is in the City!



[Home](#)

#### Oral

1. [Diverse Perspectives on Urban Housing: Institutional, Political Economy, Identity, and Feminist Perspectives](#)  
Yeon Taek Ryu (Chungbuk National University, South Korea, South Korea)
2. [Excited Body and the City: Chinese Dama's Square Dancing](#)  
Wei Huang, Fan Li (Tourism Department & Center for Land Resources Environment and Tourism Research, Foshan University, Foshan 528000, China)
3. [Gendered Spaces and Places in Indian Print Media: An Exploratory Analysis](#)  
Krishna Das (Jawaharlal Nehru University, India)
4. [Planning with Communities in Regeneration Projects: Towards A Gendered Civic Capacity in Bat Yam, Israel](#)  
Tova Fenster (Tel Aviv University, Israel), Efrat Eisenberg (the Technion, Israel)
5. [Reimagining the City: Feminist Praxis in the Classroom](#)  
Kamalini Ramdas (National University of Singapore, Singapore)
6. [Re-Inventing the Traditional Buying Roles – Exploring the New Women in Delhi](#)  
Soma Sengupta, Anjan Sen (University of Delhi, India)



## **Diverse Perspectives on Urban Housing: Institutional, Political Economy, Identity, and Feminist Perspectives**

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### **Abstract**

In the field of urban housing studies, many Western scholars increasingly devoted their attention to the meanings and roles of housing agents, institutions, capitalist system, identities, and gender in (re)configuring the internal structure of Western housing markets. However, there is no much Korean housing literature that pays attention to these perspectives in the field of urban housing studies. Given this lack of interests in alternative theoretical perspectives on urban housing in Korean housing literature, the purpose of this paper is to draw more attention to and explore discourses on research subjects of urban housing studies such as agent, institution, capital, identity, and gender. Institutional perspectives on urban housing emphasize the roles and effects of institutions and agents involved in the supply and allocation of urban housing and the relationships between conflict, power, and access in the urban housing market. According to political economy perspectives on urban housing, the forms in which urban housing is provided are interlinked with the reproduction of the social relations of capitalism. Identity perspectives on urban housing regard housing as an indicator or symbol of identity, personality, social status, accomplishments, and group values. Feminist perspectives on urban housing are concerned with women's disadvantaged position compared with men's in relation to access into the urban housing market.

### **Key words:**

urban housing; agent; institution; capital; identity; gender

## Excited Body and the City: Chinese Dama's Square Dancing

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### Abstract

With the speedy expansion of urban population and the aging of Chinese society, square dancing has become prevalent in almost every city in mainland China. The dancers are mainly middle-aged women from the middle class, famously termed as Dama and usually stereotyped as frenetic about dancing in open outdoor spaces of the urban area. This paper attempts to study the phenomenon of Chinese Dama's dancing in urban public spaces through an integrated geographical perspective of body and city, different from what has been usually done in domestic academia focusing on the spatial distribution of the dance floors and its implications over the development of urban public space. Informed by non-representational theories and the geographies of dance, we are particularly interested in the choreography and movement attributes of Dama's dancing practices, the expression of compressed affect through the bodily performance as resistance of the social identity of the elderly female, and the socio-cultural implications of square dancing as part of the nostalgic culture in the mainland. By taking both the insider and outsider perspective, we studied the case of dancing groups in community parks in the Chancheng district of Foshan City and the various recorded cases of square dancing available online by means of movement analysis. The findings suggest that by dancing together, Dama are becoming the new *communitas* of excitements, as if everybody is walking outside herself; the participation into the activity strengthens their sense of belonging.

### Key words:

square dancing; Dama; body; performance; affect; identity; city; China

## Gendered Spaces and Places in Indian Print Media: an Exploratory Analysis

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### Abstract

Members of a society have a socially constructed view of reality and gender is a salient social categorization that plays a powerful role in our self-expression and interpretation of others' behavior. Such social constructions play critical role in creating/maintaining gender differences and which are fundamentally social and normative in nature. Media is one of the crucial agents of social change and perpetuation of existing dominant ideologies including gender ideologies. Media actively participates in socialization processes and teaches us the ideal gender identities, gender roles and relations. It is the role of media as an active agent of socialization that is the underlining idea behind this work. Even though that women are taking up many jobs and their presence in public places has increased multiple times, women are surprisingly absent from public places in different media forms, especially advertisements. This study attempts to understand the complex interplay of media technologies in general and advertisements in particular, in perpetuating and articulating stereotypical gender roles and images. Media, especially advertisements portray women and men in segregated spaces, performing stereotypical roles and activities. This work attempts to analyze the nature of gendered spatial segregation and gender role portrayals in media images through magazine advertisements. It is based on the content analysis of print advertisements in selected women's magazines and general-interest magazines in India, published in English, Hindi and two regional languages.

### Keywords:

gendered spaces and places; gender Roles; gender stereotypes; politics of representation



## Planning with Communities in Regeneration Projects: Towards A Gendered Civic Capacity in Bat Yam, Israel

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### Abstract

This article explores the central role that gender plays across a variety of scales in the development of civic capacity among residents of Meonot-Yam neighborhood in Bat-Yam, Israel. The article proposes a new, gendered reading of civic capacity which involves transforming women's and men's ways of thinking and acting out of the ordinary in this regeneration project, with the aim of updating and revising the term as related to planning with communities (PwC) approaches. Using a performative understanding of gender based on feminist poststructuralist analysis to identity knowledge/power and place, we combine the analysis of community and personal scales, looking at 'paradoxical moments' to understand how the transformation in power relations has taken place and how civic capacity is developed. We do so by conducting a critical analysis of biweekly meeting minutes and in-depth interviews held over a three-year period (2010-13). This civic capacity development is particularly important for women who manage to enhance and increase their social capital throughout those years.

### Key words:

gender; civic capacity; regeneration

## Reimagining the City: Feminist Praxis in the Classroom

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### Abstract

Drawing from pedagogical research conducted as part of a class on Gender and the City, I discuss some of the possibilities for transformational politics both in and beyond the classroom. As part of the course students were asked to read literature in feminist political economy and engage with its framing of social reproduction in the context of cities and urban life. They were asked to keep a journal of their observations relating to three themes in Singapore: consumption, social reproduction and redistribution. Through the process of journaling they were also required to reflect on their positionality, privilege and emotions. Finally, they were asked to work in pairs, drawing from individual learning outcomes to produce a poster on Singapore that recognizes the 'uncountable' and unaccounted for emotional and social logics that underpin social reproduction in the city. By analyzing some of the findings and outcomes of classroom-centred research, my aim is to further contribute to literature on feminist praxis in urban research. Specifically, I discuss the benefits of student journaling in settings where conversations about difference can sometimes be problematic. Through this project, I also hope to emphasize the pedagogical value of feminist praxis in education, and argue that it remains an important starting point for reimagining alternative and more egalitarian urban futures.

### Key words:

feminist praxis; city; urban geography; social reproduction; redistribution; education.

## Re-Inventing the Traditional Buying Roles – Exploring the ‘New Women’ In Delhi

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### Abstract

Financial independence, self-identity, job satisfaction and professional achievement, which were previously considered as the sole prerogative of men, are now desired also by the women in urban India. With the emergence of new family categories, like single-women headed households; and notions of feminism and women liberation touching them; it has led to a major shift in the role-structure of women in family, leading to emergence of the ‘new women’. This is reflected in the market place in the form of a change in the purchase behavior pattern associated with a variety of goods and services.

Traditionally, men dominated purchase-decisions for products like, automobiles and electronics; while women were associated with the role of home-maker influencing purchase of groceries and kitchen appliances. But, the emergence of ‘new women’ has seen a change in the buying roles.

The paper analyses the increasing influence of the ‘new women’ in the purchase decision-making process for different category of products in Delhi. It also explores the impact of socio-economic factors on their buying roles. The study revealed that the ‘new women’ has altogether broken the stereotypical roles, with a role interchange. While men also buy groceries; women too, take important decisions regarding buying cars and electronic gadgets; and even do not hesitate in buying embarrassing products, like, sanitary napkins, condoms, birth control pills, and pregnancy-test kits. The women with more education and better jobs have more influence in purchase decision-making. The study has strategic implications for marketers in terms of product-positioning, advertising and promotional strategies.

### Keywords:

Buying Roles; Purchase Decision-making; New Women

## C12.17&C12.34 Global Change and Human Mobility / Population Geography

### Demographic Sources and Methodologies to Study Human Mobility



[Home](#)

#### Oral

1. [De la comparabilité des données migratoires au Sénégal](#)  
Pape Sakho (Université Cheikh Anta Diop, Senegal)
2. [Development of International Population Mapping Methods and Datasets at The U.S. Census Bureau](#)  
Joshua Comenetz (U.S. Census Bureau, United States)
3. [Spatial Mechanism Analysis of Inter-provincial Migration Flows in China](#)  
Yingxia Pu, Xiao Han (Nanjing University, China)

## De la comparabilité des données migratoires au Sénégal

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### Abstract

Les données sur les migrations internationales sont devenues l'objet d'une attention particulière de la recherche à la mesure de la place qu'elles occupent dans les agendas internationaux. En Afrique de l'ouest, l'intégration régionale et le débat sur les relations entre les migrations internationales et développement vont entraîner la nécessité de produire des connaissances sur la question à partir des années 1990.

Ainsi des données ont été produites à travers enquêtes nationales et régionales sur les migrations réalisées surtout dans la décennie 1990-2000 par diverses sources. Seulement leur exploitation se heurte à leur dispersion entre plusieurs structures rendant difficile la lisibilité de l'information tant dans sa nature, la méthodologie utilisée que dans la définition des variables.

Cette communication a deux objectifs, le premier est d'identifier les données migratoires dans les enquêtes nationales et régionales les recensements et les enquêtes à vocation démographique, économique et sociale au Sénégal. Le second objectif est d'analyser la comparabilité entre les données sur les migrations du recensement général de la population 2002 et les données de l'enquête MAFE, une enquête exclusive sur les migrations au Sénégal en 2007.

Elle repose sur l'analyse des enquêtes intégrant des variables migratoires et celles spécifiques sur les migrations menées au Sénégal depuis les années 1990.

### Key words:

Sources de données; variables; migrations internationales; Sénégal ; Dakar



## Development of International Population Mapping Methods and Datasets at the U.S.

### Census Bureau

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#### Abstract

The U.S. Census Bureau is expanding its efforts to develop global population map layers.

We completed the first version of the Global Population Map (GPM), a spatial data set that provides seamless global coverage of population estimates linked to subnational administrative geography. GPM links recent population estimates to subnational geography down to the third administrative level where available. The data set currently covers approximately 70,000 subnational areas, and will eventually include several hundred thousand. International boundaries are harmonized based on the U.S. Department of State's international boundary layer.

Our current focus is development of methods for adding variables to GPM, including population estimates by age and sex; language, ethnicity, and/or race; literacy; and income or poverty. For some countries or regions, we will enhance the administrative area mapping with 100-meter grid cell maps. The latter represents an extension of our existing Demobase gridded mapping product.

Data sets and maps already released online include subnational administrative geography and population estimates and projections for more than 20 countries; gridded Demobase data sets for Haiti, Pakistan, and Rwanda; and a global population dot map. While these data have a wide range of applications in government, research, education, and the private sector, our primary goal is to provide the data and maps needed to support humanitarian assistance and disaster relief efforts worldwide.

#### Key words:

population mapping; GIS; demographic change; grid; ethnicity; humanitarian; hazards

## Spatial Mechanism Analysis of Inter-provincial Migration Flows in China

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### Abstract

Since the reform and opening-up policy, migration activities in China have been greatly increased. Simultaneously, researchers at home and abroad have paid much attention on this phenomenon and have gained a lot of theoretical and empirical results. However, most of these studies are based on the traditional gravity model, which emphasizes the characteristics of origin (O), destination (D) and distance factors. It fails to express the feedback and spillover effects on neighboring regions due to not explicitly capture the spatial dependence among regions. This paper investigates the network autocorrelation effects of Chinese inter-provincial migration flows over the 2005-2010 periods. The network weight matrix provides the possibility of investigating the network autocorrelation effects among inter-provincial migration flows. Several spatial OD models are established by introducing different network autocorrelation matrices into the traditional gravity model. Monte Carlo simulation method is then applied to estimate the spillover effects of each independent variable, including total effects, direct and indirect effects. The results are as follows, firstly, the indirect effects of most variables are not zero significantly, which mean the change of any given explanatory variable in a single region will affect the migration flows to and from surrounding regions. Secondly, the direct effects are much stronger than indirect effects, that is, the impacts from a variable change of some region on its own migration flows are larger than those of surrounding areas. This is due to the fact that spillover effects take on a decreasing trend with the increase of the order of network weight matrix. Finally, the spatial OD model without constraint conditions is the best compared with the single and double constraint models. The spatial mechanisms of migration network system can be explained by spatial OD models to some extent.

### Keywords:

Migration flows; Network effects analysis; Spatial OD models; Spatial spillover effects; Monte Carlo simulation

## C12.39&C12.17 Urban Geography / Global Change and Human Mobility

### Human Mobility and Urban Vulnerabilities

#### Oral



[Home](#)

1. [Construction of Traditional Dwellings Geography](#)  
yongwei kang, hongwei zhou (Hunan Normal University, China)
2. [Exploring Urban Economic Resilience: The Case of a Leather Industrial Cluster in India](#)  
Kamala Marius (University of Bordeaux Montaigne, France)
3. [Foreign Immigration and Urban Vulnerability in Spain's Main Cities](#)  
Josefina Domínguez Mujica, Ramón Díaz Hernández, Juan Parreño Castellano (University of Las Palmas de Gran Canaria, Spain)
4. [Refugees, Violence and Women: A Case Study of Albert Park Area, Durban](#)  
Sinenhlanhla memela (Rhodes University, South Africa), Brij Maharaj (University of KwaZulu Natal, South Africa)
5. [Smart Cities, Disabled People and Vulnerable Mobilities](#)  
Kim Kullman (Goldsmiths College, University of London)
6. [Socio-Economic Development of Tribals: A Micro Level Case Study in West Bengal, India](#)  
Sumanta Kumar Baskey, Narayan Chandra Jana (The University of Burdwan, India)

## Construction of Traditional Dwellings Geography

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### Abstract

In the traditional dwellings' protection field, experts from multidisciplinary face to the crisis in common. During the protection course, new discipline of traditional dwellings geography is taking shape. Construction of traditional dwellings geography (THG) should absorb nutrients from related disciplines, but the beginning should be started at geography. On the meaning of the composed phrase (THG), the "traditional" mainly refers to historical evolution and tradition, which focusing on its gradual process and both concern history feature and take care of the current inherited condition, especially those living cultural heritage. "House" is not only the static architectural heritage, but the people's home. It reflects both dwellings of human adaptation to the natural reaction and the extent of the transformation of human nature. "Geography" refers specifically to regional differences, spatial distribution, and the spatial scale; the spatial scale option of traditional dwellings follows the type system of traditional dwellings, building materials, living culture and built environment. Traditional dwellings geography is the study of traditional dwellings traditional dwellings historical heritage, the built environment, residential style type system, living culture, regional differences and spatial distribution of the traditional building materials. Methods of Traditional dwellings geography mainly absorbed architectural historians, environmental studies, folklore, anthropology, cultural geography and other disciplines methods. Practice of geography traditional dwellings should choose the area rich in cultural heritage and in the belt of cultural interchanged district.

### Key words:

Construction of discipline; Practice of traditional dwellings Geography

## Exploring Urban Economic Resilience: The Case of a Leather Industrial Cluster in India

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### Abstract

Unlike some other developing countries of the world, India has shown relative resilience to the global economic crisis (2008-2014) by maintaining one of the highest growth rates in the world. Even if one of the main drivers of India's growth during the global economic crisis has been still the services sector (55%) located in peripheral locations of metros, the manufacturing sector not only in metropolitan areas but also in small and medium towns has contributed to keep its massive informal labour in spite of its low contribution in the GDP (16%). The example of the leather industry is one India's oldest manufacturing industry with a tendency of informalization and feminization of the work of the formal sector. The demand for its products concerns both domestic as well as international market.

In spite of low levels of innovation in Indian clusters, we have to remember the large number of workers employed in the enterprises located in these small and medium towns and its impact on the rural and urban economic growth. The performance of these clusters and their competitiveness in the globalised and liberalized economy become important.

In this context, the main objective of this study is to analyse why some small industrial towns globally positioned are economically resilient while others are not. What distinguishes resilient small towns from those that fail to recover from the economic recession?

A preliminary analytical framework based upon mechanisms, policies, actors can deepen our understanding of the factors of the resilience of industrial towns. This study has engaged with the resilience of small industrial towns well integrated from colonial times into global networks (this study is funded by ANR (French agency) SUBURBIN is a joint project of IFP and CSH, under the responsibility of Eric Denis and Marie-Hélène Zérah)

### Key words:

urban economic resilience; industrial cluster; small towns; economic geography

## Foreign Immigration and Urban Vulnerability in Spain's Main Cities

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### Abstract

The Spanish Ministry of Development has published a series of reports on vulnerable city districts in Spain, where vulnerability is defined according to a number of criteria, two of which are closely linked to processes of foreign immigration: the percentage of foreign children under the age of 15 (excluding EU-15 nationals) and the proportion of foreign immigrants in relation to the total population (again excluding EU-15 nationals).

The application of these criteria at a micro scale to Spain's largest cities (Madrid, Barcelona, Valencia, Seville, Zaragoza and Malaga), reveals the persistence of vulnerability associated with foreign immigrants. Consequently, the aim of this paper is to evaluate that vulnerability applying the criteria above to the period 2001-2011, making use of population and housing census data at microscale level.

The analytical procedure developed has consisted in the elaboration of a series of socio-demographic, housing and economic indicators that make it possible to identify vulnerability trends in certain urban areas during this period.

It is necessary, however, to bear in mind the impact the economic crisis has had on Spain since 2008, which has brought about a significant drop in foreign population rates as many immigrants, particularly Latin Americans, have returned to their countries of origin -a phenomenon that should not obscure the issue of ethnic segregation in Spain's main cities.

### Key words:

Immigration; urban vulnerability; Spain; residential segregation

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## Refugees, Violence and Women: A Case Study of Albert Park Area, Durban

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### ABSTRACT

Women refugees are affected more by violence than any other female group in the world, before, during and after forced migration. Violence against women includes psychological, physical and sexual attacks taking place in the family, community, which is sometimes tacitly condoned by state. This paper examines violence experienced by female refugees in Durban South Africa. Adopting life histories and in-depth interview methods, the specific focus is on domestic violence, the fear of urban public space, and the failure of police protection. As female refugees attempted to settle in a hostile society they encountered various forms of domestic and public violence in Albert Park. Most of the women interviewed did not report domestic violence to the police. They were scared to report it due to stigmatization. Female refugees were afraid of using urban public space because they were subject to physical attacks, verbal abuse and sexual harassment from refugees, local people and taxi drivers and conductors. This was aggravated by the high levels of xenophobic violence in South Africa. Female refugees were not only threatened by the local people but were also harassed by other refugees. The fear of urban violence compounds the trauma that most female refugees experienced in their home countries. Women were also frustrated by the tension between local people and foreigners and the knowledge that police protection was limited. Female refugees are an extremely vulnerable group that needs special attention. South African refugee policies and legal instruments at an international level have failed to protect refugee women.

### Key words:

Women; Refugees; Violence; Albert Park; South Africa



## Smart Cities, Disabled People and Vulnerable Mobilities

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### Abstract

As notions of smart cities are spreading rapidly around the world, this paper offers critical insight into the largely unexplored question of how these impact the everyday mobilities of disabled people, a particularly vulnerable urban population. Drawing on a European Research Council funded study, the paper examines how contemporary cities are increasingly seeking to respond to the needs of disabled persons through a wide range of smart city solutions, such as digitally enhanced, interactive street furniture, lighting and signage, in order to facilitate their ease of movement. The paper follows smart city practices at different scales and in diverse domains, from urban governance through design work to daily encounters between technologies and users. In doing so, the paper demonstrates how disabled people are chronically absent from smart city discourses, which are mainly concentrated on younger and able-bodied populations to evoke dynamic and future-oriented scenarios for cities, thereby effectively immobilising the former. Apart from critiquing such a limited approach to urban transformation, the paper develops more affirmative alternatives by discussing design projects have started to question prevailing smart city discourses and are currently experimenting with more inclusive forms of technological development by collaborating with disabled people and by thinking closely about how their products impact the urban mobilities and immobilities of vulnerable social groups.

### Key words:

Smart cities; urban mobility; vulnerability; disability; design.

## **Socio-Economic Development of Tribals: A Micro Level Case Study in West Bengal,**

### **India**

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#### **Abstract**

Tribal development has been an emerging issue in India since 1950. Tribes have almost always been considered as a peripheral phenomenon even amidst huge diversities of mainstream Indian life and culture. They remained socio-economically backward due to socio-political reasons. The economic reforms in India since 1990s due to globalisation although put an emphasis on the eradication of poverty, but do not consider the problems of tribals on priority basis. Despite the initiation of several developmental programmes at the government level for their welfare, no significant economic growth has taken place among the tribals. Only a small section has been benefited from the programmes. Their economic conditions had gradually deteriorated with more and more tribals becoming landless labourers. Keeping the above situation in backdrop, Manbazar-II Block of Purulia District in West Bengal, India has been taken as a case study for assessing the level of socio-economic development of tribals. In the present study, composite index with the help of principal component analysis and some statistical methods has been used. Result reflects that socio-economic development of tribals is not uniform and wide ranging disparity has been observed within the study area. Overall development can be possible only through improvement of common minimum needs and their awareness and it should focus on the human capabilities. Finally tribal development in real sense requires guaranteed Government action especially for women, elderly and children.

#### **Key words:**

Socio-economic development; tribals; principal component analysis; common minimum needs; awareness

## C12.33&C12.10 Political Geography / Gender and Geography

### Conversations Between Gender and Political Geographies Key Concepts, Methods and Themes

#### Oral



[Home](#)

1. ["Don't Worry, We Will Tell a Great Story." Narrative and Politics of Migrants](#)  
Marianne Blidon (Paris 1 Pantheon Sorbonne University, France)
2. [Migration and Citizenship in Post-Apartheid South Africa: Perspectives On Social Cohesion](#)  
Dr. Innocent Moyo (Geography Department, University of South Africa)
3. [Migration, Regional Cohesion and Citizenship: Teasing Out a Borderless Southern Africa](#)  
Christopher Nshimbi (GovInn, University of Pretoria, South Africa)
4. [Out of Place: Popular Geopolitics and The Representations of The 2015 'Refugee Crisis' In Europe](#)  
Virginie Mamadouh (University of Amsterdam, Netherlands)
5. [The REPLACE Approach for achieving Social Norm Transformation: Tackling Female Genital Mutilation \(FGM\) in the European Union \(EU\).](#)  
Hazel Barrett (Coventry University, United Kingdom), Yussif Alhassan (Coventry University, United Kingdom), Katherine Brown (Coventry University, United Kingdom)



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## "Don't Worry, We Will Tell a Great Story." Narrative and Politics of Migrants

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### Abstract

Since the 1980s, the French immigration policy was increasingly restrictive. The images of the massive arrival of refugees from the Middle East by sea as well as the attacks in Paris and Brussels have created a tense situation that favors the rise of far-right parties. This situation affects the application of the law by the regional prefects. The regularization of undocumented persons or the granting of asylum depends on the ability of individuals to document their situation and their trajectories. The presentation of evidence and the storytelling as a proof is a key moment in the course of the applicants. Associations help them build their case. From the observation of a permanence in Paris, this paper will examine the expectations of personal narrative which also depends on gender, social class and country of origin. Through this case, the paper tries to think the contemporary geopolitical issues at different levels (European, national, regional, local) and politics of spaces (be in place or out of place).

### Key words:

migration; gender; political geography

## Migration and Citizenship in Post-Apartheid South Africa: Perspectives On Social Cohesion

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### Abstract

Given that the immigration debate in South Africa has often targeted African immigrants in both actual and symbolic ways, which could be interpreted as exclusionary and granted that I conceptualize social cohesion as constituted by "the elements of social progress which include human security and solidarity, and can be both constitutive to development, and instrumental to other elements of development, for example the ability of social groups to sustainably improve living standards, or the ability of representative institutions to facilitate economic reforms" (Norton and De Haan 2013:4), my paper places a "strong emphasis on the importance of inter-group relations—on overcoming perceptions of grievance held by social groups which can become the basis of conflict, and on actions which can help to overcome such perceptions e.g. by building citizen identities which cross-cut social difference or by conflict resolution approaches"(Norton and De Haan 2013:4). In this regard, I propose, to investigate the context of the migration and immigration debate in South Africa in terms of how it reflects on claims to citizenship vis-à-vis the African immigrants and social cohesion. Being infinitely aware that the South Africa population is not cohesive in its own right, my interest is on the added dimension of African immigrants. How does the presence of African immigrants complicate social cohesion? What livelihoods do African immigrants engage in? Are these beneficial to the host communities? Can this be the basis of social cohesion? If some African immigrants play an important role in their host communities, what can be done to reduce the divide between 'us' and 'them'? Considering that we live in an "era of globalisation, mass mobility and super diversity" (Dyers and Wankah 2012:234), in which migration is not only increasing, but will be a permanent feature of all countries, it is urgent that social cohesion is achieved at least between South African citizens and African immigrants, because "social membership—a clear sense of who belongs (community, nation) is necessary to establish clarity around the basic rights and obligations which govern social interaction" (Norton and De Haan 2013:4).

### Key words:

Migration; xenophobia; social cohesion; South Africa

## Migration, Regional Cohesion and Citizenship: Teasing Out a Borderless Southern Africa

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### Abstract

This paper considers the possibility of establishing a borderless southern Africa—under the auspices of regional bodies such as the Common Market for Eastern and Southern Africa (COMESA), the Southern African Development Community (SADC), and the Southern African Customs Union (SACU). Special attention is given to migration and informal cross-border interactions, and corresponding legislations and policies of selected member states of the said regional bodies. This is done, against the realities and understandings of migration and contested notions of citizenship and development in southern Africa. A thorough review of legislative and policy frameworks regarding and affecting migration at the regional and national levels was conducted. Personal interviews with key policy makers selected on the basis of their policy portfolio, migrants, and other non-state actors, and participant observations at border posts/crossings, immigration offices and refugee or asylum application centres, etc. were conducted. Southern Africa is characterized by open borders and substantial formal and informal cross-border movements that have political and socioeconomic costs. While the most preferred destinations by migrants in the region have officially and systematically opposed a formal regional free-movement-of-people regime, geographical logics and realities on the ground indicate the necessity of a regional migration governance framework that is devoid of borders. This, however, needs to be carefully crafted and consider the region's history, the challenges associated with migration to sending and receiving countries and the general fear of the unknown that is manifest in state authorities and national and regional legislators.

### Key words:

Migration; Xenophobia; Social cohesion; South Africa

## Out of Place: Popular Geopolitics and The Representations of The 2015 ‘Refugee Crisis’ In Europe

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### Abstract

Media representations of the 2015 ‘refugee crisis’ in Europe are key to responses by governments and policy makers at the Union, national and local level, by civil servants on the ground, by journalists and by the general public. They are shaped contingently by a variety of actors, ranging from the conventional media to the migrants themselves through their use of the social media, and circulate within and between nationally shaped public arenas. This paper discusses geopolitical discourses representing migration in general and more specifically the 2015 ‘refugee crisis’. These geopolitical representations consist of many elements. These include first representations of the actors: the migrants themselves (framed in different groups allegedly deserving different entitlements), and the states involved at different level (local, national, regional, EU) and at different stages of the process (states of origin, transit states, states of destination) – and second representations of the places along their journeys: sea and land borders, migration routes and border crossings, camps and reception centres, cities and public space in Western European countries. They also feature storylines about the deep and direct causes of migration flows, their consequences in the short and the longer term, and the desirable and actual management of the flows, and articulate assumptions about the agency of migrants, the nature of the border, and the ethical challenges for the receiving societies and communities. The paper will focus more specifically on the gendered representation of refugees and/or migrants and their presence ‘out of place’.

### Keywords:

political geography; popular geopolitics; gendering; othering; Europe; migration; refugee crisis; border; place

## **The REPLACE Approach for achieving Social Norm Transformation: Tackling Female Genital Mutilation (FGM) in the European Union (EU).**

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### **Abstract**

This paper will present the innovative REPLACE Approach for achieving social norm transformation that has been produced by researchers at Coventry University. The REPLACE Approach was developed in response to concerns about the continuing increase in FGM in the EU, despite the practice being illegal in all EU Member States (most with an extra territoriality clause) and many decades of campaigning by third sector organisations to end the practice. The REPLACE Approach brings together Community-based Participatory Action Research methods with behaviour change theories and has produced a five stage approach to social norm transformation. Using the results of the implementation and evaluation of the approach in five EU Member States (Italy, Netherlands, Portugal, Spain and UK), working with a variety of FGM affected African diaspora groups in those countries (Eritrean, Ethiopian, Gambian, Guinean Bissau, Senegalese, Somali and Sudanese) this paper will describe the approach, in particular focussing on the innovative REPLACE Community Readiness to End FGM Assessment. The paper will demonstrate that different communities have different belief systems and community enforcement mechanisms concerning FGM and are at different stages of readiness to end FGM. The REPLACE Approach allows these differences to be investigated and inform intervention activities designed to tackle FGM. Evaluation has confirmed that the REPLACE Approach has potential to transform social norms that perpetuate FGM in the EU and beyond and could be used to tackle other harmful social norms. The REPLACE Project was funded by the European Commission's Daphne Programme (JUST/2012/DAP/AG/3273).

### **Key words:**

REPLACE Approach; Female Genital Mutilation; European Union; Social Norm Transformation.

## C12.34&C12.10 Population Geography/ Gender and Geography

### Understanding Contemporary Dynamics of International Student Mobilities



[Home](#)

#### Oral

1. [Collective Identity: Chinese Student Experiences of UK Universities](#)  
Ning Tang (Sheffield Hallam University, United Kingdom)
2. [Educational Strategies of Internationally Mobile Students Choosing Denmark as Their Study Destination](#)  
Lisanne Wilken (Aarhus University, Denmark)
3. [International Students and "Two-Step Migration" Policies in Switzerland: To What Extent Are Federal Policies Re-Interpreted at The Cantonal Level?](#)  
Yvonne Riaño (Institute of Geography, University of Neuchatel, Switzerland)
4. [Stay, Return or Move On? Mobility Decisions of International Students in Germany](#)  
Birgit Glorius (TU Chemnitz, Germany)
5. [What China? Which Chinese? Reshaping Identity through Transnational Student Mobility: A Case Study of Indonesian Mobile Students in China](#)  
Rika Theo (Utrecht University, Indonesia)

## Collective Identity: Chinese Student Experiences of UK Universities

Ning Tang

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### Abstract

The number of Chinese first-years coming to the UK has increased by 59% since 2009/10 with 58,810 Chinese undergraduates started their study in the UK last year, comparing with the total number of 57,190 EU students (HESA Feb 2016). A large body of literature discusses the barriers of integrating Chinese students to the UK campus. An understanding of Chinese students in the UK academic context requires further examination of their conceptualization of their own identities. This paper aims to explore how Chinese student experiences construct a collective identity which helps position themselves as being Chinese enjoying British culture on British campus.

The paper will review existing literature about Chinese student identities in an international context. The concept of collective identity will be discussed which has rarely been applied in the study of Chinese students studying abroad. Drawing on data collected from qualitative interviews and focus groups with Chinese students, the paper argues that the construction of collective identity is a fluid and dynamic process as indicated in the Chinese students' interaction among themselves as well as with home and other international students. This process holds for both individuals and collectivities (Snow 2001). Whilst the issue of identity becomes more problematic and unsettled as societies become more structurally differentiated, fragmented, and culturally pluralistic (Castells 1997; Giddens 1991), the understanding of Chinese students' collective identity and its significance in their negotiating process to be accepted by both English and Chinese cultures is critical in improving Chinese students' experiences in UK universities.

### Key words:

collective identity; Chinese student experiences; UK universities

## Educational Strategies of Internationally Mobile Students Choosing Denmark as Their Study Destination

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### Abstract

Over the past ten years the number of students who go abroad to pursue tertiary education has more than doubled, from 1,9 million in 2000 to 4.1 million in 2010 (OECD 2012). More than half of the internationally mobile students go to just five countries: The USA, UK, France, Australia and Germany, and a substantial number of the rest go to Canada, Russia, Spain, Italy, Austria, China and South Africa (UIS 2011).

In recent years' smaller European countries have entered the competition to attract some of the mobile students. Universities in countries such as Denmark, Norway, and Sweden are increasingly offering courses and Masters Programs in English and adapting their educational structures to the Bologna model in order to ease student mobility. While initially primarily targeting European and select non-European students there is an increasing interest in also attracting students from emerging market economies.

So far very little research has been done into how students come to choose a university in a smaller European country, or who these students are.

With reference to a comprehensive survey of students who attend international study programs in Denmark and to 85 narrative interviews with students from such programs this paper aims at pinpointing the educational strategies of students who navigate the global space of tertiary education and end up in Denmark. The analyses in the paper takes inspiration from Bourdieu's concept of strategy and asks who the students are who go to Denmark and how Denmark becomes the destination of 'choice'?

In a Bourdieusian sense "educational strategies" may be understood as ways of "manoeuvring" in a 'space of possibles' (Lamaison 1986). The 'possibles' that individuals perceive as available options for action depend on their habitus (internalized dispositions acquired through socialization) and their capitals (e.g. exams, language abilities, network and money) with reference to their position in social space. A social space, Bourdieu pointed out, is always a signposted space where different routes are open to different people (Bourdieu 2000). Different individuals may thus see different possibilities in the same space depending on position, habitus and capital.

Thus in order to understand the educational strategies of students who go to specific places we thus need to construct an understanding of not just their nationality, age and gender, but also their social class, previous



# 33rd International Geographical Congress

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mobility experience, inherited and acquired capitals as well as insights into the position of (in casu) Denmark on their “mental worldmaps” or geographical imaginaries (Wilken 2007, Holton & Riley 2013).

**Key words:**

Student mobility; Navigating space; Bourdieu

## International Students and "Two-Step Migration" Policies in Switzerland: To What Extent Are Federal Policies Re-Interpreted at The Cantonal Level?

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### Abstract

Academics have recently recognized the key role of migration policies in regulating the extent and character of international student flows. However, research in this new field remains scant. As we know, several governments around the globe view international students as valuable future skilled migrants. Accordingly, the Swiss parliament passed in 2010 the "Neyrinck initiative", which entered into force on 1<sup>st</sup> of January 2011, allowing international students who were successful in securing employment to remain in the country. Studies on the implementation of "two-step migration" policies are rare. Furthermore, scholars examining policies of student mobility tend to focus on how 'state actors' influence student flows without recognising the role of the different levels of government from the federal to the local. In Switzerland, federal actors play dominant roles in setting the conditions for how international student flows are handled but the process of how these policies are implemented is largely influenced by cantonal authorities. On the assumption that two-step policies may be re-interpreted at the local level, we formulate the following questions: (a) How is the Neyrinck two step-migration policy understood and implemented by key actors, at the federal and cantonal levels of government? (b) To what extent is the Neyrinck policy reinterpreted by cantonal authorities in its practical implementation, and what types of tensions may exist between the two levels of government? These questions are examined by means of expert interviews with key actors at the federal and cantonal levels, as well as by content analysis of policy texts.

### Keywords:

international student mobility; migration policies; two-step migration; local government; Switzerland

## Stay, Return or Move On? Mobility Decisions of International Students in Germany

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### Abstract

Facing demographic decline and shortages of qualified labor force, Germany entered into the international “battle for the brains” by introducing policies aiming to favor the immigration of highly qualified foreigners and – more recently – also policies trying to support international students’ long-term stay in the host country after having completed tertiary education. However, state administration had to realize that the mere introduction of supportive measures is not sufficient for retaining considerable numbers of international graduates.

Before this background, we have to ask how international students actually make their decision concerning future mobility steps. The proposed paper tackles this question by analyzing individual migration biographies and considerations on future perspectives whether to stay, return or move on. It draws on a series of biographical interviews with international students at the University of Halle (Germany). The paper assumes that migratory decisions are individually negotiated using elements of rationality, subjectivity and emotionality. The analysis shows that future mobility intentions are densely connected to life-cycle or career considerations on the one hand, and to character and perception of framing elements such as economic and labour market situation, integration policies or societal conditions on the other. The paper discusses how major findings such as the embeddedness of migratory decisions in the individual and family biography, subjectivity in decision making and a high degree of transnationality in daily life can feed into a broader conceptualization of mobility and migration.

### Key words:

brain circulation; life cycle; student mobility; transnationality



## **What China? Which Chinese? Reshaping Identity through Transnational Student Mobility: A Case Study of Indonesian Mobile Students in China**

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### **Abstract**

This paper draws attention to the role of transnational mobile students as social and political agents which was less well discussed in the existing research on student mobility. Using the case study of Indonesian students in China, this paper investigates the deconstruction and reconstruction of the politicized identities on China, Chinese, and Chinese-Indonesian by the transnational mobile students. The dominant politicized identities have been produced under a long fragile historical trajectory of Indonesia and China's relation that intersected with their domestic politics. Chinese-Indonesians in particular have been portrayed as the problematic non-native others who could threaten the nation building and dominate the economic sector. Under the burgeoning economic cooperation and closer diplomatic ties of China and Indonesia, the mobile student are the ones to contest and negotiate previous identity discourses, then reconstruct them with the encultured knowledge obtained during their mobility. This paper investigates the process of attaining transnational identity capital including the tension within in challenging the old myth of identities through the experience of being and becoming the transnational mobile students.

### **Key words:**

Student mobility; transnationalism; transnational identity; Chinese-Indonesians; China

## C12.25 & C12.07 Landscape Analysis and Landscape Planning / Cultural Approach in Geography

### Role of Heritage Sites and Cultural Landscapes in Harmonizing the World



[Home](#)

#### Oral

1. [A Critical View of the Subjectivities behind the Cultural Maps of Beijing](#)  
Xin Li, Shangyi Zhou (Beijing Normal University, China)
2. [A Geo-Ethical Issue of Caste Base Human Discrimination-A Fault Line for Harmonious World](#)  
Prakash Chanyal (Kumaun University Nainital, India)
3. [A Research on Buddhist Cultural Landscape in the Guanzhong Region Based on the Culture of Birthplace](#)  
Yuanlin Xiang, Mingming Cao (Northwest University, China)
4. [Aggressive Dragon or Benevolent Panda? The Dilemmas of the Confucius Institute in Global Expansion and Local Thrust](#)  
Hong Zhu (Center for Social and Cultural Geography, South China Normal University, China, China),  
Zhenjie Yuan (The Centre for Contemporary Chinese Studies, Asia Institute, the University of Melbourne, Australia, China), Junwanguo Guo (Center for Social and Cultural Geography, South China Normal University, China, China)
5. [Commodified Language in Foshan after the Urban Renewal: A Case Study of the Linguistic Landscape in the Lin-Nan New World](#)  
Wei Huang, Fan Li (Tourism Department & Center for Land Resources Environment and Tourism Research, Foshan University, China)
6. [Construction of Cultural Landscape by the Spatial Idea in the Jinuo's Village](#)  
Chen Yapin (Yunnan Normal University, China), Zhou Shangyi (Beijing Normal University, China)
7. [Cultural Geography in Russia: Historical Origins and Contemporary Research Areas](#)  
Vladimir Streletskiy (Institute of Geography, Russian Academy of Sciences, Moscow, Russian Fed)
8. [Cultural Heritage of Ayodhya \(India\): an identity of National integrity](#)  
Sarvesh Kumar Prof. Rana P.B. Singh (Banaras Hindu University, Varanasi (UP) India, India)
9. [Cultural Transformation of "Deori" S: A Social Geography Perspective](#)  
Sujata Deori (North Gauhati College, India)
10. [Culture-Led Transformations of Industrial Heritage at Multiple Scales: A Case of Xinhua Printing](#)

## Plant in Beijing

Juncheng Dai (Central University of Finance and Economics, China)

11. Different Interpretation Patterns of the Ancient Water System in Hongcun and Its Influence on the Optimization of Man-Land Relationship  
Xiang KONG (East China Normal University, China)
12. Diffusion of the Morin Khuur Music and Registration to the National Representative List of Intangible Cultural Heritage in Qian Gorlos Mongol Autonomous County, Jilin Province, China  
Kentaro Takahashi (Komazawa University, Japan)
13. Exploring Public Sphere Based on Folk Belief: Case of CunXin Charity Hall in Chaoshan area of China  
Geng Lin, Zuyi Lv (School of Geography and Planning, Sun Yat sen University, China)
14. Fiction and Urban Space in Shanghai in late Qing Dynasty: the case study about <Hai Shang Fan Hua Meng>  
Xiaohong Zhang (Fudan University, China)
15. Geographic Scenes and Space Construction in Macbeth  
Yangming Bai (Hubei University of Technology, China)
16. Heritage Value of Religious Sites and Cultural Landscapes: The Scenario of Hinduism from India  
Rana P.B. SINGH (Banaras Hindu University, Varanasi, India)
17. Indigenous Diplomacy: Following the script or writing the book?  
Simon Lambert (Lincoln University, New Zealand)
18. Is Education a Right? Production of Bulletin Board Space Based On a Comparison Between British Columbia University and Xianlin University Town of China  
Chao Ye (East China Normal University, China)
19. Lingering Resonance— the Soundscape and Poetic Patina in China Classical Garden  
Zhiran Fan, Shuaiqi Xia, Zhen Xu (Nanjing Forestry University, China)
20. Microterritorialités Rurales Dans Un Espace Urbain au Sud Du Brésil: Imaginaires Géographiques Et Autres Modes D’Habiter La Ville  
Nicolas FLORIANI, Maximillian Ferreira CLARINDO (PPGG, UEPG, Brazil), Nicole MATHIEU (LADYSS, PARIS 1, France), Enrique ALISTE (FAU, U de CHILE, Chile)
21. Multi-Images of an Historical Area in Central Beijing: A Post-Modern Case Study of Dongjiaominxiang

Shangyi Zhou (School of Geography, Beijing Normal University, China), Xin Li

22. [Nanjing Historical Landscape and Its Planning from Geographical Perspective](#)

Yao Yifeng (Nanjing Normal University, China)

23. [Old Québec City: Religious, Touristic and Harmonious](#)

Pascale Marcotte, Laurent Bourdeau (Université Laval, Canada)

24. [On Literary Landscapes](#)

Daxing ZENG (Guangzhou University, China)

25. [On Modification of Literary Region to Current History of Literature in Terms of Literary Geo-criticism](#)

Jianjun Zou (Central China Normal University, China)

26. [Public Awareness of Beijing City's Axis](#)

Xinya LI (Yunhe Middle School, China), Baoxiu ZHANG (Beijing Union University, China)

27. [Religious Landscape of Mountain Buddhist Monasteries in Korea](#)

Hae Un Rii, Ju Yun Jung (Dongguk University, South Korea)

28. [Reproducing Sacred Landscapes: A Case Study of Industrial Uses of Ancestral Temples in Rural Wenzhou, Southeast China](#)

Ningning CHEN (National University of Singapore)

29. [Results of Planning the Historical Landscapes in Georgia](#)

Elizbarashvili Nodar (Tbilisi State University, Georgia)

30. ["Revitalizing Soul of the Heritage City": Exploring the New Agenda for Integrated and Sustainable Development of Heritage Cities in India](#)

Bhawna Bali (TERI University, New Delhi, India)

31. [Sacred Water Bodies and Cultural Practices in Varanasi City, India: An Exploration into Challenges to their Sustainability](#)

RAVI SHANKAR SINGH (Dept. of Geography, Institute of Science, Banaras Hindu University, Varanasi (UP), India, India), SINGH PRATIBHA (Ashadeep Vidyashraam, Varanasi (UP), India, India)

32. [Singapore: Heritage Sites & Cultural Landscape in Harmonizing the World](#)

Haiyan WANG (South Central University for Nationalities, Wuhan, 430074, P. R. China), Fen LIU (Economics and Business English College, Wuhan Technology and Business University, Wuhan Hubei 430065), Zhaoxia HU (China South University, Hengyang, Hunan, China)

33. [Spatial Narratives in the Perspective of Geographical Criticism-A Case Study of Sutpen's Hundred in Faulkner' Absalom, Absalom!](#)

Haiyan WANG (South Central University for Nationalities, Wuhan, 430074, P. R. China), Fen LIU, Zhaoxia HU (Economics and Business English College, Wuhan Technology and Business University, China),

34. [Spatial Reconstruction of Cultural Heritages: An Example of the Beijing City's Central Axis](#)  
Baoxiu ZHANG (Beijing Union University, China)
35. [Study On Interactive Mechanism Between the Inheritance and Innovation of Regional Culture and The Characteristic Development of Animation Industry in Jiangsu Province](#)  
Zhaoyi Meng, Aixue Qu (Jiangsu Normal University, China)
36. [Temporal-spatial Characteristics of World Cultural Landscape Heritage and the conservation of Honghe Hani Rice Terraces](#)  
JIAO Yuanmei (Yunnan Normal University, China)
37. [The Buddhist Temples and the Buddhist Culture in Ancient XIYU in China](#)  
Renxiong Gao (Northwest university for nationalities, China)
38. [The Real and Imaginary Sacred Landscape of Bodhgayā](#)  
Nikhil Joshi (National University of Singapore, Singapore)
39. [The Research of Relationship Between Geographical Space and Image of Literature in The Novel the Ordinary World](#)  
lu cai, beibeima (Shaanxi Normal University, China)
40. [Tianxia and Guojia: Politics of Space Reconstruction in Cultural Heritage Tourism](#)  
Hongni WEI, Hong Zhu (Sun Yat Sen University, South China Normal University, China), Ling Ma (South China Normal University, China), Feng Su (Yanhuang Culture Research Center, China)
41. [Traditional Knowledge and Geographic Ideas in the Disaster Risk Reduction under the circumstances of climate change -- A Comparative research between Tibetan in China and Aborigine in Australia](#)  
Lun Yin (Yunnan Academy of Social Science, China), Melissa Nursey Bray (University of Adelaide, Australia)
42. [Trans-Regional Culture and Trans-Place Construction: A Case Study of Urban Hui Immigrant Communities in Hohhot Hui District](#)  
Shaowei Ai (Henan university, China)
43. [Wilderness of Russia Landscapes and Ecoregions](#)  
Vladimir Bocharnikov (The Pacific Institute of Geography of the Russian Academy of Sciences)
44. [Woodcarving Allocating Management System of Irrigation Water in Hani Rice Terraces -A Case Study](#)



# 33rd International Geographical Congress

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## of Yakou Ditch in Yuanyang County

Wang Mei (Yunnan Normal University, China)

## A Critical View of the Subjectivities behind the Cultural Maps of Beijing

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### Abstract

The maps do reflect the so-called real world objectively. It is more obvious of the maps which show cultural features of a place. Both cartographers and cultural geographers are interested in the subjectivity of mapping. This research takes cultural relativism as its perspective and look at the maps of Central Beijing with cultural features. We interviewed the makers of the maps what they wanted to show in the maps and by what cartographical methods. Meanwhile we interviewed the users of the maps what they wanted and gained from the maps. Then we categorized the subjectivities of the map makers, and classified the cultural imagination gaps between the map makes and users, who include locals of Beijing and Chinese and foreign tourists. The conclusions are as following. Firstly, the main landmarks of Central Beijing are the common image components of the map makers and users. It is caused by the influence of the typical cultural representations in many kinds of visual sources. Maps plays a role in cultural identity of Beijing as other visual sources. Secondly, the subjectivities varied among map makers, locals and outsiders. It is good that more and more publication opportunities for common people inside Beijing or outside Beijing to show their cultural images of Beijing, rather than the only source of authority. And the cartographical methods are improved to represent cultural feature creatively.

### Key words:

subjectivity of mapping; maps of Central Beijing; cultural relativism

## A Geo-Ethical Issue of Caste Base Human Discrimination-A Fault Line for

### Harmonious World

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#### Abstract

Caste has been one of the oldest and most distinctive feature of human society of the world, which are discriminate in layers basis on various parameters such as, color, occupation, heredity, rituals and religious as well as by birth. Caste Discrimination Effects (CDE) an estimated 360 million peoples on worldwide, the huge population living in South Asia. These are facing massive violation of civil, untouchability, sexual assault, murdered, economic, social, festivals, and political, however their have suffering from fundamental rights and needs. Caste systems is spreading other country such are Jati in Nepal, Pakistan, Sri Lanka, Burkumin in japan, Baekjeon in Korea, Al-Akhdam in Yeman and as well as in African countries similar to India. Caste system divided peoples into unequal and hierarchical social groups. Those at the bottom are considered lesser human being and polluting to other caste group.

It is a geo-ethical issue for as geographers. In this paper, I will compiled and correlated that we cannot reduce and make harmonious world without mitigation of Caste base discrimination of the human societies in the world. We have try to analyze, how can mitigate the impact of man-made & natural disaster, Climate changes, Inequality, Poverty, Chronic Diseases and Terrorism also. We want introduce also, a new discipline in geography education as a “Caste & Casteism Geography–A Geoethics”, because we believe the sustainable social Development is must be our first priority and we cannot go as untoward, than will be influenced on another issues.

#### Key words:

Caste Geography; Mitigation of Disasters; Caste Discrimination Effects (CDE); Sustainable Society.



## A Research on Buddhist Cultural Landscape in the Guanzhong Region Based on the Culture of Birthplace

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### Abstract

The Guanzhong region is located in the middle of shaanxi province, China. It is one of the important birthplaces of Chinese nation, and it's also one of the birthplaces of many Han cultural landscapes. The old Chang An is one of the earliest regions when Buddhism introduced into China. In the surrounding of it collected six of the eight birthplaces of Han Buddhist sects . And thus the Buddhist culture spread to the whole of China and the whole of east Asia, formed a unique culture we named it "Culture of Birthplace", attracting Buddhist culture lovers from China,Japan, South Korea and other countries in east Asian cultural circle. Through the analysis of the planning layout characteristics of the six major Han Buddhist birthplaces which remained to now, and the spatial distribution patterns and regulations of the Buddhist monasteries in the Guanzhong region,we explore the effects of diffusion and its inherent regulations of "the Culture of Birthplace" to "the Buddhist culture". Meanwhile we put forward the culture landscape patterns of the Guanzhong region,hoping that we can provide some basises and references to the development of religion and tourism ,the protection and construction of the Buddhist cultural landscape.

### Key words:

Buddhist Cultural Landscape; Culture of Birthplace; spatial distribution patterns

## Aggressive Dragon or Benevolent Panda? The Dilemmas of the Confucius Institute in Global Expansion and Local Thrust

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### Abstract

The Confucius Institute (hereafter, CI) has become the signifier of Chinese soft power. Majority of Anglophone literature tends to see the CI as “Trojan Horse” carrying well-disposed motivations to map China’s soft power globally and insert communist dictatorship and legitimacy locally. So far, the threat of the CI, in a large sense, has been stereotyped and “taken for granted”. However, little attention could explore the capability of the CI in serving China’s exportation of soft power in its continuous and inseparable dynamics of globalization and localization. Borrowing the technical toolkits from Geographical Information System and carrying out ethnographies in four CI branches, this paper attempts to response the question that to what extent could the CI serve China’s soft power agenda. The findings are: 1) unlike the mainstream declaration which portrays the CI as aggressive and wishful actor, this paper tease out the economically- and politically-based logics behind its global extension, arguing the CI is the subtle “consequence” of mutual negotiations where fulfill with ongoing persuasion, compromise and even resistance between China and its collaborators; 2) Moreover, this paper evidences the capability of the CI is systematically-limited in its everyday operations, reflecting China’s impotence in managing such a global cultural network; 3) The dilemmas that the CI shows generosity in economic concession but hesitation in political negotiation echo China’s uneven development of economic and political reform. By the international cooperative project like the CI, China may export its domestic uncertainty and dilemmas to the world.

### Key words:

Confucius Institute; Geopolitics; Soft power; Foreign policy; China

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## Commodified Language in Foshan after the Urban Renewal: A Case Study of the Linguistic Landscape in the Lin-Nan New World

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### Abstract

In Foshan's newly transformed neighborhoods, recent commercial establishments, primarily Chinese owned chains, use non-Chinese-language signs as design features targeted towards people who neither read nor have ethnic ties to these foreign languages. Using Lin-nan New World, an urban renewal project for the historic neighborhood of Dong Hua-li as a case study, we applied a contextualized approach to linguistic landscape through a qualitative analysis of a total of 500 visual signs along the main pedestrian street of the region. Drawing from cultural geography and sociolinguistic studies, we analyzed how written language interacts with other features of the built environment to construct commodified urban places. By linking micro-level linguistic and para-linguistic analysis of individual signs to the specific local socio-geographic processes of spatial commodification, we try to attain a greater understanding of the larger socio-political meanings of linguistic landscapes. We found that with one third mono-linguistic English signs, internalization and globalization have steadily made their way into Foshan's urban landscape, as a result of which linguistic landscape have become the most representative sites and as English and other non-Chinese languages are not an officially admitted social interactive means, the commodification of these languages in the construction of urban landscape reflects the gentrification of the neighborhood after the urban renewal.

### Key words:

linguistic landscape; urban renewal; commodification; neighbourhood; Foshan

## Construction of Cultural Landscape by the Spatial Idea in the Jinuo's Village

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### Abstract

Previous studies of Jino's village cultural landscape mainly focused on the study of material culture landscape. In this paper, the spatial environment of cultural landscape is treated as a concept of the symbolic system, through the research of Jino's spatial idea in the Yunnan, the formation of idiosyncrasy of place, and its role in reconstruction of cultural Landscape. Jino's spatial idea in the village can be divided into spatial impressions and spatial perception. The spatial impression is how Jinuo view the space of the village, the spatial perception is the perceptual structure of relative position of Jinuo's themselves and the surroundings. The spatial perception reflects spatial position and value in Jinuo people's thinking, " idiosyncrasy of place" is a stable relationship of human and environment. " idiosyncrasy of place " is stable relationship between man and the environment created by the spatial idea, all of which converge in the methodical spatial pattern, so that people can better understand the world and shape the landscape of self-identity. Certain cultural space is created in accordance with spatial idea by themselves, concise idiosyncrasy of place, construction of cultural Landscape and give meaning to the landscape. The research methods used in this study are community mapping and PGIS.

### Key words:

spatial idea; the structure of spatial perception; idiosyncrasy of place; PGIS; Jinuo's village

## Cultural Geography in Russia: Historical Origins and Contemporary Research Areas

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### Abstract

The paper presents an overview of the historical origins, specific features, development trends, key issues and prospects for the further development of cultural geography in Russia. Establishing of cultural geography in Russia took place in the course of close interaction between geography, ethnography, social and cultural anthropology. In pre-revolutionary Russian geography the anthropo-cultural approaches were widely used; however, since the 1920–1930s most of them were buried, and revival of Russian cultural geography began actually only in the late Soviet period (in the 1980s). The orientation of national human geography toward the cultural geographic dimension at the end of the last century is explored in the paper. Key features and development trends that were characteristic of Russian cultural geography over the past quarter-century are discussed. Statistical data on dissertations in the field of cultural geography between 1995 and 2014 in Russia are aggregated and analyzed. The following directions of cultural-geographical researches reached the prior development in Russia at the end of the XX - early XXI centuries: 1) cultural geography of ethnic groups; 2) confessional geography; 3) the studies of the urban-rural cultural-geographical distinctions; 4) cultural-landscape studies; 5) the studies of regional identity; 6) the studies of geographical images (with their modeling, representation and classification) and perception of geographical space by various cultural groups; 7) the integral regional cultural geography (focused on studies of cultural regions and investigation of regionalism as phenomenon of culture).

### Keywords:

cultural geography; Russia; cultural space; cultural regionalism; cultural landscape

## Cultural Heritage of Ayodhya (India): an identity of National integrity

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### Abstract

The concept of heritage appeared with respect of cultural tourism, consisting of all kind of things which give knowledge about the past – they are under the heritage. It is always visible and maintains the relationship between the memories of our past for better consequences of present and future. Since the ancient days of the *Vedas* and *Puranas*, cultural-heritage city Ayodhya has been a famous place of pilgrimage, possessing salvific quality and holy tradition of Hindu religion, wherein the river Saryu (Ghaghara) perceived as a goddess just like the Ganga river. Ayodhya, assumed as birthplace of Rama, the seventh incarnation of Vishnu, and also the birthplace of legendary foremother Korean Queen Huh, the wife of great King Suro. Ayodhya is also sacred to other religions of India, like the Jainism, Buddhism, Sikhs, and Islam (Muslims), representing a symbol of national integrity. There were five Jain temples that are related to the birthplace of five Jain Tirthankaras. According to the Buddhist holy book, Ayodhya was the birth place of Buddhist scholar Ashvaghosha, and here the Gautam Buddha had spent many rainy-seasons. Ayodhya records a number of rituals, festivities, pilgrimages journeys and important ancient temples, river *ghats* (stairways and bathing places), holy tanks, holy wells, and holy ponds; those are the representative grandeur of art and tangible and intangible heritage values of place. This paper describes the cultural, religious and heritage values of Ayodhya as identity of national integrity and basic resources for developing pilgrimage-tourism.

### Keywords:

cultural heritage; national integrity; pilgrimage journey; tangible and intangible.

## Cultural Transformation of “Deori” S: A Social Geography Perspective

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### Abstract

Culture is the reflection of livelihood including ethics, values, rituals etc. In many cases, the existing culture of any social group is the result of assimilation with other groups to some extent and influence of Geographical condition to another extent. As a whole, culture is the product of Historical, geographical, social, political conditions and also traditional values are attached with it.

As some Geographers consider Human Geography as Human Ecology, so both living and non-living things are included there. We can observe that culture has living characteristics. It can modify, transform or strictly preserve its tradition. Sometimes it might become completely lost in the vast and broader society.

“DEORI”S are inhabitants of North East India specially Assam, India. They belong to Scheduled Tribe population. Available records show that prior to the sixth century AD, *Deoris* had been living in an around Sadiya (north-easternmost part of Assam) in Assam. The term ‘*Deori*’ is attached to the religious or priestly functionaries of various tribal as well as non-tribal communities of Assam.

Since the time of 17<sup>th</sup> century the Deori habitat areas had been facing problems. The attack of ‘Manns’ and ‘Mishmi’ tribes, epidemic and diseases and influx of hill tribes from some parts of neighbouring states created problems of shelter and settlement. Internal migration too took place from various parts of Arunachal Pradesh and this had a debilitating effect on availability of land for the community as a whole and the people were migrated to the south of their origin settlements through the Brahmaputra valley.

There was another flow of migration of *Deori*’s in the last century, which was caused due to the devastating earth quake in 1950s and Consequent flood and river bank erosion. They migrated to different districts of upper and middle Assam forming some groups. This process continued up to last century and they are now distributed in eight districts of Brahmaputra valley.

As a result of the migration and consequent spatial distribution of *Deoris* the socio-cultural, economic and religious life of the community is affected to a great extent. Their economic activities have been influenced by the ecological conditions prevailing in the newly settled areas and their earlier pattern of livelihood has changed in a considerable way. A new social transformation has taken place with the assimilation of different ethnic groups.

This research aims at identifying the spatial patterns in the process of migration from earlier settlements to the present locations and the degree of cultural transformation of the community. The research also makes a modest attempt at getting an insight into the causes and consequences of migration of *Deoris* from their original settlements.

**Key words:** Migration; Cultural Transformation

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## Culture-Led Transformations of Industrial Heritage at Multiple Scales:

### a Case of Xinhua Printing Plant in Beijing

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#### Abstract

In the context of efforts to protect industrial heritage, or in scenarios where industrial heritage is a dimension of conflict, most part of the difficulty has been the challenge of appreciating fully the question of different scales. By invoking scale, we refer to the different power that might relate to heritage, in some instances through highly specific contexts and profoundly local scale and in others through links to national or regional scale. These different scales of power and relationships can both frame and complicate efforts to protect or reuse industrial heritage. In this paper we explore the culture-led transformation that have occurred at Xinhua Printing Plant in Beijing, a famous historical industrial heritage where the attraction of cultural industries has been used to revitalize the area. We employ a multiple framework that considers how different scales of powers that including central government, state-owned enterprises, Beijing and Xicheng government engaging on the process of transformation. It finds that different scales of power with diverse commitments to a particular heritage site or expression are often distinct and not always easily compatible. Our analysis suggests effective ways to align different stakeholder interests in industrial heritage at multiple scales of engagement, and as a basis for relationship-building across fraught geopolitical boundaries, should be an important research priority in the culture-led transformation policy sphere.

#### Key words:

industrial heritage; scale; power; culture-led transformation; Xinhua Printing Plant;



## Different Interpretation Patterns of the Ancient Water System in Hongcun and Its Influence on the Optimization of Man-Land Relationship

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### Abstract

Cultural heritage often contains wisdom and experience on harmonious man-land relationship at some specific historical period. Different interpretation patterns of the cultural heritages may affect the cognition of modern people on man-land relationship and thus affect the current construction of ecological civilization. As a model of harmonious man-land relationship, the construction history of river system in Hongcun was explained in different ways by the tour guide words and the residents, which delivers different ideas on man-land relationship. Interviews shows that tourists are mainly humbled by the "cow-shape" water system according to the tour guide words, which may strengthen the cultural determinism thought. However, residents are more likely to combine the construction of water system with the development of the village, which mainly reflect the thought of harmonious man-land relationship. For the current construction of ecological civilization, the thought of harmonious man-land relationship may play a positive role. Therefore, cultural heritage tourism should respect history and convey scientific thought of man-land relationship.

### Key Words:

water system in Hongcun; interpretation pattern; man-land relationship

## **Diffusion of the Morin Khuur Music and Registration to the National Representative List of Intangible Cultural Heritage in Qian Gorlos Mongol Autonomous County, Jilin Province, China**

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### **Abstract**

The government of P.R. China ratified UNESCO treaty of the Convention for the Safeguarding of the Intangible Cultural Heritage in 2004. They started safeguarding intangible cultural heritage and made national representative lists four times from 2006 to 2014. Though the population of the Mongol in Qian Gorlos Mongol Autonomous County is only 41 thousand (6.8% of the total population of the county), 10 elements of intangible cultural heritage of the county were registered to the national list, all of which are associated with Mongolian culture. Based on field research, the author studied how the Morin Khuur (horse-head fiddle) music diffused in the county. Mongolian political leaders and officers play important roles, from 1990s the local government started introducing this instrument into elementary and middle schools. They invited teachers and players of the instrument from Inner Mongolia Autonomous Region, and supported organizing an official Mongolian music band in the county. Nowadays, thousands of residents, both of the Mongol and other ethnic origins from kindergarten pupils to senior citizens, play the Morin Khuur in the county, which forms a striking contrast to the Cultural Revolution period when almost nobody played the instrument. As a result, the Morin Khuur music of the county was registered to the national list in 2008. Since the Mongolian cultural elements gain popularity, it would promote the vitalization of regional tourism. However the Mongolian tradition in the Morin Khuur music would be weakening simultaneously.

### **Keywords:**

the Mongol; the Morin Khuur; intangible cultural heritage; ethnic minorities; acculturation; ethnic autonomous system; China

## Exploring Public Sphere Based on Folk Belief: Case of CunXin Charity Hall in

### Chaoshan area of China

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#### Abstract

As a cultural force of informality, folk belief inter-grows with the social structure and naturally conforms to the social governance. This paper argued that strong private emotions and social relations generated by folk belief continue to play important roles in the operation of modern social organizations. With an empirical study of CunXin Charity Hall, which originated from the worship of a deity called Dafeng Patriarch in Chaoshan area of China, this paper examined the mutual relationship between “public” and “private” in the following aspects: (1) Belief motivations of members (in public, the purposes include feeding back the society or serving the community; in private, the purposes are seeking shelter and bailment, pursuing happiness after-life or revering ancestors). (2) Management mechanisms (in public, the charity hall adopts a bureaucratic model to promote management efficiency; in private, it retains traditional mentorship on a concentric power structure). (3) Practical activities (in public, Buddha activities, ceremonies, alms giving and folklore festivals have provided opportunities for strengthening collective cultural memory and social consciousness; in private, relative practices have improved interpersonal relationship and mutual understanding among believers and helped construct individual identity and realized self-achievement. Public sphere based on the folk belief has showed a multi-dimensional picture of the “public” and “private” that integrates and interweaves with each other under modernity, which may has some inspiration for the innovation of the pluralistic social governance model.

#### Key words:

folk belief; public sphere; informality; social governance; China



## **Fiction and Urban Space in Shanghai in Late Qing Dynasty: the case study based on Hai Shang Fan Hua Meng.**

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### **Abstract**

After opening in 1843, Shanghai was the important window through that foreigner and Chinese observed each other as while as it became the largest city in the Far East. There were many records about Shanghai City left, include tourist guides, collections, maps, fictions, and etc. The documentation has different purposes in research of the urban space, especially about urban social space in Shanghai that time: non-fiction records could give us the exact geographic location of streets other than the lifestyle of Shanghai, but the fictions could represent the routine life of the citizens vividly. If we combined the two kinds of documents, we could make a significant breakthrough in the study of urban social space in Shanghai. Therefore, the study aims to represent the active space of Shanghai in the late of Qing Dynasty by analyzing the details in the fictions: Hai Shang Fan Hua Meng, that the social characteristics of space in Shanghai were used to recount the story and the portrayal of the characterization.

### **Key Words:**

Fiction; Urban Space; Opening; Shanghai; Hai Shang Fan Hua Meng



## Geographic Scenes and Space Construction in *Macbeth*

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### Abstract

In *Macbeth*, Shakespeare designs many geographic scenes, constructing mysterious space and power space, in which the fate changes along with different geographic scenes and the tragedy develops with the shifting of spaces. Differences of geographic scenes in the play present the inevitability of Macbeth's miserable fate. The research, carried on space scenes and space construction from the perspective of literary geography, provides a new way and a new point of view to interpret *Macbeth* and a better way to understand how Shakespeare presents space experience and the characters' fate by way of geographic space.

### Key words:

*Macbeth*; geographic scenes; mysterious space; power space

## Heritage Value of Religious Sites and Cultural Landscapes: The Scenario of Hinduism from India

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### Abstract

Hinduism is experienced through its spirituality, sacredness, architecture, and landscape. Hindu temples are Hinduism's coded religious messages, constructed of symbols, designs, iconography, and depictions of historic and literary events. Combining and unifying these elements, Hindu temples communicate the divine. Eight of the 32 UNESCO's World Heritage Sites (WHS) in India fall in the category of the religious heritage of Hinduism, viz. Chola temples, Hampi shrines, Mahabalipuram, Pattadakal, Khajuraho, Sun temple, Elephanta caves, and Ellora caves. To date 51 properties are listed in the WHS's Tentative List from India, and 7 of them are associated with Hinduism, viz. Bishunpur, Ekambra, Hoysala, Srirangapatan, Kakatiya, Sri Ranganathaswamy Temple at Srirangam, and Majuli Island. In Southeast Asia, there are 5 religious WH sites, viz. Prambanan Temple (Indonesia), Angkor Wat (Cambodia), Pashupatinath Temple and other temples (Nepal), Mý Son Sanctuary (Viet Nam), and Mother Temple of Besakih (Bali, Indonesia). The case of Varanasi's Riverfront is a unique Religious Heritage and cultural landscape, still waiting for inscription in the WHL, however due to internal politics and lack of coordination, the process becomes too complicated and difficult. As recent discourses identify the unique characteristics and heritage value of Hinduism and its temples, it will affirm the value of the divine in the human experience. As a result, pilgrimage-heritage tourism will promote and contribute to global understanding.

### Keywords:

Heritage ecology; Hinduism; Krishna; Riverfront heritagescapes; Shiva; Southeast Asia; Varanasi; Vishnu; World Heritage Sites.



## Indigenous Diplomacy: Following the script or writing the book?

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### Abstract

Indigenous Peoples and ethnic minorities have highly-attuned rituals and ceremonies reflecting their ancient concepts of how to engage with other peoples and societies. These practices not only retain their relevance in contemporary diplomacy but have increasing value as future diplomatic efforts will encompass diverse and self-conscious cultural groupings at both sub-national and international scales.

This paper describes how Indigenous Peoples achieve new roles as diplomatic agents at the fluid borders of international exchange. In particular, the experiences of Maori in New Zealand will be presented as they have increased their presence in international trade from a recent history of 'performing' in the arts and culture, sports, tourism and military roles. It is argued that seeking wider relationships while promoting and protecting self-determined cultural logics, Indigenous Peoples have fundamental insights into how ethical exchanges can be articulated and maintained.

### Key words:

Ethnic minorities; Indigenous Peoples; diplomacy; cultural diplomacy; trade missions



## Is Education a Right? Production of Bulletin Board Space Based On a Comparison Between British Columbia University and Xianlin University Town of China

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### Abstract

As a kind of micro-scalar space, bulletin board in campus is an important symbol and representation of the university culture, and is a window to observe higher education. Based on a comparison of bulletin board culture between Xianlin University town of China and British Columbia University of Canada, this paper attempts to reveal the dialectical relationship between culture and space: the different cultures shape the different campus spaces, and these kind of spaces also shape people's daily life and cultural values. The same points between the two places are reflecting the cultural diversity of university and very close interaction between university, city and society. By contrast, the academic and humanistic space in Chinese university campus has been squeezed because of erosion from utilitarian and commercial culture, and then forming a tense, separated and rootless university culture; although there is a little utilitarian tendency in Canada but more pluralistic and tolerant than China, and more considerable share on academic and humanistic information on the bulletin board which means more academic spaces. There is a dialectical tension between everyday life and production of campus cultural space. This production of university bulletin board, although it is only a micro scale space, indicates the crisis of higher education, especially for the universities of China.

### Key words:

production of space; university culture; education; bulletin board; China; Xianlin University Town; British Columbia University

## Lingering Resonance— the Soundscape and Poetic Patina in China Classical Garden

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### Abstract

"The making of the poetic world is the highest pursuit of traditional China gardening. The integral poetic setting consists of visual form, sound, odor and even tactile perception which derive from stone, water, architecture and plant, catalyzes psychological perception as well as mental reflection of visitors. Sound's contribution to garden patina has rarely been researched for a long period because the difficulties of acquiring or reproducing historical soundscape in gardens. Based on the historical literatures, local annals, construction documents and journals, this paper analyzes the significance and configuration of soundscape in the making of poetic patina, and attempt to contextualizes it in the city sound background of that time.

With measuring and analyzing current soundscape of several existent classical gardens and their surroundings, the author also conduct questionnaire survey and relevant user interviews to acquire contemporary visitors' perception and evaluation.

The paper aims to reconstruct the sound environment of several China classical gardens, and to formulate the contribution of the poetic patina, hence to provide insights of creating sonic amenity with vitality for the hurly-burly urban environment."

### Key words:

China Classical Garden; Soundscape; Poetic Patina; Historical Landscape

## Microterritorialités Rurales Dans Un Espace Urbain Au Sud Du Brésil: Imaginaires Géographiques Et Autres Modes D'Habiter La Ville

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### RÉSUMÉ

Ce document traite de la configuration des microterritoires traditionnels d'origine rural dans l'espace urbain de la ville de Ponta Grossa, état du Paraná, au sud du Brésil. On part de la prémisse que la mondialisation capitaliste et la rationalisation du monde de la vie n'ont pas homogénéisé les spatialités urbaines qui se imbriquent et se hybridisent en résultant aux plusieurs expressions d'identité traduits dans la pluralité de façons de vivre et de habiter. Malgré la représentation sociospatiale hegemonique urbaine (submis a la temporalité moderne) est imposée comme projet dominant sur d'autres identités et sur les géographies vernaculaires quotidiennes, les imaginaires et les pratiques rurales résistent et s'adaptent au mode de vie urbaine. Ils se présentent comme un projet alternatif d'urbanité en proposant autres façons d'habiter (se relationer) sur et avec l'espace (avec les individus et les choses). Dans la multiplicité sociospatiale urbaine de la ville de Ponta Grossa persistent et se réinventent microterritorialités rurales traditionnelles ressubjectivés dans quelques pratiques culturelles telles comme l'agriculture biologique, la médecine populaire et des pratiques alimentaires paysannes. En termes paysagistique ces expressions identitaires sont associés à geosymboles de l'architecture vernaculaire, les parcelles de cultures, les jardins potagers, et l'agencement du voisinage qui révèlent rapports sociaux particuliers. La reproduction des savoirs écologiques, médicinales et alimentaires d'origine rural forment des réseaux d'acteurs, ce qui permet de réaffirmer les identités traditionnelles et alternatives dans le contexte sociospatiale de la culture urbaine.

### MOTS-CLÉS:

microterritorialités rurales; espace urbain; modes d'habiter; imaginaires géographiques; pluralité sociospatiale

## Multi-Images of an Historical Area in Central Beijing: A Post-Modern Case Study of Dongjiaominxiang

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### Abstract

Administrators want to know the impacts of giving a specific title or defining a specific function to an historical area in the city. For answering this question, we conducted a survey in Dong Jiao Min Xiang (DJMX) which is near Tiananmen Square in Beijing and is one of the 25 historical areas in Central Beijing. We sampled and interviewed more than 100 local people and tourists in DJMX. The questionnaires and interviews reveal that they have more than five images of this place - as a residential area, the embassies area in the late Qing Dynasty, a conservation area of western architectures, a place of patriotism education and a state administrative quarter. The quantitative analysis of the data reveals that the historical and political senses of this area are not more obvious than other images. The Pearson correlations relating individual attributes' and their identities of the images show that there is no common identity within most groups. We conclude that tourists and locals have multiple images of DJMX. This conclusion coincides with perspective of administering postmodernism, that is, there is no apparent reason to label DJMX as a specific image. It may allow people to add more significant meanings to it after their deeper thinking in the future. It also allows to add individual locals and tourists memories and emotions to this historical area rather than to erase them by a single image.

### Key words:

post-modern; multi-images; Dongjiaominxiang; historical area

## Nanjing Historical Landscape and Its Planning from Geographical Perspective

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### Abstract

The paper endeavors to explore a new framework of thoughts on the research into the landscape of the ancient capital based on the geographic sceneries. Historical cityscape has changed because it was the expression of the dynamic interaction between natural and cultural forces in geographical condition. Geography was the most stable, inheritable and lasting force for its founding and development. Therefore, usually the planning for preserving the landscape of the ancient capital in China tends to proceed from architecture only limited in the architectural space, from individual buildings, streets and blocks to whole city, while lacking research into the landscape of the ancient capital from the perspective of the composition of geography. The composition of geography in Nanjing blesses its development as an ancient capital in history with unique and profound traditions of the landscape. Its structure is mainly as follows: three mountains, two rivers and three lakes. The conception and planning of Nanjing have been following this system of natural geography since its birth along with several subsequent major changes. The modern urban development of Nanjing has segmentally resolved the entity of continuous mountain ranges in history while the river network has fallen into a discontinuous state. The thought of research in this paper is marked by investigating and analyzing the relics of the ancient capital based on the system of mountains and rivers as well as exploring changes of time and space and laws of evolution with regard to the composition of cultural landscape of the ancient capital in the course of exploring the present system of mountains and rivers, so as to further confirm and seek for the geographic key of the development of historic cities in the landscape system, and make analysis of and planning for the preservation of Nanjing as an ancient capital in the light of geographic landscape, i.e. taking the system of continuous mountains and hills, rivers and city-moats as backbones, keeping the continuity of mountain outlines, maintaining the integrity of the river network; taking natural mountains and rivers to link with historic ruins which are independent of one another; taking the city-wall of the Ming dynasty and historic streets as a network as well as important buildings scattered in different places for preservation to constitute a complete composition for preserving the landscape of the ancient capital. The concept of sceneries is to be extended to the entire urban area, hence integrating the preservation of natural resources, land utilization and landscape planning into one.

**Key words:** Geographic composition of Nanjing; landscape changes; heritage-oriented corridor; landscape planning of the ancient capital.

## Old Québec City : Religious, Touristic and Harmonious

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### Abstract

The historic district of Old Québec City (Canada) is known as the crucible of French civilization in America. In 1984, the Old Québec was designated as a World Heritage (UNESCO). The main reasons were his “coherent and well preserved urban ensemble, ... an exceptional example of a fortified colonial town, and by far the most complete north of Mexico” and because “the former capital of New France, illustrates one of the major stages in the European settlement of the colonization of the Americas by European”. Still today, its architecture and streetscapes shows evidence of presence of French, British, and Canadian rule.

The fortified colonial town refers to its old defense system: authentic fortifications and a substantial citadel. But the Old Québec have also an important religious landscape, legacy of the different empires, and their different cultures and religions.

Today, religious heritage sites and landscape are a major and recognized tourist attraction. But for many years, despite a large number of tourists, these religious sites were not seen as touristic, and the tourism was not seen as a mean of religious heritage preservation and conservation. Today, these tourists facilitate improved understanding between different culture and religion. The religious communities also changed their discourse about religion and tourism.

This communication will present the case of Old Québec City, and specially of Le Monastère des Augustines. Le Monastère occupies the historic wings of the Hôtel-Dieu de Québec (1639) and offers a unique wellness experience connected with the Augustinian Sisters' heritage, but in a non-confessional setting. The transformation of the former cloister into experiential accommodation with holistic care offers a peaceful oasis. The Augustinians has also social implications, while they hire people who are vulnerable or disadvantaged to work with the tourists. Is a monastery can become a tourism product without affecting the essence of his heritage?

### Key words:

Tourism; religious heritage; landscape; heritage preservation and conservation; Québec city.



## On Literary Landscapes

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### Abstract

Literary landscapes which gain and expand reputation with literature works have closely related with literature. Compared to general landscapes, literary landscapes, natural or cultural, have rich literary implications. This paper launches the initial study on the definition, types, criterion of classification and values of literary landscapes. It is believed the significance of literary landscapes is protean for it can be determined greatly different at different time, from different angle, in different ways and mood, and even by different sightseers. Literary landscape, as a kind of landscape text, can be more profoundly interpreted than paper text. The significant implications for literary landscape cover in many aspects, geographical, historical, architectural, fine arts and tourist economic as well. According to statistics, there are more than 4768 literary landscapes in the long history of China and many of them have been retained today. They deserve further research, protection and developing to yield greatest returns on cultural and literary heritage.

### Key words:

literary landscape; definition; type; classification criterion; significance



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## On Modification of Literary Region to Current History of Literature in Terms of Literary Geo-criticism

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### Abstract

Although the compilation of the history of foreign literature or the history of world literature has witnessed great progress and quite a few textbooks with high quality have been put into use in recent three decades, the history of literature concept seems rather conventional, conservative and to some extent confusing due to the lack of the awareness of literary region. This article compares three popular textbooks of literature history, points out the serious problems in the current narratives in the history of literature and analyzes the reasons to these problems. And it argues that if the concept of literary region in terms of geo-criticism is put forward to the compilation work, some consequent modifications will contribute to frame a more comprehensive, reasonable, objective and scientific history of literature, even rewrite it. The conventional East and West framework ought to be taken place by an organic one which is based on the objectivity and originality in terms of natural and cultural literary geo-criticism. To relocate literary regions and research their respective features is a must in the future narratives in the history of literature.

### Key words:

literary geo-criticism; modification; literary region; history of world literature; history of foreign literature

## Public Awareness of Beijing City's Axis

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### Abstract

Beijing city's axis is the significant linear legacy through the old city of Beijing. The paper is mainly concentrate on the public awareness of Beijing city's Axis. Beijing city's axis is divided into fifteen units for questionnaire. And the survey was focus on the person who are living near Beijing city's axis and visiting the unit of Beijing city's axis.

Based on the questionnaire data, public awareness of Beijing city's axis is preliminary presented in three conclusions. First, public cognition of the starting and end positions of Beijing city's axis is ambiguous. Second, the younger the respondents are, the less they know about Beijing city's axis. Third, the public awareness of different units of Beijing city's axis is diversity. The results illustrate that raising public awareness of Beijing city's axis as the linear legacy is necessary.

### Keywords:

Beijing city's axis; public awareness

## Religious Landscape of Mountain Buddhist Monasteries in Korea

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### Abstract

The number of Traditional Buddhist Temples including Monasteries are recorded as much as 944 at the end of 2014. The Traditional Buddhist Monasteries are mainly located in the mountain areas harmonized with the nature, have a long history from the its foundation in the history of the nation and Buddhism in Korea, and are the practical place of Buddhism by Buddhist monks and ordinary peoples. In the Monasteries, Buddhist monks and other persons are living in the monasteries, and monks are only concentrated to study for two times in a year. Many people are also staying for a while or living for considering as a healing places. In fact, Korean Mountain Buddhist monasteries are the living heritage, in the harmonizing with the man and nature. All of them are sacred and religious places. In this paper, we will discuss about the location, history and landscape of the monasteries as a harmonizing place with the nature. We also analyze these monasteries are considered as a healing places and sacred places.

### Key words:

Traditional Buddhist Monasteries; living heritage; sacred places; religious landscape



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## Reproducing Sacred Landscapes: A Case Study of Industrial Uses of Ancestral Temples in Rural Wenzhou, Southeast China

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### Abstract

This paper explores the reproduction of sacred landscapes in contemporary rural China. Drawing on the analysis of the transformation of sacred ancestral temples into private factories in rural Wenzhou, China, it firstly investigates why and how ancestral temples are secularized in the context of rapid rural cultural-economic restructuring. It further explores the discursive strategies developed by lineage groups and private factory to re-interpret the significance of ancestral temples and economic production, thereby promoting the conversion of temple spaces. This paper finally shows how traditional sacred temples are re-produced through lineages' ritual performances and factory owners' worship and daily protection. In so doing, this paper foregrounds the complexity and flexibility of sacred-secular entanglement, and reflects on the changing traditional sacred landscapes in rural China.

### Key words:

sacred landscape; secularization; ancestral temple; Wenzhou; rural China

## Results of Planning the Historical Landscapes in Georgia

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### Abstract

Besides, UNESCO has summoned Georgia, in addition to different data, to identify the clearly non-stable (sensitive) areas of the historical landscape of Mtskheta (Historical Capital of Georgia), develop the general conservation plan considering the specific landscape environment, identify the functional areas related to a historical monument, and alleviate the negative impacts on the historical landscape. Thus, within the limits of the said measures, the process of studying and planning a historical landscape is in fact a pioneering initiation for the country.

The research of the following questions were linked to the major goal and objectives of the study: review of the legislative base of the landscape use and protection and identification of their peculiarities; specification of the essence and borders of historical landscape; classification and description of the traditional typology of the landscape; identification of the factors (natural, anthropogenic) and processes (erosion, denudation, flood, borrow pits, pasturing, exploitation of forest resources, etc.) affecting the study area and analysis of the associations between them; identification of the properties of the landscape important in cultural (material objects, non-material objects) and natural (eco-systems) respect; identification of the material and non-material attributes of the landscape promoting and/or showing the particular universal value of the landscape; functional zoning of the landscape; fixing the visualization points for periodic monitoring of panoramas and views; development of the recommendations and guidelines of management, rehabilitation and sustainable use of the landscape (based on the methods of landscape planning); specification of the world heritage buffer zones.

### Key words:

environment; historical and cultural landscapes; UNESCO nomination; landscape planning; Functional zoning; management.

## **“Revitalizing Soul of the Heritage City”: Exploring the New Agenda for Integrated and Sustainable Development of Heritage Cities in India**

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### **Abstract**

Heritage conservation and management strategies have been adopted across different countries, both within the established international frameworks as well as national policies. In India, heritage has been mostly confined to the fringes of conventional planning and policies for urban development. Aligning heritage management within the city development planning processes offers an opportunity for holistic urban development. This has been aimed at through the recently concluded urban development initiative of Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and is followed by Heritage City Development and Augmentation Yojana (HRIDAY). With Mathura as a case study, this research explores the city development planning process adopted under the recently concluded JNNURM, and the on-going centrally sponsored mission for heritage cities HRIDAY. It further aims to examine the integrated city development approach of socio-economic, urban planning and heritage management planning adopted under the HRIDAY mission for revitalizing the city. The study is based on an analysis of policy documents, heritage toolkit, projects implemented in the city as well as observations drawn from the field and discussions with the officials of implementation agencies. The study has identified four areas for remedying policy gaps of JNNURM, *viz.* community participation as primary stakeholders of heritage assets, legal and institutional set up for heritage conservation, financial support, and capacity building of implementing agencies. These are expected to be addressed through the HRIDAY mission.

### **Key words:**

Heritage cities; JNNURM; city development plan; heritage toolkit; HRIDAY; heritage management plan

## Sacred Water Bodies and Cultural Practices in Varanasi City, India:

### An Exploration into Challenges to their Sustainability

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#### Abstract

Water bodies are immensely significant for the human settlements, especially the large urban ones, as the source of water (supply) and also for their often overlooked role in the process of ground water recharge. Varanasi, one of the most sacred Hindu pilgrimage centres of the world, is a million-plus city too. Sacrality has an over-arching influence on both the natural and man-made elements of (urban) landscape here. Hence, nothing could be truly envisaged in this city in the absence of the sacred context.

The lakes (variedly termed as *tal*, *jhil*, and *sarovar*) in the city have been under threat since many decades. They were an integral part of the natural urban drainage system and were also important source of water for sacred and profane purposes alike. Urban growth, the ever increasing and pressurising demand for land led to their encroachment from all sides. Mushrooming buildings around made them detached and isolated from the natural drainage system, whose part they were in the past, and thus, threatened their existence. Such encroachments, made by individuals and even by the (local) government, together have sealed the fate of lakes here. The interventions to save the lakes here mostly are from the voluntary organisations which have several limitations and eventually turn out to be non-effective 'face-lifts'.

This paper is a modest attempt to understand the importance of water bodies, especially the lakes, in the city life; challenges to their sustainable existence; and present a critical appraisal of the interventions made since recent past.

#### Keywords:

Culture; Heritage; Landscape; Sustainability; Urban; Water.

## Singapore: Heritage Sites & Cultural Landscape in Harmonizing the World

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### Abstract

Synopsis: Singapore, as a young country is small in area and has very few heritage sites or cultural landscape. Due to its limited resources, it became more significance to the identity of its country that its few heritage sites and cultural landscape be conserved and enhanced.

Historically, Singapore was known as Temasek, a Malay Fishing village with a Sultanah descended from Johor, Malaya. There is an historical sultanate with its kingdom at Fort Canning which was sacred. Fort Canning has also a cultural landscape of archeological and historical value of the British Empire since the founding of Singapore by Sir Stamford Raffles in 1819.

The British ruled Singapore until 1960 and handed the island to the Singapore Government formed by Late David Marshall. In 1965, late Prime Minister, Lee Kuan Yew formed the Singapore Government to rule Singapore as an Independence country. Without any natural resources, the Singapore Government built up the economy of the country. Most of the heritage sites were conserved and upgraded in its maintenance. Areas of cultural heritage were conserved for its buildings and culture based on the foundation of the British's planned area for the Civic District, Chinatown, Kampong Glam and Little India as Singapore grew from an entreport to a first world City State.

The British also left behind the Botanic Gardens which is now the first UNESCO Botanic Gardens in Asia.

With progressive planning and implementation, most of the Heritage sites and religious buildings are conserved and maintained. Religious buildings provide the strong communities which are well respected in harmonious relationship. Thus, Singapore is known as a mutli-racial and multi-cultural country and a vibrant and melting pot of culture and natural heritage.



## **Spatial Narratives in the Perspective of Geographical Criticism---A Case Study of Sutpen's Hundred in Faulkner' *Absalom, Absalom!***

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### **Abstract**

Sutpen's Hundred is a geographical space constructed by Faulkner in his *Absalom, Absalom!* Besides serving as the setting for narration and the aid for character portraying, Sutpen's Hundred is utilized to represent time, to arrange the structure of the novel with its spatial logic, and even to push forward the whole narrative process with the spatial changes. Sutpen's Hundred, totally different from the conventionally chronological narrative, achieves spatial narrative touch by breaking through the monotony constrains of linear narrative.

### **Key words:**

Sutpen's Hundred; geographical space; spatial narratives

## Spatial Reconstruction of Cultural Heritages: An Example of the Beijing City's

### Central Axis

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#### Abstract

The purposes of the spatial reconstruction of cultural heritages are to reorganize, rearrange, and reread spatially the existing factors of cultural heritages, systematize the scattered pattern of cultural heritages, strengthen their intrinsic relationship, and form the new, prospective, inheritance-and-developing combined, tangible-and-intangible combined pattern of cultural regions in the background of modern urban and regional cultural development facing the future. On the base of rich research results, it's necessary, significant and feasible to study the preservation and utilization of cultural heritages from the point of cultural spatial reconstruction, which is the efficient path and means to build modern metropolitan cultural space. Here is the example of the Beijing city's central axis. The central axis, starting from the south to the north through the old city of Beijing, is 7.8 kilometres length. During the time of Ming and Qing Dynasties, it reflected the supreme imperial power of the core value and its spatial structure consisted of sixteen units, forming four kinds of cultural regions including imperial power political region, security defense region, sacrificial rites region and commercial folk region. Nowadays, its spatial structure can be divided into fifteen units with four types of cultural regions including political and cultural square, museum and cultural palace, people's park and commercial leisure space, which reflects the complete change from serving the feudal emperors to serving the common people. The continuous changes of its spatial structure, symbol of the nodes, service function and culture connotation is the process of constantly reconstructing its cultural regions.

#### Key words:

cultural heritage; spatial reorganization; reconstruction; Beijing; Beijing city's central axis; cultural region

## Study On Interactive Mechanism Between the Inheritance and Innovation of Regional Culture and The Characteristic Development of Animation Industry in Jiangsu Province

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### Abstract

Formation mechanism of placeness is the scientific basis for the protection of traditional placeness and the development of new placeness. Under the condition of market economy, the development of cultural industry is an important means of cultural and placeness reproduction. Therefore, it is of great theoretical value and contemporary significance to explore the influence of cultural creative industry on placeness. In this paper, based on the case of Jiangsu animation industry, from a view of the synergistic effect of humanism and structuralism, and from the perspective of the interactive mechanism of regional culture inheritance-innovation and animation industry characteristic development, the deconstruction and reconstruction of Jiangsu placeness as well as its dynamic construction during this course of deconstruction and reconstruction are explored. In the study, based on the comparison between regional cultural elements including the historical stories, intangible cultural heritages, dialects, landscape features, value ideas and anime works elements including the contents, stage lines, images, music, scripts, characters and style, the influence of government and the economic mechanism on Jiangsu animation industry are investigated and analyzed by using the method of structuralism, meanwhile, the recognition degree of animation enterprise, local government and consumers on placeness is discussed by using the method of humanism. Results are as follows. (1) Traditional placeness is the source of feature established and core competitiveness for animation industry formed, and at the same time, the characteristic animation industry is a contemporary way to inherit and carry forward the traditional placeness. (2) The selective and innovative use of traditional placeness in the development of animation industry is an important path to form a new placeness. (3) On the one hand animation industry faithfully reproduces the traditional placeness, on the other hand it selective and innovative utilizes the traditional placeness, its development is a course of dynamic construction with the synchronous deconstruction, reconstruction and reformation of placeness. In essence, this process is a circle of cultural capital and economic capital, also the process is an integration of culture and economy. (4) The selective use and innovative utilization of traditional placeness is not only the results of the recognition of animation enterprises, local governments and animation consumers on culture but also the consideration of economic interests, it is the results of synergistic effect of the both. (5) The selective and creative use of the characteristic culture of Jiangsu animation enterprises is narrow and uncertain. Based on above, in this paper, some



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suggestions are given. Animation enterprises should be encouraged to expand the field and the scope of cultural capital; popular culture and elite culture, culture placeness and culture diversity should all be paid attention to optimize the structure, improve the quality and enlarge the capacity of cultural capital. On the other hand, policy leverage such as tax action and financial subsidy should be strengthened to promote the virtuous cycle and the dynamic balance of cultural capital and economic capital, characteristic animation should be encouraged to realize the inheritance and innovation of regional culture which can conversely boost the characteristic development of animation industry.

**Key words:**

regional culture; animation Industry; placeness; formation mechanism

## Temporal-spatial Characteristics of World Cultural Landscape Heritage and the conservation of Honghe Hani Rice Terraces

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### Abstract

Cultural landscapes have been formally acknowledged as world heritage by UNESCO in 1992. Since then to 2013, 85 cultural landscape heritages have been inscribed in world cultural heritage list. In this paper, we collect data of all the cultural landscape heritage sites via UNESCO's official website, analyze the spatial and temporal characteristics, the evaluation criteria and the types. Taking the Honghe Hani Rice Terraces as a case, we discuss the challenges to conserve world cultural landscape heritages. The results indicate: (1) The amount of cultural landscape heritage sites keeps increasing steadily since 1992. (2) The cultural landscape heritage sites are mainly located in developed countries in mid-Northern latitudes. In the global political and economic culture partition, cultural landscape heritage in European and American area is more than 50% of the world. (3) The 85 heritages were conformed to the evaluation standard mostly on iii, iv and v. It shows that evaluation of the cultural landscape heritage is focus on the continuous evolution. (4) The world cultural landscape heritage will increase and relatively keep balance in spatial distribution in future. Re-classification of cultural landscape heritage types will facilitate the submission and protection of them. (5) Honghe Hani Rice Terraces was listed in world cultural heritage in 22 June 2013 which inscribes on the basis of criteria (iii) and (v) with the outstanding universal values. Its conservation should be an integrated serial strategies of agriculture production, natural resources such as water, forests protection, eco-tourism development and poverty elimination.

### Key words:

Cultural landscape heritage; Temporal-spatial characteristics; Evaluation criteria; Heritage types; Cultural Landscape of Honghe Hani Rice Terraces

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## The Buddhist Temples and the Buddhist Culture in Ancient XIYU in China

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### Abstract

China's western region XIYU lies in the Central Asia which is the nodal region for eastern and western cultural exchanges and commixture. The Silk Road pass through here. It has a long-standing oasis agriculture civilization and grassland nomadic civilization. According to the historical records of Han Dynasity and Wei, Jin, Northern and Southern Dynasties, the ancient XIYU Regions has abundant religious culture and arts of music and dancing. There had a variety of national languages and the corresponding literature activities. To the middle Tang dynasty, with the Huihe westward migration and Tujue southern migration, the Islamism spread to the east and the nationalitise of ancient Western Regions generally accepted Islam in the later of Yuan dynasty. From Han to middle Tang Dynasities, Buddhism prevails in ancient XIYU Regions, especially for the oasis city-states around the Tarim Basin such as Khotan and Qiuci. There had a lot of buddhist temples and grottoes. The buddhist grottoes reflects the high level of culture and art.

The landscapes of buddhist towers, temples and grottoes is the outcome of prevailed Buddhism. When the Buddhist godliness become popularization that the buddhist culture evolves popular culture in XIYU. Meanwhile the diversity architectural art, statuary art and painting art had developed. The literature also be produced by Buddhism, as the poetry, the religious drama, the religious music and dancing be developed. Meanwhile the novel descriptive skill had developed, and translatology had developed too .

In Short, the landscapes of buddhist towers, temples and grottoes reflect the Buddhist popularization and the harmonious ecological environments.

### Key words:

Ancient XIYU region; Buddhist Temples; Buddhist Culture

## The Real and Imaginary Sacred Landscape of Bodhgayā

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### Abstract

The UNESCO's decision to put the Mahābodhi Temple complex in Bodhgayā on its World Heritage List in 2002 was a moment of victory for heritage brokers who had been pushing to attain that status for years. Over the course of time, this so called prestigious designation did far more damage to the local heritage and divided Bodhgayā into boundaries – World Heritage Site core zone and the rest of the village. In addition, the Temple complex and its surrounding landscape is being continuously invented and re-invented for consumption of mainly foreign pilgrims and tourists.

This paper would argue that sacredness goes beyond scriptural texts and archaeological remains per se. Its significance lies mainly in an active interaction between religious architecture within its dynamic ritual settings. The Mahābodhi Temple complex and its immediate surrounding cultural landscape is a 'living' heritage, which has been produced socially and constitutes differential densities of human involvement, attachment, and experience. Hence, it is highly unlikely that everyone would equally share and experience this place in a similar way as advocated in authoritative heritage discourses, which are often written with a little understanding of working of the 'living' places. In the end, a conservation framework will be proposed to address cultural heritage management issues in India and would also highlight the effectiveness of people-centric conservation policies for managing the 'living' cultural landscape.

### Key words:

Unesco; Mahābodhi Temple; Bodhgayā; living; heritage; conservation; cultural heritage management; World Heritage Site; landscape



## The Research of Relationship Between Geographical Space and Image of Literature in The Novel the Ordinary World

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### Abstract

The relationship between people and region has an impact on the creation of literary works, which subtly reflects on the personalities of the characters, story structures, historical backgrounds, natural climate and plot developments in novel. Therefore, in order to study how the natural environment influences on the natural imagery in the novel *The Ordinary World* written by Yao Lu, this paper attempts to analyze the natural environment of farming-pastoral zone where the terrain is the loess plateau landform with the characterization of transition zone in the northern of Shaanxi. In addition, by studying the human geography environment in northern Shaanxi which combines the traditional culture and the multi-culture, the author reveals how the cultural environment can influence on the humanistic implication. On the whole, the regional culture elements in Yulin City of northern Shaanxi has an effect on the cultural implication in Yao Lu's novel, which reveals internal connection between abundant culture implication in novel and diversified artistic style of the author's novel.

### Key word:

Yao Lu; *The Ordinary World*; geographical space; image of literature

## Tianxia and Guojia: Politics of Space Reconstruction in Cultural Heritage Tourism

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### Abstract

This article examines the role of government in space construction of the legendary heritage site which is regarded as the ancestral mausoleum for all Chinese. The government helped to make this site a National 5A scenic spot and upgrade its ancestral rites into a national memorial ceremony in the heritage cite. This change brings more visitors, media, enterprises and worshipers from all around the world. To explore the role of government in space construction process, this paper adopts the method of discourse analysis and in-depth interview to analyze the role of government in the field of national memorial ceremony, local memorial ceremony as well as everyday life. Government attempts to use tourism as a political instrument to legitimize its power and highlight Chinese national identity.

### Key words:

space construction; legendary heritage site; political legitimacy; national identity

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## **Traditional Knowledge and Geographic Ideas in the Disaster Risk Reduction under the circumstances of Climate Change -- A Comparative Research Between Tibetan in China and Aborigine in Australia**

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### **Abstract**

Modern Geographic knowledge differs from traditional geographic knowledge in being thoroughly quantitative. We exemplify this difference by comparing modern geography with traditional knowledge about the land. Modern geography understands the land as a system of global, quantified interrelationships, whereas traditional knowledge about the land relates it to a system of local, qualitative interrelationships of humans and spirit powers. Against this background we examine traditional knowledge and geographic ideas in the disaster risk reduction under the circumstances of climate change. We argue that traditional knowledge and geographic Ideas in the disaster and climate change and its impacts are very detailed and can give important insights into local concerns and processes of in the disaster risk reduction. Perceived disaster and climate changes differed significantly even within a small geographic area. Furthermore, disaster and climate changes was seen as a moral and spiritual issue. These interpretations affect how people deal with disaster, climate change and its impacts and which solutions are regarded as relevant. In order to effectively address disaster impacts at the local scale and to enable the process of reduction, it is necessary to address a combination of perceptions, local variations, moral and spiritual interpretations, and locally relevant solutions.

### **Key words:**

traditional geographic knowledge; disaster; risk; climate change

## Trans-Regional Culture and Trans-Place Construction: A Case Study of Urban Hui Immigrant Communities in Hohhot Hui District

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### Abstract

Place is the key dimension to understand the structure and change of the urban minority community. In the context of globalization, urbanization and trans-regional migration of the minorities, place will be constructed or reconstructed, and it will obtain a changing meaning over time. Taking Hohhot Hui District as a typical case, the paper focuses on the place construction of the structure of urban Hui immigrant community, especially the integration, assimilation and separation effect which are dependent on the social and economic interaction of Hui population from different places. The urban Hui immigrant community is a social cultural space where the different Hui cultures interact from the different Hui places, and the community structure is determined by the combination of multiple local cultures, forming a kind of trans-cultural place. This Study has shown that the "residential structure", "economic structure", "dietary structure", "relational structure" and "teaching structure" of Hohhot urban Hui communities are dependent on the place construction or trans-place construction of "East Hui" and "West Hui". The integrated place has been embodied in "mosque-centered residence" structure, the "economic structure", "dietary structure" of Hohhot urban Hui communities have shown the significant assimilated place, and the "relational structure" and "teaching structure" perform as a strong characteristics of separated place. At the same time, the emergence of the new phenomena, such as "Collective Grave Digger", "Mosque Restaurant", "Islamic Style Street", "Hui Commercial Street", "New ethnic Teaching" in Hohhot Hui District, result from the place reconstruction based on the collaboration of local government, economic elite, religious elite, ethnic institute, and Hui people. The paper argues that these practices on place construction of trans-regional cultures contribute positively to the formation and evolution of Urban minority community. (Supported by the Project "Spatial Pattern & Development Path of Modern Transformation of Urban Hui Communities: Case Studies of 'Zheng-Bian-Luo-Hu' Urban Ethnic Districts" (Project Number: 41471104) awarded by National Nature Science Foundation of China)

### Key words:

Trans-place construction; Trans-regional culture; Integrated place; Assimilated place; Separated place

## Wilderness of Russia Landscapes and Ecoregions

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### Abstract

A reasonable balance in the relations of man and nature is impossible without understanding the ratio in which today really is nature and society as well as the weight of each of these components. Soviet geographical science coined the doctrine of nature, where the most basic fractional unit used nature territorial complex concept, whose dynamics was determined by the production system, and have a rational (sustainable) and unsustainable (unsustainable) nature. Human culture clearly forms the shape of the anthropogenic landscape and cultural heritage is part of the cultural landscape, which are represented by objects, where traditional and cultural activities. There is a special understanding of the radically changed landscapes – anthropogenic, such as rural-, urbolandscape, etc. nd wilderness in its essence it is a missing link in landscape ecology, and physical geography in general. The article presents the preliminary results of the GIS assessment of the degree of anthropogenic transformation of landscapes within territory of Russian Federation. This paper shows and discusses the algorithm of calculation of an index of wilderness, allows to clearly determine the real extent of human impact on the surrounding natural environment. The article presents the results of quantitative assessments of large wilderness areas within its official administrative units (Federal district). The conclusion about the low level of representation of wilderness of Russia within the territory of natural reserves, national parks and wildlife refuges of Russia made, there are prognosis about the possibility of preserving Russian wilderness for future generations shows by the map. The degree of preservation of wilderness in Global200 - ecoregions of global importance situated in Russia as of special map are considering. A statement is substantiated the necessity of further continuing and more details of inventory and monitoring large areas of wildlife remaining on the territory of the Russian Federation.

### Key words:

large areas of wilderness; protected areas under federal jurisdiction and international importance; ecoregions; landscape zoning

## Woodcarving Allocating Management System of Irrigation Water in Hani Rice Terraces: A Case Study of Yakou Ditch in Yuanyang County

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### Abstract

Water resource is the key to the stability of the Hani Rice Terraces. To adapt the high slope of mountainous environment, utilize water resource rationally, avoid disputes of water use, the Hani people created and maintained an unique woodcarving allocating management system of irrigating water (WAMSIW) during the rice farming of terraced fields. We take the WAMSIW of Yakou ditch in Yuanyang county as the object, based on field investigation and interviews, sum up the ditch excavation, the electing way of ditch leaders and their responsibilities, and draw the spacial distribution of the water-allocating woods, quantify the number of water-allocating woods and their relationships. The results are as follows: 1) the irrigation water of rice terraces in Yakou area is come from the Yakou River directed by the Yakou ditch which was excavated by human beings. The ditch irrigate rice terraces belonging to eight villages. 2) the ditch leader, who is elected by a certain way of villagers, should to manage the Yakou ditch. He is responsible for the inspection, maintenance, water allocation and water disputes regulation. Certainly, he can get a certain number of ditch grain as labor compensation. 3) There are 16 water-allocating woods on the Yakou ditch, among them 12 woods have 2 carving-gates, 1 wood has 4 carving-gates and the other 3 woods has 3 carving-gates. Impacted by the micro-topography, the water-allocating woods is mainly distributed in lower part of Yakou ditch. 4) About the length of water-allocating woods, the longest is 254cm, the shortest is 86cm and the average is 141cm. The speed of water flow is  $39.44 \text{ cm}^3 \cdot \text{s}^{-1}$ , the maximum, minimum and average water flow is  $387.50 \text{ cm}^3 \cdot \text{s}^{-1}$ ,  $12.50 \text{ cm}^3 \cdot \text{s}^{-1}$  and  $168.75 \text{ cm}^3 \cdot \text{s}^{-1}$  respectively. If the terrain is flat, the water-allocating wood's length is longer, and the water speed is slower, which indicate the water flow is impacted by water depth, flow speed and topography. 5) Every year, the ditch leader can get 1326kg to 1770kg wet rice just harvested from rice terraces as the labor compensation to manage the Yakou ditch. It is equivalent to the rice harvest of 3 to 4 *mu* terraced fields which shows a good income of ditch leader.

### Key words:

Hani Rice Terraces; Irrigation water; Water-allocating wood; Yakou ditch

## C12.06 & C12.18 Cold Region Environments / Hazards and Risk

### Cold Socio-ecological Systems Under Hazards and Risks: Harmonious Approaches to Resilience Building



[Home](#)

#### Oral

1. [A Study on Community Planning Framework Based on Resilience Concept](#)  
Chong Peng, Zuyuan Guo, Minhang Yuan (College of Architecture and Urban Planning, HUST, Wuhan, China)
2. [Impacts of Snow Disaster on Meat Production and Adaptation: An Empirical Analysis in the Yellow River Source Region](#)  
Yiping Fnag (Institute of Mountain Hazards & Environment, CAS, China)

## A Study on Community Planning Framework Based on Resilience Concept

Chong Peng, Zuyuan Guo, Minhang Yuan.

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### Abstract

Resilience, due to its profound influence on urban planning and management in disaster prevention, has attracted global attention of scholars both inside and outside China. Especially, the community resilience which is representative and practical in urban inner space refers to a set of capacities (such as the ability to adapt to changing conditions and to recover rapidly from disruptions) , also a process of capacities improvement and disaster adaptation, and even future objectives of community development. Based on resilience concept, the objective of community resilience planning could be summarized as enhancing the capacity to cope with hazards. Then the study in this paper managed to establish a planning framework of community resilience from three dimensions comprising physical and cultural environment buildings, community organizations, and governance and risk response. (1) On physical environment, based on community inner needs, resilience assessment and gaps between desired and anticipated performance, the study determined priority by assessment outcome; on cultural environment, the study built a culture of hazard prevention, promoting public awareness of disasters and capacity of dealing with disasters and recovery. (2) On community organization and governance, the study set up a scaffold for cooperation among government, public and social groups, raising the level of leadership and building disaster safeguard mechanism. (3) On risk response, the study tried to establish the mechanism for multi-scenario response. Finally, we forecasted the focus of China's resilient community planning in the future based on the sum-up hereof.

### Key words:

community resilience; planning framework; community organization and governance

## Impacts of Snow Disaster on Meat Production and Adaptation: An Empirical Analysis in the Yellow River Source Region

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<sup>3</sup> Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, Lanzhou 730000, P.R. China

### Abstract

The Yellow River source region has a sensitive response to global change due to its unique cryosphere processes and geographical conditions. Any slight changes in natural elements and human activity can have a magnified effect on grassland ecosystem, animal husbandry, and pastoral livelihoods since its economy is exclusively dominated by grassland animal husbandry. Because snow disaster has been one of the major natural disasters in the source region, it is crucial to explore the economic impact of snow disaster on animal husbandry and identify effective adaptation measures. A nonlinear model of meat production was established in relation to snow disaster, grassland productivity, and disaster prevention by introducing a snow level index, and selecting three key indicators of grassland productivity and disaster prevention, including grass growing season precipitation concentration, sown grassland area, and warm barn area. This is an inverse of negative correlation, less meat when there is more snow. Per unit increase in snow level in the source region led to a decrease of 0.213 units in meat production. However, production losses caused by the snow disaster could be effectively suppressed by the increase in scale and intensity of sown grassland and warm barn construction. Per unit increase in sown grassland and warm barn area led to an increase of 0.240 and 0.610 units in meat production, respectively. The effects of sown grassland and warm barn area in reducing snow damage at different snow levels were analyzed. Finally, authors give some suggestions for raising the adaptation.

### Key words:

meat production; snow disaster prevention; adaptation; adaptive performance

# KEY TOPICS

IGU COMMISSIONS

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JOINT COMMISSIONS

KEY TOPICS

PLENARY LECURES





## Climate Change and Global Understanding

### Characteristics of the Pressure

#### Distribution Between Matsumoto Iida in central Japan in sunny day



[Home](#)

### Poster

1. [Characteristics of the Pressure Distribution Between Matsumoto and Lida in Central Japan in Fine Day](#)

HANAI yoshio (Japan, Kiso-seiho high school); SAKAKIBARA Yasushi (Japan, Shinshu University)

## Characteristics of the Pressure Distribution Between Matsumoto Lida in Central Japan in Fine Day

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### Abstract

Previous research on the local air pressure system of central Japan in the fine day has revealed that local high pressure is generated by the earth's surface cooling at night, while local low pressure is generated by the heating of the ground by solar radiation in the daytime. For a more detailed analysis of this local air pressure system, we placed a high-precision barometer in a vehicle, and moved it along the highway for observation during the evening and early morning. The observation of local pressure system was carried out by selecting a day atmospheric changes in the synoptic covered in widely high pressure is low. In the evening, the pressure deviation distribution was classified into four patterns. One type reduced air pressure air pressure in the pan bottom shape of the Matsumoto basin from spring to summer. This was the case in which the most local low-pressure system developed. In other types, local low pressure become weaker as it went from one type to another. Furthermore, in some types, pressure increased in specific locations, such as Ina basin. The cause of this pressure variation was estimated to be a cold airflow from the basin west of the mountains. In the early morning, the pressure deviation distribution was also classified into four patterns. These indicated the presence of a local high pressure that developed during the night.

### Key words:

Atmospheric pressure; Mobile observation; Local atmospheric pattern; Automatic Measurement

## Climate Change and Global Understanding Research on Water Scarcity and Water Allocation for Integrated River Basin Management



### Oral

1. [An Impact Analysis of Industrial Growth on Water Quality of Ghaggar River: A Case Study of Panchkula District, Haryana](#)  
Rohtas Godara (Government P.G. College, Panchkula, India)
2. [Assessing Expansion of Tsho Rolpa Glacial Lake and Induced Risk Potential in Nepal Himalaya using Satellite Data](#)  
Suraj Mal (Department of Geography, Shaheed Bhagat Singh College, University of Delhi, India, India), Udo Schickhoff, (Institute of Geography, University of Hamburg, Germany, Germany), R.B. Singh (Department of Geography, Delhi School of Economics)
3. [Assessment and Management of Water Quality in River Yamuna, Delhi](#)  
Vishwa Raj Sharma (Shaheed Bhagat Singh College, University of Delhi, India)
4. [Changes in Confluence Characteristics in Downstream Direction of River Bhima in Maharashtra](#)  
Maya Unde (Savitribai Phule Pune University, Pune; Ahmednagar College, Ahmednagar, India)
5. [Changes in Water Use Efficiency of Agriculture in Heihe River Basin](#)  
Wei Song (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
6. [Climate Change and Glacial Fluctuation in Pindari Region, Himalaya](#)  
Santosh Kumar (Department of Geography, Delhi School of Economics, University of Delhi, Delhi 110007, India), Dr.R.B. Singh (Department of Geography, Delhi School of Economics, University of Delhi, Delhi 110007, India), Dr. Anju Singh
7. [Conservation of Water Resources: A Case Study of Northern Portugal](#)  
Meenakshi Lohani (Km Mayawati Government Girls P.G. College, Badalpur, GB Nagar, Uttar Pradesh, India)
8. [Decentralisation in China's Centralised Water Governance System: Authoritarianism, Pluralisation and Local Practices](#)  
Yu Wang (The University of Hong Kong, HongKong SAR, China), Tao Liu (Renmin University of China, China)

9. [Demarcation of the groundwater potential zones of Kumari Watershed in drought prone Purulia, West Bengal: An integrated approach for water resource management](#)  
Prasanta Kumar Ghosh (The University of Burdwan, India), Narayan Chandra Jana (The University of Burdwan, India), Sujay Bandyopadhyay (The University of Burdwan, India)
10. [Design and Development of Nine Plateau Lakes Water Resource Dynamic Forecast System in Yunnan](#)  
shuo fan (Northwest University, China), dan chong (Northwest University, China), haojie li (Northwest University, China), jiaojiao li (Northwest University, China), jie wang (Yunnan Institute of Water Resources and Hydropower Research, China), shiqiang zhang
11. [Does Water-saving Technology Reduce Water Consumption? A rebound Effect in Zhangye City of the Heihe River Basin, China](#)  
Wu Feng (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Jinyan Zhan (Beijing Normal University, China)
12. [Droughts over Marathwada Meteorological Sub-division of India: Climatological and Remote Sensing-based Assessment](#)  
Amit Dhorde (Department of Geography, Savitribai Phule Pune University, Pune, 411007, Maharashtra, India)
13. [Flood of 2015 that Engulfed Rarh Plains in West Bengal, India: A Wake-up Call for Society](#)  
Narayan Chandra Jana (The University of Burdwan, India), Sujay Bandyopadhyay (The University of Burdwan, India), Prasanta Kumar Ghosh (The University of Burdwan, India)
14. [Framing the Land Use Dynamic Modeling with Regional Climate Models](#)  
Pei Wang (Zhongnan University of Economics and Law, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
15. [Geographical Assessment of Community-based Traditional Water Tank Structures \(Maji-Malgajari Talav\) in Eastern Vidarbha, INDIA](#)  
Prashant Magar (Government Vidarha Institute of Science and Humanities, Amravati (MAH), India)
16. [Glacial Lake Outburst Flood and Integrated River Basin Management: A case of Lahaul and Spiti district, Himachal Pradesh](#)  
Pankaj Kumar (Department of Geography, University of Delhi, India), R B Singh (Department of Geography, University of Delhi, India)
17. [Groundwater Resource Management using Geospatial Techniques: A Case Study of Jaipur District, Rajasthan, India](#)

AJAY KUMAR (Shaheed Bhagat Singh College, University of Delhi, India), R.B. Singh (Department of Geography, Delhi School of Economics, University of Delhi, India)

18. [Hydrological Study of Watershed programme in Tonk District of Rajasthan](#)  
Rakesh Wadhwa (Govt.P.G. College, Mandi Dabawali(Hararyana), India)
19. [Identification of Groundwater Scarcity Zones in The Karha River Basin with the Help of Groundwater Fluctuation](#)  
Virendra Nagarale (SNDT Womens University Pune India, India), Pravin Gaikwad (SNDT Womens University Arts College Mumbai, India)
20. [Impacts of Water Allocation on Long Time-Series Variations of NPP and Water Use Efficiency in The Lower Heihe River Basin](#)  
Haiming Yan (Beijing Normal University, China), Jinyan Zhan (Beijing Normal University, China), Huicai Yang (Beijing Normal University, China), Fan Zhang (Beijing Normal University, China)
21. [Integrated and Adaptive Water Management in the Heihe River Basin of China](#)  
Xiangzheng Deng (Institute of Geographic Sciences and Natural Resource Research, Chinese Academy of Sciences, China), Pei Wang (Institute of Geographic Sciences and Natural Resource Research, Chinese Academy of Sciences, China)
22. [Integrated River Basin Management in A Federal Country: The Case of Piracicaba, Capivari and Jundiai Watersheds, Brazil.](#)  
Graziele Muniz Miranda (Institute of Geography and Sustainability (IGD), Switzerland), Emmanuel Reynard (Institute of Geography and Sustainability (IGD), Switzerland)
23. [Irregular water disputes of Brahmaputra River between India and china and its impact on Sino-Indian relations](#)  
Pankaj Choudhary (University of Delhi, India)
24. [Land Use/Land Cover Changes in Coastal Districts of Karnataka](#)  
Ashok Kumar (Department of Geography University of Delhi, India), Anju Singh (Department of Geography Aditi College University of Delhi, India)
25. [Rainfall Runoff Modelling using Remote Sening and GIS -A Case Study of Bandal Watershed, Dehradun, India](#)  
Birdhi Chand Jat (Govt. P.G. College, Neemkathana, Rajasthan, India)
26. [Remote Sensing Dynamic Monitoring of the Nine Plateau Lakes in Yunnan](#)  
Haojie LI (Northwest University, China), Dan CHONG (Northwest University, China), SHuo FAN

(Northwest University, China), Shiqiang ZHANG (Northwest University, China), Jie WANG (Yunnan Institute of Water Resources and Hydropower Research, China)

27. [Seasonality of Streamflow, Climate Shock, and Its Impact on Sustainable Livelihood in the Kosi Region, Bihar, India](#)

Rajan Kumar (University of Delhi, India)

28. [Space-time Distribution of China's Water Resources Under the Global Climate Change](#)

Haibin XIA (East China Normal University, China), Zheng WANG (Institute of Policy and Management, CAS, China), Le Qun (East China Normal University, China)

29. [The Effect of Change of Water Supply on Water Productivity](#)

Zhongxiao Sun (State Key Laboratory of Water Environment Simulation, School of Environment, Beijing Normal University, China), Feng Wu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Jinyan Zhan

30. [Using High-Resolution DEM and SWAT Model for Surface Water Resource Management in Ajay River Basin, India](#)

Sujay Bandyopadhyay (The University of Burdwan, India)

31. [Water Consumption and Water Quality Changes Caused by Industrial Structure Upgrading and Their Integrated Optimal Allocation in Heihe River Basin](#)

Qunou Jiang (Beijing Forestry University, China)

32. [Water Resources and Related Issues in the Ganga Basin: An Overview](#)

MOHAN PATHAK (Smrdpg College, Bhurkura, Ghazipur 233001 (U.P.), India)

33. [Water Scarcity in the villages on Kas-Patan Laterite plateau in Satara District, India](#)

Suchitra Pardeshi (Annasaheb Magar MAHavidyalaya, Hadapsar, Pune, India), Sudhakar Pardeshi (Savitribai Phule Pune UNiversity Pune, India)

34. [Water Use efficiency in Agriculture: A meta-regression analysis](#)

Guofeng Wang, Jiancheng Chen (School of Economics and Management, Beijing Forestry University, Beijing, China), Xiangzheng Deng, Feng Wu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China; Center for Chinese Agricultural Policy, Chinese Academy of Sciences, China)

35. [Watering the Pop-up Mega City: A Study of Water Supply in Kumbh Mela of 2013 in Allahabad](#)

Satyam Mishra, Anjan Sen (Department of Geography, Delhi School of Economics, University of Delhi, Delhi – 110007, India)



## Poster

1. [Research on Water Resources Vulnerability and Its Spatial Heterogeneity in Huaihe River Basin, China](#)

Junxu Chen (China, Yunnan university)

## An Impact Analysis of Industrial Growth on Water Quality of Ghaggar River: A Case Study of Panchkula District, Haryana

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### Abstract

Rapid industrialization and related population growth in the developing world has significant impact on the land, air and water resource of the region. Ever growing industrialization and urbanization has been exerting too much of pressure and deteriorating the limited available resources in these regions. Therefore, it warrants an impact analysis study in order to avoid the overuse and damaging of the natural resources beyond sustainability. Water as a resource has numerous uses viz. transportation, hydroelectric power generation, recreational, domestic, agricultural, industrial and commercial. Moreover, it supports all forms of life and affects human health. The study area is an important industrial centre in Northern Haryana. In the study area the industrial effluents, domestic and municipal wastes pour into Ghaggar river along its course in the upper reaches. The study is based on secondary data collected from the Haryana Pollution Control Board. The monthly averages of various biological, chemical and physical parameters have been computed, analyzed and compared with the national standards to gauge the impact of industrial growth on the water quality of Ghaggar river. The higher values of BOD and COD clearly indicate the extent of pollution in the river. The study provides a valuable insight into the impact of industrial growth on the water quality of Ghaggar river on one hand and the need for effective treatment and management of the industrial effluents and municipal wastes on the other hand.

### Keywords:

Industrialization; water resource; industrial effluents; impact analysis

## Assessing Expansion of TshoRolpa Glacial Lake and Induced Risk Potential in Nepal Himalaya using satellite Data

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### Abstract

Glacial lakes have increased in numbers and size as a response of climate change. The expansion of glacial lakes and increasing water volume in higher Himalayan regions poses significant damage potential to downstream regions. Therefore, the study compared Corona (1962), Landsat-MSS (1972 and 1979), TM (1992), ETM+ (2002) and OLI (2014) images for assessing the changes of TshoRolpa glacial lake in Nepal.

The study reveals that Tsho Rolpa Lake has significantly increased during 1965-2014. The surface area of lake was about 0.26 km<sup>2</sup> in 1965 which increased to 0.72 km<sup>2</sup> in 1972, 1.05 km<sup>2</sup> in 1979, 1.41 km<sup>2</sup> in 1992, 1.52 km<sup>2</sup> in 2002 and 1.55 km<sup>2</sup> in 2014. Lengthwise, it increased nearly four times from about 800 (1965) to >3.5 km (2014). Expansion of lake has also led to unusually higher retreat of the Rolwaling glacier i.e. 40 m<sup>-1</sup> (1968-2014). The TshoRolpa Lake has been identified by ICIMOD as one of most critical glacial lakes in Nepal due to failure risk; therefore, an artificial outlet has been constructed to prevent an outburst flood. The study aims to improve understanding of glacier induced risk together with development of metrics and models for community resilience.

### Keywords:

glacial lake; risk; potential; Nepal

## Assessment and Management of Water Quality in River Yamuna, Delhi

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### Abstract

The BOD level in the Yamuna River has been in the range of 12 to 51 mg/l. The range of Chemical Oxygen Demand in Delhi varied from 50-155 mg/l. However, during its exit, the water quality becomes unfit for any purpose. Research paper analyse the present status of the river Yamuna. Despite ongoing research efforts on land-cover and land-use patterns, there remains a need for development of basic land-cover datasets providing quantitative, spatial land cover information. With the rapidly growing population in Delhi, pollution levels are at an all-time high and continue to become increasingly dangerous to city residents. Delhi is subject to pollution in all forms and has been categorized among the top ten most polluted cities in the world. The pollution of the river Yamuna has a variety of impacts on Delhi's environment. This paper analyzed land use/cover (LULC) of the past, present and futuristic modeling along river Yamuna, evaluated Land use/cover Change (LULCC) on the basis of socio-economic parameters.

To assess and analyze land use/cover (LULC) of the past, present and futuristic modeling along river Yamuna.

To evaluate Land use/cover Change (LULCC) on the basis of socio-economic parameters

To quantify and analyze the impact of LULCC on the basis of land, water and air along the river.

To establish Sustainable Socio-Economic Framework (SSEF) for better LULC practices in accord with Delhi Vision 2021.

The LULC data collection, classification and analysis has been done for over a decade (2001-2012) on the basis of LISS III, Landsat TM/ETM, STRM-DEM, SOI toposheet, from various government agencies and organizations. The physical data has been collected from organizations like: Survey of India Publications, Topographical Map 1: 50,000, National Remote Sensing Agency (NRSA), Hyderabad, Central Pollution Control Board (CPCB), New Delhi and socio-economic data from Census of India Population Totals for Delhi, 1991 and 2001; District Statistical Handbooks etc. Remote sensing data and techniques and geographic information systems (GIS) provide efficient methods for analysis of land use issues and tools for land use planning and modelling. After completing the analysis to show the maps cartographically correct, various cartographic techniques in ERDAS 9.1, ArcGIS 10 and ArcView 3.2a has been used.

### Key words:

Assessment, Management, Land Use, Land Cover, Water Quality, Modeling

## Changes in Confluence Characteristics in Downstream Direction of River Bhima in Maharashtra

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### Abstract

Flow and form variables of the river represent channel morphology of main stream and tributary streams. Channel morphology of river confluences is studied by number researcher but studies on downstream changes in confluence zone are bit less. Confluences of the source zone and confluences of middle and lower reaches are different in morphological characteristics. Present study aims to understand the downstream morphological changes in five major confluences of river Bhima in Maharashtra. In all five confluences are taken for study. In this paper researcher has tried to describe changes in channel geometry occurring at every tributary junction. Bhima basin in Maharashtra is second largest river basin. It has 4 left bank and 9 right bank tributaries in Maharashtra. All 9 confluences have observed for last 7 years and found that the cross sectional characteristics of the upper reaches and lower reaches differs in width, Depth and velocity. The entire hydraulic geometry variable adjusts according to its proportion with discharge they are interrelated and hence it difficult to find out complexity in them.

Junction angle of all the tributaries is wide angle between  $50^{\circ}$  to  $80^{\circ}$ . It is found that width - depth ratio of these tributaries is increased. These confluences are dominated by junction scoure. Depth of these scoure is of 2-4 times of confluence channel. After the junctions scoure mid-channel bars are found in 3 tributary confluences.

Morphological characteristics in source region and downstream on smaller or large tributaries are same and proportional.

### Key words:

Bed Morphology; Junction Angle

## Changes in Water Use Efficiency of Agriculture in Heihe River Basin

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### Abstract

Water crisis is one of three crises that persecute the whole world. China is among the countries which face severe water shortages. Water scarcity and water pollution have seriously affected China's sustainable development in economy and society. Due to the limited water resources, increasing the water use efficiency (WUE) has become a crucial issue for sustainable development in watershed. In Heihe River Basin, the consumption of irrigation water accounted for 90% of the total consumption. Increasing the WUE of agriculture is thus particularly important for alleviating the water scarcity in Heihe River Basin. Unfortunately, due to the limitation of knowledge in irrigation water in spatial and lack of crop type distribution information in spatial, the changes in WUE of agriculture in Heihe River Basin is still not clear, particularly at a large spatial scale. In this paper, we first extracted the crop type distribution in Heihe River Basin at a 30m raster pixel during 2007-2014 using TM images and NDVI time series method. Then, we established an empirical equation to assess the relationship between irrigation water and physical geography conditions. By the empirical equation, we allocated the total irrigation amount in 30m raster pixel. Finally, we calculate the actual evapotranspiration of different crops in spatial. The WUE of agriculture was defined as the ratio of actual evapotranspiration to irrigation water. The changes in WUE of agriculture in Heihe River Basin at 30m pixel were finally assessed.

### Key words:

water use efficiency; crop type distribution; irrigation water; Heihe River Basin

## Climate Change and Glacial Fluctuation in Pindari Region, Himalaya

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### Abstract

Climate change is considered as a significant man-made global environmental challenge currently faced by the mankind today. The warming has a direct impact on the temperature sensitive snow and ice cover. Recent evidence suggests that most glaciers in the Himalaya have been retreating with greater pace in terms of climate change. The present research paper tries to access the climate change trends and estimation of glacial fluctuation in the Pindari Region, Himalaya. Climate change analysis (1901-2010) results show that annual mean air temperature has increased by 1.6°C during the past 110 years, as against the global average of 0.5°C; the Pindari region trend indicates an increase of 0.0105°C per year. Glacial fluctuation analysis (1976-2013) illustrates that Pindari glacier area has reduced by 0.998 km<sup>2</sup>, with an average loss of 26.97 m<sup>2</sup> per year. This reduction in glacier area is 14.9 per cent over 1976. With a reduction in the area and length of the Pindari glacier, there has also been a retreat in the snout position. The trend shows that the length of the glacier has reduced by about 0.535 km in 37 years, from 1976-2013, with an average retreat rate of 14.459 m/year. Analysis shows that the glacier is not only receding in length but also in terms of glaciated area from all the sides. The huge amount of moraines and number of debris cones and talus fans along the valley were observed at the front of Pindari glacier, which clearly indicates influence of climate change in Pindari region.

### Key words:

Climate Change; Global Mean Temperature; Snow cover; Glacial; fluctuation; Moraines



## Conservation of Water Resources: A Case Study of Northern Portugal

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### Abstract

Portugal is a republic comprised of a continental part and two autonomous regions. There are three different administrative jurisdictions governing the Water Framework Directive (WFD) implementation in Portugal: mainland Portugal (PTRH1 to PTRH8) governed by the Portuguese Environmental Agency (APA) and the Azores (PTRH9) and Madeira (PTRH10) governed by the respective autonomous region environment authority. The Azores autonomous region is comprised 9 islands, while the Madeira autonomous region is comprised of 2 islands. Portugal shares four river basin districts with Spain: Minho and Lima, Douro, Tejo and Guadiana. Both countries signed a bilateral agreement on the shared water resources safeguarding quantity and quality of water.

In the present study the status of water resources in the northern part of Portugal will be taken up In terms of conservation and management of surface water, groundwater and coastal waters. The focus will be on the impact of Water Framework Directives implemented in 2000 and also on the new Blueprint for Safeguarding Europe's Waters, which aim to protect the quality and quantity of Europe's waters. In the paper, the past and the present status of Portuguese waters and future sustainable planning will be discussed.

### Key words:

Water Resources; surface water; Groundwater; Water Framework Directives

## Decentralisation in China's Centralised Water Governance System:

### Authoritarianism, Pluralisation and Local Practices

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#### Abstract

The Chinese state has been commonly viewed as an authoritarian regime which lacks of pluralisation in most realms of politics and policy making. In environmental governance, although democratic political regimes characterized by polycentricism and public participation can be responsive to environmental challenges, authoritarianism is meanwhile favoured by some analysts for effectively enforcing stringent regulations without being hindered by ceaseless lobbying and interminable negotiations. This paper engages in this debate, not by focusing on the comparative performance of polycentricism and authoritarianism, but by exploring the extent, scale and rigorousness of how environmental authoritarianism operates in the context of China. Using empirical evidence collected from irrigation districts in semi-arid Ningxia autonomous region, it challenges the prevailing perception that China signifies environmental authoritarianism. It argues that China's water governance model is a dynamic mixture of both centralised policies and decentralised practices. This model, on one hand, contains a state-centric policy process which has been not only informed by local socio-economic conditions, but also manoeuvred by local jurisdictions to facilitate their pursuit of interests. On the other hand, peasants at the local level still enjoy some flexibility to adapt to local changes, reconcile local conflicts and maximize local benefits, despite the overt top-down imposed policies. The findings of this study have implications for China's future water policy reform. They also highlight an imperative need for examining environmental governance beyond traditional theories. Extra attention should be paid on not just national discourse, but also local practices as well as their complex interconnections.

#### Key words:

environmental authoritarianism; China; water governance; decentralization; irrigation; collective action

## Demarcation of the Groundwater Potential Zones of Kumari Watershed in Drought Prone Purulia, West Bengal: An Integrated Approach for Water Resource management

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### Abstract

Being the world's most precious natural and valuable resource, groundwater is largely unexploited for agricultural development till today in drought prone western part of West Bengal, India. In drought prone areas, micro-watershed based development strategy may be considered as the best practice for integrated development. On this background, the micro-watersheds of Kumari River Basin in West Bengal have been selected for better water resource management. Geologically the area consists of Chotanagpur granite-gneissic complex while physiographically highly dissected in nature with lateritic upland and skeletal soil. Eventually, cultivation of this area is dominated by monocropping and thus per hectare production is also low as compared to other parts. So, the supply of sufficient water resource is more important to offer food security instead of rain-fed subsistence farming. In this context, the present study has been endeavoured to evaluate the potential zones for groundwater in Kumari River Basin with the help of quantitative geomorphological analysis in combination with satellite data, maps and field verification. To fulfill the objectives, the study area has divided into seven watersheds and subsequently the groundwater potential zones were identified based on linear-areal-relief parameters, grid-wise theme-weight and class-weights of the watersheds in GIS environment. The analyses of the results reveal that the elongated shape, favourable drainage network, permeable geologic formation and low relief makes the south-eastern and south-western part of Kumari as the promising groundwater potential zones. In addition, efforts have been made to find out the artificial recharge structure and sites for the better usage of groundwater.

### Key words:

Groundwater potential; Kumari Watershed; Water resource management; Geographic Information System; Morphometry

## Design and Development of Nine Plateau Lakes Water Resource Dynamic Forecast System in Yunnan

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### Abstract

Nine plateau lakes in Yunnan is an important carrier of water resources. With the economic development rapidly in recent decades, the resource utilization intensity of plateau lakes continued to increase and caused eutrophication and other issues, which need to strengthen the dynamic monitoring on water resources status. This study illustrated the user's needs, the system functional structure, system logical architecture and system functional realization respectively, and also implemented the dynamic forecast system of Yunnan plateau lakes water resource that applied the remote sensing image timed harvest, cloud servers, the open source map server and other new technologies into the system development effectively. So, it is this system that provided an important support on optimization management and pollution prevention of Yunnan plateau lakes water resource.

### Key words:

plateau lakes; water resource; system; dynamic forecast; cloud computing

## Does Water-saving Technology Reduce Water Consumption? A rebound Effect in Zhangye City of the Heihe River Basin, China

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### Abstract

As water is closely associated with economic activities, the growing population, agricultural development and reallocation of water resource of Heihe River Basin have highlighted the issues of intensified water consumption and groundwater overexploitation in Zhangye. Here we conducted a quasi-dynamic input-output analysis to investigate the changes of water footprint among different sectors of Zhangye during 2002-2012, and clarified the driving mechanism of these changes. Results showed that the direct agricultural water consumption coefficient calculated by using input-output table and other water-related data, is the largest among coefficients of all sectors, and especially the fishery sector still consumed about 1m<sup>3</sup>water per unitoutput in 2012. We found water-saving technology made evident contribution to the decrease of total water consumption during 2002-2007 but induced the rebound of total water consumption during 2007-2012. At the same time, other sectors cannot take away the water resources consumption from the primary industry, which caused the expansion of cultivated land and the increase of virtual water by the trade of agricultural product and. This study provides insights into water challenges in Zhangye and sheds lights on the combating strategies in the future. It is also an endeavor to enhance the policy relevance of land use governance and industrial transformation. The comprehensive exploration on the system of water-ecosystem-economy is critical in integrated water management.

### Key words:

Heihe River Basin; integrated water management; water-saving technology; rebound effect

## Droughts over Marathwada Meteorological Sub-division of India: Climatological and Remote Sensing-based Assessment

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### Abstract

Like many other agricultural regions of India Marathwada is also highly dependent on performance of monsoon. The rainfall from June to September is a primary source of moisture. Good rainfall during these months ensures good agricultural production during Kharif season and also lays the foundation for Rabi season. Marathwada receives moderate to scanty rainfall, and is therefore, always susceptible to drought. It has been realized that this hazard has been visiting this area with increased frequency. The main objectives of the research were: (1) To investigate long-term trends in monsoonal rainfall (June-September) over Marathwada. (2) To assess drought conditions during the months of October and November using indices derived from remote sensing data. The analysis revealed that, over majority of the districts monsoon rains showed decreasing trends, significant over couple of districts. Remote sensing based drought indices such as Temperature Condition Index (TCI), Vegetation Condition Index (VCI) and Vegetation Health Index (VHI) were used for drought assessment. These indices were computed using Moderate-Resolution Imaging Spectroradiometer (MODIS) level-3 datasets. The drought conditions during the low rainfall year of 2002 reflected very well in the output maps. Maps prepared for average conditions during the post-monsoon months of October, November and December revealed greater temporal and spatial details throughout the last one and half decade. According to VCI, during November of 2003, conditions were severe in the districts of Aurangabad, Beed and Osmanabad (Western Marathwada). The research also highlights need of better river basin/watershed management strategies to mitigate droughts.

### Key words:

drought; monsoon; long-term trends; temperature condition index; vegetation condition index; Marathwada

## Flood of 2015 That Engulfed *Rarh Plains* in West Bengal, India: A Wake-Up Call for Society

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### Abstract

The South Bengal flood 2015 was one of the important river disasters in recent history, which affected more than 10.6 million people in Rarh plains of West Bengal. Although incessant rainfalls during the month of July 2015 and Komen, the cyclone that hit on 30<sup>th</sup> of July 2015 have been cited as the major causative factor for this disaster, but the human interventions in the river system over the years made this disaster a catastrophe. Geomorphic analysis suggests that the rivers of *Rarh plains* had a very dynamic regime in the past. These rivers are eastward flowing parallel debouching into the Bhagirathi-Hooghly (a distributary of the Ganges) and represented by five major western tributaries: the Mayurakshi, the Ajay, the Damodar, the Silabati-Rupnarayan and the Kangsabati-Haldi. However, the river has now been constrained by embankments on both sides, and several dams have been constructed along the river. As a result, the floodplain undergoes great changes as a result of the aggrading river bed and confinement of flow due to construction of embankment. Confinement increases stream power that facilitates sediment entrainment (erosion from bed and banks) and transport within the system which leads to devastating breaching of embankment. Further, embankment breaching results in large area inundations and subsequent sand incursion in the fertile and densely populated floodplain. It is therefore of utmost importance to identify such areas and suggest mitigation measures to reduce the risks and vulnerability. We emphasize the role of geomorphology in flood analysis and management and urge the river managers to take relevant steps urgently to incorporate the geomorphic understanding of these Cratonic Rivers in river management plans.

### Key words:

River disaster; rarh plains; flow confinement; aggradation; embankment breaching; sand incursion; fertile floodplain

## Framing the Land Use Dynamic Modeling with Regional Climate Models

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### Abstract

A framework of land use change dynamics (LUCD) model compatible with regional climate models (RCMs) is introduced in this study. The LUCD model can be subdivided into three modules, namely, economic module, vegetation change module, and agent based module. The economic module is capable of estimating the demand of land use changes in economic activities maximizing economic utility. A computable general equilibrium (CGE) modeling framework is introduced and an approach to introduce land as a production factor into the economic module is proposed. The vegetation change module provides the probability of vegetation change driven by climate change. The agroecological zone (AEZ) model is supposed to be the optimal option for constructing the vegetation change module. The agent-based module identifies whether the land use change demand and vegetation change can be realized and provides the land use change simulation results which are the underlying surfaces needed by RCM. By importing the RCMs' simulation results of climate change and providing the simulation results of land use change for RCMs, the LUCD model would be compatible with RCMs. The coupled simulation system composed of LUCD and RCMs can be very effective in simulating the land surface processes and their changing patterns.

### Key words:

land use change; land use change dynamics model; regional climate model; computable general equilibrium modelling; agroecological zone

## **Geographical Assessment of Community-based Traditional Water Tank Structures (Maji-Malgujari Talav) in Eastern Vidarbha, INDIA**

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### **Abstract**

India is blessed with traditional water tanks as rainwater harvesting structures for agriculture, drinking, domestic needs and groundwater recharge. Rural community fulfills their water needs from these traditional tanks. These tanks are easily adaptable to the village administrative system that prevailed during the mediaeval period. One such community based traditional water tank structures of water management exists in the eastern Vidarbha region of Maharashtra locally known as Maji Malgujari Talav (MAMA Talav). Present work attempts to understand the geographical aspects of traditional water tanks structures, that have been used to store rain water for agricultural use in various villages of eastern Vidarbha region of Maharashtra. Many of the tanks have become dry, dis-functional and silted up resulting into the decline in their potentiality. The study recommends repair and restoration of these tanks by creating water users' associations. De-silting, rearing of fish to enhance the aquaculture, community use of water for domestic purpose to avoid the stagnation of water, regular maintenance and cleaning of the tanks are some of the measures suggested to restore and rejuvenate these traditional water tank structures. Scientific and technical study would be the real gateway for further exploration of surface and groundwater harvesting in the watershed areas of traditional water tanks.

### **Key words:**

Assessment; Community; drinking; harvesting; tank

## Glacial Lake Outburst Floods and Integrated River Basin Management: A case of Lahaul and Spiti district, Himachal Pradesh

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### Abstract

Lahaul and Spiti district forms central part of the Northern Himachal Himalayan region comprise an area of around 13988 sq km. Glacial lake formation is currently being observed in the glaciated regions of the district. Glacial lake outburst floods and associated geohazard like flashflood, landslide and avalanches are common in the district. The paper deals with the inventory and mapping of glacier lakes, and potential danger glacier lakes of Lahaul and Spiti district and its impact on Integrated River Basin Management. Satellite imageries of Landsat TM and Shuttle Radar Topographic Mission (SRTM) Digital Elevation Model (DEM) have been acquired from GLCF and Earth Explorer for the year 2011. Mapping of glacial lakes has been done using Normalized Difference Water Index (NDWI) and Normalized Difference Pond Index (NDPI). In order to identify potential Glacial Lake Outburst Floods (GLOFs), the present paper uses a technique adopted by Clague and Mathews (1973) for estimating maximum instantaneous discharge from a lake at the time of outburst. Potential GLOF can pose danger to Integrated River Basin Management of the downstream in coming decades. The example of Glacial Lake Outburst Flood (26th June, 2005) of Parea Chu lake of Tibet Himalaya has been taken for detailed study of its impact on Integrated River Basin Management of downstream population living in the Spiti river valley of Himachal Pradesh. Preventive techniques have been discussed to mitigate the adverse effect of GLOFs on community residing in the region.

### Key words:

Glacier Lake; Glacial Lake Outburst Flood; Normalised Difference Water Index; Integrated River Basin Management; Himachal Himalaya

## Groundwater Resource Management using Geospatial Techniques: A Case Study of Jaipur District, Rajasthan, India

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### Abstract

Effective management of aquifers is becoming an increasingly important aspect of water resource management strategies. Application of geospatial techniques in site selection for artificial recharge and flood spreading management have been the topic of several researches. As the study area has semi-arid climatic conditions and receives normal annual rainfall of 565mm, therefore it becomes important to conserve water resources through recharge of groundwater. The paper attempts to identify direct surface recharge sites by recharge ponds, as the soil of the study area has a good permeability and the area of implementation is wide enough. Intensive data have been collected to carry out the study like satellite images, maps, reports, soil characteristics and hydrological data. All of these data have been stored and manipulated by using ArcGIS 10.2. The results show that the western part of the district has huge potential for ground water recharge sites compared to the central and southern parts of the district. The southern part of the district has the least potential for establishment of groundwater recharge sites due to excessive concentration of salts in the region. After detailed scientific studies, massive programme needs to be taken up for artificial recharge to groundwater using suitable techniques like harvesting roof top rainwater (RTRWH), storm rainwater runoff, dug well recharge in farms, constructing sub surface barriers across streams. Along with the water harvesting and recharge of groundwater, conservation strategies need to be adopted for securing groundwater availability in Jaipur district.

### Key words:

Groundwater recharge; aquifer management; water conservation; semi-arid; GIS



## Hydrological Study of Watershed programme in Tonk District of Rajasthan

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### Abstract

Tonk district covers an area of 7298.29 Sq. Km. which is located in the North eastern part of Rajasthan. Physiographically, the area is characterised by plains with scattered hills in Tonk, Newai, Todaraisingh and Deoli blocks. It is mainly drained by Banas River and its tributaries. The district is comprises of six blocks. The main water bearing formations in the district are Older Alluvium, Mica Schist and Gneisses. The watershed approach has conventionally aimed at treating degraded lands with the help of low cost and locally accessed technologies such as in situ soil and moisture conservation measures, afforesting etc. and through a participatory approach that seeks to secure close involvement of the user communities.

Many projects designed within this approach were at different points of time, taken up by the government of India. The Drought Prone Areas Programme (DPAP) and the Desert Development Programme (DDP) were brought into the watershed mode in 1987. The Integrated wasteland development of the national wasteland development board also aimed at the development of wasteland on watershed basis.

### Key Words:

Tributaries; watershed approach; Drought Prone Areas Programme; wasteland development

## Identification of Groundwater Scarcity Zones in the Karha River Basin with the Help of Groundwater Fluctuation

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### Abstract

The Maharashtra State enjoys a tropical monsoon climate. Despite of the incidence of high annual rainfall, hilly tracts and elevated areas in the study region experience drought during summer season. The vast majority of groundwater scarcity problems present today are caused by overexploitation of water resources. Rapid growth of urbanization in the Karha river basin resulted into depletion of groundwater level in pre monsoon season. The groundwater depth in the region decreases season by season because of lack of proper management of water recourses. In the Study area groundwater is only source of drinking water, agricultural and industrial use, thus a large population is exposed to risk of groundwater scarcity. The Study Area is located at Purandhar and Baramati Tahasil in Pune District Maharashtra State. Karha River basin covers most of the area of these two tahasils. Karha river is a seventh order stream with a basin area of 1357.4 square kilometre. In present study, total 30 Dug-Wells has been take in to consideration for fluctuation of groundwater and on the basis of that data Various thematic maps has been generated (like pre-monsoon groundwater depth and post-monsoon groundwater depth), from those maps we can understand and can delineate the ground water scarcity zones.

### Key words:

Groundwater Fluctuation; Water Scarcity; Drought

## Impacts of Water Allocation on Long Time-Series Variations of NPP and Water Use Efficiency in the Lower Heihe River Basin

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### Abstract

The Lower Heihe River Basin (LHRB) as a typical arid region in China suffered from increasing water scarcity due to the imbalanced water allocation. The Ecological Water Diversion Project was implemented in 2000 to restore local ecological conditions, it is of great significance to analyze impacts of water allocation on long time-series variations of essential ecosystem services and water use efficiency (WUE) in this region. With net primary productivity (NPP) as the indicator of essential ecosystem services, this study estimated NPP and WUE in the LHRB during 2001-2010 to reveal their long time-series variations under the influence of human activities and climate change, and scenario analysis was carried out to study the impacts of water allocation and climate change on NPP. Results suggested NPP and WUE ranged between 0-448.70 gC/(m<sup>2</sup>•a) and 0-2.20 gC kg<sup>-1</sup> H<sub>2</sub>O, respectively, both showing obvious spatial heterogeneity. Besides, NPP and WUE both showed an overall increasing trend during 2001-2010, but accumulative WUE of the whole study area showed a first sharply decreasing and then gradually increasing trend, indicating there was still some improvement scope of WUE. In addition, the fractional vegetation change resulting from water allocation played a dominant role in influencing NPP, accounting for (69.75%) of the NPP change, while climate change also had an overall positive effect on NPP. These results can provide valuable spatially explicit information for formulating more specific policies to further improve water allocation within the LHRB to guarantee sustainable provision of essential ecosystem services.

### Key words:

water allocation; water use efficiency; ecosystem services; NPP; Heihe River Basin



## Integrated and Adaptive Water Management in the Heihe River Basin of China

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### Abstract

In ecologically fragile areas with arid climate, such as the Heihe River Basin in northwestern China, sustainable social and economic development depends largely on the availability and sustainable uses of water resource. However, there is more and more serious water resource shortage and decrease of water productivity in Heihe River Basin under the influence of climate change and human activities. We attempts to identify the severe water scarcity under climate change and presents possible solutions or sustainable development in Heihe River Basin in this study. Three problems that intervened land use changes, water resource, the relevant policies and institutions in Heihe River basin were identified, including (1) water scarcity along with serious contradiction between water supply and demand, (2) irrational water consumption structure along with low efficiency, and (3) deficient systems and institutions of water resource management along with unreasonable water allocation scheme. In this sense, we focused on reviewing the state of knowledge, institutions, and successful practices to cope with water scarcity at a regional extent. Possible solutions for dealing with water scarcity are explored and presented from three perspectives: (1) scientific researches needed by scientists, (2) management and institution formulation needed by governments, and (3) water resource optimal allocation by the manager at all administrative levels.

### Key words:

waterscarcity; water consumption; water demand; water management; Heihe river basin

## **Integrated River Basin Management in A Federal Country: The Case of Piracicaba, Capivari and Jundiai watersheds, Brazil**

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### **Abstract**

Currently, governments and international institutions consider integrated water resources management (IWRM) at the watershed scale as the most sustainable way for water management. In centralized countries, its implementation is done in a relatively homogeneous way with the purpose to decentralize water governance. Differently, in federal countries, authority is already more decentralized due to the local autonomy and the share of administrative and political power. Nevertheless, this situation is different in federal Latin-American countries, as in Brazil, where the implementation of IWRM is linked to a wish for decentralization after a dictatorial and very centralized period. In this context, the present article aims to underline the advances and obstacles for IWRM implementation in Brazil, taking as a study case the Piracicaba, Capivari and Jundiai (PCJ) watersheds. The interviews of stakeholders reveal that the integrated river basin management experience increased the participation and local environmental awareness and the efficiency of some management tools, as the charging of water use. Nevertheless, the main obstacles are linked to the share of water-property between federal and state governments (which makes difficult the operation of committees of different states); mandatory plans at all levels (federal, state, regional and local), and the poor implementation and co-ordination between the plans.

### **Key words:**

Integrated water resources management; watershed; governance

## Irregular Water Disputes of Brahmaputra River Between India and China and Its Impact on Sino-Indian Relations

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### Abstract

It is said if there is any possibility of third world war it is bound to happen only for Water. So it is quite evident that water has the all the extrapolated potential to be one of the great challenges of the twenty-first century. We know According to United Nations estimates, more than half the global population will live in water-stressed or water-scarce countries by 2025. The vast majority of this forecast population will be in China and India. Changes result from continued economic growth and modernization in these countries—including an increase in irrigated farming, rising industrial production, expanding mass consumption in a growing middle and lower class, and, particularly in China, raising animals for a more meat-centric diet—will place ever-greater pressure on water supplies. Macro challenges such as climate change and pollution will further strain freshwater resources. The present case study examines some of the international, regional, and local challenges that arise from friction over water resources, using as a case study of the Brahmaputra River. It also highlights the other factors including basic water usage data for China, India, and Bangladesh; an overview of the Brahmaputra River's course and geography; and a history of China's dam building and water diversion projects on the river to date. It also explores the understanding and challenges of the Brahmaputra: international river governance norms, food security issues, water governance as an issue involving both international and domestic politics, and the key role that Tibet plays in Asia's water challenges. Up to some extent the study examines the extent to which a dispute over the river's use represents a threat to India and explores India's options as a downstream state.

### Key words:

United Nations; Brahmaputra River; India; China



## Land Use/Land Cover Changes in Coastal Districts of Karnataka

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### Abstract

Coastal environment has an instrumental bearing over the economy of the nation. By virtue of its diverse and precious resources productive habitats, rich biodiversity and its locational advantage to human activities. It contains diverse and productive habitats for human settlements, resource development and local subsistence; coastal zones among the most heavily utilized area because of their resources. The process of land acquisition for beach resort, hotels and industries has changed entirely the land use pattern of the coastal areas, leading to adverse effects on environment and local people. Increase in population and expansion of tourism activities in coastal Karnataka, are the major factor which leads to land use and land cover changes in the coastal zone. The area under irrigation, forest cover are increased whereas the area under unirrigated and culturable waste land is decreased from 1995-2015. The coastal backwaters, estuaries, river-mouths are well known for their productivity. With passage of time, Land use and Land cover of coastal area undergoes significant change due to varying natural and anthropogenic causes. Therefore, it is essential to monitor the changes in land use and land cover at regular intervals for proper management of natural resources of existing area. In the present study deals with the land use and land cover mapping and monitoring of the area around the river mouth, urban and village settlements and infrastructural activities Karnataka coast. The satellite data were interpreted based on visual interpretation keys to prepare land use and land cover map of year 1995 and 2015.

### Key words:

Land uses land cover; change detection; Coastal environment; GIS

## Rainfall Runoff Modelling using Remote Sensing and GIS: A case Study of Bandal Watershed, Dehradun, India

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### Abstract

The SCS method of estimating runoff from rainfall is based on method developed by SCS hydrologist. This method is the most commonly used method all over the world for estimation of runoff resulting from rainfall over small watersheds. The SCS approach involves the use of simple empirical formula and readily available tables and curves. The empirical equation requires the rainfall and a watershed coefficient as inputs. The watershed coefficient is called the curve number (CN), which is an index that represents the combinations of hydrologic soil group and land use classes. This model involves relationships between land cover hydrologic soil group and curve number. As satellite data can be used for estimating the land cover distributions, hence it provides useful input support for SCS model. The study area depicts rugged terrain consisting of structural hills, gently sloping piedmont zone bounded by Lesser Himalayas in the North and Shiwalik in the South. In between these two Northern and Southern hill ranges lies the Dun valley, comprising mostly of piedmont zone and alluvial plains. Spatial data base developed during this study was used to obtain all the input parameters of SCS model; The GIS provides estimation of weighted curve number of the watershed. Any future change in land use which is one of the input parameter for SCS model may also be incorporated in the prepared spatial data base and change in runoff may be monitored. This study recommends empirical model in GIS as a potent tool of resource assessment.

### Key words:

rainfall runoff modeling, SCS model, curve number, GIS



## Remote Sensing Dynamic Monitoring of the Nine Plateau Lakes in Yunnan

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### Abstract

Nine plateau lakes in Yunnan province are very important for the sustainable development of social economy in Yunnan province. In this study, the Landsat series remote sensing satellite data and SPOT6/7 remote sensing data were used to monitor the lakes area of Yunnan province in 1989, 1993, 2000, 2007, 2015 years. The results showed that: The area of Yunnan Plateau Lake in 1989-2015 years is a few atrophic, indicating that the nine plateau lakes area as a whole is stable, however, Qilu Lake and Yilong Lake area continued to shrink, 2015 has shrunk about 40%. The lake area in 2015 were less than in 2007, shows that the continuous drought in recent years has had a marked impact on the lake area. The comparison of the nine Lake area in 2015 Landsat 8 OLI data and the SPOT 6/7 solution showed that the results of different spatial resolution were significantly different (even up to 8%), which indicated that the effect of different spatial resolutions on the spatial resolution of the lake area was considered when using multi-source remote sensing data.

### Key words:

Lake area; high resolution; remote sensing monitoring; Yunnan province

## Seasonality of Streamflow, Climate Shock, and its Impact on Sustainable Livelihood in the Kosi Region, Bihar, India

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### Abstract

Anthropogenic activities forced us to think towards rapidly changing climate and sustainable development. The present studies highlight the distortive effect of climate change on social cohesion. The contribution of this study to existing empirical analyses is fivefold. First, it measures climate shocks through deviations from long-term rainfall patterns in a nonlinear (U-shaped) relation, capturing both drought and excessive rainfall, instead of focusing on droughts only. These calculations are based on deviations from normal which exhibit anomaly for different seasons in Kosi region second, it introduces a new set of variables which could analyse and interpret the relation between concerns about climate shock and livelihood. The major concerns have always been related to mass migration which has resulted in human desertification in the region. The other being agriculture sector which is one of the major contributors towards climate change, as well as largely affected adversely by climate change Agricultural productivity is known to be sensitive to climate change induced effects and it has impact on livelihood of families linked with farming. Thus it is important to understand the avulsive nature of Kosi river and what are the existing coping strategies that farmer deploy in case of climate shocks like flood and drought and who is involved in making decision relating to these coping strategies. This paper has focused the Levels of sustainability which will be determined by using standard carrying capacity techniques, geological structure of the landscapes, nature of vegetations, and size of the livestock.

### Key words:

Kosi region; streamflow; Climate Change; human desertification; water sustainability solution; Livelihood Sustainability

## Space-Time Distribution of China's Water Resources Under the Global Climate

### Change

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### Abstract

The water resource is the basic proposition of agricultural and industrial development in China because of our big population. It is noteworthy that what climate change will affect on Chinese future water resource. The influence of climate change includes precipitation and evaporation, of which the former is more discussed and the latter is readily ignored. This article is based on the regional climate model (RegCM4) which is developed by NCAR/PSU (National Center of Atmospheric Research/University of Pennsylvania). We made a simulation to estimate the future climate change in China with A1B scenario. And got the spatial distribution characteristics of temperature and precipitation in historical period (1981-2000 average annual value) and future period (2041-2060 average annual value). The P-M evapotranspiration model recommended by the FAO is used to calculate the evaporation. And the moist degree is used as the index of water resources. In general, the results showed that water resources in China present latitude zonal distribution, gradually reduce from south to north. From the trend of the change, the water resources in the south of Yangtze river will decrease in the future, on the other hand, in the north of Yangtze river, especially in the north of the Huai-he river, the water resources condition will get better. The most obvious regions for the growth of water resources include the western of northeast China, Huai-he river basin, Si-chuan province and the south of Tibetan autonomous region.

### Key words:

A1B scenario; water resources; climate change

## The Effect of Change of Water Supply on Water Productivity

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### Abstract

Water is an important restricted factors for development, especially in arid area, water is particularly important. The Heihe River, the second largest inland river of China, is located in arid area of Northwest China. Zhangye city is located in the midstream of the Heihe River, which is main region of economic activities, accounting for more than 80% of GDP and attracts 95% population in Heihe River Basin. Naturally Zhangye city is the major region of consuming water of productive use in Heihe River Basin. Water supply has been changing in Zhangye city, which will affect water productivity remarkably. Nevertheless, current studies about water productivity mainly concentrated on agriculture.

This paper studied the effect of change of water supply on water productivity in 48 production sectors which covers the whole production progress in Zhangye city based on the CGE (Computable General Equilibrium) model embedded with water. Preliminary results show that reducing water supply will improve water productivity, and reducing surface water supply will improve water productivity of industrial sectors and service sectors higher than agricultural sectors, inversely, reducing groundwater supply will improve water productivity of industrial sectors and service sectors lower than agricultural sectors. The interesting results may be useful for water reallocation and integrated management in Zhangye city, even in the Heihe River Basin.

### Key words:

CGE model; water productivity; water supply; Zhangye city

## Using High-resolution DEM and SWAT Model for Surface Water Resource Management in Ajay River Basin, India

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### Abstract

Over-utilization of the water resources due to ever-increasing population and rapid urbanization is exerting pressure on these commonalities which are on the brink of collapse. Along with the problems of population pressure, the world climate is changing more rapidly in recent years and causes difficulty in appropriate water management including storage plans. The impact of climate change would be quite severe for India including Gangetic West Bengal (GWB) because as per IPCC (2013) report, there is a high confidence in a projected rise in temperature and medium confidence in the increase of summer monsoon precipitation in future over South Asia. So, there is an urgent need for the evaluation of water resources in GWB for sustainability of livelihood and regional economy. However, environmentally and socially sustainable sound management of water resources requires long-term, reliable hydrologic information and high resolution topographic database. The present research attempts to fill the vacuum of high quality database and to appraise future changes in stream flow under projected climate scenarios of Ajay River Basin in GWB using Cartosat-DEM and SWAT (soil and water assessment tool) model. The high resolution topographic data has been produced from the stereo coverages of Cartosat-1 data products through digital photogrammetric techniques, in combination with field surveys through DGPS. In addition, the hydrological data were obtained from the Central Water Commission (CWC), India. The results of the SWAT demonstrate that the model reproduces and generates properly the climatic variables and permits correct water resources assessment in this basin.

### Key words:

climate change; monsoon precipitation; Cartosat-DEM; SWAT Model; stream flow; water resource management

## Water Consumption and Water Quality Changes Caused by Industrial Structure Upgrading and Their Integrated Optimal Allocation in Heihe River Basin

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### Abstract

With the rising pressure and costs of energy and environment, there has been a surge of industrial transfer from the east area to central and western areas in China. However, the industrial development in Western China is seriously constrained by the extremely fragile ecological conditions and severe water shortage. Heihe River Basin is the second largest inland river basin in Northwest China and one of the most undeveloped regions, where there is an extremely fragile ecological environment due to the drought. The industrial structure in Heihe River Basin has changed greatly, which may lead to more water consumption and water quality deterioration. This study explores the relationship between economic development and the water consumption and water quantity in 20 industrial sectors in Heihe River Basin during the industrial transfer process on the basis of statistical data. Besides, this study analyzed the effects of industrial structure upgrading on water consumption and water quality during the two periods of 1997-2002 and 2002-2007. The results illustrate that the industrial structure adjustment has different impacts on the water pollution and water consumption efficiency in different sectors. Although there is serious water pollution and more water consumption, it is relieved by the decreasing emissions in other industries such as real estate, leasing and business services and high-tech industry. Those conclusions can provide very important decision support information on how to allocate the water resource through industrial structure adjustment in Heihe River Basin to reduce the water pollution.

### Key words:

water consumption; water quality

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## Water Resources and Related Issues in the Ganga Basin: An Overview

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### Abstract

The Ganga basin covers about 26 per cent of India's geographical area, supports more than 40 per cent of the population and supplies 30 per cent of the country's water resources. The average water potential of the Ganga basin at present is 525 billion cubic metres (BCM) but only 250 BCM is utilizable. Water is abundant during the monsoon but scarce during the dry season. In the catchment area the mean maximum flow of rivers is about 50 times greater than the mean minimum flow. Due to spatial and temporal variability the basin faces the problem of floods and droughts syndrome. With rapid growing population, improving agricultural activities, urbanization and industrializations, the pressure on water resources is increasing day by day. Over exploitation of ground water is leading to reduction of low flows in the rivers and declining the ground water levels. The quality of surface and ground water resources is also deteriorating because of increasing pollutant loads from point and non-point sources. The climate change is expected to affect precipitation and water availability. The paper presents availability and utilization pattern of water resources in the basin as well as describes the various issues and strategies for developing a holistic approach for sustainable development and management of water resources in the Ganga basin.

### Key words:

Ganga basin; water resource; sustainable development

## Water Scarcity in the villages on Kas-Patan Laterite plateau in Satara District, India

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### Abstract

Dry spell that is pre monsoon phase in peninsular India is very crucial phase with reference to water resource management. People face serious problems of water scarcity in dry spells. The villages located on the hillslopes, Plateaus and hill tops face acute water shortage during dry spell. These settlements are age old settlements and sustained over several decades on the laterite plateau. Earlier the settlements and the size of population were small so the demand for water was less. As the settlements are grown, demand for water also increased in this area. The plateau topography and lithology in the form of laterite rock does not support water storage as an aquifer. The area receives sufficient amount of rainfall in monsoon period. Since the catchment area is small major streams are not formed on the plateau top. Getting water in such conditions is a major challenge in front of the villagers. The settlements like, Ninaiwadi, Dafalwadi, Sada Waghapur, Dhangarwadi on the plateau top and Kas, Jagmin and Keoli on the plateau margin are suffering from water scarcity. The study highlights water scarcity problem in this area. It is also revealed that the agriculture is depending upon the surface water available from rainfall only for a short period. Present study is an attempt to find out the domestic and agriculture water requirement. It is also found the plateau topography can be used to harvest surface runoff and meet the demands of water in the villages.

### Key words:

Water scarcity; Satara Distric; Kas Patan Plateau; water management

## Water Use efficiency in Agriculture: A meta-regression analysis

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### Abstract

The idea of water use efficiency (WUE) came from constrain of water resources. As an essential material for human life, water saving entered an orbit of unprecedented rapid development. While for water saving, two directions maybe taken into consideration, reduce water use and increase water use efficiency. While WUE increase achievements would greatly accelerate the promotion of water saving. WUE is closely linked to agriculture production, thus affecting the long-term agricultural development potential. This study surveys the water use efficiency in agriculture by applying meta-regression analysis. Thinking about the databases, a thorough review was made in the following databases: Agricola; Agris International; Ingenta; Science Direct; Social Science Citation Index; and the World Agricultural Economics and Rural Sociology Abstracts. This process yield 107 published papers, which include the whole information of present studies. The main goals are to figure out the WUE difference between countries, production function, input-output variables and estimate methods. The results suggest that stochastic frontier models generate lower WUE than non-parametric deterministic models. The studies from Western Europe and Oceania shows higher WUE among the whole world. Aside from the main results, this paper summaries the threshold of WUE is related to average income. This paper will provide some references for WUE calculation.

### Key words:

water use efficiency; agriculture; meta-regression; International

## Watering the Pop-up Mega City: A Study of Water Supply in KumbhMela of 2013 in Allahabad

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### Abstract

Allahabad an important city in the state of Uttar Pradesh in India, is glorified as the “*tirtharaj*”, or the king among all sacred places, in various Hindu scriptures. Also known as Prayag, the city is picturesquely situated at the confluence of the rivers Ganga, Yamuna and invisible Saraswati. Every twelve years, Hindu pilgrims and devotees from around the world, congregate in hundreds of thousands to the World’s greatest religious bathing festival, the ‘KumbhMela’.

Making of this temporary mega city inhabited by pilgrims and tourists requires proper planning and execution, done by Government of Uttar Pradesh in consultation with Government of India, which requires massive investment of capital, and human and technical support. As water is a necessary element for human beings to sustain, it remains equally important for the cities as well as the mass gathering. Hence, it becomes important to study the water supply and its management in the mega events like KumbhMela.

This present research paper critically evaluates the various organizations and institutions involved in providing infrastructure support to KumbhMela, like Town and Country Planning Organization, KumbhMela Authority, Tourism Department (Govt. of Uttar Pradesh), etc. Inductive methodology has been used in this research paper to accomplish the objectives of the study. The present paper studies specifically focusses on water supply, key issues related to it, future challenges and prospects in the KumbhMela in Allahabad.

### Key words:

pop-up city; KumbhMela; pilgrimage tourism; mass gathering; water supply; global tourism

## Research on Water Resources Vulnerability and Its Spatial Heterogeneity in Huaihe River Basin, China

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### Abstract

Multiscale assessment of the vulnerability of water resources on the basis of political boundaries and watersheds is necessary to adaptive water resources management. Using RESC model, the vulnerability of water resources in the Huaihe River Basin in four scales, namely, second-class water resource regions (Class II WRRs), third-class water resource regions (Class III WRRs), Province-Class II WRRs, and Municipality-Class III WRRs were assessed. And then with the Theil index and the Shannon-Weaver index, the spatial heterogeneity of vulnerability in the above four scales was evaluated. Results show that vulnerability enhances from the west to east, and shows obvious heterogeneity instead of moving toward convergence in multiscale assessment results. Among the Class II WRRs, the vulnerability of the Upper Huaihe River is lower than that of Midder reaches of the Huaihe River, which in turn is lower than that of Yi-Shu-Si River. And the Lower reaches of the Huaihe River are the most vulnerable. In the scales of Class III WRRs and Municipality-Class III WRRs, the vulnerability shows obvious spatial heterogeneity and diversity. Multiscale vulnerability assessment results innovatively provided in this manuscript are important and useful for uncovering the real spatial pattern of the vulnerability and improving water management.

### Key words:

water resource vulnerability assessment; spatial heterogeneity

## Climate Change and Global Understanding

### Regional Science Collaboration on Integrated Transboundary River Basin Management – Case on Koshi River basin



#### Oral

1. [Land Cover Pattern and Land Cover Change of Koshi River Basin in The Central Himalaya](#)  
Xue Wu, Jungang Gao, Yili Zhang, Linshan Liu, Zhilong Zhao, Basanta Paudel (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Kabir Uddin, MSR Murthy (International Centre for Integrated Mountain Development, Kathmandu, Nepal)
2. [Rapid Assessment of Fresh Water Ecosystems of Koshi River Basin](#)  
Rai, Roshani, Timalina, K., Lamichane, S., Bhandari, R. (Green Governance Nepal, Kathmandu, Nepal), Poudel, M., KC, M. (Green Governance Nepal, Kathmandu, Nepal), Bhatta, L. D., Wahid, S.M. (International Centre for Integrated Mountain Development, Kathmandu, Nepal)
3. [Sediment Dynamics and Sediment Connectivity in The Koshi Basin: Implications for River Hazards](#)  
Rajiv Sinha, Somil Swrankar, Alok Gupta (Department of Earth Sciences, Indian Institute of Technology Kanpur, India), Santosh Nepal (International Centre for Integrated Mountain Development, Kathmandu, Nepal), Kanchan Mishra (Department of Earth Sciences, Indian Institute of Technology Kanpur, India), Vikrant Jain (Division of Earth Sciences, Indian Institute of Technology Gandhinagar, India), Shivam Tripathi (Department of Civil Engineering, Indian Institute of Technology Kanpur, India), Shahriar M Wahid (International Centre for Integrated Mountain Development, Kathmandu, Nepal)
4. [The varieties of mountain hazards and human resilience in the trans-boundary Koshi River basin of the Himalayas](#)  
Ningsheng Chen (The Institute of Mountain Hazards and Environment (IMHE), China)

## Land Cover Pattern and Land Cover Change of Koshi River Basin in the Central Himalaya

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### Abstract

The Koshi river of central Himalaya is the most important cross-border river in south Asia region. This river basin is one of the sensitive areas of global climate change, with its special natural and geographical conditions, huge difference in elevation, diversity of land cover and rich biodiversity. With the increasing intensity of human activities and global climate change, scholars pay more and more attention to the study of land cover change in this basin. Based on the vector data of land cover in 1992 and 2010, this study analyzed the characteristics of land cover pattern and land cover change in the last 20 years. Study shows: (1) Grassland, forest, bare land and cultivated land were the main land cover types, which accounting for 25.84 %, 21.19 %, 18.93 % and 15.12 % respectively of the total area in KRB. (2) Due to climate warming and human disturbance, the middle part of the basin of high altitude glaciers and snow was disappeared, along with the ice lake and river area increased. (3) Alpine Grassland in the northern part of the region Continuous degradation. Human activities are the main influencing factors of alpine grassland shrinkage. And the expansion of alpine grassland due to climate warming will offset the increase of population and livestock density to grassland pressure to a certain extent. (4) In the southern area, due to human activities, a large number of forests have gradually changed to the farmland, especially the evergreen broad leaved forest area.

### Key words:

Himalayas; Koshi river basin; land cover pattern; land cover change

## Rapid Assessment of Fresh Water Ecosystems of Koshi River Basin

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### Abstract

The Koshi River Basin is a major transboundary river basin, running across Nepal from the Tibetan Plateau to the Indo-Gangetic Plain. Various freshwater ecosystems found in the basin provide numerous regulatory and provisioning services for the benefit of both natural environment and the socio-economic development of its inhabitants. However, increasing development activities related to agriculture, hydropower and road networks in the basin is reducing the vitality of the prevalent ecosystems.

In this assessment we aimed to produce a knowledge package on the status and trends of freshwater ecosystems in the basin by identifying key drivers, pressures and resulting impacts along with recommendations for their sustainable use.

Critical freshwater ecosystems of the basin were identified with the help of GIS analysis complemented by field verification. Consultations with local communities, thematic experts, local/national level stakeholders and secondary review of relevant literature were carried out to select six most critical sites across three geographical belts (High Mountains, Middle Mountains, Terai/Churiya). Elaborate assessments on physical and chemical characteristics of water and bio-assessment for examining habitat quality and macro-invertebrate assemblage based on the existing stresses were conducted in the selected sites. Focussed group discussions (FGDs) were conducted to triangulate the findings with existing socio-economic stressors.

The results showed that human interference (development activities, waste dumping and agricultural practices) and very less vegetative cover determined the status of the freshwater ecosystems in the study sites. It was found that water characteristics, field habitat conditions and macro-habitat assemblage were in critical conditions in the study sites from Terai/Churiya than High and Middle mountains.

### Key words:

freshwater, ecosystems, river basin, human interference, socio-economic, natural

## Sediment Dynamics and Sediment Connectivity in the Koshi Basin: Implications for River Hazards

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### Abstract

For a sustainable sediment management, it is important to know the spatial distribution of different sediment sources and their temporal variability. In the absence of such knowledge, it is difficult to assess the controlling factors of sediment production and transport, which is crucial not only for managing any upstream storage as well as for irrigation schemes but also for reducing flood risk in the plains. The trans-boundary Koshi river (about 87,000 km<sup>2</sup>) in the eastern part of the Ganges river basin originates from the mountains of China and Nepal and further flows downstream in the Indo Gangetic Plain of India. The river has been documented as a dynamic river and one of the most distinctive characteristics of the Koshi is its high sediment load varying from 100 million tonnes/yr at Chatara (upstream station) to 43 million tonnes/year at Baltara (the last gauging station before the Koshi river meets the Ganges at Kursela). Such excessive sediment load is responsible for extensive sedimentation and associated fluvial hazards downstream. Due to high sediment load and low gradient in the plains, the river channels have shifted westward by about 115 km across northern Bihar State in India over the past 220 years. Though, it is well known that the tectonically active Himalaya is the main source of riverine sediment loads in the Koshi River basin, the understanding of the contributions from different physiographic regions in the basin and their causal factors is fragmentary. This paper aims to investigate the spatial and temporal sediment dynamics in the Koshi river basin and to understand its relationship with several hazards resulting from river dynamics and floods. We have applied integrated approaches including stream power computation, sediment transport capacity modeling and HEC-RAS modeling to quantify the sediment fluxes from the hinterland. Stream power distribution shows a close proximity with the spatial variability in slope data and provides a good proxy for sediment erosion. Significant spatio-temporal variability in sediment yield at sub-basin scale is documented from stream power based approach. The Koshi has a very high transport capacity and our simulated sediment load is in close agreement with the observed sediment load at the outlet of the basin at Baltara. Our model also suggests high specific sediment load values for the Siwaliks and Lesser Himalayan zones. Results obtained from different approaches are currently being integrated to understand the sediment dynamics and sediment connectivity in different components of the Koshi river system such as upstream-downstream and hillslope-channel connectivity.

### Key words:

sediment dynamics; sediment connectivity; Koshi river basin; river hazards

## The Varieties of Mountain Hazards and Human Resilience in the Trans-Boundary Koshi River Basin of the Himalayas

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### Abstract

Koshi trans-boundary basin covers an area of 71500km<sup>2</sup> and enjoys the largest elevation difference in the world. In this basin, the earthquake is frequent and the precipitation is abundant, leading to high frequency of mountain hazards, including mountain torrent, debris flows, landslides and GLOF. Owing to large disparity on natural conditions and social economy, disaster type and characteristic and the disaster mitigation measures such as structural and non structural measures are quite different among China, Nepal and India, respectively in the upper, middle and lower part of Koshi basin. In this paper, few number of regional disaster cases have been discussed to uncover the existing varieties of mountain hazards and highlighting the mitigation measures. In China, landslides and GLOFs is the prime disasters with large magnitude and low frequency and the transformation disaster chain can significantly influence large domain. The government leads the disaster mitigation efforts through spending money on the high standard mitigation measures such as engineering, monitoring and warning works. In Nepal, debris flows and landslides are the major hazards with medium magnitude and low frequency and the disaster chain can pose bad effect to a certain area. The local residents lead the disaster mitigation efforts under government's suggestions, and community based warning is the primary measure, followed by the flexible engineering works. In India, torrent is the main type, covering a large area with high frequency and large magnitude. The government, non government organization and local residents work together and conduct limited flexible engineering works and partly non-structural warning system. Research suggests in the analogous basin, the scientific disaster mitigations should cover the whole basin falling in different countries to make a scientific plan and the utilization of water resource in disaster mitigation. Besides, the resilient alleviation model among different countries requires corporation from all the countries.

### Key words:

mountain hazards; human resilience; Himalayas; Koshi river basin

## Climate Change and Global Understanding

### Transboundary Waters - Cooperative Utilization and Management



#### Oral

1. [Glacial Lake Outburst Flood Risk in the Poiqu/Bhote Koshi/Sun Koshi River Basin in the Central Himalayas](#)  
Jinming Hu (Yunnan University, China), Narendra Khanal (International Centre for Integrated Mountain Development, Nepal)
2. [Improving Integration of wetland Conservation with Utilization of Wetland Resources Based on Spatial Scale](#)  
Zhang Chunli (Northeast Institute of Geography and Agroecology, CAS, China)
3. [Modes and the characteristics of cost-benefit apportionment involved in hydropower cooperation cases on the international rivers](#)  
Feng Yan (Aisan International Rivers Center, China)
4. [The Framework of Resolving Water Issue in Spatial Planning in Netherlands](#)  
Cao Zhejing (Tsinghua University, China)

#### Poster

1. [Quantitative Evaluation of Agro-Meteorological Disasters in China](#)  
Huishi Du; Chen Zhiwen; Qi Ji (China, Jilin Normal University)

## Glacial Lake Outburst Flood Risk in the Poiqu/Bhote Koshi/Sun Koshi River Basin in the Central Himalayas

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### Abstract

Global warming increased the risk of glacial lake outburst floods (GLOFs) in the Himalaya mountain region. In the center Himalayas, Poiqu (upstream) - Bhote Koshi & Sun Koshi (downstream), one of the transboundary catchment between China and Nepal, has been identified as highly prone to GLOFs. Through field survey and remotely sensing interpretation, we explored the distribution of and changes of the glacial lakes, past GLOFs, risk from potential GLOFs, and past risk prevent mechanism within the watershed. Previously established empirical equations between lake area and volume of lake water were used to estimate the volumes and the possible minimum and maximum discharges of 10 critical glacial lakes within the watershed. It showed big variations between of the potential minimum and maximum discharges, but even the minimum discharge may cause certain disaster and great loss. The social survey showed both China and Nepal lack of effective mechanism to prevent and reduce the risk of GLOFs within this catchment. We recommend different strategies to reduce GLOF risk and to establish transboundary cooperation mechanism to decrease the potential GLOFs risk.

### Key words:

Glacial Lake Outburst Flood Risk; Poiqu catchment; transboundary cooperation mechanism



## Improving Integration of wetland Conservation with Utilization of Wetland

### Resources Based on Spatial Scale

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#### Abstract

Scale issues in resource and environmental management have received ample attention. Wetland ecosystem services are supplied on (at) various spatial and temporal scales, which have a strong impact on the values different stakeholders attach to the services. However, to date, there has been relatively little elaboration of the various spatial and temporal scales at which wetland conservation and utilization are integrated. This paper analyzes the wetland ecosystem, wetland services and the relationship between stakeholders and wetlands on three spatial scales which are: macro scale (region), medium scale (local) and micro scale (spot). Furthermore, we put forward a different management focus, including a dividing zone on macro scale, selecting a reasonable development model on a medium scale and controlling the exploration scale on a micro scale, in order to accomplish the objective of the integration of wetland conservation with the utilization of wetland resources. Finally, we propose that compensation payment (conflict resolution) is an effective tool to balance the interests of different stakeholders in a cross-scale interaction.

#### Key words:

Wetland; compensation payment; Spatial scale

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## Modes and The Characteristics of Cost-Benefit Apportionment Involved in Hydropower Cooperation Cases on the International Rivers

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### Abstract

Water and energy security are key issues in the sustainable development, which are also complex and sensitive issues in international rivers. After 32 hydropower cooperative cases with cost-benefit apportionments on 16 international rivers in 1937-2010 are verified, the modes and the characteristics of cost-benefit apportionments can be discovered based on the detail analysis of the cooperative schemes, the mainly results are: (1) hydropower cases are mainly developed on the reaches of international rivers, without cooperation at the river basin level, 3 types of the cost-benefit apportionment modes are formed as equal ratio cost-benefit apportionment, equal one and unequal one; (2) on the cross-border rivers, the mode of equal ratio cost-benefit apportionment is the major one, upper-stream states can share the benefits from down-stream ones' power generation, down-stream states usually should supply compensation to upper-stream ones in order to get their cooperation; on the frontier rivers/reaches, the mode of equal cost-benefit apportionment is the basic one; (3) the major apportionment modes have obvious differences among different developing phases, the major modes are equal one, and equal ratio one until 1950s, equal apportionment is the basic mode in 1950s-1990s, the major modes can't verified since 1990s because of the limited cases; (4) the mode of equal apportionment is mainly used between the states with similar economic level; the states with a certain and big economic gap mainly use the ones of equal ratio one, and unequal one, and among which implement most of the cases with compensation schemes.

### Key words:

international river; hydropower development; cost-benefit apportionment

## The Framework of Resolving Water Issue in Spatial Planning in Netherlands

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### Abstract

Netherlands is home to spatial planning and has been integrating water issue with spatial planning in the practice of land reclamation and polders, change from water to metalled road, building water ways as driving force for development, water management, key projects on waterfront, etc. Since a large proportion of inhabitable land is below sea level, the principal dealing with water issue in spatial planning is to combine water planning and design with delta management, regional transportation, flood control, military defense, agriculture irrigation, urban and architectural design under the framework of Deltares, Water board, Ministry of Infrastructure and Environment within “Water Act”. Thus this paper firstly retrospects spatial planning policy in terms of water planning and design in Netherlands both in history and at present in the perspective of pivotal years, major policy documents, organizations, policy concepts and icons. Secondly, it probes into three major spatial water planning programmes and explains how they are implemented and embedded with existing spatial planning framework, namely “Delta Program”, “National Environmental Spatial Strategy” and “Room for the River”. In the national “Delta Program”, the water management policies in Netherlands delta is examined in four dimensions: future oriented adaptive strategies, multi-governance, institutional arrangements, risk based approach focusing on flood risk management, spatial adaptation, freshwater supply. Further, in “National Spatial Environment Strategies”, a large number of cross-sector implementation programmes are combined in one comprehensive vision within which the “water safety and nature” is underlined on different levels of scale. In addition, “Room for the River” movement is being carried out for resolving flood protection and land reserving both in long term and short term in different ecological delta areas.

### Key words:

Water Issue; Spatial Planning; Planning System and Framework; Netherlands

## Quantitative Evaluation of Agro-Meteorological Disasters in China

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### Abstract

Using the statistical analysis method on Chinese agro-meteorological disaster data during 1949 to 2012, the rate of meteorological disasters and their variance values are calculated. Thus, we assigned values to the various classifications of meteorological disasters. The grey relativity analysis method was used to compute the correlation of all types of meteorological disasters with the total amount of disasters and determine their impact on agriculture production weights. The objective of the analysis of the spatial-temporal variables of agro-meteorological disasters in China is to assess the degree of influence of meteorological disasters on agricultural production. Results showed that in the last 64 years, the average disaster impact rate of agro-meteorological disasters in China and the average rate of the various types of disasters indicate an increasing trend, with the average drought disaster rate growing the fastest at 0.98% every 10 years. Drought disasters have the largest effect on production weight and mainly affect the northern parts of China. In general, agro-meteorological disasters are at medium levels. In the last 10 years, the frequency of major disasters has increased. The research results in this paper provide a scientific reference for the analysis of the evolution of agro-meteorological disasters, agricultural disaster prevention and mitigation, food production, and yield stability.

### Key Words:

agro-meteorological disaster; quantitative evaluation; China; grey relation analysis

## Climate Change and Global Understanding

### Theoretical Analysis and Case Studies of Free Economic Zone



#### Oral

1. [A Study on the Present Developments and Prospects of China- Belarus Economic and Trade Cooperation Zone](#)  
Xiaonan Lu (College of Urban and Environmental Science, Institute of Free Economic Zone, Tianjin Normal University, China), Meng Guangwen (College of Urban and Environmental Science, Institute of Free Economic Zone, Tianjin Normal University, China)
2. [Challenges to Development and Regional Economic Integration in Brazil: The Manaus Free Trade Zone](#)  
Hindenburgo Pires (Institute of Geography, Brazil)
3. [Chinese Sustainable Trade and Investment to Saudi Arabia](#)  
Ying Ma, Guangwen Meng (College of Urban and Environmental Science, Institute of Free Economic Zone, Tianjin Normal University, China)
4. [Evolution of Free Economic Zone in India and Its Implications](#)  
Xue Wang, Guangwen Meng, Nana Sui (Tianjin Normal University, China)
5. [Financial Innovations in the Pilot Free Trade Zone \(FTZ\)](#)  
Hei Zuqing (Institute of Free Economic Zone, Tianjin Normal University, China)
6. [Study on evolution and dynamic mechanism of Tianjin Pilot Free Trade Zone](#)  
Guangwen Meng (Urban and Environmental Science, Tianjin Normal University, China), Hongling Wang (Tianjin Middle School Affiliated to Beijing Normal University, China), Shuang Yang (Nankai middle school in Tianjin, China), Xue Wang (Urban and Environmental Science, Tianjin Normal University, China)
7. [Study on the Construction and Development of Zambia-China Economic and Trade Cooperation Zone](#)  
Nana Sui, Guangwen Meng, Xue Wang (Tianjin Normal University, China)
8. [The Bibliometric Analysis of Domestic China Free Trade Area over Fifteen Years](#)  
Guangwen Meng, Hongmei Wang (Tianjin Normal University, China)
9. [The Development Process and Inspiration of Shanghai Free Economic Zones](#)  
Guangwen Meng, Xue Wang, Nana Sui (College of Urban and Environmental Science, FEZ Institute, Tianjin Normal University, China)
10. [The Study of Sustainable Development Strategy on China's investment in Africa trade: In the case of](#)



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## Nigeria

Chunzhi Wang, Guangwen Meng, Xiaonan Lu (College of Urban and Environmental Science, Tianjin Normal University, China)



## **A Study on the Present Developments and Prospects of China- Belarus Economic and Trade Cooperation Zone**

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### **Abstract**

The “One Belt And One Road” proposal put forward by Chinese government intends to accelerate the regional economic integration by developing the neighboring countries’ economic partnership actively. Belarus is an important node of the economic zone on the land silk road. The China-Belarus Industrial Park in the territory of Belarus established by China-Belarus governments, is not only the biggest industrial park that China has invested overseas, but also an important platform for China to expand the direct investments in Central and Eastern Europe and to establish trade centers. Based on the predecessors researches on the economic and trade ties and investment climate of China and Belarus, this paper focuses the study on the investment climate, its industrial park development patterns, the industrial and spatial structure, and the regional impact in Belarus. This paper has reference value for the establishment of other Chinese overseas economic and trade cooperation zones as well as theoretical researches.

### **Key words:**

One Belt and One Road; Economic Cooperation; China-Belarus Industrial Park; Development Patterns; Regional Impact

## Challenges to Development and Regional Economic Integration in Brazil: The Manaus Free Trade Zone

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### Abstract

Built on the banks of the Rio Negro in Manaus, Amazonas state capital, the Manaus Free Trade Zone (MFTZ) was created in 1957 as a political component of the Amazon Economic Recovery Plan. During the military regime the MFTZ began to play a strategic role in ensuring the geopolitical control of the northern region of Brazil. In the late 70s and early 90s, with tax incentives and unbundling, the MFTZ began to stimulate national industrial components and raw materials. In 1986, it was created the Superintendency of the Manaus Free Trade Zone (SUFRAMA) to promote free trade areas in the western Amazon region. In the mid-90th and early 2000s, the MFTZ experienced adaptations and austerities undertaken by the Real Plan. In the current period, with expansion of the regional economic integration process, the MFTZ is the most important industrial pole of northern Brazil. Thus, in order to contribute a case study on the MFTZ, this study has four objectives: (a) add considerations on the geo-economic role of the MFTZ, in the regional development of Brazil; (b) reveal what were the main changes in the MFTZ; (c) analyze the recent performance indicators MFTZ; (d) discuss the challenges posed by the emergence of secret pacts US euro for creating trade agreements that exclude the BRICS.

### Key words:

Manaus Free Trade Zone; regional economic integration; SUFRAMA; regional development; BRICS



## Chinese sustainable trade and investment to Saudi Arabia

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### Abstract

In the current context of global economic slow recovery, strengthening regional cooperation is an important driving force to promote world economic development. The introduction of Arab countries "Look East" and the "One Belt And One Road" of China strategies has provided a broad cooperation space for bilateral trade and investment. Based on the current station of Chinese investment in Saudi Arabia to discuss the Saudi trade and investment factors. Firstly, the current station of trade and investment in Saudi Arabia, the results show that the two sides are highly complementary trade; Secondly, favorable and unfavorable factors affect Chinese investment in Saudi Arabia, the results show that political instability and trade protection have a greater adverse impact on trade and investment; Finally, to provide relevant recommendations on sustainable investments in Saudi Arabia for China. The study will be of great significance for Chinese sustainable investment to Saudi Arabia in the future and deepen bilateral economic trade cooperation.

### Key words:

Trade and investment; sustainability; China; Saudi Arabia



## Evolution of Free Economic Zone in India and Its Implications

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### Abstract

As the growth pole of the national economic, Free Economic Zones are not only the product of the economic globalization and the regional economic integration, but also platforms for promoting the development of the urbanization and system innovation. India, as one of the five BRICs, is one of the fastest economic growth in emerging economies in the world. India FEZ not only promotes the development of the Indian economy, increases trade volume and expands employment, but also becomes the important platform of regional economic integration. At present, scholars research both in domestic and overseas mainly lie in the background, industry development, preferential policies and management mode of the Export Processing Zones, Science and Technology Parks, Special Economic Zones and China-India Free Economic Zone.

Part of the study also discuss the evolution of a single Free Economic Zone, but they are still confronted with an absence of systematic research in the overall development evolution process of FEZs, as well as the study of the dynamic and the resistance mechanism in the development of all the Free Economic Zones in India. Therefore, the paper adopts literature induction, case analysis and comparative research methods, summarizing that the Indian Free Economic Zone had gone through four periods included Export Processing Zones, Science and Technology Parks, Special Economic Zones and Sino-indian Free Economic Zone. Based on this, the paper summarizes the international and domestic factors. At last, the paper discusses the influence of the evolution of India Free Economic Zone on Chinese establishment of FEZ (pilot Free Trade Zone). This study will improve the theory exploration in India and make contribution to China.

### Key words:

Free Economic Zone(FEZ); Free Trade Zone; dynamic mechanism; resistance mechanism; India



## Financial Innovations in the Pilot Free Trade Zone (FTZ)

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### Abstract

In the face of the US rate hike and Chinese economic growth transition, RMB market had been highly volatile. Subsequently, the economy encountered capital outflows pressure, which posed risks to the financial stability. To defend the risks arising from, the central bank should manage the currency regime properly. As a result, the capital account would be liberalized gradually and restrictions on cross-border capital outflows would be tightened.

However, RMB was officially accepted into the International Monetary Fund's benchmark currency basket and it would be a freely usable currency. In order to promote further internationalization of RMB, China could tap financial reforms and innovations in the Pilot Free Trade Zone(FTZ). By introducing the free trade account, they could transact cross-border RMB business and conduct offshore RMB business. They could make RMB more convertible under the capital account by selling RMB-denominated debt overseas and freeing up overseas investment for corporates and individuals. As such, more financial platforms and RMB products and services will be created. This will facilitate investment and trade as well as corporate cash management and push forward development of the Pilot FTZ.

### Key words:

Financial Innovations, Pilot Free Trade Zone (FTZ)

## Study on Evolution and Dynamic Mechanism of Tianjin Pilot Free Trade Zone

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### Abstract

In recent years, the Free Economic Zones (FEZs), as a product of economic globalization and regional economic integration, have become the growth poles of economic development in developing countries, the motivations of urbanization and a significant stage for the reforms of related institutions. In China, there is an urgent need to construct free trade zones in order to meet the new challenges of globalization and international trade structure, to strengthen the reform motivation, and to carry out the national strategies of One Belt and One Road and Beijing-Tianjin-Hebei integration. At present, some experts and scholars scrutinize the rules and factors contributing to FEZs' development based on the qualitative analysis. However, they are still confronted with less research on evolution law in FEZs on account of quantitative research methods. Therefore, this paper applies methodologies such as interview, and questionnaire to collect data based on domestic and overseas theories and case studies about FEZs. It also adopts the analysis of hierarchy process and fuzzy evaluation method, selects seven elements: policies, markets, environments, industries, inputs, benefits and innovativeness, and establishes the index system and evaluation model of FEZs' development evolution mechanism. Finally, with the aid of the model and combined with the actual situation of Tianjin Binhai New Area, the paper analyzes the main driving forces of Tianjin Pilot Free Trade Zone's development dynamic mechanism. This study is an asset to the transformation and development of the FEZs in China as well as further theoretical research in the future.

### Key words:

Free Economic Zone; Free Trade Zone; dynamic mechanism; fuzzy comprehensive evaluation; Tianjin Binhai New Area

## Study on the Construction and Development of Zambia-China Economic and Trade Cooperation Zone

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### Abstract

Since the 1980s, China began a direct investment in African. The economic and trade cooperation has been strengthened under the joint efforts of both sides. China has established six economic and trade cooperation zones in Africa according to the successful experiences of Chinese special economic zones, the establishment and operation of these economic and trade cooperation zones in line with interests of both sides and have huge potential for development. At present, foreign and domestic related research have focused on China-Africa economic and trade cooperation zones establishment background, development process and status, analysis of influencing factors, measures and suggestions of sustainable development, but lacking of in-depth research and analysis of a single economic and trade cooperation zone. Therefore, using Zambia-China Economic and Cooperation Zone in southern Africa as a case, the paper analyzes its establishment background, as well as development process, strengths, difficulties and challenges, discusses the experiences and implications of its construction. The study is expected to have the reference value for China's foreign investment theory and constructions of other oversea economic and trade cooperation zones.

### Key words:

Free Economic Zone; Free Trade Zone; Oversea Economic and Trade Cooperation Zone; China-Africa Economic and Trade Cooperation Zones; Zambia-China Economic and Trade Cooperation Zone

## The Bibliometric Analysis of Domestic China Free Trade Area over Fifteen years

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### Abstract

In terms of research focus, the number of documents, research institutions, research time, researchers and so on, this paper takes a more comprehensive literature econometric analysis to 6000 study documents related the Free Trade Zones from 2000 to 2015 in China National Knowledge Infrastructure (CNKI) database including: the hotspot issues of Free Trade Zones through cluster analysis, the relationship between the number of published documents in the various stages and the national macro-policy institution. Studies have shown that: ① in nearly fifteen years, the number of free trade zones published documents are on upward trend overall, the number of issued are direct close contacted with the national macro-control policies; ② literatures published are based in trade journals, but the number of dispatch core journals very limited; ③ research institution focused on domestic colleges and universities, the top five are the Chinese special economic zones of Shenzhen University Research Center, Hebei University School of economics, School of economics, Shenzhen University, Fudan University, Shanghai Customs College, Tianjin Normal University, urban and environmental Sciences Institute, CASS Institute of World economy and politics Institute, School of economics and management, Southeast University;④ the top five authors of FTA-related research are Zhong Jian, Liu, haiping Luo, xingping Wang, guangwenMeng, Wang Wenqing, professional researchFTAechelon should be further strengthened; ⑤ domestic hot research topic FTA is bonded port, bonded logistics, export processing zones, control zones, comprehensive Bonded Zone. This article reveals the characteristics and development trends Free Trade Area, as well as domestic research scholars seeking partners, domestic academic exchanges and scientific management to provide a reference.

### Key words:

FTA; free economic zone; Zone; SEZ; bonded area; regional economic integration

## The Development Process and Inspiration of Shanghai Free Economic Zones

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FEZ Institute, Tianjin Normal University

### Abstract

Since 1980s, China has been adopting reform and opening up policy, extending unbonded zones and fields gradually, establishing various types of Free Economic Zones (FEZs), and preliminarily building socialist market economy), which makes China not only become the second largest economy and the first manufacturing power worldwide. During this process, Shanghai has fulfilled the development objectives of different phases, restored and strengthened its economic status by establishing various types of FEZs, striding forward to the goal of becoming the economic, financial, trading, shipping and innovative center of the world. Most of the studies on various types of Shanghai FEZs focused on several aspects of establishing background, significance, investment environment, industrial structure and upgrading, developing and management patterns, development and transition, etc. However, there're only a few considering the FEZs of all types in Shanghai as a whole and discussing its development, influences, experience and practical application. Therefore, this paper first analyzes the development of Shanghai FEZs from three aspects, domestic and overseas political and economic environments, the objectives for Shanghai's Development and the establishment and development of FEZs. The paper also explores the reasons behind the successful development of Shanghai FEZs in terms of development objectives, location model, industrial and spatial structure, management and development pattern, preferential policies, etc., as well as the new challenges brought by the new international trade pattern, the economic restructuring in China and the lack of experience in investment and free trade, etc. The last part concludes and discusses not only the experience of Shanghai FEZs in investment environment, preferential policies, types and locations of FEZs, industrial and spatial restructuring, management and development pattern, but also its significance to transition countries.

### Key words:

Free Economic Zone; Development Zone; Special Economic Zone; Pudong New Area; Shanghai Pilot Free Trade Zone



## **The Study of Sustainable Development Strategy on China's investment in Africa trade: In the case of Nigeria**

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### **Abstract**

The introduction of "One Belt One Road" policy bring new opportunities for Chinese economic "going out" strategy. As an important partner of Chinese foreign investment, Africa shows stronger develop potential under the current background. How to ensure that China's investment in Africa sustainability issues increasingly become the focus of China's foreign investment, but terrorism raging on the African earth has brought great impact on Africa's economic development, made many non-investors to worry about. Most existing research based on the perspective of economic and political, this paper will combine the current situation of China Investment Nigeria analysis, study the advantages and hinder of Chinese investment in Nigeria in the Location Theory Perspective, provide recommendations for the future sustainable development of Chinese investment in Nigeria.

### **Key words:**

One Belt One Road; foreign investment; terrorism; Nigeria; sustainable development

## Climate Change and Global Understanding

### Climate Change and Anthropocene



[Home](#)

#### Oral

1. [Governing Climate Change: An analysis of Mitigation Strategies in Brazil and China over the Past 20 Years](#)  
Fabiana Barbi (State University of Campinas, Brazil), Leila Ferreira (State University of Campinas, Brazil)
2. [Quantifying the Co-benefits of CO<sub>2</sub> and Air Pollutants Reductions in China's Actions on Climate Change](#)  
Bing Xue, Xiao Xie, Chengpeng Lu (Institute of Applied Ecology, Chinese Academy of Sciences, China), Wanxia Ren
3. [Sea Level Rise and Lost of Mangrove Forest in the Sundarban Coastal Stretch using Geospatial Technology, West Bengal, India](#)  
Ismail Mondal, Jatisanakr Bandyopadhyay (Vidyasagar University, India)
4. [The impact of urbanization on spatial distribution of precipitation in Shenzhen](#)  
Huijuan Chen, Ping Liu, Bo Sun (Shenzhen Institutes of Advanced Technology Chinese Academy of Sciences, China)

## Governing Climate Change: An Analysis of Mitigation Strategies in Brazil and China Over the Past 20 Years

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### Abstract

This paper analyses the internalization process of the climate issue at the government level in Brazil and China. This analysis is based on three main points: i) trajectory of greenhouse gases emissions in Brazil and China, in the period of 1992-2015; ii) political and institutional structures mobilized to the climate issue, focusing on mitigation; iii) political strategies related to climate change mitigation. The results show that regarding political and scientific framework in Brazil, there was a significant increase in the production and systematization of studies and reports, which could assist the design and implementation of policies and reduce some of the uncertainties related to climate change. China has also made some progress in this direction. The internalization process of the climate issue has three phases in Brazil: the first is marked by the establishment of political-institutional and scientific structures engaged with the issue; the second is marked by the development of a political and scientific agenda around the theme and planning actions. Finally, the third phase is marked by the development of climate policies and by the strengthening of the scientific agenda around the theme. In the Chinese case, the internalization process of the climate issue has two phases: the first, has more focus on combating air pollution and energy conservation, whereas climate mitigation stands as a co-benefit and the second phase, more proactive regarding concrete commitments on climate change mitigation, with the establishment of the National Climate Change Program and the National Leadership Panel on Climate Change.

### Key words:

climate policy; climate change mitigation; Brazil; China

## Quantifying the Co-benefits of CO<sub>2</sub> and Air Pollutants Reductions in China's Actions on Climate Change

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### Abstract

Co-benefits approach refers to the development and implementation of policies and strategies that simultaneously contribute to tackling climate change and solving local environmental and developmental problems. In the case of air pollution, there are strong linkages between global climate change and local air pollution. As a major force behind anthropogenic carbon emissions, China accounted for almost one third of global carbon dioxide emissions and 80% of the world's increase in CO<sub>2</sub> emissions since 2008. Carbon emissions have been one of the biggest challenges on China's road to long-term sustainability, therefore, we need to have a deeper understanding into China's climate policy at very different levels, particularly from the perspectives of co-benefits in global climate change and local environmental pollution. Thus, our intent is to provide insight about China's policy and actions addressing climate change by applying the co-benefit approach to measure the contribution of GHG emissions as well as air pollutants (SO<sub>2</sub>, NO<sub>x</sub>, PM<sub>10</sub>) reductions from 2006 to 2010, mainly based on the *China's Policies and Actions for Addressing Climate Change* reports. Our evaluation shows that the total carbon emission would increase one third more without such mitigation activities, and the activities in mitigation show a significant co-benefits contribution to air pollutants reduction.

### Key words:

climate policy; carbon reduction; air pollution; co-benefits approach; China

## Sea Level Rise and Lost of Mangrove Forest in the Sundarban Coastal Stretch using Geospatial Technology, West Bengal, India

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### Abstract

Sundarban Coastal zones are highly sensitive where the multivariate geologic/ geomorphic processes viz. tectonic, fluvial, marine and aeolian processes act in varying degrees and exposed to various natural disasters such as coastal erosion, flooding, storm surges, tsunami, etc. The dynamism of these disasters are further incremented by the improper human intervention through the various developmental activities without proper understanding of ongoing coastal processes dynamics. Global warming and its related accelerated sea level rise is one of the major long-term disasters along the low-lying coastal margin of Sundarban. The accelerated sea level rise is likely to become threats and damage to the world heritage Sundarban mangrove forest. Our study observed 1509.9 sq.km forest cover in the year 1990 where as 1582.4 sq.km forest cover in the year 2015. So vegetation loss is very much prominent in the area.

The Sundarban is particularly responsive to changes in Sea Level besides increasing vulnerabilities to storm surges and coastal erosion. It changes tidal forcing and influences estuarine sedimentation. With onset of the Holocene, the sea level rise fast at the beginning, then very slowly from c. 7,000 yr BP to get nearly stabilized at 2,000~3,000 yr BP<sup>2</sup>(Nandy and Bandyopadhyay). According to the Fourth Assessment Report (AR4) of the Intergovernmental Panel for Climate Change (IPCC), the rise in the sea level picked up again during the 19<sup>th</sup> century at 1.7 mm yr<sup>-1</sup> and escalated to 3mm yr<sup>-1</sup> in the final decade of the 20<sup>th</sup> century (Nandy and Bandyopadhyay). Between 1990 and 2015, thermal expansion of sea water and melting of land ice accounted for about half of the rise. On an average, the rate was estimated by our calculation at about 1.6 mm yr<sup>-1</sup> for the last 25 years. The AR4 also unequivocally confirm the human induced global warming responsible for this accelerated increase and suggested a rise of 4 mm yr<sup>-1</sup> up to 2090s according to one of its future scenarios.

### Key words:

Sea level rise; coastal zone, impacts; adaptation; tide gauge data; Biodiversity

## The Impact of Urbanization on Spatial Distribution of Precipitation in Shenzhen

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### Abstract

Increase of urban rainfall contributed to the city's flood control pressure could cause the urban waterlogging. At the same time it also could cause some secondary disasters. In this paper, in view of the indirect effects of urbanization to precipitation, we use daily meteorological data of 130 observation stations over Shenzhen for the period of 2000 to 2015. After spatial standardization of precipitation data, we analyze the impact of Shenzhen urbanization on the precipitation by employing the trend fitting method and correlation analysis. In our analysis, urbanization factors include topography, land use, urban population, GDP and energy consumption. The results illustrate that in the study area, annual precipitation spatial heterogeneity and the urbanization process is closely linked, and as temperature rises, rainfall increases.

Therefore, urbanization has an impact on urban meteorology and environment. It is obvious that urban rainfall is significantly greater than the surrounding suburban, which makes the formation of urban rain island effect.

### Key words:

urbanization; spatial normalization; urban rainfall island; spatial distribution; climatology

## Climate Change and Global Understanding Geo-political, Economic, Cultural Change and Conflicts



### Poster

1. [A Study on the Geographical Distribution of Global Terrorist Activities](#)  
Liu Ziyi; Cai Zhongxiang; Liu Hongjian (China, Information Engineering University)
2. [Prediction of Third-party Intervention in the Conflict Based on Artificial Neural Networks](#)  
Feng Changqiang; Jiang Nan; Wang Pei (China, Institute of Geospatial Information, Information Engineer University)
3. [The Pattern of the Industrial Relevancy Impacting on Regional Carbon Emission: Empirical Analysis Based on the Input-Output data of EU](#)  
Yuan YUAN (China, Northwestern Polytechnical University); Qiangmin XI (China, Nankai University); Guoping LI (China, Peking University)



## A Study on the Geographical Distribution of Global Terrorist Activities

Liu Ziyi, Cai Zhongxiang, Liu Hongjian, Zhang Linxiang, Long Jimeng

Information Engineering University

### Abstract

In today's society, terrorist activities has flooded around the world. Obviously, there are certain some objective laws behind these attacks and activities. On the basis of quantitative analysis, this paper analyses the temporal and spatial distribution of global terrorist activities from 1970 to 2014, revealing their patterns systematically from a geographical perspective. Furthermore, characters and primary areas of global terrorist activities are also pointed out in the article. With the analysis of inner mechanism of activities distribution, this paper indicates the coupling relationship between geopolitics and the distribution of terrorist activities.

### Key words:

Terrorism; geographical distribution; quantitative analysis

## Prediction of Third-party Intervention in the Conflict Based on Artificial Neural Networks

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### Abstract

Driven by interests, State conflicts often occur. Meanwhile, third-party interventions, especially developed countries, have a greater impact on related countries' conflict resolution and decision-making. Because third-party interventions also involve the interests of themselves, like political, economic and military benefits, intervention forecast is a complex non-linear task, which makes it difficult to be done using traditional mathematical formulas and models. Instead, it mainly relies on qualitative analysis of international political researcher, which has more subjectivity and uncertainty. Given the outstanding performance of artificial neural networks(ANN) in dealing with complex nonlinear problems, this article uses it to predict third-party intervention in the conflict between two countries.

First, from the perspectives of national power, geo-strategic objectives, interdependence and conflict characteristics, the essay resolves the factors affecting third-party intervention, including national strength contrast among conflict sides and intervention one, regional influence of conflict countries, third-party political, economic and military dependence on conflict sides, the influence level and incentives of conflict. Second, analytic hierarchy process is used to quantify the influence level of conflict and third-party political, economic and military dependence on conflict sides. Third, tests are done based on a real case. The initial forecasts of third-party invention are achieved and counted using trained ANN, where the action occurring most frequently is considered as the final prediction of third-party intervention. Experiments show that the method can make an accurate prediction on third-party intervention with a greater probability, and can serve conflict countries' decision-making.

### Key words:

conflict; intervention prediction; analytic hierarchy process; artificial neural networks

## The Pattern of the Industrial Relevancy Impacting on Regional Carbon Emission: Empirical Analysis Based on the Input-Output data of EU

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<sup>3</sup>School of Government, Peking University, Beijing 100871, China

### Abstract

Carbon emission is the inevitable result of development. Generally, the developing pattern changes from extensive to intensive with the industrialization. So is there an inherent peak and then obtain reduction naturally? And if the peak does exist, when it would appear? The answers of above questions are directly related to the carbon distribution principle and equity of global carbon quotas. The correlation of different industries, which is the inherent driving force of the upgrade of economic structure, can demonstrate the stage of regional economic development. This paper utilized theoretical and empirical analysis and concluded that the pattern of carbon emission has an Inverted-U shape (Carbon Emission Baseline). This pattern shows that if a region was still in the stage of correlation between low manufacturing and service sector, this region has rights to keep emission increasing to sustain the basic development. Therefore, CEB not only gives a shape of emission, but also provides a standard relationship between the evolution of emission and economic development. On this level, CEB has potential to be a complement principle of global carbon apportion.

### Keywords:

carbon emission; impacting characters; evolution pattern; correlation of industries

## Climate Change and Global Understanding Global Observation and World Data Systems



### Poster

1. [A Two-leaf Model for Improving the Application of PRI to Indicate Vegetation Light Use Efficiency Using Multi-Angle Observations](#)  
Qian Zhang; Weimin Ju; Jing Chen (China, Nanjing University)
2. [Evaluation of MODIS GPP Products Across Multiple Biomes in China](#)  
Hongji Zhu; Aiwen Lin; Yu Xia (China, School of Resource and Environmental Science, Wuhan University)
3. [New Approach of RGB-composition to the Analysis of Synoptic Situations](#)  
Nadezhda Eroshkina; Aleksei Poliukhov (Russian Fed, Lomonosov Moscow State University)

## A Two-Leaf Model for Improving the Application of PRI to Indicate Vegetation Light Use Efficiency Using Multi-Angle Observations

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<sup>3</sup> Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China.

### Abstract

The photochemical reflectance index (PRI) is a promising way to indicate light use efficiency (LUE). However, there are certainly some internal and external factors that affect PRI signals. To consider the spectral difference between sunlit and shaded leaves, a two-leaf approach based on a four-scale optical transfer model is used to process multi-angle canopy reflectance for estimating fractions of sunlit and shaded leaves. Thus, two-leaf canopy PRI ( $PRI_t$ ) is retrieved using the least square regression with different angles observations, and is compared to simply averaged big-leaf canopy PRI ( $PRI_b$ ) using observations acquired from April to September 2013 in a sub-tropical coniferous forest in Southern China. Retrieved two-leaf PRI are generally able to capture variations of observed PRI (>70%) at different angles proving that this two-leaf approach is effective for PRI upscaling. The two-leaf approach significantly enhances the sensitivity of PRI to bioclimatic stress and its ability to track LUE variations at either half-hourly or daily time steps. Generally, diurnal correlations between  $PRI_t$  and LUE increase with the increases of bioclimatic conditions (e.g. light, temperature and water).  $PRI_t$  is very effective in detecting the light stress on LUE. At daily time step,  $PRI_t$  is more significantly correlated with LUE than  $PRI_b$  does from July to September when weather conditions and background reflectance are steadier than those at the rest time. The correlation is the strongest ( $R^2 = 0.785$ ,  $p < 0.001$ ) in July. Overall, the two-leaf approach overcomes some external effects (e. g. bidirectional reflectance) that interfering PRI signals.

### Key words:

PRI; LUE; external factors; sunlit and shaded leaves; half-hourly or daily time steps; light stress

## Evaluation of MODIS GPP products across multiple biomes in China

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### Abstract

MOD17A2 estimates gross primary production (GPP) according to the light use efficiency (LUE) concept relating gross photosynthesis to the amount of photosynthetically active radiation (PAR) absorbed by plants. In this study, we evaluated the performances of MOD17A2 across multiple biomes in China through comparisons with eddy covariance (EC) flux measurements during the period 2003-2005. The results show that MOD17A2 provided better estimates of annual GPP and agreed well with tower-based GPP measurements during the autumn and winter. However, its effectiveness was poor at estimating GPP over 8 days and even worse during the summer. In addition, MOD17A2 was also ineffective when estimating annual GPP for mixed forests (MF), evergreen needleleaf forests (ENF) and cropland (Crop). We further examined the potential error contributions of all input variables used in the MOD17A2 algorithm, including meteorology, leaf area index (LAI)/fractional photosynthetically active radiation (FPAR), land cover and light use efficiency (LUE). It was found that the meteorological reanalysis data failed to properly estimate tower measured vapor pressure deficit (VPD). Moreover, FPAR and maximum LUE ( $\epsilon_{\max}$ ) underestimated the corresponding improved data for most sites. Thus, the qualities of meteorology data and FPAR need to be improved, and  $\epsilon_{\max}$  in the Biome Properties Look-Up Table (BPLUT) should be adjusted to provide better GPP estimates using MOD17A2 for China's ecosystems.

### Key words:

MODIS; gross primary productivity (GPP); validation; eddy covariance; China

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## New Approach of RGB-Composition to The Analysis of Synoptic Situations

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### Abstract

The development of satellite technologies and its application in meteorological researches led to an increasing of the information received from satellites last years. In recent years the RGB-compositions, visualizing data in different wavelengths, are actively being created. These compositions are useful in the manual analysis of synoptic situations, but their large number complicates and slows down the manual processing of the visual information.

To overcome this problem, we made EVSI software. With this software a user can choose a type of satellite information for each color channel. The creation of the efficient software, which would provide more easy and convenient way of the analysis of obtained images, was the purpose of our work. The results of an atmospheric scanning by satellite METEOSAT-10 were the input data for our program.

With EVSI the RGB-composition was created. It is usable for the primary analysis of a synoptic situation over a required region without any other information. This composition is the combination of 10.8 and 6.2 micron channels and the difference of 6.2 and 7.3 micron channels.

The cloud structure looks like white area, so it is easy to differentiate and analyze it. The towering clouds with the precipitation regions and the potential severe weather activity are colored in bright blue on a white background. Additionally, the RGB-composition helps to find information about the properties of air masses. All of it contributes to a fast detection, analyzing and forecasting of the weather in the required region.

### Key words:

satellite information; meteorology; RGB-composition; synoptic analysis



## Climate Change and Global Understanding Local Action and Global Social Governance



### Poster

1. [Resilience: New Thought of NGOs to Climate Change?](#)

YiJie Li (China, Social Resources Institute)

## Resilience: New Thought of NGOs to Climate Change?

YiJie Li

Social Resources Institute

### Abstract

Due to the uncertainty of climate change, some NGOs have chosen to adapt to climate change through building the resilience of system (individual, family or community) and to regard the management based on resilience as an important way to respond to the impact of climate change. Compared to urban residents, rural ones rely more on agriculture and other climate-sensitive resources to acquire income, and are more climate-sensitive but the fact is the input of domestic NGOs to improving the capacity of farmers in adapting to climate change remains insufficient.

Though quite a few NGOs have worked in rural areas, there are two problems in helping farmers to adapt to climate change. First, there are fewer NGOs directly engaging in the resilience of climate change in rural areas; second, the current resilience relating to climate change focuses on disaster assistance, and most NGOs just don't know what to do with the potential risk of climate change and thus lack planned and proactive actions. The introduction of resilience can establish relationship between the project of NGOs and the adaptation to climate change, more proactive measures can be adopted to improve the resilience of farmers to respond to external risks including climate change.

Thus, through literature research, quantitative research and case studies, this paper studies how NGOs can help to improve farmers' resilience. First, key factors for farmers' resilience are defined; second, it has an analysis of the current actions of domestic NGOs in "improving farmers resilience" from the aspects of types, degrees and recognition on the basis of questionnaire inquiry; third, to detail the practices of NGOs, three cases are introduced to seek experiences to be drawn on and to explore the potential ways of domestic NGOs in participating in the climate change response of rural community.

Quantitative research shows that, most NGOs don't have sufficient understanding of the content of climate change adaptation or clear idea of the relationship between their projects and climate change adaptation. This hinders their introduction of the view of climate change to their projects or a better climate change adaptation. In addition, from the scoring of resilience indexes, NGOs work can effectively improve "farmers' resilience" but there is still a huge potential to rise.

Case studies (the eco-community empowerment of The Daba Mountain Ecology and Poverty Issue Research Institute, underground water protection of SEE Conservation, and community protected area of ShanshuiCenter) show that, NGOs helps to improve community resilience to respond to climate change mainly through improving community ecological environment, farmers' livelihood and community self-development ability but they have different functions and ways. Farmers' effective participation is a premise to improve



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resilience, which means whether NGOs' projects meet farmers' needs, and whether they ensure farmers' status as the main body.

At last, the paper gives three suggestions for NGOs, namely taking climate change and resilience into consideration in specific work, climate resilience project should meet farmers' current needs, and the improvement of self-development ability should be taken as the core of improving resilience.

**Key words:**

Resilience; climate change; NGO; rural; community; farmer

## Climate Change and Global Understanding

### Cryospheric Change and Its Impacts To Sustainability



#### Oral

1. [Climate and Meltwater Changes in the Himalayas: Impacts and Risk Assessment](#)  
Cunde Xiao (Cold and Arid Regions Environmental and Engineering Research Institute, China)
2. [Glacial Lake Outburst Flood \(GLOF\) Disasters and Integrated Risk Management from China](#)  
Wang shijin (Cold and Arid Region Environment and Engineering Research Institute, CAS, China)
3. [Glacier Stagnant in Central Karakorum During 2003 to 2008 Derived from DEOS Mass Transport Model GRACE Data and One Monthly Degree-day Model](#)  
Xiaowen Zhang, Zhang Shiqiang (Northwest University, China), Junli Xu (Cold & Arid Regions Environmental & Engineering Research Institute, Chinese Academy of Sciences, China)
4. [Impacts of Surface Air Temperature and Sea Ice Extent Anomalies on Arctic Ocean Mercury Cycle](#)  
Chen Long (Peking University, China), Zhang Wei (Renmin University of China, China), Tong Yindong (Tianjin University, China), Wang Xuejun (Peking University, China)
5. [Light-absorbing Impurities in Surface Snow/Ice from Glaciers in the Southeastern Tibetan Plateau: Concentrations and Radiative Forcing](#)  
Yulan Zhang, Shichang Kang (State Key Laboratory of Cryospheric Sciences, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China)
6. [Runoff Variation and Its Reason Analysis in Typical River of the Cold Region in China](#)  
Jia Qin (Division of Hydrology Water Land Resources in Cold and Arid Regions, Chinese Academy of Sciences, China)
7. [Snow Cover in China And its Rapid Changes with Regional Differences](#)  
Lijuan Ma (National Climate Center, China), Ruonan Zhang (Chinese Academy of Meteorological Sciences, China), Duo Li (National Climate Center, China)
8. [Spatiotemporal Variations of Snow Cover in China based on the Passive Microwave Remote Sensing and in situ Data](#)  
Tao Che, Liyun Dai, Shengnan Zhou, Xin Li (CAREERI, CAS, China)
9. [The Cryosphere Science: Research Framework and Discipline System](#)  
Yongjian Ding (CAREERI, China)
10. [The Temporal and Spatial Changes in Snow Cover and the Corresponding Radiative Forcing in Siberia from the 1970s to the 2010s](#)

Lingxue Yu, Shuwen Zhang, Tingxiang Liu (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)

## Poster

1. [Snow Cover in the Tarim River Basin Monitoring by Remote Sensing](#)

Jing Li; Shiyin Liu; Donghui Shangguan (China, State Key Laboratory of Cryospheric Sciences, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, Lanzhou, 730000, China)

2. [Variability of Snow Cover in Beijing-Zhangjiakou Region in Winter and Spring](#)

Xiao Wangxing (China, Chinese Academy of Meteorological Sciences); Xiao Cunde (China, State Key Laboratory of Cryospheric Sciences, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences); Guo Xiaoyan (China, Chinese Academy of Meteorological Sciences)

## Climate and Meltwater Changes in the Himalayas: Impacts and Risk Assessment

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### Abstract

Regional warming was identified in the whole Himalayas in the past ~50 years, with larger warming rate in the last decade. During the same period, precipitation decreased in the most areas of Himalayas. Warming-dry regime of climate resulted in widespread retreating of glaciers. Based on in-situ investigations and mapping of satellite images, we studied glacial changes between 1970's to 2008. It shows that in the north slope of Himalayas, retreating glaciers amount to 25.3% of overall glaciers in Ganges basin, 23.3% in Yarlung Zangbo basin, 29.2% in Indus and 25% in other areas. Glacier changes in the southern slope of the Himalayas have larger amplitudes, with averaged retreated distance roughly doubled, than that of the northern slope. Darkening of glacier surface due to back carbon and other light-absorbing aerosols might have contributed to the strong melting, especially in the southern slope.

Using degree-day model (DDM), we estimate glacier mass balance as well as contributions of glacier meltwater to river runoff over different drainage basins in north Himalayas. During 1961-2006, the total mass losses of glaciers amounts to 198 km<sup>3</sup>, equals to approximately 10 m thinning of glaciers. Among the mass loss, 40 km<sup>3</sup> occurred in Ganges basin (10.8m ice thinning) which is 360.4×10<sup>8</sup> m<sup>3</sup> water equivalent, and 168.4 km<sup>3</sup> (11.4m ice thinning) occurred in Yarlung Zangbo basin which amounts to 1515.7×10<sup>8</sup> m<sup>3</sup> water equivalent. While glaciers in Indus basin experienced a positive mass balance before 2000 and negative after 2000. The mass balance is averaged -220mm•a<sup>-1</sup> during 2000-2006. Glacier melt water increases in the last 5 decades, contributing to an increasing amount to total river runoff in the Indus, Ganges and Yarlung Zangbo Rivers. For instance, melt water averagely contribute about 11.8% to runoff of Yarlung Zangbo during 1961-2008, with the percentage a slightly increasing trend.

Projections of future climate change by Regional Climate Model (ICTP RegCM3) shows continuously warming and drying trends in the most part of Himalayas before 2050, implying continuously retreating of glacier thus depletion of water storage over the Himalayas. Assessment of glacial lake outburst flood (GLOF) disaster risk is completed in the north slope, combined with potential dangerous glacial lakes (PDGL) outburst hazard, regional exposure, vulnerability of exposed elements and adaptation capability (risk management) using the analytic hierarchy process. The zones at highest risk of GLOF disaster are mainly located in Nyalam, Tingri, Dinggyê, Lhozhag, Kangmar and Zhongba, in the mid-eastern Himalayas.

### Key Words:

Himalayas; glacier change; meltwater; GLOF; black carbon; degree-day model; climate scenarios; vulnerability



## Glacial Lake Outburst Flood (GLOF) Disasters and Integrated Risk Management

### Form China

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#### Abstract

High-risk areas of Chinese GLOF disasters are mainly concentrated on the middle-eastern Himalayas and Nyainqêntanglha, Tibetan Plateau in China. In the past 20 years, glaciers in these regions retreated and thinned rapidly to regional climate warming, leading to the formation of new glacial lakes and the expansion of existing glacial lakes. Meanwhile, these regions are located in the border belt between the Indian and Eurasian plate, in which Neotectonics is strong, and tectonic seismic activity is also frequent and intense. The earthquake often destroyed the stability of mountain body, glacier and moraine dam, resulting in the imbalance of own state of glacial lakes and the increase of loose materials in the channel. It is foreseeable that the possibility of GLOFs and derivative disaster occurrence is great in the background of frequent earthquakes and obvious continued warming. By integrated analysis of temporal and spatial characteristics, incentives and typical cases of GLOF disasters, the objects of the paper is to propose a program of integrated risk management and control of GLOFs disaster with multi-objective and multi-mode features. In addition, the study aims to avoid and mitigate the impact of GLOF disasters on mountain economic and social systems, and enhance the level of the analysis of disaster risk and the capabilities of risk management and disaster prevention and reduction of GLOFs.

#### Key words:

GLOF disaster; Temporal and spatial characteristics; Risk management and control

## Glacier Stagnant in Central Karakorum During 2003 to 2008 Derived from DEOS Mass Transport Model GRACE Data and One Monthly Degree-Day Model

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### Abstract

Glacier change in central Karakorum is known as 'anomaly' in the late 1990s, where many glaciers expanded and numbers of glacier surged while most of glaciers in the Greater Himalaya rapidly retreated. However, the understanding of glacier change in this region is still poor. Glacier changes for the Hunza river basin (HRB) in central Karakorum during 2003 to 2008 were investigated from different data sources. The mass variation in HRB were estimated from the DEOS Mass Transport Model (DMT-1) GRACE data and the Variable Infiltration Capacity (VIC) model, and compared with the simulated glacier mass balance by one monthly degree-day model. The surface elevation difference of glaciers between ASTER DEM and SRTM were calculated. The mass variations from GRACE data suggest that the glacier mass balance in HRB during 2003-2007 has no clear trend. The cumulative mass balance is positive during 2003-2008. The average glacier surface elevation difference between SRTM DEM and ASTER DEM is  $11.8 \pm 3.2$  m. The average differences of glacier surface elevation of Batura glaciers in accumulation zones is increased with  $0.88 \text{ m.a}^{-1}$ . These results indicate that there is no significant glacier retreat during 1999 to 2008. The seasonal amplitude of simulated mass variation of the monthly degree-day model agreed well with that estimated from DMT-1 GRACE data, but the simulated glacier accumulation is less than that calculated from GRACE data. The main reason probably lies in that the precipitation of glaciers and unglaciated areas were underestimated, especially in alpine areas.

### Key words:

Glacier change; GRACE; DEMs; degree-day model; Precipitation gradient

## Impacts of Surface Air Temperature and Sea Ice Extent Anomalies on Arctic Ocean Mercury Cycle

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### Abstract

Mercury (Hg) pollution is of particular concern in the Arctic where populations rely heavily on marine-based diets. Climate changes in the Arctic are more remarkable than low latitudes, which likely affect Hg cycle in the Arctic. We use a global biogeochemical box model coupled to an Arctic mass budget model to investigate the impacts of typical climate changes on Arctic Hg cycle. Difference in present-day anthropogenic enrichment to preindustrial era inferred from lake-sediment records between the Arctic and low latitudinal regions suggests the remarkable impacts of surface air temperature (SAT) and sea ice extent (SIE) anomalies on Arctic Hg cycle. The increase of SAT and decrease of SIE have resulted in the loss of Hg in Arctic surface and subsurface ocean during the last several decades. A decline of -12% (11 Mg) and -9% (39 Mg) is for surface and subsurface ocean, respectively, relative to the absence of climate changes in 2008. Future SAT and SIE projections will mitigate the increase of Hg content in the Arctic Ocean or generate a synergistic effect with mercury control policies. Sufficient efforts should be made to better coordinate the policymaking of Hg controls and climate changes in the future, and then effects of Hg pollution mitigation could be improved.

### Key words:

Mercury; Arctic Ocean; surface air temperature; sea ice extent

## Light-Absorbing Impurities in Surface Snow/Ice from Glaciers on the Southeastern Tibetan Plateau: Concentrations and Radiative Forcing

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### Abstract

Light absorbing impurities (LAIs) deposited on snow and glaciers darken the surface and reduce the surface albedo. Assessing LAIs in snow and ice on the southeastern Tibetan Plateau is of interest because this region borders the south Asia atmospheric brown clouds, and is an important headwaters of large rivers. Surface snow/ice and snowpit samples were collected from Yarlang, Dongga, Renlongba and Demula glacier in the southeastern Tibetan Plateau in June 2015, providing the comprehensive observation data of LAIs. The results show that LAIs concentrations are higher in surface ice due to the post-depositional processes including melting or sublimation. "Altitude effect" is observed except from Yarlang glacier, indicating more intense melt exposed more LAIs to the surface at lower elevation. Impurity concentrations were highly variable across snowpits with maximum dust, BC and OC concentrations frequently occurring at the lower port of snowpit, except Dongga glacier with maximum at the snowpit top, suggesting that impurities scavenged from upper snowpit layers can flush downward and accumulate at the snowpit bottom layer. The averaged simulated albedo caused by BC and dust account for about 22.1% of the albedo reduction relative to clean snow using SNICAR model. Radiative forcing caused by BC and dust deposition on the Yarlang glacier vary between 6.77-11.21 W m<sup>-2</sup> and 0.70-6.21 W m<sup>-2</sup>, respectively. The result indicates that LAIs have potential to accelerate glacial melt during summer and this process enriches BC and other LAIs, which could impact the water resources.

### Key words:

Light-absorbing impurities (LAIs); Glacier; Black carbon; Dust; Tibetan Plateau



## Runoff Variation and Its Reason Analysis in Typical River of the Cold Region in China

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### Abstract

The Burqin River originated from the Altai Mountain was selected as a typical river to analyze runoff change in cold region and its reasons in the research. Based on the data of precipitation, temperature, runoff, glacier and underlying surface in the past 50 year, it found the fluctuation of annual runoff was significant and runoff turned to increase since the late 1980s in the typical river, which is very similar to runoff change in other rivers of northwest China, While the maximum monthly runoff in the Burqin River (in June) arrived earlier than most other rivers. Except precipitation change in the Burqin River, land utilization and glacier melt also has significant impact on runoff change in the typical river. The effect of climate change and different land cover scenarios on runoff change was analyzed. When the temperature raises 2°C, river runoff would decrease 12.9%. Glacier melt water would increase significant (28.5%) and total runoff would change little (1.3%) in the next 20 years in the Rcp4.5 scenario. About 65% and 20% runoff was generated in the forest and grassland correspondingly in the typical river. Deforestation and over grazing could significant increase peak discharge, and water resource in the Burqin River basin would decrease as change of the microclimate and hydrological effect.

### Key words:

Runoff change; melt water; underlying surface; climate change; Burqin River

## Snow Cover in China and Its Rapid Changes with Regional Differences

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### Abstract

With the rapid climate warming, snow cover in Northern Hemisphere suffers obvious decreasing, especially in spring. However, changes in regional snow cover exhibit great differences. What happens in China and what makes those discrepancies? This study, by using observed snow cover data, investigated the changing characteristics of snow depth (SD), snowwater equivalent (SWE), and snow density in China in the past 60 years, and then, revealed the regional differences in snow depth changes and explored the possible reasons in view of atmospheric circulation transition.

Research indicated that, on average, SD, SWE, and snow density were all the smallest in the Qinghai-Tibetan Plateau (QTP), and were greater in northwestern China (NW). Although the trend in China as a whole was not significant, the amplitude of variation became increasingly greater in the second half of the 20<sup>th</sup> century. EOF disclosed the anti-phase characteristics for snow cover in northern China and the QTP. Significant increasing trends were found in both NW and northeastern China (NE), while SD over the QTP declined into its negative phase, especially since the later period of last century. Analysis investigated that the increases of snow cover in northern China possible link to remarkable warming in Arctic and continuous record-breaking decreasing of Arctic sea ice.

### Key words:

snow cover; rapid changes; response; feedback; atmospheric circulation; climate change

## Spatiotemporal Variations of Snow Cover in China based on the Passive Microwave Remote Sensing and in Situ Data

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### Abstract

We reported the spatiotemporal variations of snow depth in China in the past four decades. The snow depth data include the observations of meteorological stations of Chinese Meteorological Administrator (CMA) and the retrievals from the passive microwave remote sensing data. First of all, we compared the observations of stations with the retrievals of remote sensing data to see the consistency between them. The spatial representativeness of each station was evaluated based on the topographical factors and land cover types. The observations with the higher spatial representativeness were considered as the higher confidential level and entrusted to validate the snow depth derived from remote sensing data. Secondly, the snow depth data derived from remote sensing data with larger errors were corrected based on the ground observations with the high confidential level. Finally, the snow depth from remote sensing data was used to analyse the spatiotemporal variations in the past four decades, as well as the relationships with air temperature and precipitation. The results showed that (1) snow depth in China has a very large fluctuation on the both of spatial and temporal scales; (2) average snow depth showed no clear positive or negative tendency in the whole of China in the past four decades due to the large annual fluctuation; (3) the snow depth in spring were decreasing significantly in the whole of China due to the increases of temperature; (4) the snow depth in winter in some regions were increasing due to the increases of precipitation.

### Key words:

Spatiotemporal variation; snow depth; passive microwave; remote sensing

## The Cryosphere Science: Research Framework and Discipline System

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### Abstract

The growing concern of the society on Cryosphere change and its impact has promoted the research on cryosphere, the impact and social adaptation of interaction between different spheres, and cryosphere science rapidly grew. However, the systematic study on the cryosphere science is still very weak, and the scientific connotation and denotation of cryosphere science is still very vague. Based on the international study trends on cryosphere, the scientific definition of cryosphere and cryosphere science, the studies on interaction between cryosphere with other spheres, the scientific framework of cryosphere science, and disciplines of cryosphere sciences were analyzed around the cryosphere science discipline system problems. We pointed out that "Cryosphere Science" as a system of disciplines is the inevitable outcome under the background of international global environmental change and sustainable human development. It should not only enhance the closely connection between cryosphere and other spheres in traditional research, but also pay more attention to the key roles of cryosphere in the interaction between cryosphere and other spheres, and strengthen the relationship between the impact of cryospheric changes on climate, ecology, hydrology and surface environmental change and social sustainable development. The framework of cryosphere science was constructed around the research mainline of changes - impact - adaptation of cryosphere in this paper, and the composition of "cryosphere science" disciplines was combed aim at the characteristic of each element of traditional cryosphere study and new branches of cross study between cryosphere and other sphere, which will provide reference to the systematic and the mature development of cryosphere science.

### Key words:

Cryosphere; cryosphere science; research framework; discipline composition; cryosphere change, impact and adaptation

## The Temporal and Spatial Changes in Snow Cover and the Corresponding Radiative Forcing in Siberia from the 1970s to the 2010s

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### Abstract

The temperature record during the 20th and 21st centuries showed that the temperature increased obviously especially from 1970s. As an indicator of climate change, the snow cover in northern hemisphere has decreased with high confidence according to the satellite records. The warming and the snow cover changes in the Northern Hemisphere's high latitude terrestrial areas represent the important energy feedbacks to climate systems. In this paper, the temporal and spatial changes in snow cover were firstly estimated based on a long time series of remote sensing snow cover data, which showed that the average snow coverage and snow days during 1970s to 2010s decreased at a trend of  $-0.8551 \times 10^4 \text{ km}^2/\text{a}$  and  $-0.2479 \text{ d/a}$ , respectively. Based on this, we estimated the radiative forcing caused by the snow cover changes from the 1970s to the 2010s and compared it with the radiative forcing caused by the land cover changes over the same time period in Siberia. The shortwave and longwave radiative forcings caused by the snow cover changes were  $2.59 \text{ W/m}^2$  and  $0.007 \text{ W/m}^2$ , respectively, while the shortwave and longwave radiative forcings caused by the land cover changes were  $-0.0178 \text{ W/m}^2$  and  $-0.000074 \text{ W/m}^2$ , respectively, indicating that the snow cover changes in Siberia can accelerate climate warming while the land cover changes here have the opposite effect, and more than that the snow cover changes may play a more important role than the land cover changes in regulating the surface radiation balance in Siberia on the regional scale.

### Key words:

Snow cover changes; climate change; energy feedbacks



## Snow Cover in the Tarimriver Basinmonitoring by Remote Sensing

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### Abstract

In this paper, we combined GIS system with MODIS and SSMI/SMMR snow data to monitor the temporal-spatial distribution of snow cover in theTarimRiver basin. The results show snow cover mainly appears at mountainous areas around the TarimRiver basin. The southern slope of TuomuerPeak and the mountainous areas in the southwest of the basin connecting the Pamirs and KarakorumMountains are main areas with snow cover.The snow cover in the basin has significant temporal-spatial variation. Regarding the temporal variation, it has clear accumulation-ablation cycle. The accumulation period is from September to next February, and the ablation period is from March to August. As for spatial variation, both snow cover and snow depth increase with the elevation. Under a global warming climate with more precipitation, the snow cover increase during the past 30 years. But there are distinct seasonal differences for the variation. Snow cover generally increases in the spring, autumn and winter, but decreases in the summer. This is probably due to the increase of the temperature which expedites the melting of the snow.

### Key words:

Tarim River basin; MODIS snow cover; SSMI/SMMR snow depth; temporal-spatial distribution

## Variability of Snow Cover in Beijing-Zhangjiakou Region in winter and spring

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### Abstract

Beijing and Zhangjiakou will hold the 2022 Winter Olympics. For organizing a successful Winter Olympics, it is important to investigate the temporal and spatial variations of snow cover in the past decades, especial the most recent decade, using winter and spring snow-cover data from MODIS 2002 to 2014, DEM and meteorological data 1966 to 2013. It is found that snow cover frequency is low and its maximum is 0.23, appeared at the beginning of January averaged for 2002-2013. The accumulation of snow was slow, but melting was rapid and the distribution of snow cover was patchy. The fluctuation of snow days in winter is larger than that in spring, and in February the number of snow days in Yanqing (4.6d) and Chongli (13.9d), where the main resorts located, was declining. Meanwhile the beginning and ending dates of snow cover are earlier than before while the duration of snow cover was shorter. There were two periods of relatively high snow depth, 1966-1980 and 2000-2012, but with big annual fluctuations. The period between the above two was characterized with low snow depth. It is found that the correlation between snow cover and air temperature (precipitation) is higher in the interseasonal (interannual) variations. Because of unsuitable temperature, less precipitation and inadequate snow days in the Winter Olympics venues, there will probably be insufficient snow for the sports. And with rising in temperature and declining in precipitation, snow depth and snow days, 60%-95% of snow may have to depend on artificial snow, to meet the requirement of Winter Olympics standards.

### Key words:

Winter Olympics; MODIS; snow days; maximum snow depth; artificial snow

## Climate Change and Global Understanding

### Rapid Change and Its Dynamics In Cryosphere During the Last Decade



#### Oral

1. [Enzyme Activities as Affected by Pedogenesis and Permafrost in a Boundary Area of Continuous Permafrost in the Qinghai-Tibetan Plateau](#)  
Xiaodong Wu (Cold and Arid Environment and Engineering Institute, Chinese Academy of Sciences, China)
2. [Impacts of Light-absorbing Impurities on the Cryosphere over the Third Pole](#)  
Shichang Kang, Yang Li, Zhenming Ji (The Institute of Tibetan Plateau Research, Chinese Academy of Science, China)
3. [Mechanisms and Simulation of Accelerated Shrinkage of Continental Glaciers: A Case Study of Urumqi Glacier No. 1 in Eastern Tianshan, Central Asia](#)  
Zhongqin Li, Wang Puyu (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China)
4. [Relationship Between Climate and Permafrost Across the Mid-latitude Alpine Regions During the Period 2008-2013](#)  
Wu Tonghua, Lin Zhao (Cold and Arid Regions Environmental and Engineer Research Institute, Chinese Academy of Sciences, China), Ren Li
5. [Simulation and Prediction of Equilibrium Line Altitude of Glaciers in the Eastern Tibetan Plateau](#)  
Keqin Duan (Shanxi Normal University, China)
6. [The Dangerous Lakes of Kyrgyzstan: Development Caused by Climate Change](#)  
Bohumir Jansky (Charles University in Prague, Faculty of Science)
7. [The Last Decade Changes in Glaciers Area in the Caucasus and Altai Mountains.](#)  
Tatiana Khromova, Gennady Nosenko, Stanislav Nikitin (Institute of Geography RAS, Russian Fed)

#### Poster

1. [Effects of Modified Soil Water–heat Physics on RegCM4 Simulations of Climate over the Tibetan Plateau](#)  
Wang Xuejia; Guojin Pang; Meixue Yang (China, State Key Laboratory of Cryosphere Sciences, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)
2. [Glacier Area Changes in the Tien Shan over the Past 40 Years](#)



## 33rd International Geographical Congress

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Chen Jiao; Wang Xianwei (China, Sun Yat-sen University)

3. [Quantification of Recent Dynamics in Glacial and Paraglacial Environment: Application of UAV, Digital Photogrammetry, Terrestrial Laser Scanning and DEMs of Difference \(DODs\)](#)

Marek Ewertowski (Poland, Adam Mickiewicz University); Aleksandra Tomczyk (Poland, Adam Mickiewicz University)

## Enzyme Activities As Affected By Pedogenesis and Permafrost in a Boundary Area of Continuous Permafrost in the Qinghai-Tibetan Plateau

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### Abstract

To investigate the effects of pedogenesis and permafrost on soil enzyme activities in the Qinghai-Tibetan Plateau, this study examined the soil enzyme activities of invertase, amylase, catalase, polyphenol oxidase, urease, and alkaline phosphatase in the north boundary of the permafrost region of the Qinghai-Tibetan Plateau. The results showed that soil properties could be categorized using soil organic carbon (SOC) and total phosphorus, as well as factors that were favorable for their accumulation, such as active layer thickness, moisture, pH, and bulk density. The above factors were closely associated with one another. Invertase, urease, and alkaline phosphatase activities were significantly positively correlated to SOC, total nitrogen, and total phosphorus, while amylase, catalase, polyphenol oxidase showed different patterns. Soil enzyme activities in various soil horizons could reflect the effects of permafrost and vegetation type. Soil enzyme activities in different horizons demonstrate that permafrost, vegetation type and depth has important effects on soil characteristics and biogeochemical cycles.

### Key words:

Soil enzyme; Permafrost; Qinghai-Tibetan Plateau; Soil organic matter

## Impacts of Light-Absorbing Impurities on the Cryosphere over the Third Pole

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### Abstract

Black carbon (BC) and mineral dust (MD), the most important compositions of light absorbing impurities (LAIs), significantly absorb the solar radiation in the atmosphere, and reduce albedo after being deposited on the cryosphere, thus promoting snow/ice melting and causing positive climate warming feedback. BC and organic carbon over the Third Pole (TP) regions were simulated using a regional climate model (RegCM4.3) coupled with a chemistry-aerosol module. Results showed that mixed carbonaceous aerosols produced positive shortwave radiative forcing in the atmosphere and negative forcing at the surface. Aerosols increased surface air temperatures by 0.1-0.5 °C over the Tibetan Plateau and decreased temperatures in South Asia during the monsoon season. Further, to estimate the impacts of LAIs on glacier and snow cover melt, surface snow/ice samples have been in-situ collected from five benchmark glaciers and snow cover in the TP during 2013-2015, using SNICAR model and a distributed energy-mass balance model. The sensitivity analysis shows that contributions of BC and MD were less than 37 % and 32 %, respectively, of summer melting on Laohugou Glacier No. 12 in the northeast of the TP. While MD (38%) contributed more glacier melt than BC (11%) to Zhadang Glacier, Mt. Nyainqentanglhi in the southern TP. This study provided the baseline information on LAIs' climatic effects and their contributions in cryosphere change over the TP.

### Key words:

Black carbon; mineral dust; climatic effects; cryosphere; Third Pole

# **Mechanisms and Simulation of Accelerated Shrinkage of Continental Glaciers: A Case Study of Urumqi Glacier No. 1 in Eastern Tianshan, Central Asia**

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## **Abstract**

Similar to most mountain glaciers in the world, Urumqi Glacier No. 1 (UG1), the best observed glacier in China with continued glaciological and climatological monitoring records of longer than 50 years has experienced an accelerated recession during the past several decades. The purpose of this study is to investigate the acceleration of recession. By taking UG1 as an example, we analyze the generic mechanisms of acceleration of shrinkage of continental mountain glaciers. The results indicate that the acceleration of mass loss of UG1 commenced first in 1985 and second in 1996 and that the latter was more vigorous. The air temperature rises during melting season, the ice temperature augment of the glacier and the albedo reduction on the glacier surface are considered responsible for the accelerated recession. In addition, the simulations of the accelerated shrinkage of UG1 are introduced in this study.

## **Key words:**

glacier; acceleration of recession; Urumqi Glacier No. 1; mechanism

## Relationship between Climate and Permafrost across the Mid-Latitude Alpine Regions during the Period 2008-2013

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### Abstract

The links between climate and permafrost were well documented in lots of previous literature. However, the responding mechanism of permafrost to climate change and the feedback of permafrost changes on the climate system were still kept poorly understood until now, especially in the mid-latitude alpine regions such as the Qinghai-Tibet Plateau, the Loess Plateau in China, and the Mongolian Plateau. Three typical permafrost sites in above-mentioned three plateaus were selected to perform the comparison analysis. The related meteorological elements and ground temperatures at different levels were continuously measured over the period 2008-2013. The difference of the impacts of climate on the permafrost was demonstrated in details in this study. The surface offset, the thermal offset, and the air and ground surface freezing/thawing indices were calculated according to the observation data. The possible impacting mechanism of climate conditions on the ground thermal regimes were quantified and compared. This study will enhance our understanding on the response of permafrost to recent climate changes across the mid-latitude alpine regions. The strengthened observations at those sites were suggested in the following work.

### Key words:

permafrost; climate; mid-latitude alpine regions; response

## Simulation and Prediction of Equilibrium Line Altitude of Glaciers in the Eastern Tibetan Plateau

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### Abstract

As the third polar on the Earth, the Tibetan plateau holds more than 40,000 glaciers which have experienced a rapid retreat in recent decades. Glacier loss has increased concern for water resources around the Tibetan plateau. The variability of equilibrium line altitude (ELA) indicates expansion and wastage of glacier directly. Here we simulated the ELA variability in the eastern Tibetan Plateau based on a full surface energy and mass balance model. The simulation results are agreement with the observations. The ELAs have risen at a rate of 2-8m/a since 1970 throughout the plateau, especially in the Qilian Mountain and the southeastern Plateau where the ELAs have risen to or over the top altitude of glacier, indicating the glaciers are accelerating to melting over there. Two typical glacier, Xiaodongkemadi glacier in the center of the Plateau and Qiyi glacier in the Qilian Mountain, are chosen to simulate its future ELA variability in the scenarios of RCP2.6, RCP4.5 and RCP 8.5 given by IPCC. The results show the ELAs will arrive to its maximum in around 2040 in the scenario of RCP2.6, while the ELAs will be over the top altitude of glaciers in 2035-2045 in the scenarios of RCP4.5 and RCP8.5, suggesting the glaciers in the eastern plateau will be melting until the disappear of the glaciers.

### Key words:

Tibetan Plateau; glacier

## The Dangerous Lakes of Kyrgyzstan: Development Caused by Climate Change

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### Abstract

Global warming causes an intensive melting and retreat of glaciers in the majority of high mountains all over the world. This process is also evident in the mountain regions of central Tien Shan. Melting glacier water affects changes in the hydrological regime of water streams and causes overfilling of high mountain lake basins. The dams of many lakes are very unstable and often burst open. To determine the degree of this risk, it is necessary to analyse the genesis of the lakes, to characterize the morphology of the lake basins and to know the particularities of their hydrological regime.

More than 2000 of alpine lakes covering more than 0,1 hectare each have been identified within the territory of Kyrgyzstan. Nearly 20% of these are supposed to be potentially dangerous because of instability of moraine or landslide dams, frequent overflowing, rapid development of lake basins and melting of buried ice inside the moraine. According to the latest inventory, in total 328 lakes have been identified as potentially dangerous, 12 lakes are considered as actually dangerous, other 25 feature high potential hazard. Since 1952 more than 70 disastrous cases of lake outburst have been registered. The hazardous alpine lakes are studied in Kyrgyzstan systematically since 1966. In the last ten years the monitoring work has been carried out within the programme of Czech-Kyrgyz cooperation.

### Key words:

Global warming; mountain lakes; Tien Shan; Kyrgyzstan; glacier retreat; outburst lakes; GLOF; warning system

## The Last Decade Changes in Glaciers Area in the Caucasus and Altai Mountains

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### Abstract

The last decade is of special interest as this comparatively short period of time was marked by a rapid melt of glaciers and increase in the number of natural disasters in the high-mountain area of the Caucasus and Altai - increase in number and capacity of snow avalanches and occurrence of glacial mudflows. Repeated satellite imagery has provided a uniformity of imaging conditions and compatibility of glacier data of different time, and the availability of meteorological stations operating in high-mountain area has allowed to perform comparative analysis of variability of the main meteorological parameters within the period of assessment.

The results of studies have shown that glaciers retreat in both regions was taking place during the second part of 20th century and at the beginning of this century. Considerable variability in glacier retreat (up to complete disappearance) depending upon morphological types, sizes and local conditions of alimentation of glaciers has been identified for the assessed territories. The rate of glaciers retreat during the last decade has increased 1.5–2 times compared with the end of 20th century.

### Key words:

Glacier change; space imagery; mountain regions

## Effects of Modified Soil Water–Heat Physics on RegCM4 Simulations of Climate over the Tibetan Plateau

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### Abstract

To optimize the description of land surface processes and improve climate simulations over the Tibetan Plateau (TP), a revised soil water–heat parameterization scheme (SWHPS) is implemented into the Community Land Model 3.5 (CLM3.5), which is coupled to the Regional Climate Model 4 (RegCM4). This scheme includes Johansen’s soil thermal conductivity scheme together with Niu’s groundwater module. Two groups of climate simulations are then performed using the original RegCM4 and revised RegCM4 to analyze the effects of the revised SWHPS on regional climate simulations. The effect of the revised RegCM4 on simulated air temperature is relatively small (with mean biases changing by less than 0.1 °C over the TP). There are overall improvements in the simulation of winter and summer air temperature, but increased errors in the eastern TP. It has a significant effect on simulated precipitation. There is also a clear improvement in simulated annual and winter precipitation, particularly over the northern TP, including the Qilian Mountains and the source region of the Yellow River. There are, however, increased errors in precipitation simulation in parts of the southern TP. The precipitation difference between the two models is caused mainly by their convective precipitation difference, particularly in summer. Overall, the implementation of the new SWHPS into the RegCM4 has a significant effect not only on land surface variables, but also on the overlying atmosphere through various physical interactions.

### Keywords:

Tibetan Plateau, regional climate model; air temperature, precipitation, soil water–heat physics

## Glacier Area Changes in the Tien Shan over the Past 40 Years

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### Abstract

Living water and irrigation in Central Asia heavily depend on snow and glaciers melt. Changes to the glaciers area in the main mountain range in this region, the Tien Shan, have been reported over by CGI1, CGI2, GCL2000, WGI, ESA inventory. However, because those have lower spatial resolution and susceptible to cloud and snow. It is acquired to snowless and cloud-free high resolution satellite imagery to reconstructions over longer time series in perennial snow Tien Shan mountain region. An object-oriented image segmentation method is proposed to map an intact glacier boundary and their changes with multitemporal Landsat imagery. We estimate the overall decrease to total area loss of 1359 km<sup>2</sup> in 2013, with total glacier area of 29% since 1977. And an average glacier area-change rate of -8.0 %/(10) yr.

### Key words:

Glacier area change; remote sensing; Tien Shan; object-oriented image segmentation

## **Quantification of Recent Dynamics in Glacial and Paraglacial Environment: Application of UAV, Digital Photogrammetry, Terrestrial Laser Scanning and DEMs of Difference (DODs)**

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### **Abstract**

Dynamics of glacial and paraglacial environment of several Svalbard glaciers was quantified in different spatio-temporal scales. Time-series orthophotos and digital elevation models from 1961, 1990 and 2009 (with ground resolution varying from 0.4 m to 0.7 m) were used for quantification of decadal changes for the whole catchments. Photographs captured by UAV (Unmanned Aerial Vehicle) and repetitive geomorphological and geodetic field surveys were applied to estimate seasonal (2011-2016) and intra-seasonal transformations of various landforms assemblages and individual landforms.

Research was carried out for several glacial forelands in the central part of the Spitsbergen Island, including: Nordenskiöldbreen, Ebbabreen, Raganbreen, Hørbyebreen, Cambridgebreen, Balliolbreen, Svenbreen and Ferdinandbreen. In the period LIA-2015, glaciers' margins retreated seriously, moreover ice volume and glaciers' surface profiles changed enormously emphasizing the relative importance of glaciers' thinning over area loss. In terms of landscape alteration most important transformation included: (1) developing of a terminoglacial and/or supraglacial lakes, which acted as a sedimentary trap and at the same time probably accelerated glacier recession, (2) developing of the lateral moraines with various magnitudes of debris flow and backwasting activity that changed over time (3) developing of end moraine complexes, which are now the most stable components, alternated mainly by dead-ice downwasting and to a lesser extent by sporadic debris flows. Short-time dynamics of different components showed very high variability in transformation and illustrate relative importance of ice backwasting over downwasting for studied forelands. The research was funded by Polish National Science Centre (project granted by decision number DEC-2011/01/D/ST10/06494).

### **Key words:**

Glacier recession; monitoring; dead-ice melting; landscape alteration

## Climate Change and Global Understanding

### The Role of Snow in Cryospheric Change



Home

#### Poster

1. [Comparison of Field Methods for Measuring Snow Density](#)

Hang Su (China, Lanzhou University); Tingjun Zhang (United States, Lanzhou University); Xinyue Zhong (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)

2. [Spatial-temporal Changes of Snowfall Across Eurasian Continent from 1966 to 2012](#)

Huijuan Wang; Tingjun Zhang; Xinyue Zhong (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)

3. [Spatiotemporal Variation in Snow Phenology over Eurasian Continent during 1966-2012](#)

Xinyue Zhong (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences); Tingjun Zhang; Kang Wang (China, Key Laboratory of West China's Environmental Systems (Ministry of Education), College of Earth and Environmental Sciences, Lanzhou University)

## Comparison of Field Methods for Measuring Snow Density

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### Abstract

Snow density is a key parameter for snow physical process studies, snow water equivalent assessment, and land surface model validation. Many field methods have been developed for measuring snow density, however, few studies have focused on evaluating the sensitivity and accuracy of snow density measurements. The objective of this study is to evaluate the sensitivity and accuracy of snow density results obtained by using different field methods. We conducted a series of field experiments in the Altai Mountains in February 2015 using three instruments: the snow fork, the 1000 cm<sup>3</sup> stainless-steel wedge cutter, and the weighting snow-gauge. The primary results show that snow density measured by snow fork method was lower than the results measured by other methods in the whole snow profile, although snow fork method can provide samples with higher resolution. The average snow density measured by using the wedge cutter method is about 8% higher than that by the weighting snow-gauge method with the correlation coefficient of 0.846 ( $p < 0.05$ ); Snow densities measured by the snow fork is, on average, about 16% smaller than that by the weighing snow-gauge method and about 20% by the wedge cutter method, with the absolute value of relative error up to 40%. For different snow layers, snow density measured by using the snow fork method is, on average, about 22% smaller than that by the wedge cutter method in the depth hoar, and about 18% in the upper layers. In terms of the accuracy of snow fork method, the measurement stability of snow fork method in the depth hoar, which the root mean square error (RMSE) was within 2.3%, was lower than the upper layers with the RMSE was within 1.6%.

### Key words:

Snow density; Field experiment; Comparison

## Spatial-Temporal Changes of Snowfall across Eurasian Continent from 1966 to 2012

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### Abstract

Snow plays an important role in climate system through strong feedbacks related to surface albedo. Both mean snowfall and the intensity of snowfall are important, with extreme snowfall events having particularly large economic and human impacts. Based on ground-based measurements from 1863 stations across Eurasian continent, we investigated the changes in light snow ( $0.1\text{mm} \leq \text{daily snowfall (dsf)} < 2.5\text{mm}$ ), moderate snow ( $2.5\text{mm} \leq \text{dsf} < 5\text{mm}$ ), heavy snow ( $5\text{mm} \leq \text{dsf} < 10\text{mm}$ ) and snowstorm ( $\text{dsf} \geq 10\text{mm}$ ) over the period 1966-2012. The results indicated that annual total snowfall did not have a significant trend during the study period over the study area, while the annual snowfall days decreased with a rate of  $-0.14\text{d yr}^{-1}$ . The light snowfall was decreased at a rate of  $-0.1\text{mm yr}^{-1}$ ; the heavy snow was increased at a rate of  $0.06\text{mm yr}^{-1}$ . The snowstorm decreased with a rate of  $-0.15\text{mm yr}^{-1}$  before the 1990s, while it increased with a rate of  $0.29\text{mm yr}^{-1}$  from the 1990s through the end of the study period; the moderate snowfall had opposite trend with the snowstorm, the annual moderate raised slowly before 2000, and then declined rapidly with a rate of  $-0.24\text{mm yr}^{-1}$ .

Regionally, northern Xinjiang, the eastern Tibetan Plateau, northeastern China and most of Russia are the key regions of snowfall with more frequency and strong variability. The significant increased areas were located in European Russia, the upper reaches of Yenisei River, Sakhalin and northern Xinjiang, northeastern China and eastern Tibetan Plateau. The significant decreased areas were mainly located in south of China, Central Siberia and on the coast of Arctic Russia. The change of light snow is decreased all over Eurasia, while most of the stations of the heavy snow have positive trends in the north of  $40^{\circ}\text{N}$ . There was a high correlation of snowfall with latitude, which increases with latitude as moving northward with approximately  $4\text{mm}$  per latitude. Overall, heavy snowfall increased, while light snowfall decreased, especially in high latitude and high elevation regions.

### Key words:

Snowfall; Spatial-temporal changes; Stations; Eurasian continent

## Spatiotemporal Variation in Snow Phenology over Eurasian Continent during 1966-2012

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### Abstract

Snow cover phenology critically effects on surface energy fluxes, surface albedo and hydrological processes. In this study, climatology and spatiotemporal variation of snow cover phenology were investigated using the long-term (1966-2012) ground-based measurements of daily snow depth from 1103 stations over Eurasian Continent. The results showed that distributions of the first date, last date, snow cover duration and number of snow cover days generally represented the latitudinal zonality over Eurasian Continent, and there were significant elevation gradient patterns on the Tibetan Plateau. The first date of snow cover delayed by about 1.2 day decade<sup>-1</sup>, the last date of snow cover advanced with the rate of -1.2 day decade<sup>-1</sup>, snow cover duration and number of snow cover days shortened by about 2.7 and 0.6 day decade<sup>-1</sup>, respectively, from 1966 through 2012. Compared with precipitation, correlation between snow cover phenology and air temperature was more significant. Changes in snow cover duration were mainly controlled by the changes of air temperature in autumn and spring. The decreased number of snow cover days was affected by rising temperature during the cold season except for the air temperature in autumn and spring.

### Key words:

Eurasian Continent; snow cover phenology; in situ measurements; spatiotemporal variation

## Climate Change and Global Understanding

### Permafrost Engineering Under A Persistent Warming Climate



Home

#### Poster

1. [Characteristics of Unfrozen Water Content in Frozen Soils, Qilian Mountain](#)  
Hong Guo; Tingjun Zhang; Bin Cao (China, Lanzhou University)
2. [Spatiotemporal Variations of the Near-surface Soil Freeze/Thaw Status in the Northern Hemisphere Detected by using Passive Microwave Remote Sensing Data](#)  
Wanwan Shao; Tingjun Zhang; Kang Wang (China, Lanzhou University)
3. [The Effect of Wildfire on Permafrost on the Northern Da Xing'anling Mountains, Northeastern China](#)  
Li Xiaoying (China, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences)

## Characteristics of Unfrozen Water Content in Frozen Soils, Qilian Mountain

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### Abstract

Climate change will result in permafrost temperature increase as having been observed worldwide. Permafrost temperature increase, especially for relatively high temperature permafrost, would result in the increase of unfrozen water which would dramatically impact thermal, electric and mechanical properties of frozen soils. The primary objective of this study is to investigate changes in unfrozen water content with temperature and soil properties using data and information from field measurements and laboratory experiments. We explore the relationship between the unfrozen water and the soil temperature, grain size, and salinity of five different soils in the source area of Heihe River, northeast Tibetan Plateau. Soil temperature and soil moisture were measured by using thermistor string and time domain reflectometry, respectively. Soil basic physical and chemical properties were measured at different depths. We derived five soil types by analysing soil particle size and classifying soil texture according to the United States Department of Agriculture standard. Each soil type has an empirical equation to describe unfrozen water content as a function of soil temperatures and the effect of grain size and salt content. The study confirmed that the factors influencing unfrozen water content in frozen soils are soil temperature, grain size, and salinity.

### Key words:

Unfrozen water; soil freezing characteristic; soil type

## Spatiotemporal Variations of the Near-surface Soil Freeze/Thaw Status in the Northern Hemisphere Detected by using Passive Microwave Remote Sensing Data

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### Abstract

Frozen soil regions occupy about 35% of the land surface of the earth. Changes of the near-surface soil freeze-thaw cycle can affect surface energy and water balance, vegetation dynamics, carbon dioxide exchange between atmosphere and soil, and the ecosystems as a whole. The objective of this study is to investigate spatial and temporal changes in the near-surface soil freeze-thaw status in the northern hemisphere using passive microwave remote sensing data. We used the SMMR, SSM/I and AMSR-E EASE-Grid daily brightness temperature products with a spatial resolution of 25km that is publicly available from the National Snow and Ice Data Center. Daily mean soil temperatures at 5cm depth were obtained from China Meteorological Administration to calibrate and validate the frozen soil algorithm (FSA). FSA requires two parameters: a negative spectral gradient between  $T_{B19V}$  and  $T_{B37V}$  and a threshold of  $T_{B37V}$ . Using the validated FSA, daily near-surface frozen soil extent was detected over a period from 1979 through 2014 in the northern hemisphere. Based on the output from the validated FSA, we found that: (i) the average duration of the near-surface soil freeze is about 217 days and the actual number of the near-surface soil freeze days is about 161 days. (ii) Over the period of 1987-2014, with the increasing of the near-surface soil temperature, the freeze/thaw status obtained from SSM/I reveal that the onset date of the near-surface soil freeze in autumn was delayed at a rate of  $1.3 \pm 1.0$  day  $yr^{-1}$ , and the last date of surface freeze in spring was advanced at a rate of  $1.2 \pm 0.6$  day  $yr^{-1}$ . The duration of the near-surface soil freeze decreased at a rate of  $2.5 \pm 1.1$  day  $yr^{-1}$ , while the actual number of the near-surface soil freeze days decreased at a rate of  $1.6 \pm 0.8$  day  $yr^{-1}$ . Annual maximum frozen area extent also showed a decreasing trend, with a trend of  $(-55.60 \pm 7.20) \times 10^3 km^2 yr^{-1}$ . (iii) The rates of changes in the near-surface soil freeze/thaw status increased dramatically at the lower and higher latitude and presented distinct latitudinal zonation and vertical zonation. From 2002 to 2010, compared to the classification results of SSM/I, AMSR-E underestimated the near-surface soil freeze.

### Key words:

the Northern Hemisphere; the near-surface soil freeze/thaw; SMMR; SSM/I; AMSR-E; passive microwave remote sensing

## The Effect of Wildfire on Permafrost on the Northern Da Xing'anling Mountains, Northeastern China

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### Abstract

The wildfire is one of the main factors influencing the boreal forest ecosystem in many aspects; not only the nutrient cycles and surface energy balance, the changes of soil physical and chemical properties, but also the changes of active layer thickness and soil temperature. Under the context of global warming and increase of the anthropogenic activities, the occurrences of the wildfire have been frequently increased in boreal forest. Previous studies indicated that the wildfire had significant impacts on the hydrothermal of active layer and permafrost, which tends to induce the degradation of permafrost and release of organic carbon. Da Xing'anling Mountain, the ecological barrier of the Northeastern China, is the primary boreal forest in permafrost region of China, as well as the only primeval boreal forest in north of China suffering from the highly frequent wildfire. The wildfire, taken place on 6 May 1987 in the Da Xing'anling Mountain, was the most serious catastrophic one since the founding of the new China. It led to irreversible degradation of permafrost, converse succession of forest and wetland, the loss of carbon storage, thermal subsidence and slumping in Northeast China. Besides, it threatened the buildings on permafrost. However, there were few related studies except the 3 years' research on the impacts of wildfire on the hydrothermal of permafrost in the Da Xing'anling Mountains (e.g., Zhou et al., 1994). Still, long-term and systematic observations and numerical simulations are scarce as well as the applications on the research of frontier discipline basic theory and practical engineering. By means of field investigation, interpretation of remote-sensing images, we found out the fire point in 1987-2015, and determined the different fire intensity. It aims to study the change of permafrost in different years and different fire intensity, and the research of model simulation. This study could provide important scientific basis for reasonable assessment of the impacts of wildfire on boreal forest and wetland in permafrost region, the environmental restoration and management, and the research of shallow carbon pool in mid- and high latitude in China.

### Key words:

Wildfire; Permafrost degradation; Da Xing'anling Mountains; Boreal forest

## Climate Change and Global Understanding

### Global Change and Biometeorology



Home

### Oral

1. [An Improved Method for Npp Estimation in Wuhan, China from 2001 to 2010](#)  
Lunche Wang, Chunju Huang, Lan Feng, Dongmei Li (China University of Geosciences, China)
2. [Assessing Remote Sensing Phenology and Its Spatiotemporal Variation Based on Plant Senescence Reflectance Index in the Inner Mongolian Grassland](#)  
Shilong Ren, Xiaoqiu Chen (College of Urban and Environmental Sciences, Laboratory for Earth Surface Processes of the Ministry of Education, Peking University, China)
3. [Assessment of the Carbon Footprint of Four Commercial Dairy Production Systems in Australia Through Integrated farm System Model](#)  
Sejian Veerasamy (ICAR National Institute of Animal Nutrition and Physiology, Adugodi, Hosur Road Bangalore, India, India), Shyaam Prasad (Indian Institute of Technology Madras 600036, Tamil Nadu, India, India), Angela Lees (School of Agriculture and Food Sciences, The University of Queensland, Australia)
4. [Autumn Phenology Shifts and its Response to Climate Changes on the Tibetan Plateau in the Past Three Decades](#)  
Nan Jiang, Wenquan Zhu (Beijing Normal University, China)
5. [Changes in Flowering Phenology of Woody Plants in North China](#)  
Huanjiong Wang, Junhu Dai (Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
6. [Climate Impacts on Oil Palm Yields in the Nigerian Niger Delta](#)  
Stanley Uchenna Okoro (Center for Earth System Research and Sustainability, Institute of Geography, Bundesstrasse 55, 20146 Hamburg, Germany, Germany)
7. [Concerns for Extreme Climate Conditions and their Implications in Southwest Nigeria](#)  
Adebayo Eludoyin (Department of Geography, Obafemi Awolowo University, Ile Ife, Nigeria, Nigeria), Peter Abuloye, Augustina Nevo (Institute of Ecology and Environmental Studies, Obafemi Awolowo University, Ile Ife, Nigeria, Nigeria)
8. [Daily Changes on Lamb-Jenkinson Circulation Types as Meteorological Predictor of Influenza Outbreaks in Different Geographical Regions of China.](#)  
Pablo Fernandez de Arroyabe (University of Cantabria, Spain), Deliang Chen (Laboratory for Climate

Studies, CMA, Beijing, China), Steven Zhixiang Zhou (BCIT, Canada), Alberto Marti Ezpeleta (Universida de Santiago de Compostela, Spain), Dominic Roye (University of Cantabria, Spain)

9. [Does Increasing Intrinsic Water use Efficiency \(iWUE\) Stimulate Tree Growth at Natural Alpine Timberline on the Southeastern Tibetan Plateau?](#)

Ru Huang, Haifeng Zhu (Key Laboratory of Alpine Ecology and Biodiversity, Institute of Tibetan Plateau research, Chinese Academy of Sciences, China)

10. [Estimating the Potential of Energy Saving and Carbon Emission Mitigation of Cassava-Based Fuel Ethanol Using Life-Cycle Analysis Coupled with a Biogeochemical Process Model](#)

Dong Jiang, Mengmeng Hao, Jingying Fu (Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

11. [Flowering Duration and Date Differed in Response to Experimental Warming and Snow Addition on an Alpine Meadow Ecosystem in Tibet](#)

Tsechoe Dorji (Institute of Tibetan Plateau Research, Chinese Academy of Sciences, China), Julia Klein (Department of Ecosystem Science and Sustainability, Colorado State University, United States), Shiping Wang (Institute of Tibetan Plateau Research, Chinese Academy of Sciences, China)

12. [Hospitals Admissions Related to Influenza Diagnostics and Circulation Weather Patterns in the Iberian Peninsula for the Period 2002-2014](#)

Pablo Fdez Arroyabe, Dominic Roye (University of Cantabria, Spain)

13. [Impacts of Changes in Solar Radiation Components on Winter Wheat Yield and Water Use in The North China Plain](#)

Jun Li, Shouhua Xu, Qiang Yu (Institute of Geographic Science and Natural Resources Research, Chinese Academy of Sciences, China)

14. [Infectious Diseases in Different Climate Zone in Western China Under the Background of Climate Warming](#)

Yuxia Ma, Bingshuang Xiao, Yuxin Zhao, Xiaodong Zheng (Lanzhou University, China)

15. [Shift in China's Agro-climatic Resource Inventory under Climate Change](#)

Zhan Tian (Shanghai Climate Center, China), Günther Fischer, Laixiang Sun (International Institute for Applied Systems Analysis / School of Oriental and African Studies, University of London)

16. [Variations of Leaf Phenology Sensitivity to Temperature in Northeast China and Mechanisms During the Past 40 Years](#)

Junhu Dai, Yunjia Xu, Huanjiong Wang (Institute of Geographic Sciences and Natural Resources

Research, CAS, China)

## Poster

1. [Korean Human Thermal Sensation for Beach Tourism](#)  
Sookuk Park (South Korea, Jeju National University); Stanton Tuller (Canada, University of Victoria)
2. [Quantitative Evaluation of Agro-Meteorological Disasters in China](#)  
Huishi Du; Chen Zhiwen; Qi Ji (China, Jilin Normal University)
3. [Seasonal Plant Cover Dynamics of Degraded Grasslands in Inner Mongolia Recorded by Continuous Photography Technique](#)  
Xiaotian Xu (China, Chinese Academy of Forestry); Hongyan Liu (China, Peking University)

## An Improved Method for Npp Estimation in Wuhan, China from 2001 to 2010

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### Abstract

Dynamic monitoring of vegetation net primary productivity (NPP) is of great importance for better understanding the carbon cycle of terrestrial ecosystems [1, 3]. By analyzing the dependence of photosynthetically active radiation (PAR) on cosine of solar zenith angle and clearness index (Kt), an efficient all-sky model was introduced for estimating PAR under various sky conditions. As a key variable in NPP estimation, light use efficiencies were also improved by considering the stress factors of temperature/humidity for different types of vegetation [4, 12]. Seasonal and interannual variations of NPP in Wuhan, China from 2001 to 2010 were then investigated using MODIS products and ground meteorological data. The results showed that NPP increased slightly from 2001 to 2005 and decreased from 2005 to 2010; annual mean NPP was about  $502 \text{ gCm}^{-2}\text{a}^{-1}$ . Significant differences in NPP values for different vegetation types were also found: evergreen broadleaf vegetation produced the highest annual NPP value of  $1016.7 \text{ gCm}^{-2}\text{a}^{-1}$ , and annual grass vegetation had the lowest mean value of  $448 \text{ gCm}^{-2}\text{a}^{-1}$ . This study will improve our basic understanding of carbon cycling process in the study area and the proposed model will be useful for other regional NPP estimations in the world.

### Key words:

Net primary productivity; photosynthetically active radiation; MODIS; Wuhan

## Assessing Remote Sensing Phenology and its Spatiotemporal Variation Based on Plant Senescence Reflectance Index in the Inner Mongolian Grassland

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### Abstract

Extracting remote sensing phenology based on the Plant Senescence Reflectance Index (PSRI) may enrich phenological research methods. Here, we used Moderate Resolution Imaging Spectroradiometer data from 2000 to 2011 to calculate PSRI and determine start (SOS) and end (EOS) dates of the vegetation growing season in the Inner Mongolian Grassland, and validated their reliability within situ phenological data and MODIS phenology product at 5 phenological stations. We also conducted partial correlation analysis between SOS/EOS and climatic factors at 56 meteorological stations in order to look for what determines the occurrence of SOS/EOS in temporally and spatially. Results show that (1) PSRI-derived SOS/EOS presents better accuracy and ability in reflecting ground vegetation phenology than MODIS phenology product; (2) precipitation is a more important factor than air temperature in determining the SOS/EOS at most stations; (3) precipitation also influences the spatial distribution of SOS more greatly than air temperature in most years, while precipitation and air temperature both control the spatial distribution of EOS. The significant temporal and spatial correlations between SOS/EOS and thermal-moisture factors provide an indirect evidence that remote sensed vegetation phenology can capture ground-based plant community phenology in the Inner Mongolian Grassland. Moreover, the significant linear trends of SOS and EOS were detected only at small portions of pixels.

### Key words:

grassland phenology; remote sensing; Plant Senescence Reflectance Index; validation

## Assessment of the Carbon Footprint of Four Commercial Dairy Production Systems in Australia through Integrated Farm System Model

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### Abstract

A dairy farm is a complex system with several interacting subsystems. The integrated farm system model (IFSM) is a cost effective and efficient method of estimating greenhouse gas(GHG) emissions from dairy farms and analyzing how management strategies affect these emissions. An IFSM (DairyGHG model) was employed in this study to predict the GHG emission and assess the carbon footprints of four different dairy farms at Southeast Queensland, Australia. Four representative farms were selected: Farm 1 (220 cows; Jersey), Farm 2 (460 cows; Holstein Friesian), Farm 3 (850 cows; Holstein Friesian) and Farm 4 (434 cows; Holstein Friesian). Across the four farms the cows were fed corn silage, grain and had access to grazing. The animal emission contribution to carbon footprints in Farm 1, Farm 2, Farm 3 and Farm 4 were 54.2%, 60.0%, 59.6% and 38.6% respectively for total output. Likewise the manure emission contribution to carbon footprints in Farm 1, Farm 2, Farm 3 and Farm 4 were 30.6%, 29.0%, 29.0% and 58.3% respectively. On the basis of per kg of energy corrected milk the amount of GHG produced in Farm 1, Farm 2, Farm 3 and Farm 4 are 0.39 kg CO<sub>2</sub>e, 0.64 kg CO<sub>2</sub>e, 0.54 kg CO<sub>2</sub>e and 1.35 kg CO<sub>2</sub>e respectively. The method and database developed for this assessment effectively supported the calculation of GHG emissions related to dairy production and may be considered an important step towards a harmonized methodology for the quantification of emissions in dairy farms.

### Key words:

Carbon footprint; Methane; Nitrous Oxide; GHGs; dairy farm; dairyGHG model

## **Autumn Phenology Shifts and its Response to Climate Changes on the Tibetan Plateau in the Past Three Decades**

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### **Abstract**

Vegetation phenology has been proved as a significant indicator of the climate change. Autumn phenology is as important as spring/summer phenology since it controlled the carbon by determining the length of the growing season. However, the progress of autumn phenology remains unclear and relatively less work has been carried out on autumn phenology, which makes the analysis on autumn phenological events more important and difficult. With the most completed in-situ observation of autumn phenological events for Tibetan Plateau, we revealed the autumn phenology shifts in the past three decades and its response to climate changes. The results showed a postponed trend for all the records of phenological events, however, there remained large differences among different species and phenological events: The woody plants had earlier fruit phenology and little changes on leaf phenology, while the herbaceous plants experienced later leaf phenology and little changes on fruit phenology; the leaf phenology of xerophilous herbaceous plants had advanced trends while those of hygrophilous herbaceous showed significantly postponed trend. Those differences were caused by their diverse responses to climate factors, for example, the xerophilous herbaceous showed negative response to temperature and positive response to precipitation; while the opposite results were observed for the hygrophilous plants. Therefore, we argued that, though the Tibetan Plateau suffered the same background of climate change with higher temperature and fewer precipitation, the autumn phenology should not be easily summed up in delayed/advanced trends. These discrepancies caused by species or events should be fully considered when building phenological models.

### **Key words:**

autumn phenology; climate change; in-situ observation; phenological model

## Changes in Flowering Phenology of Woody Plants in North China

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### Abstract

Over the past several decades, abundant evidences proved that the first flowering date of plants in northern hemisphere became earlier in response to climate warming. However, the existing results about impact of climate change on flowering duration are controversial. In this study, we studied temporal trends in first flowering date (FFD), end of flowering date (EFD) and flowering duration (FD) of 94 woody plants from 1963 to 2014 at three stations (Harbin, Beijing and Xi'an) in North China. Meanwhile, we analyzed the relationship between length of flowering periods and temperature using two phenological models (including regression model and growing degree day model). At all stations, more than 90% of observed species showed earlier flowering over time from 1963 to 2014. The average trends in FFD were 1.33, 1.77 and 3.01 days decade<sup>-1</sup> at Harbin, Beijing and Xi'an, respectively. During the same period, EFD also became earlier by a mean rate of 2.19, 1.39 and 2.00 days decade<sup>-1</sup>, respectively. Regarding FD, a significant shortening of FD was observed at Harbin (-0.86 days decade<sup>-1</sup>), but FD extended by 0.37 and 1.01 days decade<sup>-1</sup> at Beijing and Xi'an, respectively. Through regression analyses, we found more than 85% of time series revealed a significant negative relationship between FFD (or EFD) and pre-season temperature. The regression and growing degree day model could simulate the interannual changes in FFD and EFD, but failed to simulate the FD accurately. Therefore, we concluded that the FFD and EFD advanced notably in recent six decades as a result of climate warming, but the direction of FD changes depended on locations and the species involved. In addition, the conventional phenological models could not explain most parts of interannual variance in FD, partly due superposition of errors caused by simultaneously simulating FFD and EFD. Therefore, the mechanism of FD changes and more drivers of FD such as soil moisture and light need to be further studied.

### Key words:

phenology; flowering duration; first flowering date

## Climate Impacts on Oil Palm Yields in the Nigerian Niger Delta

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### Abstract

Palm oil production has increased in recent decades and is estimated to increase further. The optimal role of palm oil production, however, is controversial because of resource conflicts with alternative land uses. Local conditions and climate change affect resource competition and the desirability of palm oil production. Based on this, crop yield simulations using different climate model outputs under different climate scenarios could be an important tool in addressing the problem of uncertainty quantification of those model outputs. Previous studies on this region have focused mostly on single experimental fields, not considering variations in agro-ecological zones, climatic conditions, varieties, and management practices. In addition, most of the earlier studies did not consider various IPCC climate scenarios and were based on single climate model output. Furthermore, the uncertainty quantification of the climate-impact model has rarely been investigated in this region. To this end we use the biophysical simulation model APSIM (Agricultural Production Systems Simulator) to simulate the regional climate impact on oil palm yield over the Nigerian Niger Delta. We also examine whether the use of crop yield model output ensemble reduces the uncertainty rather than the use of climate model output ensemble. The results could serve as a baseline for policy makers in this region in understanding the interaction between potentials of energy crop production of the region as well as its food security and other negative feedbacks that could be associated with bioenergy from oil palm.

### Key words:

Climate Change; Climate impacts; Land use and Crop yields

## Concerns for Extreme Climate Conditions and their Implications in Southwest

### Nigeria

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#### Abstract

Extreme climate conditions are deviation from the norms and are capable of causing upsets in many important environmental parameter including disruption of water balance and air temperature balance. Studies have shown that extreme climate conditions can foretell disaster in regions with inadequate early warning systems. In this paper, we combined geographical information systems, statistics and social surveys to evaluate the physiologic indices [(Dewpoint Temperature (Td), Effective Temperature Index (ETI) and Relative Strain Index (RSI)] and extreme climate conditions in different parts of southwest Nigeria. This was with the view to assessing the nature and the impact of the conditions on the people and their coping strategies. The results indicate that minimum, mean and maximum temperatures were higher in 1960-1990 than 1991-2013 periods at most areas, and more than 80% of the people adapt to thermal stress by changing wear type or cloth, installing air conditioner and fan at home and/or work place and sleeping outside at certain period of the night and day. With respect to livelihoods, about 52% of the interviewed farmers indicated that too early rainfall, late rainfall, prolonged dryness after an initial rainfall, excessive rainfall and windstorms caused low crop yields. Main (76%) coping strategies were changing of planting dates, diversification of crops, and practices of mulching and intercropping. Government or institutional support was less than 20%.

#### Key words:

Extreme climate; coping strategies; livelihoods and physiologic comfort

## Daily Changes on Lamb-Jenkinson Circulation Types as Meteorological Predictor of Influenza Outbreaks in Different Geographical Regions of China.

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### Abstract

Influenza epidemics have become of global concern in the last decades. Some influenza viruses related to avian flu such as A (H5N1) and A (H7N9) have caused serious infections in human being recently. A global alert and response to avian influenza and to other minor impacting influenza viruses must be given. According to the Global Health understanding, new approaches to the study of influenza outbreaks should complement the traditional epidemiological ones. In this sense, this research proposed a biometeorological approach to this problem based on the study of the potential relationship between meteorological distress conditions and influenza viruses spreading at a particular geographic region. The Meteorological Contrast Index (MCI) based on the daily changes of Lamb-Jenkinson circulation types in different regions of China is calculated in order to analyse how the physical properties of the atmospheric changes are connected to influenza spreading period in different Chinese regions.

### Key words:

Lamb-Jenkinson classification; MCI; Influenza; Predictor; Distress

## Does Increasing Intrinsic Water use Efficiency (iWUE) Stimulate Tree Growth at Natural Alpine Timberline on the Southeastern Tibetan Plateau?

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### Abstract

The rising atmospheric CO<sub>2</sub> concentration is expected to increase tree growth worldwide. However, few studies have focused on whether such CO<sub>2</sub> fertilization effect exists for trees at the temperature-limited alpine timberline from a physiological point of view. Herein, we use dendrochronological methods and tree-ring carbon isotope to investigate variations in basal area increment (BAI) and iWUE of Smith fir (*Abies georgei* var. *smithii*) during the past century at the timberline in the Sygera Mountains, southeastern Tibetan Plateau. The random forest model revealed that warming and rising atmospheric CO<sub>2</sub> together contributed to the increasing iWUE. The commonality analysis showed (1) for raw data (mainly including low frequency information), unique iWUE played a more significant role on BAI than unique temperature, common effects among iWUE and temperature usually were stronger than their unique effect; (2) for the linearly detrending data (high frequency data), unique iWUE, common effects among iWUE and temperature had scarcely effect on BAI, while temperature was the still the crucial factor on tree growth. We conclude that (1) increasing iWUE could stimulate tree growth at our site at the low frequency, while increasing iWUE could not stimulate tree growth at the high frequency data.

### Key words:

Natural timberline; tree growth; water-use efficiency; CO<sub>2</sub> fertilization; south-eastern Tibetan Plateau

## Estimating the Potential of Energy Saving and Carbon Emission Mitigation of Cassava-Based Fuel Ethanol Using Life-Cycle Analysis Coupled With a Biogeochemical Process Model

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### Abstract

Global warming and increasing concentration of atmospheric greenhouse gases (GHG) and fossil fuel consumption have prompted considerable interest in the potential role of energy plant biomass. While energy efficiency and GHG emission saving vary from one energy plant to another which need to be estimated scientifically. Cassava is an important biomass feedstock of fuel ethanol and has attracted much attention. This article provides an approach for estimating the energy saving and carbon emission mitigation potentials of cassava-based fuel ethanol using life-cycle analysis (LCA) coupled with biogeochemical process model. First, potential of cassava production on suitable marginal land in China was calculated using an optimized biogeochemical process model (GEPIC model); then, this was used to find the spatial distribution of ethanol production through a conversion coefficient between cassava and ethanol. Finally, the net energy potential and carbon emission reduction potential in China were simulated. This study indicates that cassava is one of the most promising feedstock for fuel ethanol production. The use of cassava-based fuel ethanol will mitigate the climate change by producing efficient, clean, and renewable energy. The results of this paper show that the potential of cassava production on marginal land in China is 52.51 million tones, and the net energy surplus of cassava fuel ethanol is about 92.92 billion MJ and the carbon emission mitigation is about 4.59 billion kgC. The mitigation potentials of Guangxi, Guangdong, and Fujian are particularly of note and are identified as target regions for large-scale development of the cassava-based ethanol industry.

### Key words:

Cassava; fuel ethanol; GHG; LCA

## Flowering Duration and Date Differed In Response to Experimental Warming and Snow Addition on an Alpine Meadow Ecosystem in Tibet

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### Abstract

Flowering duration is a key component of plant physiology that influences plant reproductive fitness in a changing environment. Although, there are evidences indicate that climate change affects plant phenology across different biomes, but little is known about changes in flowering duration under the changing climate scenarios and how the changes in flowering duration was attributed to different flowering phenological components under changing climate. We used data from 7 years' fully-factorial field experimental study to understand how flowering duration of two species (*Potentilla fruticosa* and *Potentilla suandersiana*) were affected by warming (open top chambers), snow addition, and their interaction on an alpine meadow ecosystem in central Tibet. The experiment was started in 2009 and continued up to date. The phenological data were only available in 2010, 2011, 2014 and 2015 due to some logistical reasons. Our results showed that the flowering duration did not significantly differ between treatments in both species, but warming significantly delayed the date of first flowering and warming did not affect the date of last flowering in both species. Snow addition significantly advanced the first and the last date of flowering in *P. suandersiana*, but not for *P. fruticosa*. The flowering duration of both species were negatively and positively related to the date of first and last flowering respectively. These results indicate that flowering duration of alpine plant may be less plastic, even though the date of first and last flowering changed, in order to maximize their reproductive fitness under changing environments.

### Key words:

Phenology; warming; Tibet

## Hospitals Admissions Related to Influenza Diagnostics and Circulation Weather Patterns in the Iberian Peninsula for the Period 2002-2014

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### Abstract

The spreading of infectious diseases is one of biggest concerns nowadays all around the world. In this sense, the study of the relationships between transmission vectors, bacteria, viruses... and meteorological and climatic factors has become a frequent scientific task. In the present study, different biometeorological indexes and statistical models are applied to the analysis of daily circulation weather types in order to assess how relevant weather changes can be in the explanation of the outbreaks of influenza epidemics and in their temporal and spatial spreading in Spain. Firstly, a daily weather classification has been created based on Lamb's approach for the Iberian Peninsula. Moreover, Spanish's hospitals admissions with a primary or secondary diagnose of flu were obtained from the Spanish health system through the hospital database CMBD. This repository of medical data relates to hospitals admissions of citizens and covers the public network of Spanish's hospitals. Codification of diagnoses of influenza patients was done according to the International Classification of Diseases (ICD v.9) (487 and 488). Using both data sources, Meteorological Contrast Index (MCI) has been estimated (Fdez-Arroyabe, 2004) based on weekly circulation weather types and they have been related to influenza spreading in Spain. Generalized Linear Mixed Models (GLMM) were also applied in order to define the relative importance of the sequences of changes in the circulation weather types during the outbreaks and the spreading periods of the infectious disease for the period 2002-2014.

### Key words:

Weather types; Lamb; MCI; CMBD; Hospitals discharges; ICD v.9

## Impacts of Changes in Solar Radiation Components on Winter Wheat Yield and Water Use in the North China Plain

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### Abstract

The changes in solar radiation components may alter the radiation distribution in plant canopies and influence photosynthesis sequentially. In recent fifty years (1960-2010), solar radiation and direct radiation declined significantly in four sites (Beijing, Tianjing, Jinan and Zhengzhou) in the North China Plain. Diffuse radiation changed diversely in different places. It decreased in Beijing ( $\alpha < 0.05$ ), increased in Jinan and Zhengzhou ( $\alpha < 0.01$ ) and was trendless in Tianjing. Nevertheless, the diffuse radiation fraction (DRF) enhanced markedly in all sites ( $\alpha < 0.01$ ). Though DRF decreased with the increase in clearness index (CI), it was usually regarded as a constant parameter in most crop models. Considering the influence of different sky conditions (Clear, cloudy and overcast), the relationships between hourly DRF and CI were described by Badescu Equation. The equation was parameterized based on field observations and involved in a crop model (ChinaAgrosys). The improved model was used to simulate the impacts of changes in solar radiation components on winter wheat yield and water use in the North China Plain in recent fifty years. The influences of shifts in wheat varieties and field managements were neglected. The effects of precipitation variability were also ignored for sufficient irrigation. The simulation results indicated that the decline in solar radiation may lead to significant reductions in winter wheat yield and water use efficiency (WUE) in the North China Plain from 1960 to 2010. However, the decrease trends were weakened or turned to rise with the increase in DRF and CO<sub>2</sub> fertilization effects.

### Key words:

diffuse radiation fraction; clearness index; crop model; winter wheat yield; water use efficiency

## Infectious Diseases in Different Climate Zone in Western China under the Background of Climate Warming

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### Abstract

Climate warming has both direct and indirect impacts on public health, including affecting the distribution of infectious diseases and speeding up the diffusion of epidemics. In this study, spatial-temporal distributions of three infectious diseases in Gansu province located in western China are analysed. Results showed that Hepatitis A occurs in all areas of Gansu province, while epidemic encephalitis and epidemic hemorrhagic fever are parochial. The incidences of infections have great differences in different climate areas. The high incidences of Hepatitis A are mainly found in Gannan Tibetan plateau. Epidemic encephalitis mainly occur in south of Gansu, where climate is warm and humid. Epidemic hemorrhagic fever mainly occurs in Gannan Tibetan plateau. The infections also have evident seasonal climax. Epidemic encephalitis mainly occurs from July to September, hepatitis A mainly in August, September and October, and epidemic hemorrhagic fever mainly from October to December and in February. Pearson correlative analysis shows that there are good correlations between the monthly cases of infections and monthly average values of meteorological elements. The above results indicate that climate factors play very important roles in the occurrence of infections.

### Key words:

Climate warming; climate types; infectious diseases; spatial-temporal distribution; incidence of a disease

## Shift in China's Agro-climatic Resource Inventory under Climate Change

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### Abstract

China's demand for grains has been growing rapidly and the growth is expected to continue in the coming decades. This leads to a great concern on future supply potentials of Chinese agriculture under climate change and the extent to which China would have to depend on world markets. An array of research results indicate that food crop's yield will reduce by the 2050s. However, these assessments only focus on single crops and neglect the improved multi-cropping opportunities induced by climate change, thus tending to over-estimate the adverse impacts of climate change on crop production. Here we provide an additional dimension of climate change impacts by focusing on the shift in China's agro-climatic resource inventory. Based on an assembling of 30 General Circulation Models under 4 Representative Concentration Pathways scenarios in the CMIP5 (Phase 5 of Coupled Model Inter-comparison Project), the results show that the extents of the multi-cropping classes in current cropland will move northwards and/or northeast-wards. This shift of multi-cropping zones creates significant increases in multi-cropping opportunities. And this significant increase in the production potential of China's agro-climatic resource base calls for technological and policy preparedness so that any newly emerging multi-cropping opportunities can be readily utilized in the decades to come. As more than 70% of China's current food production comes from irrigated fields, securing future irrigation water supplies and improving irrigation water use efficiency will be essential for exploiting future enhanced temperature regimes especially in north and northeast China.

### Key words:

climate change; multi-cropping; China's agro-climate resource

## Variations of Leaf Phenology Sensitivity to Temperature in Northeast China and Mechanisms during the Past 40 Years

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### Abstract

Temperature sensitivity ( $S_T$ ), a direct indicator of impacts of climatic change on plant phenology, measures to which degree plant phenophases respond to temperature changes.  $S_T$  reflects the relationship between climate change and plant phenology, and has been discussed as hotspot topic in recent phenological studies. In this study, we analyzed  $S_T$  variations in northeast China by using one of the most systematic phenological data set obtained in Mudanjiang, Heilongjiang Province, from China Phenological Observation Network (CPON). Leaf unfolding date (LUD) of 41 plant species in a mid-temperate mixed coniferous broad leaved forest, together with the corresponding meteorological data from 1978-2014 in Mudanjiang were collected for the analysis. The results show that LUD is sensitive to the average temperature of a certain period before phenophase onset for all the studied plant species, which is called the optimistic period (OP), ranging from 20 to 86 days (with a mean value of 45). The average  $S_T$  of LUD for all the plant species is  $-3.2 \pm 0.48 \text{ days}^\circ\text{C}^{-1}$ , which increased from  $-3.14 \pm 1.17 \text{ days}^\circ\text{C}^{-1}$  during 1983-1997 to  $-3.36 \pm 0.68 \text{ days}^\circ\text{C}^{-1}$  during 2000-2014. Of all the plant species, 56% show increasing  $S_T$  of LUD, and 49% ( $P < 0.05$ ) are significant.  $S_T$  for 44% of the species exhibit decreasing trend, and 19.5% ( $P < 0.05$ ) are significant. For different species, there is a significantly negative correlation between  $S_T$  and the OP length. Species with longer OP and later phenophase tend to show increasing trend of  $S_T$ , while species with shorter OP and earlier phenophase tend to display a declining trend for their  $S_T$ . By applying random sampling method, we can detect the relationship between different temperature parameters and  $S_T$ . It is shown that the standard deviation of pre-season temperature is the parameter influencing  $S_T$  of LUD most significantly.

### Key words:

Phenology; temperature sensitivity; random sampling; standard deviation

## Korean Human Thermal Sensation for Beach Tourism

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### Abstract

Climatic index for tourism (CIT) has recently been advanced which includes complete human energy balance models such as physiological equivalent temperature (PET) and universal thermal climate index (UTCI). This study investigated human thermal sensation at Woljung-ri beach, Jeju, Republic of Korea, in spring and summer, 2015. Microclimatic data measurements and human thermal sensation surveys from ISO 10551 were conducted together. 869 adults participated. As a result, perceptual and thermal preference which consider only physiological aspects had a high coefficient of determination ( $r^2$ ) with PET in linear regression analyses: 92.8 % and 87.6 %, respectively. However, affective evaluation, personal acceptability and personal tolerance which consider both physiological and psychological aspects had low  $r^2$ s: 60.0, 21.1 and 46.4 %, respectively. However, the correlations between them and PET were all significant at the 0.01 level. The neutral PET sensation range in perceptual was 25-27 °C, but PET ranges less or equal to 20 % dissatisfaction which was recommended by ASHRAE Standard 55 could not be achieved in perceptual. Only PET ranges in affective evaluation and personal tolerance affected by both aspects qualified with the recommendation as 21-32 °C and 17-37 °C, respectively. PET heat stress levels ranges on the beach were 2-5 °C higher than those in Republic of Korea inland urban areas. They were similar to high results in Taiwan and Nigeria, and higher than those of western/middle Europe and Tel Aviv, Israel.

### Key words:

human thermal sensation; human thermal comfort; climatic index for tourism; summer; beach; PET

## Quantitative Evaluation of Agro-Meteorological Disasters in China

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### Abstract

Using the statistical analysis method on Chinese agro-meteorological disaster data during 1949 to 2012, the rate of meteorological disasters and their variance values are calculated. Thus, we assigned values to the various classifications of meteorological disasters. The grey relativity analysis method was used to compute the correlation of all types of meteorological disasters with the total amount of disasters and determine their impact on agriculture production weights. The objective of the analysis of the spatial-temporal variables of agro-meteorological disasters in China is to assess the degree of influence of meteorological disasters on agricultural production. Results showed that in the last 64 years, the average disaster impact rate of agro-meteorological disasters in China and the average rate of the various types of disasters indicate an increasing trend, with the average drought disaster rate growing the fastest at 0.98% every 10 years. Drought disasters have the largest effect on production weight and mainly affect the northern parts of China. In general, agro-meteorological disasters are at medium levels. In the last 10 years, the frequency of major disasters has increased. The research results in this paper provide a scientific reference for the analysis of the evolution of agro-meteorological disasters, agricultural disaster prevention and mitigation, food production, and yield stability.

### Key Words:

Agro-meteorological disaster; quantitative evaluation; China; grey relation analysis

## Seasonal Plant Cover Dynamics of Degraded Grasslands in Inner Mongolia Recorded By Continuous Photography Technique

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### Abstract

Recently, the influence of global change on the phenology of grassland has attracted more and more attentions of ecologists. Although dozens of controlled experiment have been conducted, there have been few records of phenology changes of grassland under different human interference. This study used continuous photography to record vegetation cover changes on plots for nitrogen addition and seasonal rainfall control experiments on grasslands along a degradation gradient. After extracting binary data from the photos with mathematic methods, we obtained variation trends of plant cover during the growing seasons for all plots. It is found that, after nitrogen addition, the increase rates of the plant cover in degraded grasslands enlarged obviously, but the increase rates in non-degraded grassland has not been influenced; seasonal rainfall control enlarged the differences between treatments, but the differences tended to disappear after the treatments were removed, while the non-degraded grassland was still not influenced significantly. The analysis of the image data revealed that, nitrogen addition could promote the increase rates of growth and further induced the increase in plant cover. Compared to the total biomass, the seasonal vegetation cover responses of grasslands to different treatments was more obviously. During these responses, the degrade status played a key role.

### Key words:

degraded grassland; plant cover; continuous photography; nitrogen addition; seasonal rainfall control

## Environment-Health and Social Welfare

### Environmental, Socio-economic and Climatic Changes in Northern Eurasia and Their Feedbacks to the Global Earth System and Society



#### Oral

1. [A statistics-process combined scheme to monitor the spatiotemporal pattern of grazing consumption in Temperate Eurasian Steppe \(TES\)](#)  
Chen Yizhao (Nanjing University, China)
2. [Freezing Precipitation Frequency over the Northern Extratropics](#)  
Pavel Groisman (UCAR at NOAA National Centers for Environmental Information, Asheville, North Carolina, 28801, USA and RAS P.P. Shirshov Institute for Oceanology, Moscow, The Russian Federation, Russian Fed), Xungang Yin (ERT, Inc., United States), Olga Bulygina
3. [Nonlinear Response of Streamflow to Climate Change in Headwater Region of Nenjiang River Basin, Northeast China](#)  
Zhang Guangxin (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
4. [Projected Distribution of Vegetation, Forest Types and Major Conifers Across Russia in the Warming Climate of the 21st Century](#)  
Nadezhda Chebakova, Elena Parfenova (V.N. Sukachev Institute of Forest, Siberian Branch, Russian Academy of Sciences, Krasnoyarsk, Russian Fed)

#### Poster

1. [China's Water Security and Socioeconomic Behavior Based on Water Resources Turning Endogenous: Risk Assessment and Resilience](#)  
Xiaolin Guo (China, Tsinghua University); Yang Hong (United States, Tsinghua University); Jing Cao (China, Tsinghua University)
2. [Simulation Study on Indirect Climate Effects of Black Carbon Aerosol over Asian Monsoon Circulation and Precipitation](#)  
Zihao Lu (China, Nanjing University)
3. [Water Scarcity under Various Socio-economic Pathways and its Potential Effects on Food Production in the Yellow River Basin](#)  
Yuanyuan Yin; Qihong Tang; Xingcai Liu (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

## A Statistics-Process Combined Scheme to Monitor the Spatiotemporal Pattern of Grazing Consumption in Temperate Eurasian Steppe (TES)

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### Abstract

Temperate Eurasian Steppe (TES) is a region with various environmental, social and economic stresses converged. Grazing activity is an important anthropogenic activity and disturbance to the grassland ecosystems in this region. However, because this activity is largely manipulated by human-being, the spatiotemporal trend of grazing consumption is difficult to be monitored and quantified properly. In this study, we try to map the regional grazing impact on carbon cycling by developing a statistics-process based scheme. The distribution of livestock is first determined by the prefecture/province inventory data. At this spatial level, the policy and cultural difference could be largely excluded. Then the regional spatial pattern of grazing consumption could be evaluated by integrating the process-oriental model of herbivore energy circulation model. The result from the year of 2008 indicated that grazing activity consumed about 2 TgC. In Mongol Steppe, the livestock are mainly located in the productive grasslands, but in Kazakh Steppe, the major livestock communities are distributed in the barren areas. The grazing consumption percentages from grassland NPP in Turkmenistan, Uzbekistan and Tajikistan were 15.8%, 9.8% and 3.7%. The corresponding percentages from NEP were up to 34.7%, 18.9% and 12.8% in the three countries. We further propose that this scheme could produce a pixel-based grazing map by incorporating an herbivore adaptive behavioral module. It could contribute to the accurate estimation of regional carbon budget, as well as the sustainable management of grassland resources.

### Key words:

grazing modeling; terrestrial carbon sequestration; grassland management; Temperate Eurasian Steppe (TES); net primary productivity (NPP); livestock

## Freezing Precipitation Frequency over the Northern Extratropics

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### Abstract

With global climate change in the extratropics, the 0°C isotherm will not disappear and associated precipitation events will continue to occur. The near-0°C temperatures should generally move poleward and arrive at many locations earlier in spring or later in autumn. This could potentially affect the seasonal cycle of near-0°C precipitation. The overall warming, together with a larger influx of the water vapor in the winter atmosphere from the oceans (including ice-free portions of the Arctic Ocean) can also affect the amount of near-0°C precipitation. The issue of near 0°C precipitation is linked with several hazardous phenomena including heavy snowfall/rainfall transition around °C; strong blizzards; rain-on-snow events causing floods; freezing rain and freezing drizzle; and ice load on infrastructure. In our presentation using more than 1,500 long-term time series of synoptic observations for the past four decades, we present climatology and the empirical evidence about changes in occurrence, timing, and intensity of freezing rains and freezing drizzles over four countries of Northern Eurasia and two countries of North America. In the former Soviet Union, instrumental monitoring of ice load has been performed by ice accretion indicator that in addition to the type, intensity and duration of ice deposits reports also their weight and size. Estimates of climatology and changes in ice load based on this monitoring at 958 Russian stations will be also presented. The work was supported by the Ministry of Education and Science of the Russian Federation (grant 14.B25.31.0026) and the NASA LCLUC Program.

### Key words:

freezing rain; freezing drizzle; northern extratropics; climatology and changes

## Nonlinear Response of Streamflow to Climate Change in the Headwater Region of Nenjiang River Basin, Northeast China

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### Abstract

Hydro-meteorological variation in headwater region have received considerable attention due to its significance in regulating water, reserving water and maintaining water balance in the whole river basin. This study investigates the response of streamflow to climate change in headwater region of Nenjiang River Basin (HNRB) using a novel data-driven method named Ensemble Empirical Mode Decomposition (EEMD), which is suitable for nonlinear and nonstationary signals. EEMD is here applied to decompose annual streamflow, temperature, precipitation and potential evapotranspiration record from 1961 to 2010 in HNRB. The reconstructed inter-annual and inter-decadal variability effectively revealed that the streamflow for HNRB changed nonlinearly over the years, namely the states of high and low water period appear alternately. The variation of streamflow showed anti-phase relationship with precipitation in different time scales (inter-annual, inter-decadal and trend variability), while exhibited anti-phase or in-phase relationship with temperature and potential evapotranspiration alternatively. Nonlinear decreasing in streamflow and precipitation and rising in temperature and potential evapotranspiration suggests a strengthening warm-drying trend in HNRB since 1980s, which necessitate more efficient regulation to manage water resources and meet the requirements of agriculture, wetlands and city water consumption in Nenjiang River Basin. Moreover, EEMD is proposed as a powerful method for extracting physically meaningful information from hydro-meteorological data.

### Key words:

nonlinear response; streamflow variation; climatic factors; ensemble empirical mode decomposition

## Projected Distribution of Vegetation, Forest Types and Major Conifers across Russia in the Warming Climate of the 21<sup>st</sup> Century

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### Abstract

Global simulations have demonstrated the potential for profound effects of GCM-projected climate change on terrestrial ecosystems at all hierarchical levels. We developed large-scale bioclimatic models to predict progressions of potential vegetation zones (zonobiomes), forest types and major forest-forming conifers in Russia in the warming climate of the 21st century. Three bioclimatic indices (growing degree-days, base 5°C; negative degree-days, below 0°C, and a moisture index) and continuous permafrost (the active layer depth <2 m) were climatic drivers of our models. To provide a range of warming we used 16 AR5 GCMs for the B1, A1B, and A2 scenarios projected the smallest, medium and greatest temperature increases. All bioclimatic simulations were run by pairing our bioclimatic models with the bioclimatic indices and permafrost distributions for the baseline period 1960-1990 and decades of 2011-2020, 2041-2050 and 2091-2100. With these projected climates, the zonobiomes would need to shift far to the north to reach equilibrium with the change in climate. Under the warmer and drier future climate, most of Russia would be suitable for grasslands rather than for forests. Water-stress tolerant light taiga would prevail over water-loving dark taiga in new climates. Permafrost would not retreat fast enough to provide favorable habitats for all conifers except permafrost-tolerant *L. dahurica* that would remain the dominant conifer in the cryolithozone. Increased fuel accumulation and severe fire weather in warmer and drier climates would promote large, high-severity fires, which are expected to facilitate vegetation progression towards equilibrium with the climate.

### Key words:

zonal vegetation; forest types; major conifers; bioclimatic models; climate change; Russia

## China's Water Security and Socioeconomic Behavior Based on Water Resources

### Turning Endogenous: Risk Assessment and Resilience

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#### Abstract

Uncertainties in global change and risks of climate extreme events in combination with the characteristics of complex and varied climate systems pose great challenges to natural resources and socioeconomic behaviour of China. Our research aims to systematically quantify impacts of water resources under different scenarios of policies on socioeconomic behaviour in China and to formulate adaptation to such impacts by integrating a dynamic water- computable general equilibrium (CGE) model.

Water, as a natural resource, is gradually becoming a limiting factor to societal and economic development. Based on the rules of water supply and demand and the law of market economy, this study puts water resources into the CGE model as an endogenous variable and analyzes the change of socioeconomic behaviour such as the gross domestic product and grain output affected by water resources constraint and relevant policies. This is a comprehensive study by taking water resources as an endogenous variable in every stage of production.

The simulation shows that the output and market price change more than expect as to policy only in water industry, for taking water resources as an endogenous variable conforms to the actual situation. In addition, when compared different scenarios of policies, the results show that they all can change water use structure and improve water use efficiency. However, policy has personalized impacts on sectors, especially agriculture and food processing. So government policy makers should be more cautious when make water policies.

#### Key words:

Water security; computable general equilibrium model; endogenous variable

## Simulation Study on Indirect Climate Effects of Black Carbon Aerosol over Asian Monsoon Circulation and Precipitation

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### Abstract

Black carbon aerosol (BC) is one of the most important aerosol components in atmosphere. It is emitted directly at the source from incomplete combustion processes such as fossil fuel and biomass burning. Former researches find out that the indirect climate effect of BC aerosol is more significant than its direct climate effect, and the second indirect effect is more significant than its first indirect effect. It is meaningful and necessary to investigate the indirect climate effects of BC aerosol over Asian monsoon circulation and precipitation for China emitting high levels of BC and locating at typical Asian monsoon region. Here we first present numerical simulations on accessing the temporal and spatial variations of BC surface concentration, column burden, and optical depth (AOD); then investigated BC induced climate effects (including first indirect and second indirect) using a regional climate model coupled with a troposphere atmospheric chemistry model (RegCCMS). Hydrophilic BC aerosol acting as cloud condensation nuclei (CCN) results in higher cloud droplet number concentration, smaller cloud droplet size under the condition with fixed cloud water and low auto-conversion rate from cloud water to rain water. Due to BC total indirect effects, annual cloud amount and water increase while absorbed solar radiation, surface air temperature and precipitation decrease. Surface cooling and drying leads to less water vapor exchange between land and atmosphere. Additionally, indirect effects lead to summer rainfall drought, downdraft enhanced and atmosphere cooling over China mainland.

### Key words:

numerical simulation; black carbon aerosol; Asian monsoon

## Water Scarcity under Various Socio-economic Pathways and its Potential Effects on Food Production in the Yellow River Basin

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### Abstract

The Yellow River (YR) plays an important role in the development of the regional economy as the major source of freshwater. Increasing population and socio-economic development have put great pressure on water resources of the basin. The anticipated climate and socio-economic changes may further increase water stress. The water managers of the basin will face great challenges in meeting the human and environmental requirements for water. In this study, we assess water scarcity under climate change and various socio-economic pathways with an emphasis on the impact of water shortages on food production. The water demands in the 21<sup>st</sup> century are estimated based on the newly developed Shared Socio-economic Pathways (SSPs) and the renewable water supply is obtained from the climate projections under the Representative Concentration Pathways 8.5 scenario. The irrigated agriculture is assumed to have the lowest priority of all water consumers under water stress. The results show that the water demands, especially the demands in domestic and industrial sectors, will grow rapidly and put the middle and lower reaches in conditions of severe water scarcity from the next a few decades. As more water resources would be appropriated by domestic and industrial sectors, a portion of irrigated land would have to be converted to rain-fed agriculture which would lead to more than 13% reduction in food production under various socio-economic pathways. This study highlights the links between water, food and ecosystems in a changing environment and suggests that trade-offs should be considered when developing regional adaptation strategies.

### Key words:

water scarcity; Shared Socio-economic Pathways; climate change; North China

## Environment-Health and Social Welfare

### Dynamics of Coupled Human and Natural Systems in Water-limited Regions



#### Oral

1. [Changes in Glacial Extent in the Tien Shan Mountains of the Kaidu River Basin, Northwestern China – Impacts to Water Resources](#)  
Daniel Lawson (Dartmouth College, United States), Brian Tracy (CRREL, United States), Jonathan Chipman (Dartmouth College, United States)
2. [Caspian Sea Water Level Changes: Reasons and Effects](#)  
Haijun Deng, Yaning Chen (Xinjiang Institute of Ecology and Geography, CAS, China)
3. [Calibration of SCS model parameters about Boertala River in Xinjiang](#)  
Wang Jin Jie, Ding Jian Li, Zhang Zhe (Xinjiang University, China), Zhang Cheng (Xinjiang Vocational and Technical College of Communications, China)
4. [Case Study of Chinese City of Ganzhou on Hydrologic Management in Urban Drainage Basin](#)  
Liu Chao, Sheng Kuang (China Architecture and Design Group, China)
5. [Climate Observations Affected by Irrigated Agricultural Development over Xinjiang, Northwest China](#)  
Songjun Han (State Key Laboratory of Simulation and Regulation of Water Cycle in River Basin, China Institute of Water Resources and Hydropower Research, China), Qiuhong Tang (Key Laboratory of Water Cycle and Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
6. [Effects of Land Use Pattern on Soil Water in Re-Vegetation Watersheds in the Loess Plateau](#)  
Lei Yang (Research Center for Eco Environmental Sciences, Chinese Academy of Sciences, China)
7. [Impact of GCM Structure Uncertainty on Future Streamflow Prediction: A Case Study in Tianshan Mountains](#)  
Gonghuan Fang (State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences; Department of Geography, Ghent University, Belgium), Jing Yang (State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
8. [Inter-Specific Variation in Nighttime Sap Flux of Three Shrub Species on the Semi-arid Loess Plateau in China](#)  
Weiwei Fang, Nan Lu, Lei Jiao (Research center for Eco Environmental Sciences, Chinese Academy of Science, China)

9. [Land Cover Change and Water Management on the Tarim and Konqi River Systems, Xinjiang, China](#)  
Jonathan Chipman, Francis Magilligan, Xun Shi (Dartmouth College, United States), Yaning Chen (Chinese Academy of Sciences, China), Baofu Li (Qufu Normal University, China), Winter J, Sneddon C
10. [Land Cover Consequences of Decadal Inter-basin Water Transfers in Xinjiang, China](#)  
Xun Shi, Francis Magilligan, Jonathan Chipman (Dartmouth College, United States), Yaning Chen (State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
11. [Potential Impacts of a Warming Climate on Water Tower in Central Asia](#)  
Yaning Chen (State Key Laboratory of Desert and Oasis Ecology, Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China)
12. [Raster Cell-Level Wetland Assessment Using Support Vector Machines](#)  
Zhaohui Yang, Zhihui Chen, Qun Su (Suzhou University of Science and Technology, China)
13. [Recent Rises of Global Terrestrial NPP and Evapotranspiration Suggested an Increased Risk of Drought](#)  
Zhi Li (Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, China), Yang Wang (College of Pratacultural and Environmental Sciences, Xinjiang Agricultural University, China)
14. [Spatiotemporal Climate Change Feathers and Trends in Tibet Plateau](#)  
Qihu Li (Xi'an University Tecnology and Science, China)
15. [The Extraction of Terrace in the Loess Plateau Based on Radial Method](#)  
Wei LIU, Fayuan LI, Chenrui LI (Nanjing Normal University, China)
16. [The Shrinking Glaciers in the Central Tien Shan Mountains During 1977-2013](#)  
Xianwei Wang, Huijiao Chen (Sun Yat sen University, China)

## Poster

1. [Analysis of the Nonlinear Trends and Non-Stationary Oscillations of Regional Precipitation in Xinjiang, Northwestern China, Using Ensemble Empirical Mode Decomposition](#)  
Bin Guo (China, Shandong University of Science and Technology)
2. [The Nonlinear Variation of Runoff and Its Response to Climate Change in Yihe River, East China](#)  
Baofu Li (China, College of Geography and Tourism, Qufu Normal University)
3. [The Impact of Climate Change and Human Activities on Vegetation NDVI Change in Yulin, China](#)  
Tao Wang (China, College of Geomatics, Xi'an University of Science and Technology)

## Changes in Glacial Extent in the Tien Shan Mountains of the Kaidu River Basin, Northwestern China – Impacts to Water Resources

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### Abstract

Water resources in the Kaidu Basin are linked directly to runoff from glaciers within three sectors of the Tien Shan Mountains. Glacial runoff provides a seasonally important source of freshwater to the Bayinbuluke Wetland-Grassland conservation region, desert lowlands and Bosten Lake, especially during the dry season. Thus, changes in discharge over annual and decadal timespans affect water availability and management. Quantitative analyses of high resolution satellite imagery from the mid-1960's (Corona) compared to WorldView II imagery from 2012 to 2015 indicate significant reduction in glacial extent across the basin. Similarly, losses are evident on an annual basis in the recent imagery. Thinning and recession of the termini behind end moraines occupied prior to the 1960's has exposed overdeepened basins that are now filled with meltwater. These glacial lakes are increasing in size as the ice margin continues to recede and create a potential hazard if they were to drain catastrophically due to failure of the enclosing moraines or thru other mechanisms. The resulting glacial outburst floods (GLOF's) pose downstream risks to the infrastructure and importantly the local residents.

### Key Words:

glaciers; recession; climate change; glacial runoff; glacial lakes; GLOF's; satellite imagery; water resource; glacial hazards

## Caspian Sea Water Level Changes: Reasons and Effects

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### Abstract

The water level changes of inland waterbodies are affected by climate change and human activities. In this study, we had analyzed the Caspian Sea water level changes based on the Caspian Sea water level data from 1992 to 2011, furthermore, reasons of the Caspian Sea level changes and its impact on the surrounding environment were also explored. The results are as follows: 1) the level of the Caspian Sea has exhibited a steady downward trend, dropping from -26.05 m in 1995 to -26.96 m in 2011 over the past 20 years; 2) the drop of Caspian Sea water level was mainly attributed to such factors, the decreasing precipitation, increasing temperature and increasing evaporation. 3) meanwhile, the sharp overall drop in terrestrial water storage in the Caspian Sea plains region had a close relationship with the drop in water levels in the Caspian Sea ( $R^2_{adj}=0.866$ ,  $p<0.01$ ) from 2003 to 2011; 4) the drop of Caspian Sea water level caused reduction of ground water and soil moisture in the Caspian Sea plains region, which led to the degradation of vegetation in this region. As a whole, the drop of Caspian Sea water level had negative effects on ecological environment in the Caspian Sea plains region.

### Keywords:

Caspian Sea water level; Climate change; Terrestrial water storage

## Calibration of SCS Model Parameters about Boertala Riverin Xinjiang

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### Abstract

The water resource is the most important factor for socio-economic development on the background of global warmer, especially in arid regions. The Soil Conservation Service Curve Number (SCS-CN) developed by the U.S. Department of Agriculture National Resources Conversion Service (NRCS) is the most popular and widely applied model for direct runoff estimation. In this paper, using original SCS-CN model and after parameter algorithm improved SCS-CN model respectively to simulation the runoff. Compare the two model simulation accuracy to provide a reference for similar watershed runoff forecast. First time to use the 16m resolution remote sensing image about high-definition earth observation satellite "Gaofen-1" to provide a high degree accuracy data of the land use classification for SCS-CN to determine the curve number. This paper focus on Wen-quan basin and combines 18 rainfall events to simulation the runoff with before and after parameter algorithm improved SCS model. The simulation results show that the improved model is better than original model. Both of them in calibration and validation periods Nash-Sutcliffe efficiency were 0.79, 0.71 and 0.66, 0.38. And relative error were 3%, 12% and 17%, 27%. It shows that the simulation accuracy should be further improved and using remote sensing parameters information technology to improve the basic geographic data for the hydrological model has the following advantages: 1) Remote sensing data having a planar characteristic, comprehensive and representative. 2) To get around the bottleneck about lack of data, provide reference to simulation the runoff in similar basin conditions and data-lacking regions.

### Key words:

runoff simulation; SCS model; remote sensing; improved algorithm of parameters

## Case Study of Chinese City of Ganzhou on Hydrologic Management in Urban Drainage Basin

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### Abstract

Nowadays, severe shortage of hydrologic resource and deterioration of hydrologic environment have been obstacles in urban sustainable progression. Improper management results in drawbacks of water resource and safety, including structural water shortage. This essay illustrates a case study on city of Ganzhou, one of 291 Chinese prefecture-level cities, which integrates model water treatments on various terrain in its 146 km<sup>2</sup> existing built up area and becomes a typical case of Lingnan area of China. Based on interviews and investigation with 23 local government departments, the study covers over 150 information of planning, construction schedule, implement evaluation etc., and explores partnership between government departments, enterprises and customers, for instance decision process, object and subject of water management, policy, technical standard, investment and operation. This essay attempts to optimize modes, which firstly classify management object forms, including rainfall, underlying surface, municipal network, water treatment facility, surface and underground water, secondly comb resource administration process of, for example, planning decision making, construction, operation and maintenance, and thirdly make suggestion on technical structural criterion and government ability building in aspect of standard and investment. They are likely to result in urban water resource management with governmental transparency, constructive normalization and cooperative functions, thus fulfill integrated hydrologic goal of quality, quantity and level in urban drainage basin.

### Key words:

drainage basin; hydrologic management; three in one; planning; Ganzhou

## Climate Observations Affected by Irrigated Agricultural Development Over Xinjiang, Northwest China

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### Abstract

Meteorological stations in Northwest China are surrounded by large proportions of cultivated land. The relations between observed climate change and the cultivated land fractions (CF) within a 4 km radius at 90 meteorological stations over Northwest China are investigated. Compared with the climate variation in the Tibetan Plateau where agricultural development is negligible, stations with low CF show similar variation, whereas stations with larger CF experience less surface warming, more rapid increase in near-surface atmospheric moisture, and larger declines in surface wind speed than stations with small CFs from 1960 to the end of 1990s, especially during the main growing season. However, the differences were reversed since the end of 1990s. The impacts on observed near-surface temperature, water vapor pressure, and wind speed are attributed to the irrigated agricultural development, which causing local near-surface atmospheric wetting and cooling, as well as increasing surface roughness. The findings suggest that the land use around stations should be considered when analyzing the observed climate changes in Xinjiang, and the local climate effects should be considered to improve regional projections of future agricultural water demand.

### Key words:

climate observation; irrigation impact; agricultural development

## Effects of Land Use Pattern on Soil Water in Re-Vegetation Watersheds in the Loess Plateau

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### Abstract

Soil water is a critical constrict factor to vegetation restoration in the arid and semi-arid Chinese Loess Plateau because of low rainfall and water scarcity. For decreasing soil erosion and improving environmental conditions, large-scale re-vegetation was initiated in this area in late 1990s. However, these activities may result in excessive water consumption and soil water deficit if no appropriate scientific guidance were offered. This in turn impacts significantly the regional ecological restoration and environmental improvement. In this study, 6 watersheds with different land use pattern were selected. Soil water content and its spatial variability in depth of 0-5 m were analysed based on field observation and geostatistical method. The results showed that: (1) Soil water drastically decreased by introduced vegetation when compared with traditional farmland and native grassland. Introduced vegetation consumed excessive amount of soil water and induced temporally stable soil desiccation. (2) The analysis of differences in soil water for different land use patterns indicated that the land use had significant influence on soil water and its spatial variability. Soil water content at watershed scale increased with the increasing area of farmland, and decreased with increasing area of introduced vegetation. Land use pattern determined the soil water condition and its spatial variation at watershed scale. (3) Large-scale re-vegetation with introduced vegetation diminished the spatial heterogeneity of soil water at different scales. The improvement of land use management was suggested to improve the water management.

### Key words:

Vegetation restoration; soil water; land use pattern; spatial-temporal pattern; land use management

## Impact of GCM Structure Uncertainty on Future Streamflow Prediction: A Case Study in Tianshan Mountains

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### Abstract

Hydro-climatic effects of future climate change in the Tianshan Mountains (China) are strongly demanded by policy maker. GCM ensemble coupled with hydrological models is often used for this purpose. This paper investigated the impact of GCM structure uncertainty in hydrological impact studies in the Kaidu river basin, a typical watershed in the south slope of the Tianshan Mountains. A 21-member ensemble of General Circulation Models (GCMs) from the Coupled Model Intercomparison Project Phase 5 (CMIP5) under Representative Concentration Pathway scenarios (RCP4.5 and RCP8.5) were used as climatic input to the well calibrated hydrologic model (the Soil and Water Assessment Tool, SWAT). The results show that precipitation predicted by GCM ensemble will increase 3.4% - 13% and 6.8% - 22% and temperature will increase 2.0 °C - 3.3 °C and 4.2 °C - 5.5 °C respectively for the 25% and 75% quantiles under RCP4.5 and RCP8.5. The GCM ensemble projected streamflow will change by -26% - 3.4% under RCP4.5 and by -38% ~ -7% under RCP8.5. However, the simulated discharge forced by different GCMs can diverge widely, with prediction ranges often surpassing current discharge. For hydrological components, the proportion of snowmelt (SM) tends to decrease insignificantly but the timing will be pushed forward about 1-2 months. Evapotranspiration (ET) will increase substantially by 24% ~ 48%. The uncertainty sources of the streamflow projection were quantified using the standard deviation, and results show that uncertainty associated with GCM ensemble contributes the largest part.

### Keywords:

climate change; uncertainty analysis; hydrologic modeling; Tianshan Mountains

## Inter-Specific Variation in Nighttime Sap Flux of Three Shrub Species on the Semi-Arid Loess Plateau in China

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### Abstract

Nighttime sap flux ( $E_{night}$ ) may be a significant factor in water budget of ecosystems. In order to identify how plants adapted drought stress according to change nocturnal transpiration, we examined the effects of soil moisture on nocturnal sap flux and the contribution nighttime sap flux to daytime sap flux ( $E_{daily}$ ) of field-grown three shrub species (*V. negundo*, *H. rhamnoides* and *S. trilobata*) using sap flow gauges during June to September.  $E_{night}$  was 5-10% across the growing season in three shrubs, but up to 25.50%, 27.89% and 42.99% on some days after rainfall events for each of them, respectively. There were two main drivers of nighttime sap flow in the shrubs we investigated: nighttime micro-meteorology and soil moisture availability. The results showed that  $E_{day}$  and  $E_{night}$  was correlated with  $VPD$  and  $RH$  across growing seasons.  $E_{night}$  was more correlated with shallow soil moisture (80cm) than deep soil moisture (200cm) for *H. rhamnoides* and *S. trilobata*. The contribution of  $E_{night}$  to  $E_{daily}$  was increasing with soil moisture drier to a certain extent for each of them. The diurnal curves of leaf water potential and stomata showed different water relations among three species. Although sap flow methods have uncertainties as to the proportion of refilling and transpiration from the canopy, the difference leaf water potential between 06:00 am and 18:00 pm showed stem refilling existed in three species. Among three species, *H. rhamnoides* has a better adaptability to soil drought with its physiology attributes.

### Keywords:

nocturnal sap flux; stomata conductance; leaf water potential; Loess Plateau

## Land Cover Change and Water Management on the Tarim and Konqi River Systems, Xinjiang, China

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### Abstract

Water management practices and land cover change have dramatically altered the Tarim and Konqi river systems in western China. Among the most notable changes are a rapid expansion of irrigated agriculture and episodes of intra- and inter-basin water transfers. Using time-series of multispectral satellite images from Landsat TM/ETM+/OLI (1994 to 2015) and MODIS (2000 to 2015), we document the effects of these changes on the riparian zones of the two river systems, and on the broader surrounding landscape. Land cover classification of over 70 Landsat images shows that agricultural lands more than tripled in extent within the study area. Natural riparian vegetation experienced a more complex spatial-temporal pattern of change, with unmanaged riparian vegetation cover decreasing in some areas and increasing elsewhere. Spectral mixture analysis of sub-pixel fractional vegetation cover suggests that interbasin water transfers from the Konqi to the Tarim River resulted in an increase of near-channel riparian vegetation on the Lower Tarim and a loss of vegetation along the Lower Konqi. Finally, the temporally dense record of MODIS images revealed a heterogeneous pattern of increasing and decreasing greenness at the landscape scale, including the loss of vegetation in distal regions that were formerly subject to sporadic seasonal flooding but now may be cut off from their riparian water supply due to intensive water management practices. These results suggest that satellite remote sensing may play a valuable role in monitoring the effects of changing land use and hydrology on riparian systems in Central Asia and other arid regions.

### Key words:

Remote sensing; Riparian; Land cover; Tarim; Konqi; Interbasin water transfers

## Land Cover Consequences of Decadal Inter-basin Water Transfers in Xinjiang, China

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### Abstract

Inter-basin water transfer (IBWT) became a major means of Chinese government for dealing with regional water deficiencies. While the debate about the eventual outcome/consequence of IBWT has only gone increasingly intensive and extensive in the past two decades, empirical studies based on existent evidence, especially on the ecological outcome/consequence at a landscape scale, are very limited. The decadal water conveyances over the Tarim River in Xinjiang, China provide a valuable case. We identified four sub-regions that had played beneficiary, loser, contributor, and privilegee roles in the Tarim conveyance project, and studied the outcomes/consequences of the conveyances through examining the land cover change, as we consider the land cover change a sensitive response to and informative representation of the impact of a large-scale water management maneuver on both human and natural systems and their interactions, especially in an arid region that has been experiencing volatile climate change and rapid socioeconomic development. While the conveyances were ostensibly carried on to restore the natural ecological systems (particularly vegetation) along the lower reaches of the river, the intended and unintended, and expected and unexpected, outcomes/consequences of the project form a complex case for researchers and policy makers to examine and untangle.

### Key words:

Land use and land cover, water conveyances, human-nature interaction, Xinjiang

## Potential Impacts of A Warming Climate on Water Tower in Central Asia

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### Abstract

The Tianshan Mountains, with its status as “water tower in Central Asia”, is generally a relative abundance of water, stored in the form of glaciers, snow and permafrost. Global warming accelerates the water cycle, which indicates a general prospective benefit for water availability. However, in regions where water resources are dominated by glacier and snow melt from mountains, the availability is more complicated. Over the past half century, temperature rose fastest in Middle and East Tianshan Mountains, while only slightly increasing in West Tianshan Mountains. Precipitation had clear increasing trends in the western and northern parts of the Tianshan Mountains. The rapid warming affected precipitation fraction as well as snowpacks, glaciers, and total water storage. The ratio of snowfall to precipitation (S/P) experienced a downward trend, along with a shift from snow to rain. Spatially, the snow cover area in Middle Tianshan Mountains decreased significantly, while that in West Tianshan Mountains increased slightly. Approximately 97.52% of glaciers in the Tianshan Mountains showed a retreating trend, which was especially obvious in the North and East Tianshan Mountains. However, the retreat rate in 2000-2010s was slower than the rate in 1960s-2000 in the western part of the Tianshan Mountains. The total water storage in the Tianshan Mountains also experienced a significant decreasing trend in Middle and East Tianshan Mountains, but only a slight decreasing trend in West Tianshan Mountains at an average rate of  $-3.72 \text{ mm/a}$ , which indicated the ‘water tower’ had lost about  $-2.23 \times 10^8 \text{ m}^3/\text{a}$  in just 10 years.

### Key words:

Climate change; glacier shrinkage; total water storage; Tianshan Mountains; Central Asia

## Raster Cell-Level Wetland Assessment Using Support Vector Machines

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### Abstract

We present a raster cell-level wetland assessment approach based on the wetland-environment model, which is built with support vector machines (SVM). Firstly, remote sensing data, GIS data and field data were retrieved and processed. After selected by the local experts, the environmental factors, which include landscape-level factors (i.e., water body density, road density, tourist density, urban area density, vegetation screening index, ground surface temperature index) and field-level factors (i.e., bird observation index and water quality index), were calculated at raster cell level from above data. Secondly, combining the landscape-level factors (as input of feature vectors) and field-level factors (as output of reference results) at corresponding cell location, samples of training set were obtained. Finally, using above samples, the wetland-environment model for wetland assessment was built by using SVM, which could deal with the problems of imprecise, uncertain, and scarce field data, a common difficulty in wetland assessment. After training and testing, the output at any given raster cell, which indicate the wetland condition at that cell location, were predicted rapidly and precisely using the trained wetland-environment model. To illustrate our approach, we implemented an assessment of the wetlands in Suzhou, China as a case study. An overall accuracy of 80% was achieved in identifying output of assessment ranks using the SVM wetland-environment model. The experimental results indicate that our approach can be an efficient and cost-effective way for managers to assess wetlands at raster cell level.

### Key words:

wetland assessment; support vector machines; geographic information system

## Recent Rises of Global Terrestrial NPP and Evapotranspiration Suggested An Increased Risk of Drought

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### Abstract

The past decade has been the warmest in the instrumental record (2000-2014). Overall, the global inter-annual series of net primary production (NPP) slightly increased in 2000-2014 at a rate of 0.06 PgC/yr<sup>2</sup>. More than 64% of vegetated land in the Northern Hemisphere showed increased net primary production, while 60.3% of vegetated land in the Southern Hemisphere showed decreased trend. Vegetation feeds back to the spatio-temporal characteristics of climate through evapotranspiration. NPP correlates positively with land actual evapotranspiration (ET), especially in the Northern Hemisphere, where the increased vegetation productivity (0.13 PgC/yr<sup>2</sup>) promotes decadal rises of ET (0.61 mm/yr<sup>2</sup>). However, anomalous dry conditions led to reduced vegetation productivity (-0.18 PgC/yr<sup>2</sup>) and nearly ceased growth in ET in the Southern Hemisphere (0.41 mm/yr<sup>2</sup>). To understand why climates in the northern and southern hemispheres respond differently to NPP, the results showed that temperature is the dominant control on vegetation growth in the high latitude in the Northern Hemisphere, while net radiation is the main effect factors to NPP in the mid latitude, and in arid and semi-arid biomes also mainly driven by precipitation. While in the Southern Hemisphere, NPP decreased because of warming associated drying trends of PDSI. In addition, potential evapotranspiration (PET) as a surrogate measure of atmospheric moisture demand, with an increasing trend overpassed the precipitation in the past 15-year record. It indicates some moisture deficit between available water demand and supply for evapotranspiration. Drought indices and precipitation-minus-evaporation suggested an increased risk of drought in the present century.

### Key words:

climate change; net primary production; evapotranspiration; soil moisture; PDSI

## Spatiotemporal Climate Change Features and Trends in Tibet Plateau

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### Abstract

Temperature and precipitation time series datasets from 1961 to 2013 at 71 meteorological stations were used to reveal the spatial and temporal trends of climate change in Tibet Plateau, China. Annual and seasonal mean air temperature and total precipitation were analyzed using Mann-Kendall (MK) test, inverse distance weighted (IDW) interpolation, and R/S methods. The results indicate that: (1) both temperature and precipitation increased in the past 45 years, but the increase in temperature is more obvious than that of precipitation; (2) for temperature increase, the higher the latitude and the higher the elevation the faster the increase, though the latitude has more influence on the increase. Northern Tibet Plateau shows a faster warming than the southern Tibet Plateau, especially in the summer; (3) Increase of precipitation occurs mainly in the winter in northern Tibet Plateau, although both temperature and precipitation increased in general, the increase is different inside Xinjiang; (4) Hurst index (H) analysis indicates that climate change will continue the current trends.

### Key words:

Climate change

## Extraction of Terrace in the Loess Plateau Based on Radial Method

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### Abstract

The terrace of the Loess Plateau is a kind of typical artificial landform and an important measure of soil and water conservation. Former researches of terrace extracting using remote sensing images show both advantages and disadvantages. Fourier transform method can recognize terrace and find accurate position from frequency domain image, but it is more affected by the linear objects in the same direction of terrace. Texture analysis method is simple and has a wide range application of image processing, but this method is unable to recognize terraces' edge. Object-oriented is a new method of image classification, but when introduce it to terrace extracting, fracture polygons will be the most serious problem and it is difficult to explain its geological meaning. In order to positioning the terraces, we use high- resolution remote sensing image to extract and analyzes the gray value of the pixels which the radial went through. During the recognition process, we firstly roughly confirm the position of peak points; secondly, taking each of the peak points as the center to make radials in all directions; finally, extracting the gray values of the pixels which the radials went through, and analyzing its changing characteristics to confirm whether the terrace exists. For the purpose of getting accurate position of terrace, terraces' discontinuity, extension direction, ridge width, image processing algorithm, remote sensing image illumination and other influence factors were fully considered when designing the algorithms.

### Key words:

terrace, extraction; radial method; remote sensing images

## The Shrinking Glaciers in the Central Tien Shan Mountains During 1977-2013

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### Abstract

The Tien Shan Mountains are known as the water tower of the arid Central Asia. The mountain glaciers are rapidly retreating under the context of global and regional warming. Many works have been done to analyze the retreating rate of glacier areas and volume against individual glaciers. However, it is challenging to obtain an accurate estimate of the entire glacier extent at the regional scale due to cloud issues and the similar spectral signature of snow and glacier. This study develops an object-oriented classification to map the glacier extent by using landsat images, and then compared the glacier areas with those derived from other research groups and institutes, such as the CGI1, CGI2, GCL2000, WGI, ESA inventory. Our results show that our objected-oriented classification performs better than the regular classification methods, such as the supervised classification with maximum likelihood, band ratio method, snow index method, and so on. Summer snowfall events on the high mountains lead to greatly over map the glacier extent. After carefully selecting the timing of the landsat images and adjusting the glacier extent overestimated due to snow cover, our mapped glacier extent is much smaller and illustrates more reasonable decadal variations than other products. The glacier area shrank by 29% since 1977, with a mean change rate of -7.2% per decade. The shrinking glacier makes this area facing severe challenging for sustainable water supply in the future.

### Key words:

Glacier; Landsat image; Object-oriented classification; Tien Shan

## **Analysis of the Nonlinear Trends and Non-Stationary Oscillations of Regional Precipitation in Xinjiang, Northwestern China, Using Ensemble Empirical Mode Decomposition**

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### **Abstract**

Changes in precipitation could have crucial influences on the regional water resources in arid regions such as Xinjiang. It is necessary to understand the intrinsic multi-scale variations of precipitation in different parts of Xinjiang in the context of climate change. In this study, based on precipitation data from 53 meteorological stations in Xinjiang during 1960–2012, we investigated the intrinsic multi-scale characteristics of precipitation variability using an adaptive method named ensemble empirical mode decomposition (EEMD). Obvious non-linear upward trends in precipitation were found in the north, south, east and the entire Xinjiang. Changes in precipitation in Xinjiang exhibited significant inter-annual scale (quasi-2 and quasi-6 years) and inter-decadal scale (quasi-12 and quasi-23 years). Moreover, the 2–3-year quasi-periodic fluctuation was dominant in regional precipitation and the inter-annual variation had a considerable effect on the regional-scale precipitation variation in Xinjiang. We also found that there were distinctive spatial differences in variation trends and turning points of precipitation in Xinjiang. The results of this study indicated that compared to traditional decomposition methods, the EEMD method, without using any a priori determined basis functions, could effectively extract the reliable multi-scale fluctuations and reveal the intrinsic oscillation properties of climate elements.

### **Key words:**

ensemble empirical mode decomposition; precipitation; nonlinear characteristics

## The nonlinear variation of runoff and its response to climate change in Yihe River, East China

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### Abstract

The nonlinear variations of runoff in Yihe River during 1951-2013 and its relations to Pacific decadal oscillation (PDO), El Niño-Southern Oscillation (ENSO), temperature and precipitation phase changes from multi-scale were detected by using linear regression, Mann-Kendall test and ensemble empirical mode decomposition (EEMD) and Pearson correlation analysis method. Results show that the runoff shows a significant linear downward trend during 1951-2013, with the rate of  $3.33 \times 10^8 \text{m}^3/10\text{a}$ . However, before (after) 1976, the runoff shows a significant downward (upward) trend. Runoff also exhibited a nonlinear variation trend from inter-annual scale (quasi-3 and quasi-6-year), inter-decadal scale (quasi-13-year) and multi-decadal scale (quasi-31-year). The variance contribution rate of components from inter-annual scale was largest, reaching 58%, and that from inter-decadal scale and multi-decadal scale was 6% and 11%, respectively, which indicates that the inter-annual change had a strong influence on the overall runoff change. Results also implied that the effect of climate factors (PDO, ENSO, temperature and precipitation) on runoff in multi-decadal variability scale are more important than that in the other scales, which indicates that the impact mechanism of climate factors on runoff in different scales has obvious differences.

### Key words:

runoff; nonlinear variation; different scales; climate change

## The Impact of Climate Change and Human Activities on Vegetation NDVI Change in Yulin, China

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### Abstract

NDVI (Normalized Difference Vegetation Index) is an important index of describing and reflecting the condition of vegetation cover in the land surface, and it is also an important reference of regional ecosystem stability. Climate change and human activities are the two important driving forces of ecological environmental change currently, especially of vegetation cover change, which showed the sensitivity of NDVI to climate change and human activities. Yulin area located in the northwest of China, where is the transition zone of monsoon and non-monsoon region, is a typical fragile ecological environment and vegetation cover is strong influenced by climate change and human activities. To evaluation and understanding of the process of the impact of climate change and human activities on vegetation ecosystem scientifically, is helpful to develop and implement policies on ecological environment protection and human activities constraints. In this paper, we analyzed the impact process of climate change (temperature and precipitation change) and human activities on vegetation NDVI change, on the basis of 16d synthetic MODIS NDVI images with 250m resolution from 2000 to 2015, daily temperature and precipitation data from 2000 to 2014 in 10 weather stations of Yulin and its surrounding region, and urban or town distribution, combined with linear trend method, correlation coefficient, partial correlation coefficient and buffer analysis method. The aim of this study is to propose regional ecological environment protection and construction policies scientifically, and to establish the scientific basis of regional social-economy-ecology-environment development, through understanding the relationship between vegetation NDVI, and climate change, human activities.

### Key words:

Vegetation; precipitation; temperature; sensitive; Yulin

## Environment-Health and Social Welfare

### Natural Disasters and Vulnerable Spaces, Resilience, Coping and Adaptation in South Asia



#### Oral

1. [Gender and Adaptation: The Impact of Migration on Women'S Adaptive Capacity in The Mahanadi Delta, India](#)  
Giorgia Prati (University of Southampton, United Kingdom)
2. [Geographies of Dispossession to Repossession in Context of Climate Displacements- Revisiting 'Bhoodan Movement'](#)  
Sonali Narang (Panjab University, India)
3. [Livelihood Vulnerabilty in Coastal India: Applying the Vulnerabilty Index in Bhitarkaniak Wildlife Scantuary, Odisha, India](#)  
Sonalee Biswal (Jawaharlal Nehru University, New Delhi, India)
4. [Participatory Approaches for Disaster Risk Reduction: Case Studies from Uttarakhand and Odisha, India](#)  
Margherita Fanchiotti (University of Southampton and UNESCO, UK)
5. [The Truly Disadvantaged? Assessing Spatiotemporal Variability in Social Vulnerability to Climate Change in Urban India](#)  
Komali Yenneti (Nanjing Institute of Geography and Limnology, China), Sabyasachi Tripathi (Department of Economics, Lovely Professional University, India), Yehua Dennis Wei (Department of Geography, University of Utah, United States), Wen Chen (Nanjing Institute of Geography and Limnology, China)
6. [Vulnerable Tribal Spaces: Sites for Development and Destruction of Developmental Ethics- A Study of Sardar Sarovar Dam, Gujrat, India](#)  
Anjana Mathur Jagmohan (Department of Geography, Dyal Singh College, Univrsity of Delhi, India), Jag Mohan Arya (B.R. Ambedkar College, University of Delhi, India)

#### Poster

1. [Inequality of Economic Impact from Drought: Modelling Profit Loss Rate in Sugar Industry in Southwest China](#)  
Le Lin; Ying Wang; Hao Chen (China, Beijing Normal University)

## Gender and Adaptation: The Impact of Migration on Women'S Adaptive Capacity in the Mahanadi Delta, India

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### Abstract

The growing interest in the climate change-migration nexus has largely focused on understanding how migration patterns change as a response to climate variability. The feedback process of such response on individuals' capacity to cope with climate stresses is rarely explored and little is known about its interconnections with gender. Yet, migration and adaptation are not gender-neutral processes. This research seeks to investigate how migration shapes gender and power relationships and how this, in turn, affects women's adaptive capacity and wellbeing in the home villages. The study draws on field research conducted in the Mahanadi delta as part of the 'Deltas, Vulnerability and Climate Change: Migration and Adaptation' (DECCMA) project. In contrast to traditional approaches which have focused on the binary analysis of men vs. women, this research is innovative in that it takes an intersectionality approach to contextualise vulnerability in the broader spectrum of social identities and hidden forms of oppression in which it is embedded. Therefore, inequalities are explored as arising from the dynamic intersection of gender, class and caste. Gender identities, relations and power are continuously renegotiated through migration processes with consequences on some of the social and cultural barriers to adaptation. If we are to understand the differentiated impact, as well as potential, of migration on the adaptive capacity of those who remain behind, then we need to investigate how migration interacts with intersectional inequalities. The study has policy implications for local as well as global policymakers and practitioners.

### Key words:

Adaptive capacity; Vulnerability; Gender, Migration; Intersectionality; Adaptation; Resilience; Climate change

## Geographies of Dispossession to Repossession in context of Climate Displacements- Revisiting 'Bhoodan Movement'

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### Abstract

The impact of Climate migration in South Asia will lead to geographies of dispossession of land and create 'spaces of exception' and 'spaces of exclusion'. Such dispossession will create new 'global souls' [climate Refugees] and new social-cultural geographies of identity determined and organized on the basis of catastrophic climatic events. The momentous rejoinder to climate change will require sacrifices, strong regional Institutions with accurate governance and cooperation across borders. Hitherto, the land management policies of the State in South Asia have failed in supporting the commons and the livelihoods options of the citizens and non-citizens alike. With emerging discourse of climate change new land management policies are indispensable that will further demand committed leadership and powerful regulation. The goal of this paper is to analyse the relevance of Bhoodan movement as an institution to govern the common property management and the use of natural resources in a sustainable way. It is a process of receiving land as a gift, distribution of land to landless and plans for construction and management of land. This paper will further look into how this concept can be used inter-state or intra-state within South Asia as 'geographies of repossession' towards climate displaced community? Can this be applied to Climate refugees and understand that whether it would be able to provide land and dignity to millions who will be crossing edge in search of protected lands and livelihood? Can this have filled hope to those who are dispossessed, disadvantaged and homeless in their struggle against Climate geographies?

### Keywords:

Climate Change; South Asia, Climate displacements; Bhoondan Movement

## Livelihood Vulnerability in Coastal India: Applying the Vulnerability Index in Bhitarkaniak Wildlife Scantuary, Odisha, India

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### Abstract

Vulnerability can be defined as the degree to which a person or a community is likely to experience harm due to exposure to external stress. Vulnerability assessment describes a diverse set of methods used to systematically integrate and examine interaction between human and their physical social surroundings. A livelihood is environmentally sustainable when it maintains and enhances the local and global assets on which livelihoods depend. The Sustainable Livelihoods Approach, looks at five types of household assets; natural, social, financial, physical and human capital. It is a method to design and develop programme at community level. In this paper livelihood vulnerability index is prepared to estimate differential impact of climate change on two different set of villages whose livelihood depends on natural resource. One set of village is taken from buffer zone of Bhitarkanika Wildlife Sanctuary consisting of four villages and 148 households. The other set of village is from the transactional zone of the study area consisting of four villages and 152 households. Overall 300 households are surveyed for the analysis. The different socio-economic and developmental context of each area allows for spatial comparative analysis. An extensive analysis of all the eight sample villages of Bhitarkanika Wildlife Sanctuary is done. The above test is done to see the Livelihood Vulnerability Index (LVI) for agriculture and natural resources dependent communities in developing countries.

### Keywords:

Vulnerability; Livelihood; Sustainable Livelihood; Natural Resource

## Participatory Approaches for Disaster Risk Reduction: Case Studies

### From Uttarakhand and Odisha, India

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#### Abstract

Community participation has become unanimously recognised as a key factor for successful disaster risk reduction on the grounds that a merely top-down approach to disaster risk management, through which decisions are taken by the government or experts without any involvement of the people who are directly exposed to disaster risk, often fails to capture local needs. Community-based approaches to disaster risk reduction have then emerged as a way to better understand and address local capacities and vulnerabilities and to complement institutional efforts through an inclusive and participatory process. India is one of the most disaster-prone countries in the world and the Indian states of Uttarakhand and Odisha are at particularly high risk due to their high exposure and vulnerability to natural hazards. The magnitude and impact of past hazardous events have often challenged the existing institutional structure to the extent that several spontaneous initiatives have taken place in support or integration of governmental action. This paper presents major findings from two studies from the author, which were conducted in selected communities of Uttarakhand and Odisha respectively. The first study, in collaboration with UNESCO-IHE and UNESCO, aimed to investigate social vulnerability and risk perception in six communities in the Rudrapur district of Uttarakhand following the destructive flash floods and landslides of 2013. The second study is part of the 'Deltas, Vulnerability & Climate Change: Migration & Adaptation' (DECCMA) project and looks at understanding community resilience in selected communities of the Kendrapara district of Odisha in an effort to empirically investigate the attributes of disaster resilience in the study area through active community participation. Common findings from both studies show that, while the legislative and policy frameworks for disaster risk reduction in the country are well-founded, gaps in their enforcement at the operational level and delays in the required decentralisation and deployment pose significant limitations to their effectiveness. In practice, there has been little involvement of communities in risk reduction so far. The level of risk awareness among the general population is high, but major issues in proper risk communication and information dissemination by competent bodies have been reported. The need to put more efforts in the direction of risk prevention and of a systematic approach to community-based disaster risk reduction have emerged from both studies.

#### Key words:

Disaster risk reduction; community participation; resilience; vulnerability; Mahanadi delta; India

## The Truly Disadvantaged? Assessing Spatiotemporal Variability in Social Vulnerability to Climate Change in Urban India

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### Abstract

The rapid pace of urbanization in India has significantly increased the vulnerability of urban areas to the dangers of climate change as well as and other natural hazards. Characterizing social vulnerability of urban areas should provide a reference for urban risk management. We have developed a Composite Urban Vulnerability Index (CUVI) for India's urban areas by integrating 13 indicators from three aspects (exposure, sensitivity, and adaptive capacity) that shape the vulnerability of a society. The spatial-temporal patterns of social vulnerability of urban areas and its changes over three periods (2004-05, 2009-10, and 2011-12) are identified and mapped. The analysis reveals that social vulnerability has declined considerably over the study periods at national level. There is clearly a heavy concentration of social vulnerability in central and eastern states, such as Madhya Pradesh, Chhattisgarh, Orissa, Jharkhand, and West Bengal, attributable largely to the high levels of poverty, inequality, and problems relating to unemployment, housing, and access to basic civic amenities like safe drinking water and sanitation. Only the urban populations in relatively prosperous Northern and Southern states are relatively less vulnerable to climate change. The results signify that while social communities in urban areas across India are, in general, developing resilience to climate change, large contrasts exist, attributing to the socioeconomic and geographical differentiation among States.

### Key words:

India; poverty; inequality; climate change; urban; social vulnerability

## **Vulnerable Tribal Spaces: Sites for Development and Destruction of Developmental Ethics- A Study of Sardar Sarovar Dam, Gujrat, India**

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### **Abstract**

Development seems to be the ‘mantra’ in today’s fast moving Indian economy. Sardar Sarovar dam being built over river Narmada, is a classic example of how development for a few in India, is a life threatening and life turning event for the lakhs of people displaced because of it all of them tribals. The Dam & canal network on river Narmada is spread across 4 states and includes 30 large, 135 medium, 3000 small dams. 40,000 hectares of land shall be submerged in the reservoir while 250,000 indigenous people or the ‘adivasis’ or the tribals are being displaced. These are the already disadvantaged sections of the society the Scheduled Tribes. A large number of them do not have any legal title to the land off which they lived. So they cannot even take the legal recourse for compensation of any kind. A majority of people have been left landless and without livelihood and no bargaining power over their fate.

The oustees of the project include: The “Project Affected Persons” - those who are in the submergence zone and also those whose lands have been acquired for construction of canal; Those who do not directly come under the above but whose livelihood directly depends on the environment which shall be submerged/ a canal shall be built on it; Those whose livelihood depends on the downstream fisheries, etc.

These are people who have been forced to become environmental refugees. It seems highly unlikely that these environmentally displaced people, even with the aid of the resettlement scheme, will be fully rehabilitated to the standard of living which they were enjoying prior to the development project. This, of course, has ethical implications for this development. Development is supposed to be beneficial. It is supposed to be the creation of a better life. Within the context of a nation, the state is supposed to be committed to the development of the people as a whole. It has a responsibility to ensure an equitable distribution of the costs and benefits of development projects, especially when they are state projects. Yet the benefits accrue only to those who are better off in the society.

A personal research was conducted in the areas of rehabilitation and resettlement. This included a preprinted questionnaire having questions about the quality of life, fulfillment of promises, involvement in site selection and in decision making, and problems faced by the women etc.

The survey brought out many inferences but also brought into focus many points to ponder over: why zero involvement of locals in decision making; Who owns the natural resources? Is urbanization the only way of development? Why is there so little development using local resources?

### **Key words:**

Development; developmental ethics; vulnerable people

## Inequality of Economic Impact from Drought: Modelling Profit Loss Rate in Sugar Industry in Southwest China

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### Abstract

As a consequence of global climate change, possibility of extreme weather events in southwest China has increased in recent decades. Severe droughts cause great loss to local society and lead to unequal impact on different groups when coupled with their internal socio-economic attributes. This research tries to build an assessing model of drought impact on sugarcane growers and sugar company, which focuses on the generation and transfer mechanism of disaster economic impacts along a simple value chain and the reason why inequality of impact merged under local conditions for coping with droughts. A perspective of profit loss rate is applied to scale economic impact. By using scenario analysis “with and without” disaster, profit loss is defined as the difference in profits. The time series of sugar price “without” disaster is obtained, using an autoregressive error model to separate impact of disasters from the internal trend in sugar price which can be identified by linear regression analysis. Representative sugar prices, which represent value level in disaster-free conditions and disaster-hit conditions, are integrated from a long time series that covers the whole period of drought. As a result, it is found that in a rigid farming contract, sugarcane growers suffer far more than the sugar company when impacted by severe drought and sensitivity analysis of the model reveals that sugarcane purchase price has a significant influence on profit loss rate. This research provides reflections on some economic measure used to tackle with droughts and the unequal nature in it.

### Keywords:

drought; economic impact; inequality; sugar industry; contract farming

## Environment-Health and Social Welfare

### Women's Health and Well Being: An Indian Perspective



#### Oral

1. [A Study of Challenges of Women Empowerment in Haryana, India](#)  
Sangeeta Rani (Delhi University, India)
2. [Early and Exclusive Breastfeeding Among Women in Bihar and Maharashtra \(India\)](#)  
Ajit Yadav (Panjab University Chandigarh, India), Simrit Kahlon (Panjab University Chandigarh, India)
3. [Fuelling Urban and Middle Class Kitchen and Gender\(Ed\) Dynamics of LPG Subsidy](#)  
Shiv Narayan Sidh (Government College, Gairsain Chamoli, India)
4. [Living Arrangement, Family Support and Social Capital as Determinants of Health and Wellbeing Among Elderly Widows in India](#)  
Nidhi Jain (International Institute for Population Sciences, India), Kabir Pal (International Institute for Population Sciences, India)
5. [Perils of Women Trafficking: A Case Study of Joynagar, Kultali Administrative Blocks, Sundarban, India](#)  
Karabi Das (University of Calcutta, India), Kanailal Das (Vidyasagar University, India)
6. [Socioeconomic Inequality in Utilization of Maternal and Child Health Services in India: A Decomposition Analysis](#)  
Pushpendra Kumar (International Institute for Population Sciences, Mumbai, India), Balram Paswan (International Institute for Population Sciences, Mumbai, India)

## A Study of Challenges of Women Empowerment in Haryana, India

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### Abstract

Our empirical studies in the context of highly skewed sex ratio in the state of Haryana have made us believe that women from early to middle of their reproductive ages have no sway in the matters of their body, pregnancy, health and fate of foetus in their womb whether it would survive or not. We are convinced that instrumental empowerment initiatives cannot change the situation. Therefore, with view that empowerment is achieved when women have rights to choose from choices in the course of their life course be it education, profession, marriage, health, number and gender of offspring and so on. It has led us to adopt an agent-based phenomenological study of girls and women to understand the issues and challenges from their experience. Out of 70 rural sample subjects, about 47 were found and out of 30 urban samples about 23 have been found useful as the rest were lacking due to adolescent or children recording or detection of recording. On analysing essences of the recorded transcripts, we reached the conclusion that it is patriarchy reinforced by socio-economic conditions that let not break the vicious circle of patriarchy which they hate at the core of their heart and need widespread awareness and mobilisation by feminists NGOs to emancipate themselves from the shekels patriarchy.

### Key words:

Women Empowerment; Education; Health; Phenomenology; Essences

## Early and Exclusive Breastfeeding Among Women in Bihar and Maharashtra (India)

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### Abstract

This study deal with early and exclusive breastfeeding among women in Bihar and Maharashtra. Exclusive breastfeeding means that the infant receives only breast milk. No other liquids or solids are given – not even water – with the exception of oral rehydration solution, or drops/syrups of vitamins, minerals or medicines (WHO 2013). Breastfeeding is important for young child survival, health & nutrition. Further, breast feeding serves as one of the child spacing methods, which is especially important in developing country like ours where the awareness, acceptability & availability of modern family planning methods are very low (Yadavannavar and Patil, 2011). Early breastfeeding is an important family health intervention, if implemented widely, it can reduce neonatal mortality rate by 20 percent (Mullany et al. 2008). Population Council's study reveals that a little more than a third (36%) of women in rural Bihar initiated breastfeeding within one hour of birth of their child (Aruldas et al. 2012a). The CES-2009 report shows that only 17 percent newborns were breastfed within one hour after birth as compared to the national average of 34 percent (UNICEF 2010). Although Breastfeeding is universal in India, but exclusive breastfeeding practice rates are not satisfactory. In a study in Rajkot, the Prevalence of exclusive breastfeeding at 6 months of age of infants was found to be 62% (Chudasma *et al.* 2014). Furthermore, as per the (NFHS-3) third round, only 69 percent of children fewer than two months of age are exclusively breastfed, which further drops to 51 percent at 2-3 months of age and 28 percent at 4-5 months of age (NFHS-3). There are numerous socio-cultural barriers which potentially may affect the breastfeeding practice. Among all, beliefs like the first milk are not good or there is no secretion of milk in first three days result in practices like discarding colostrums and promoting pre-lactating feeds. Such practices increase the risk of infections and deprive the valuable benefit of colostrums feeding to the vulnerable neonates (Palestinian Family Survey, 2010). This issue becomes an area of concern since large numbers of babies born in India are low birth weight whereas exclusive breastfeeding for the first six months is viewed as the single-most effective intervention among other preventive interventions.

### Key words:

Early breastfeeding; Exclusive breastfeeding

## **Fuelling Urban and Middle Class Kitchen and Gender(ed)dynamics of LPG Subsidy**

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### **Abstract**

Access to affordable and clean energy is key to the sustainable energy security of the nation. Local availability makes biomass as preferred fuel for cooking in rural India. In order to reduce the reliance on biomass fuel, government of India has been providing LPG/PNG at subsidised rate to its people. However almost in entirety LPG/PNG subsidies are cornered by the urban areas and rural rich. Analysis of data from Census of India 2011 reconfirms the above stated statement. There are spatial pockets of concentrated usage of LPG/PNG. Developed (relatively) states and urban India have benefited more than the Indo-genetic belt, central tribal and hilly regions of India. Within urban India, million plus cities are biggest beneficiaries. By curtailing subsidy, government of India will be able to reduce the subsidy burden but is risking the marginal people (Women, urban poor, people and just above poverty line). Paper argues that there should be policy support to address the issue of indoor air pollution and transfer of cash should be made in the name of women rather than the head of the household. Alternatively, government should promote and utilise the savings from LPG subsidy for renewable energy such as biogas, and solar energy.

### **Key words:**

LPG subsidies; gender; indoor air pollution

## Living Arrangement, Family Support and Social Capital as Determinants of Health and Wellbeing Among Elderly Widows in India

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### Abstract

In coming decades, population ageing is likely to have serious policy and programmatic implications in developing countries including India. However, there is one section in India that face restrictions and stigma along with other difficulties that comes with ageing – widows. With rapid modernization of Indian society, the scenario of long considered support system of elderly is changing rapidly and elderly widow experience the brunt of this change the most. Thus the aim of study is to assess the effect of living arrangement, family and networking ties on health and wellbeing of elderly widows. Study used data from the large scale project of ageing named “Building Knowledge Base on Aging in India” conducted by ISEC, Bangalore and IEG, Delhi in sponsorship of UNFPA, India. Regression analyses were used to show the effect of social determinants on the health and wellbeing of elderly widows in India. In the sample 60% women aged 60 years and older were widowed. Almost 15% of elderly widows lived alone and out of these 43% stated ‘children away’ as the reason for living alone. The most common social activity among elderly widows was to attend religious programmes. Almost 23% did not have anyone confidante. Living with children, perceived importance from family, satisfactory communication with children were found to be associated with positive health and wellbeing among elderly widows in India. As India continues to experience demographic and health transition, this is a need to critically think about the informal and formal social support system for elderly widows.

### Keywords:

Ageing; Widows; Health; Wellbeing; Family support; Social capital

## Perils of Women Trafficking: A Case Study of Joynagar, Kultali Administrative Blocks, Sundarban, India

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### Abstract

The Indian Sundarban, comprising of 19 community development blocks (6 in North 24 Parganas and 13 in South 24 Parganas) is physiographically a deltaic plain, having an intricate network of creeks and is ravaged by natural hazards like Tropical cyclones. The inhabitants of Sundarban are primarily involved in agriculture (monocropping due to increased salinity), aquaculture and collection of non timber forest products and thus do not enjoy adequate income. An ill effect of globalization, trafficking means the trade of humans for the purpose of sexual slavery, forced labor or commercial sexual exploitation of the victim. It is now dominated by organized traffickers who lure young girls by making fake promises of love, marriage and lucrative job offers. Kultali and Joynagar of Indian Sundarban are highly vulnerable to hazards due to their close proximity to river Matla to the east and Bay of Bengal to the south. For this paper, data of women trafficking was collected from police department. Cartograms based on the data have been produced. Analysis of records over the years 2008 – 2015 shows that mostly young girls of age group of 15 – 18 are trafficked in Kultali and girls of age group 15 – 20 are trafficked more in Joynagar. Radhaballavpur, Sankijahan and Beledurganagar show highest number of cases. No definite trend could be seen for Kultali while Joynagar shows increasing trend. Poverty, illiteracy and disasters play pivotal roles in case of trafficking here. Spread of women education and interplay of Government and NGO is necessary to prevent trafficking.

### Key words:

Trafficking; Natural Hazards

## Socioeconomic Inequality in Utilization of Maternal and Child Health Services in India: A Decomposition Analysis

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### Abstract

In India large differentials found in utilization of maternal and child health services despite from several Government programme efforts such as, mother-child health care scheme, National Rural Health Mission (NRHM), Janani Suraksha Yojana (JSY), The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA). Additionally, MCH services provide free of cost in public health centre. Still now, the country facing unacceptably high maternal mortality ratio (MMR), accounting for one-fifth (19%) of the global maternal deaths. It is 16 times higher than that of Russia, 10 times that of China and 4 times higher than that of Brazil in 2005. Similarly, country contributes to the highest number of deaths among children under-five in the South Asian region (2.1 million deaths in 2006) and one-fifth of under-five deaths worldwide. However, at the current pace, the country is unlikely to achieve (MDG)-4. These studies using Indian Demographic Health Survey Data through decomposition model, try to explore absolute contribution of selected determinants for inequality in utilization of MCH services. Result showed economic status play the highest role of 42% for inequality in utilization MCH services than other selected covariates such as education 20.2%, social group 14.4%, religion 6.1% and birth order 6.5% respectively.

### Keywords:

Socioeconomic Inequality, MCH, Decomposition Analysis, IDHS data

## Environment-Health and Social Welfare

### Spatially Integrated Humanities and Social Sciences



Home

#### Oral

1. [An Integrated Method for Network-Constrained Point Pattern Analysis Based on Spatial Model](#)  
Ke Nie (Shenzhen Research Center of Digital City Engineering, China, China), Zhensheng Wang (Shenzhen Key Laboratory of Spatial Smart Sensing and Services, Shenzhen University, China, China), Qingyun Du
2. [Comparative Space-Time Research Questions for Open Source Toolkit Development](#)  
Xinyue Ye (Kent State University, United States)
3. [Households' Toilet Facility in Rural India: Socio-Spatial Analysis](#)  
Arjun Kumar (Jawaharlal Nehru University, India)
4. [Impact Assessment of Dairy Farming on Socio- Economic Transformation of Unorganized Workers in Rural Areas: A Case Study](#)  
MD Akhtar Hasinur Rahaman (Aligarh Muslim University, India)
5. [Measuring and Analyzing the Spatial Distribution of Mixed Land Use in Shenzhen:2009-2013](#)  
Quan Li (Wuhan University, China), Xinyue Ye (Kent State University, United States)
6. [Progress of Crime Mapping and Analysis in China](#)  
Lin Liu (Sun Yat Sen University, University of Cincinnati, China)
7. [Spatial Mining of Large Administrative Data to Identify and Understand Neighbourhood Problems: The Case in Brisbane, Australia](#)  
Yan Liu (School of Geography, Planning and Environmental Management, The University of Queensland, Australia), Lynda Cheshire, Robin Fitzgerald (School of Social Science, The University of Queensland, Australia)

#### Poster

1. [How to Grasp the Distributions of Urban Public Service and Facilities in Big Data Era: Case Study in Guangzhou, China](#)  
Wu Zhifeng; Zeng Jia (China, School of Geographical Sciences, Guangzhou University, Guangzhou, 510006, P. R. China)

## An Integrated Method for Network-Constrained Point Pattern Analysis Based on Spatial Model

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### Abstract

With explosive amount of spatial big data, opportunity always walk along with challenge. Previous studies focused on spatial pattern of network-constrained spatial point event have revealed that there were several shortages by applying the traditional analytic paradigm. Therefore, many studies have attempted to develop novel approaches for this point event. In this paper, we aimed at modelling network-constrained point events in geographical space and proposed an integrated method called NKDE-LINCS combining density estimation and spatial autocorrelation. The first step involves in spreading points to a density surface using Network-constrained Kernel Density Estimation (NKDE). The second step is calculating local indicators of spatial association (LISA) taking the smoothed density as input. Furthermore, the availability and practicality has been reviewed through 2\*2 groups of experiments each with 10 simulations and a case study by using traffic crash in Wuhan. The simulation has shown network-constrained approaches can avoid error, besides, as for random pattern all the approaches are availability and as for cluster pattern all the approaches work well in detecting clusters, especially, the integrated method can get more clusters which is closer to the real value. The case study has shown traffic crash delineated as a tendency of cluster pattern in the road network, and the cluster pattern was more significant when network-constrained spatial models were used. In the end, the problems were summarized and the further studies were presented. The research is not only an important branch in geographical area, but also a considerable focus in interdisciplinary of traffic safety and geography.

### Keywords:

network-constrained; point pattern analysis; spatial model;



## Comparative Space-time Research Questions for Open Source Toolkit Development

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### Abstract

Spatial turn in many socioeconomic theories has been noted in a vast field, encompassing both social and physical phenomena. The fast growth in socioeconomic dynamics analysis is increasingly seen as attributable to the availability of panel datasets. By contrast, spatial social scientists have been slower to adopt and implement new spatiotemporally explicit methods of data analysis due to the lack of extensible software packages, which becomes a major impediment to promote spatiotemporal thinking. The current research implements the new methodological advances in an open source environment for exploring space-time socioeconomic data, which lend support to the notion that space and time cannot be meaningfully separated. This research interfaces the open source revolution and socioeconomic analysis, which is among the burgeoning efforts seeking the cross-fertilization between the two fast-growing communities.

### Key words:

open source; comparative

## Households' Toilet Facility in Rural India: Socio-Spatial Analysis

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### Abstract

The 2030 agenda on Sustainable Development Goals (SDGs) highlights the importance of sanitation and sets the Goal #6: 'Ensure availability and sustainable management of water and sanitation for all'. While rural households in India have witnessed a marginal improvement in access to toilet facility in proportional terms in recent decades, they continue to face very high levels of deprivation along with spatial and socio-economic disparities and exclusions, which have been highlighted in this paper using data from Census of India, National Sample Surveys and Baseline Survey. Determinants of households having access to latrine facility in the house have been estimated using an econometric exercise and contribution of caste-based factors of the gap in access among various social groups have been estimated using decomposition technique on household level information from National Sample Survey data. Households located in backward regions and belonging to the weaker sections of society, such as Poor, Wage Labourers, Scheduled Tribes and Scheduled Castes, have been found to be the most deprived, neglected and excluded. Thus, there is an urgent need to pace up the developmental efforts for rural sanitation to achieve the SDGs, along with complementary measures to focus on backward regions, weaker sections, and sociospatial situatedness of households in rural India.

### Key words:

Sanitation

## Impact Assessment of Dairy Farming on Socio- Economic Transformation of Unorganized Workers in Rural Areas: A Case Study

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### Abstract

Dairy farming, as it is generally understood and practiced the world over, implies breeding, feeding and management of cattle (cows and buffaloes) and production, handling and marketing of their milk and milk products on satisfactory and economic basis. Milk is the second largest agricultural commodity produced in the country next only to paddy. Dairying is not only a source of employment and income for small holders, but also a storehouse of wealth, an asset that often helps tide over unforeseen demands for liquid cash. Income from dairying contributes nearly one third of the rural household's gross income, and in the case of landless wage earning households, it is nearly half. The major objectives of the study are as follows: first, to examine the role of dairy farming in rural economy second, to assess the income and employment generation through dairy farming, third, is to study the impact of sustainable dairy farming on the social development aspects of rural livelihoods, and fourth, to suggest measures to improve the rural livelihoods through dairy farming.

The socio-economic status of dairy farmers has assumed a significant importance in rural social life, as it directly bears their income and occupations. The caste, occupation, education, social participation, landholding, house type, material possession, farm power, family types and family size jointly, health status, per capita income and living standard determines the socio-economic status of an individual farmer. The present study has been made to identify the impact assessment of dairy farmers and to determine the social and rural development of different categories of small and marginal farmers of the study area. Primary and secondary sources of data have been used in the study of livestock potential villages in which data were collected through direct questionnaire; four potential villages are selected on the basis of random sampling method.

### Key words:

Land less, Livelihood

## Measuring and Analyzing the Spatial Distribution of Mixed Land Use in Shenzhen: 2009-2013

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### Abstract

Although mixed land use is still controversial, it is clear that it can generate lots of benefits in transportation, public health and urban economy. The current achievements in this research, however, used to focus on macro scale and not consider the effect of neighbour blocks, and almost all measuring are based on a hypothesis that equal proportion of different land use types means the best. What we did was to use a new indicator considering neighbours and ideal proportion of different land use types to measure the land use mix at grid scale. Shenzhen, one of classical rapid urbanization megapolis of China, were chosen to implement a case study. The data processed as follow: 1) to calculate the proportion of land use types for each 250m\*250m size grid using convolution method and 11\*11 size window; 2) to determine the ideal proportion of different land use type of Shenzhen according 2 national standards of urban land use and planning; 3) to measure the mixed land use of Shenzhen by virtue of a new indicator named MII which actually calculate the sum of squares of difference between real land use type proportion of a grid and ideal proportion; 4) to get the MII difference using MII of 2013 subtract MII of 2009, and MII ratio using MII of sprawled grid from 2009 to 2013 divide the average MII of 2013. The results show the amount of negative value grids, and the amount of grids which MII are larger than 1 were dominant.

### Key words:

measuring; analyzing; spatial distribution; mixed land use; Shenzhen



## Progress of Crime Mapping and Analysis in China

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### Abstract

Crime mapping and analysis in China is relatively new. Less than 200 research papers have published on this topic in Chinese. A national project on Policing GIS (PGIS) started in 2008 has propelled scholars to pay closer attention to this emerging field. This paper presents major opportunities and challenges of crime research in China, followed by a few case studies on street robberies, burglaries and fraud in selected southern cities of China. GIS based analysis and spatial statistical methods are used to reveal the spatial and temporal crime patterns, and to explore the associations of crime with environmental and socio-economic factors. Comparisons will be made to related research in the United States.

### Key words:

Crime Mapping and Analysis; Crime in China

## Spatial Mining of Large Administrative Data to Identify and Understand Neighbourhood Problems: The Case in Brisbane, Australia

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### Abstract

The collection of large-scale administrative data from city councils provides new opportunities for researchers and city management to monitor, understand and manage a host of city phenomena. One example is records of complaints made by city residents about their neighbours, including spatial information such as the address of the complainant and the problem neighbour as well as the nature of the problem. While large in size, the data also include records that are not specifically about neighbours, such as reports of problems when passing by an area, or requests for services. This paper presents a GIS based spatial data mining approach to identify and analyse de-identified information about complaints made to the Compliance and Regulatory Services (CARS) division of Brisbane City Council in Queensland, Australia over a seven-year period (2007-2014). By geocoding and integrating the complaint data with other spatial datasets including the Geocoded National Address File (G-NAF) and the Digital Cadastral Database (DCDB), we identified real neighbourhood problems (with both the complainant and offender living within close proximity). The spatial distribution of the problems as well as their change in patterns over time were mapped and analysed. Furthermore, an exploratory factor analysis (EFA) was conducted to identify the underlying factor structure of the problems, and spatial clustering of neighbour problems in different Brisbane suburbs. The spatially integrated data mining and analytical approaches enable us to gain deeper insights to the understanding of the nature of neighbour problems and their spatio-temporal evolution in Australia's dynamically changing urban space.

### Key words:

spatial data mining; large administrative data; GIS; neighbourhood problems; Brisbane

## How to Grasp the Distributions of Urban Public Service and Facilities in Big Data Era: Case Study in Guangzhou, China

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### Abstract

With the rapid development of the Internet, the era of big data is coming, there are huge amounts of information (include languages, instruction, data, signal, image and sound, etc.) generated and shared every day. People can be very convenient to obtain all kinds of information and to perceive the development and change the world. Urban is the result of the development of human social, economic, political and cultural. How to acquire and sense efficiency characteristic information of a urban is an opportunity and a challenge. Using the Baidu Map API (Application Programming Interface), We developed our own software programme to get quickly to the points of interest (POI). It is convenient to help us grasp distributions of urban public service and facilities. Take the primary schools as example, we accurately get the location information of more than 1000 primary schools in Guangzhou city. We also analyze accessibility, rationality and fairness of the primary school distributions by overlaying resident distribution and transportation Information.

### Key words:

Big data Era; Baidu map; Application Programming Interface (API); Points of interest (POI); Urban public service and facilities

## Environment-Health and Social Welfare

### Environmental pollution and monitoring



Home

### Oral

1. [Air Pollution and Its Impact On Human Health of Ulaanbaatar City](#)  
Myagmarsuren Dash, Otgonbayar Erdenetsogt (University of The Humanities, Mongolia)
2. [Air Quality in Major Spanish Cities: Analysis Based on Modelled Spatial Patterns in Madrid, Barcelona and Seville](#)  
Cañada Torrecilla MarÍA Rosa (Universidad AutÓNoma De Madrid, Spain), Moreno Jimenez Antonio (Universidad Autonoma De Madrid, Spain)
3. [Analysis of Uranium Content of Radionuclide in Surface Water, Paddy Soil and Rice Within the Tailing Dam in East China](#)  
Long Xiang, Pinghui Liu (East China University of Technology, China)
4. [Assessment of Groundwater Vulnerability to and Risk of Contamination in Kaduna Metropolis, Northwest Nigeria](#)  
Murtala Shehu Ahmed (Kaduna Refining and Petrochemical Company Limited, Nigeria), Adamu Idris Tanko (Bayero University, Kano, Nigeria), Murtala Muhammad Badamasi (Bayero University, Kano, Nigeria), Adnan Abdulhamid (Bayero University, Kano, Nigeria)
5. [Characterization On PM<sub>2.5</sub>/PM<sub>10</sub> During Winter Period in Guangzhou, China](#)  
Tian Li Xue (South China Normal University, China)
6. [Comparative Assessment of Phytoremedial Potential of Aquatic Macrophytes Grown in Industrial Wastewater of Ranchi \(India\)](#)  
Dr. Moushumi Hazra (Faculty, St. Xaviers College, Ranchi 834001, India), Dr. Kirti Avishek (Assistant Professor, Birla Institute of Technology, Mesra, Ranchi 835215, India), Dr. Debjani Roy (Faculty, Nirmala College, Ranchi University, Ranchi, India)
7. [Effect of Nitrogen Input on Litter and Soil Properties in A Peatland on Da Xing'an Mountains, Northeast China](#)  
Yanyu Song, Changchun Song, Xianwei Wang (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China)
8. [Evaluation of The Air Pollution Sources in Selected Zone of Textile Industries in Pakistan](#)  
Mujahid Farid, Shafaqat Ali (Department of Environmental Sciences and Engineering, Government College University Faisalabad, Pakistan, Pakistan)

9. [Identifying The Main Contributors of Air Pollution in Beijing](#)  
Sike(Lydia) Li (University of Maryland, United States), Kuishuang Feng (University of Maryland, United States), Mengxue Li (University of Maryland, United States)
10. [Mixed Plastic Waste as an Intractable Environmental Problem in Abuja, Nigeria](#)  
Adati Ayuba Kadafa (Nasarawa State University Keffi, Nigeria), Haruna K. Ayuba (Nasarawa State University Keffi, Nigeria), Nasiru Idris (Nasarawa State University Keffi, Nigeria)
11. [PM<sub>2.5</sub> Pollution Characteristics and Its Underlying Risk Factors in Beijing-Tianjin-Hebei and The Surrounding Regions](#)  
Lei Zhou (China National Environmental Monitoring Center, China), Jianjun Wu (Beijing Normal University, China), Nian Liang, Yong Ni (China National Environmental Monitoring Center, China)
12. [Pollution Characteristics and Sources of Heavy Metals in Leafy Vegetable-Soil System in Typical Industrial Areas of Suburban Shanghai, China](#)  
Chunjuan Bi (Key Laboratory of Geographical Information Science of the Ministry of Education, College of Geographic Science, East China Normal University, China), Weiyi Ni (Key Laboratory of Geographical Information Science of the Ministry of Education, China)
13. [Reducing Chemical Risks by Amending Soil with Biochar](#)  
Damian Shea (NC State University, United States), Wenling Wang (Yunnan University, China), Xin Rui Xia, Xiang Kong (NC State University, United States)
14. [Satellite-Based Predicting the Spatiotemporal Distribution of Fine Particulate Matter in China Using Deep Learning](#)  
Tongwen Li, Huanfeng Shen (School of Resource and Environmental Sciences, Wuhan University, China), Qiangqiang Yuan, Xueche Zhang (School of Geodesy and Geomatics, Wuhan University, China)
15. [Satellite-Measured Atmospheric Aerosol Content in Korea: Anthropogenic Signals from Decadal Records](#)  
Sunyurp PARK (Pusan National University, South Korea), Jinmu CHOI (Kyung Hee University, South Korea)
16. [Sources and Health Risk Assessment of Polycyclic Aromatic Hydrocarbons in Road Dusts and Vegetable Field Soils from Typical Industry Areas of Shanghai, China](#)  
Jinpu Jia, Chunjuan Bi (Key Laboratory of Geographical Information Science of the Ministry of Education, College of Geographic Science, East China Normal University, China)

17. [Spatial-Temporal Characteristics of PM<sub>2.5</sub> And Correlations of PM<sub>2.5</sub> And Natural Factors of Cities in China in 2015](#)

Zhiqiang Hu (Key Research Institute of Yellow River Civilization and Sustainable Development & Collaborative Innovation Center On Yellow River Civilization of Henan Province, Henan University, China), Changhong Miao (Key Research Institute of Yellow River Civilization of Henan Province, Henan University, China)

18. [Spatio-Temporal Visualization and Analysis of Environmental Monitoring Data](#)

Wei Lu, Tinghua Ai (Wuhan University, China)

## Poster

1. [A Comparison Research on VOC Components, Resources and Contribution to Ozone Formation in 9 Cities along Yangtze River](#)

Zihao Lu; Lixiang Gu; Yu Huang (China, Nanjing University)

2. [Aerosol Remote Sensing Research Based on Surface Partition Reflectivity Model in Pearl River Delta](#)

Wang Dehui; Sun Jie (China, School of Geography and Planning, Gannan Normal University)

3. [Evaluation of Sources and Variation of Nitrate in Surface Water of the Weihe River](#)

Ying Xue; Jinxi Song (China, Northwest University)

4. [Impacts of Ambient Air Pollution on Roadside Vegetation: A Case study of Faisalabad-Pakistan](#)

Saadia Hina (Pakistan, Department of Environmental Sciences & Engineering, Government College University, Faisalabad)

5. [Nutrient Concentrations and Fluxes in the Upper Catchment of the Miyun Reservoir, China and Potential Nutrient Reduction Strategies](#)

Jian Jiao; Ping Zeng (China, China Institute of Water Resources and Hydropower Research)

6. [Pollution Characteristics, Source Identification and Lung Cancer Risk of Ambient Atmospheric Polycyclic Aromatic Hydrocarbons in a Coking Industry City in Northern China](#)

Tao Wang; Zhonghuan Xia (China, School of Environment, Nanjing Normal University)

7. [Spatial Multi-scale Variability of Heavy Metals in Surface Sediments in Radial Sand Ridge Field, Jiangsu Coast](#)

Jianshu Lv (China, Shandong Normal University)

8. [The Hyperspectral Response of Carex cinerascens to Pb and its combined Pollution Stress](#)

Caiying NI; Pengfei SONG; Hongyi LI (China, Geography and Environmental Institute, Jiangxi Normal University)



9. [The Impact of Iron Plaque on Rare Earth Elements Uptake and Translocation by Rice](#)  
Shulan Jin; Yizong Huang (China, Shangrao Normal University)
10. [The Potential of Seaweeds to Integrate the Remediation of Eutrophic Sea Waters with the Improvement of Inland Iodine Deficiency Environments](#)  
Rui Li; Jiawei Liu; Chunlai Hong (China, Institute of Environmental and Biogeochemistry, Zhejiang University)

## Air Pollution and its Impact on Human Health of Ulaanbaatar city

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### Abstract

Due to uncontrolled expansion of a city and population growth, air quality issue had been on fire for the last decade in Ulaanbaatar city. The result study aimed to monitor Ulaanbaatar air quality changes and its impacts on human health. Air pollution research study was conducted at the "Environmental monitoring laboratory", University of the Humanities. The number of sampling of precipitation and soil were prepared. The laboratory experiment result shows that sources of burning organic fuel have been increased heavily in Ulaanbaatar city, which emits  $\text{NO}_2$  and  $\text{SO}_2$  into the atmosphere,  $\text{NO}_2$  and  $\text{SO}_2$  react to hydrogen ion in the atmosphere and forms  $\text{SO}_4^{2-} - \text{NO}_3$ . The amount of the ion has increased in the snow - water. Snow-water is considered as mild type, but its solidity has increased to 2.2-4.6 mg eqv/l for the last year. The soil water sample is 11.46-12.2 mg eqv/l, very hard. The amount of  $\text{NO}_3$  in snow - water and soil water is low. The amount of  $\text{NO}_2$  in the atmosphere is 2 to 3 times greater than snow-water. According to the average amount of total pollutants, the highest mean was measured in the samples from the air quality measurement points in Bayanzurkh district. As a result of the research, it is shown that the air quality index will be increasing for the last years and it has a clear impact on human health.

### Key words:

Urban air pollution; snow-water; soil pollution; human health

## Air Quality in Major Spanish Cities: Analysis Based On Modelled Spatial Patterns in Madrid, Barcelona and Seville

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### Abstract

The most highly populated Spanish cities experience difficulties in complying with air quality regulations established by the European Union. Therefore, the Spanish government (Plan AIRE (2013-2016), together with regional and local governments, is driving measures against air pollution and to protect the health of the population.

Our objective was to determine the spatial distribution of the most harmful pollutants, showing intra-urban contrasts. Given that measuring stations are neither abundant nor regularly distributed, extensive areas remained uncovered. Our study, therefore, has made use of spatial interpolation techniques to estimate mean annual levels of pollution. Two techniques were used for modelling nitrogen dioxide, airborne particulate matter smaller than 10  $\mu\text{m}$  and ozone: IDW (Inverse Distance Weighting) and Kriging, using ArcGIS (Geostatistical Analyst).

The results show that in large sectors of Madrid and Barcelona the maximum values of  $\text{NO}_2$  are exceeded. In  $\text{PM}_{10}$ , and applying the criteria of the World Health Organisation, limits are exceeded in the entire urban area of Barcelona, in 98% of Seville and 77% of Madrid. As for  $\text{O}_3$ , Seville is the city presenting the worst scenario with 58% of its surface area surpassing an annual mean of 25 days in excess of  $120 \mu\text{g}/\text{m}^3$ . In Madrid, this threshold is only exceeded at the suburban measuring stations. This legal threshold is not exceeded in Barcelona.

### Key words:

Urban pollution; air quality;  $\text{NO}_2$ ;  $\text{PM}_{10}$ ;  $\text{O}_3$ ; spatial interpolation; Madrid; Barcelona; Seville

## **Analysis of Uranium Content of Radionuclide in Surface Water, Paddy Soil and Rice Within the Tailing Dam in East China**

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### **Abstract**

To assess contents of radioactive element uranium utilizing X-Series ICP-MS in 3 different ditches nearby tailing dam in east China—totally 12 surface water samples, 9 rice samples, and 9 paddy soil samples were collected, which were based on their relative position to the tailing dam. The radionuclide uranium contamination levels of 3 ditches were measured by using SingleFactor Index Method. The results show that: (1) For the first ditch, the average uranium concentrations in surface water (27.68 μg/L) and in paddy soil (69.40 μg/g) were 22.32 and 15.77 times respectively comparing to that of unexploited deposit area and soil uranium element background values of Jiangxi province, indicates severe contamination. The average uranium concentration of rice (3.33 ng/g) was 2.85 times of that in unexploited deposit area, indicates moderate contamination. (2) For the second ditch, the average uranium concentrations in surface water (0.19 μg/L) and in paddy soil (4.13 μg/g) were lower than that of unexploited deposit area and soil uranium element background values of Jiangxi province. So they were unpolluted. The average uranium concentrations (1.17 ng/g) in rice were 1.51 times of that in unexploited deposit area, indicates slight contamination. (3) For the third ditch, the average uranium concentration in surface water (0.48 μg/L) and in paddy soil (3.34 μg/g) were also lower than that of unexploited deposit area and soil uranium element background values of Jiangxi province. So they were unpolluted. The average uranium concentrations (2.55 ng/g) in rice were 2.17 times of that in unexploited deposit area, indicates slight contamination. In conclusion, the first ditch was directly affected by the tailing dam and the second and third ditches were not. Much work should be done to improve the environment.

### **Key words:**

tailing dam; surface water; paddy soil; rice; uranium concentration; radionuclide contamination; East China

## Assessment of Groundwater Vulnerability to and Risk of Contamination in Kaduna Metropolis, Northwest Nigeria

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### Abstract

DRASTIC index and GOD models were applied in the assessment of groundwater vulnerability to contamination in Kaduna metropolis, Nigeria. DRASTIC index evaluates the contributions of seven environmental parameters (Depth to water level, net Recharge, Aquifer media, Soil media, Topography, Impact of vadose zone, and Hydraulic Conductivity) in the protection of groundwater against contamination. GOD model on the other hand, assesses the significance of groundwater confinement in the aquifer (G), overlying lithology (O) and depth to groundwater level (D) in determining the susceptibility of groundwater to contamination. For the risk assessment, the EU COST Action 620 approach to hazard and risk analysis was applied. Unclassified and classified hazard (contaminants sources) maps of the area were produced. Pollution potentials in the area was found to be generally moderate to low. Using the overlay operation of Arc GIS, the two vulnerability maps generated were each merged with the classified hazard map to produce the groundwater contamination risk maps of the area according to the two models. High contamination risk was found around the Kaduna refinery, the two dumpsites of Mando and Kakau as well as most parts of the residential areas. It is recommended that, strict control measures be put in place when locating land uses with high potential hazards in areas with relatively high vulnerability.

### Key words:

Groundwater; vulnerability; risk; hazard; GIS

## Characterization on $PM_{2.5}/PM_{10}$ During Winter Period in Guangzhou, China

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### Abstract

With the rapid economic development and urbanization over the past several decades, air pollution and degradation of visibility are common in Guangzhou, especially in winter. Our objective is to generalize the variation characteristic of  $PM_{2.5}$  and  $PM_{10}$  during winter period in Guangzhou and provide some theoretical evidence for the government and the relevant administration to defend  $PM_{2.5}$  and  $PM_{10}$ . This article collects the concentration data of  $PM_{2.5}$  and  $PM_{10}$  in the area of Guangzhou from 2014.11-2015.1 (the winter period), and the concentration of  $PM_{2.5}$  and  $PM_{10}$  were  $(55.01\pm 78.19)\mu\text{g}/\text{m}^3$  and  $(78.34\pm 101.76)\mu\text{g}/\text{m}^3$ , respectively. The mean ratio of  $PM_{2.5}$  to  $PM_{10}$  was 70.59% and the  $PM_{2.5}/PM_{10}$  value ranges from 54.61% to 94.37%, indicating that fine particle ( $PM_{2.5}$ ) occupy high proportion in the  $PM_{10}$ . In addition,  $PM_{2.5}$  has a good linear relationship with  $PM_{10}$ . All evidence provides us conclusions that fine particle has a higher proportion in the atmospheric aerosol, and make a major contribution in the air environmental pollution.

### Keywords:

$PM_{2.5}$ ;  $PM_{10}$ ;  $PM_{2.5}/PM_{10}$ ; Variation Characteristic; Guangzhou

## Comparative Assessment of Phytoremedial Potential of Aquatic Macrophytes grown in Industrial Wastewater of Ranchi (India)

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### Abstract

Contamination of any water body resource is common due to domestic effluents, discharges from industries as well as from agricultural activities. Heavy metals are one of the major contaminant that gets released and causes potential hazard to the soil environment as well as the species of plants that thrive on it. The present study focusses on three plant species namely *Typha latifolia*, *Monochoria hastata* and *Eichornia crassipes* that grow luxuriantly in contaminated water bodies across Ranchi. They were sampled from natural environment, allowed to grow in the mesocosm system, till their acclimatization. After about 20-25 days, industrial wastewater (influent) was given to the plants, and the effluent was collected on Day 1, 3, 5, 7, 9 and 11. Bioconcentration factor (BCF) of both belowground and aboveground biomass was found out. Simultaneously translocation factor was also evaluated. Based on the experimental study it was concluded that root structures are more efficient in taking heavy metals and it translocated less to the aboveground part of the plant. Therefore, TF was less and the values were mostly less than 1. The heavy metal tolerant species which do possess high BCF and low TF can be used for phytostabilization of any contaminated site.

### Key words:

Industrial wastewater; phytoremedial potential; bioconcentration and translocation factor; contaminants of concern

## Effect of Nitrogen Input on Litter and Soil Properties in a Peatland on Da Xing'an Mountains, Northeast China

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### Abstract

Nitrogen (N) is a limiting nutrient in many peatland ecosystems. Enhanced N deposition, a major component of global change, affects ecosystem carbon (C) cycle by changing plant and soil properties. However, the effects of enhanced N deposition on peatland ecosystems are poorly understood. We conducted a two-year N input field experiment in a peatland dominated by *Eriophorum vaginatum* on Da Xing'an Mountains, Northeast China. Four levels of N treatments were applied: (1) CK (no N added), (2) N1 (6g N m<sup>-2</sup> yr<sup>-1</sup>), (3) N2 (12 g N m<sup>-2</sup> yr<sup>-1</sup>), and (4) N3 (24 g N m<sup>-2</sup> yr<sup>-1</sup>). Plant and soil material was harvested at the end of the second growing season. Nitrogen inputs increased litter N and P content, as well as  $\beta$ -glucosidase, invertase, and acid-phosphatase activity, but decreased litter C/N and C/P ratios. Litter carbon content remained unchanged. Nitrogen inputs increased available NH<sub>4</sub><sup>+</sup>-N and NO<sub>3</sub><sup>-</sup>-N in the shallow soil (0-15 cm depth), decrease soil labile organic C (MBC and DOC), and appeared to accelerate the decomposition and reduce the stability of the soil C pool. Invertase and urease activity in shallow soils and acid-phosphatase activity in deep soils (15-30 cm depth) was strongly inhibited by N inputs. Our results suggest that an increase in N deposition in peatlands may accelerate litter decomposition and the loss of labile C, as well as alter microbial biomass and function.

### Key words:

nitrogen input; peatland; *Eriophorum vaginatum*; soil labile organic carbon; enzyme activity

## **Evaluation of the Air Pollution Sources in Selected Zone of Textile Industries in**

### **Pakistan**

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#### **Abstract**

The present work reports the gaseous emissions of the following industries, Interloop Textile (IP Tex), Crescent Textile (CT Tex), Kalash Textile (KH Tex), Noor Fatima Textile (NF Tex), Bashir Textile (BP Tex) and Hina Sana Textile (HS Tex) which are located in Faisalabad, Pakistan. Industries were tested for the mixture of gases containing carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>) and hydrogen (H<sub>2</sub>) emitting from these industries. The maximum amounts of CO, NO<sub>x</sub> and SO<sub>2</sub> were found as 4903 mg/Nm<sup>3</sup>, 437 mg/Nm<sup>3</sup> and 3383 mg/Nm<sup>3</sup> in boilers and 1927 mg/Nm<sup>3</sup>, 2297 mg/Nm<sup>3</sup> and 0 mg/Nm<sup>3</sup> in generators. Similarly concentrations of CO<sub>2</sub> and H<sub>2</sub> were found in the range of 58732-221964 mg/Nm<sup>3</sup> and 0-174 mg/Nm<sup>3</sup> in boilers and 21714-131429 mg/Nm<sup>3</sup> and 0-174 mg/Nm<sup>3</sup> in generators. The other factors of pollution in industries are temperature and noise whose values were found to be 521 °C and 97 dB respectively. Smoke opacity of oil generators was found to be exceeding NEQS at 40%. Overall, the combustion efficiency of gas boilers is better than oil boilers and which is found better than generators up to 30%. On the basis of results found it can be concluded that natural gas is better fuel as compared to diesel oil and furnace oil and low state of combustion is unfavourable for use due to low oxidation of fuel.

#### **Key words:**

Boilers; Emissions; Generators; Industries; Opacity; Pollutants



## Identifying the Main Contributors of Air Pollution in Beijing

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### Abstract

Air pollution has become an emerging environmental issue in developing countries like China in the last two decades. Sulphur dioxide (SO<sub>2</sub>) is one of the major air pollutants that poses significant risks in many areas undergoing a process of industrialization such as Beijing. Realizing the main factor causing environmental quality changes is the key to solving this problem. By using an extended version of IPAT model, this paper aims to identify the main contributors of air pollution in Beijing from 1989 to 2012. The result shows that the most influential factors affecting air pollution in Beijing are affluence and emission intensity. From analyzing the historical background, we conclude that the air pollution change in Beijing is heavily policy-driven.

### Key words:

IPAT analysis; Beijing, Air pollution; Sulphur dioxide (SO<sub>2</sub>); Environment

## Mixed Plastic Waste as an Intractable Environmental Problem in Abuja, Nigeria

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### Abstract

Plastic waste is found in all types and forms mostly from packaging material for commercial products, thus resulting in its abundance in municipal solid waste. In the developed and developing countries, high quantities of mixed plastic waste are generated but in the developed countries extensive recycling and reuse strategies have been implemented toward minimizing its quantity in waste flow and that which requires final disposal. However, in the developing countries, the concept of recycling is relatively new, thus recycling is done only informally and carried out by scavengers. In Nigeria the greatest environmental issue in the urban areas is solid waste management and the most difficult aspect is how to handle mixed plastic. Due to its high generation since it is the most common packaging material used by the manufacturing sector within the country. Polypropylene (PP/5) found in confectionery packets and Polyethylene Terephthalate (PETE/1) found in soft drinks bottles are the most commonly generated plastic in Nigeria, which can be found in abundance littering the streets. Its high quantity generated and its non-degradable nature makes it a serious environmental challenge in Nigeria. This paper looks at mixed plastic waste in Abuja, Nigeria and its environmental hazards with the aim of sensitizing solid waste managers and the public to finding sustainable solutions to the problem.

### Keywords:

Plastic, Waste; Management; Abuja; Nigeria

## PM<sub>2.5</sub> Pollution characteristics and Its Underlying Risk Factors in Beijing-Tianjin-Hebei and The Surrounding Regions

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### Abstract

The temporal-spatial characteristics of typical PM<sub>2.5</sub> pollution events in 2013 were investigated in Beijing-Tianjin-Hebei and surrounding areas based on the national urban environmental air quality real time publishing data and geographic national condition monitoring results. The hot spot areas of PM<sub>2.5</sub> pollution in Beijing-Tianjin-Hebei and surrounding areas were located by the spatial data mining method. Using the geographic detector model, the risk factors of PM<sub>2.5</sub> pollution and the associated influence degree were quantitatively analyzed. The study found that, there statistically existed the Langfang-Beijing-Baoding-Tianjin-Chengde-Zhangjiakou pollution order in selected cities. Through the spatial hot spot detection, Beijing-Tianjin-Hebei and surrounding areas were divided into five hot spot areas, and the top three of them were distributed in Beijing, Tianjin, and Hebei-central Shandong regions, with areas of 53.1 thousand km<sup>2</sup>, 102.6 thousand km<sup>2</sup> and 50.4 thousand km<sup>2</sup>, respectively. Among the selected eight PM<sub>2.5</sub> pollution risk factors, number of industrial enterprises (0.94), precipitation (0.93) and topographic slope (0.89) had significant higher influence on PM<sub>2.5</sub> pollution than other risk factors. The influence power index order of other risk factors were as follows: population (0.60), number of precipitation days (0.57), land cover (0.52), relative air humidity (0.51) and wind speed (0.33). The study can provide scientific reference and decision support to governments through analyzing the temporal-spatial characteristics of regional air pollution and its regional differentiation, detecting the pollution hot spots, and identifying the underlying PM<sub>2.5</sub> risk factors.

### Key words:

PM<sub>2.5</sub>; Beijing-Tianjin-Hebei; temporal-spatial characteristics; spatial hot spot detection; Geographic detector

## **Pollution Characteristics and Sources of Heavy Metals in Leafy Vegetable-Soil System in Typical Industrial Areas of Suburban Shanghai, China**

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### **Abstract**

The concentrations of Zn, Cr, Cu, Pb, Cd, Hg, As and lead isotope ratio in soils, road dust and vegetables were measured to analyze the pollution characteristics, risk levels and contamination sources in leafy vegetable-soil system in typical industrial areas of suburban Shanghai, China. A lead isotope simulation experiment was designed to discuss the source contributions of Pb in vegetables from atmospheric deposition and soil. The results showed that the average concentrations of Zn, Cr, Cu, Pb, Cd, Hg and As in soils were 122.51, 79.75, 24.54, 28.14, 0.12, 0.82, 6.49 mg/kg, respectively, which were less than those in dusts. Nemerow and  $I_{geo}$  assessment indicated that the contamination of Hg in soils was ubiquitous, and was more serious in the road dust. The average concentrations of Zn, Cr, Cu, Pb, Cd, Hg and As in edible leaves of vegetables were 37.0, 1.94, 4.81, 0.73, 0.44, 0.02, 0.52 mg/kg, respectively. While those in roots were much higher than that, meaning the strong enrichment capacity of roots. Target Hazard Quotient (THQ) of vegetable edible parts were totally less than 1, suggesting no health risk to people. The ratios of  $^{207}\text{Pb}/^{206}\text{Pb}$  and  $^{208}\text{Pb}/^{206}\text{Pb}$  suggested that Pb in soil was mainly derived from the Yangtze estuarine sediments, while Pb in vegetables and dusts was polluted by human activities, such as industrial emissions, vehicle exhaust, fertilizer, etc. The simulation experiment results suggested that the contributions of Pb from atmospheric dry and wet deposition to both edible leaves and roots of the vegetables were less than 20%.

### **Key words:**

heavy metals; the leafy vegetable-soil system; atmospheric deposition; contamination sources

## Reducing Chemical Risks by Amending Soil with Biochar

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### Abstract

The amendment of soil with biochar, produced through the pyrolysis of plant biomass, has been suggested as a means to partially mitigate climate change through carbon sequestration while improving soil fertility. At the same time, biochar has the potential to alter exposure to chemicals in the soil and nearby water and plants. On the one hand, biochar has the potential to increase exposure to PAHs and dioxins that are formed during pyrolysis through desorption of these chemicals to soil and water. On the other hand, biochar has the potential to decrease chemical exposure through adsorption/absorption of other chemicals already in the soil, such as pesticides. We report on the use of passive sampling devices (PSDs) to estimate the bioavailable fraction of chemicals in both the biochar and the soil before and after the biochar amendment of soils. We allowed polyoxymethylene (POM) PSDs to reach equilibrium with biochar-water and soil-water slurries to estimate the amount of chemical dissolved in water. We found that although bioavailable PAHs and dioxins increased following amendment with biochar, the concentrations did not exceed commonly used benchmarks for the protection of human health. We also found a reduction in the bioavailable amount of pyrethroids and DDT in the soil after biochar amendment. Our results indicate that biochar amended soil presents a trade-off in exposure to chemicals, but with a net reduction in risk to human health along with the added benefits of carbon sequestration.

### Key words:

biochar; human health; toxicity; pesticides; dioxins; passive sampling; carbon sequestration; soil fertility

## Satellite-based Predicting the Spatiotemporal Distribution of Fine Particulate Matter in China Using Deep Learning

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### Abstract

Fine particulate matter ( $PM_{2.5}$ ) has an adverse impact on human health, environment and climate change. In this paper, taking advantage of the satellite-based aerosol optical depth (AOD), meteorological data and station-level  $PM_{2.5}$  measurements, a deep learning model called deep belief network (DBN) is developed to obtain spatially continuous  $PM_{2.5}$  in China. This is the first study to incorporate satellite remotely sensed data into the deep learning model for predicting  $PM_{2.5}$  concentrations. Through the layer-by-layer unsupervised pre-training, the DBN model can automatically capture the deep features from multi-source data to improve the accuracy of  $PM_{2.5}$  estimation. Moreover, the optimization of model parameters (e.g., the number of layers and neurons) is further discussed. The results indicate that compared with the conventional multiple linear regression and back propagation (BP) neural network models, the DBN model obtains a better performance, suggesting that the proposed DBN model is more effective for the estimation of  $PM_{2.5}$ . Based on the established model, the spatially continuous  $PM_{2.5}$  data can be reconstructed, and the spatiotemporal characteristics of  $PM_{2.5}$  concentration in China are investigated at a large scale. The results show the capacity of our study to provide useful information for pollution control and sustainable development.

### Key words:

satellite remote sensing;  $PM_{2.5}$ ; spatiotemporal characteristics; deep learning

## Satellite-Measured Atmospheric Aerosol Content in Korea: Anthropogenic Signals from Decadal Records

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### Abstract

Spatiotemporal characteristics and anthropogenic signals of aerosol optical thickness (AOT) distributions over Korea are investigated in this study using AOT time-series data from the Moderate Resolution Imaging Spectroradiometer (MODIS). AOT observations, a quantitative measure of the atmospheric quality, had significant geographical variations during the study period (2000-2010). Annual means of AOT measurements were higher in western regions than eastern regions, indicating the strong effects of atmospheric effluents from China. Comparing metro cities or counties with similar populations, western regions showed higher AOT values than eastern regions. The transport of particular matters with a diameter  $< 10 \mu\text{m}$  ( $\text{PM}_{10}$ ) into the region has shown a strong seasonal pattern with their peaks from March to April and lows from July to September. While the Asian Dust typically blows in March and April in Korea, AOT observations peaked in June nationwide. AOT peaks in summer months and significant correlations between AOT and relative humidity during the AOT-peak month, also indicate that human activities and secondary growth of hygroscopic aerosols are still an important contributor to the urban air quality. With increasing fine-mode aerosols from anthropogenic sources and low ratios of external/internal background  $\text{PM}_{10}$  sources in summer, urban emission of anthropogenic aerosols becomes a significant, responsible factor for air-quality degradation in the non-dusty season over the Korean Peninsula. Human impacts on the aerosol distributions were also noticeable on different land use types. AOTs in urban areas were significantly higher than those in cultivated land or forests.

### Key words:

AOT; MODIS; land use;  $\text{PM}_{10}$ ; Korean Peninsula; hygroscopic aerosol

## Sources and Health Risk Assessment of Polycyclic Aromatic Hydrocarbons in Road Dusts and Vegetable Field Soils from Typical Industry Areas of Shanghai, China

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### Abstract

Road dust and vegetable field soil samples were collected from eight sites close to steel mills, chemical plants and municipal solid waste incinerator in suburban Shanghai. Sixteen polycyclic aromatic hydrocarbons (PAHs) were determined by GC/MS. Total PAHs concentrations in road dust samples ranged from 791.61 to 6196.49 ng·g<sup>-1</sup> with a mean value of 2378.14 ng·g<sup>-1</sup>, while they varied from 258.05 to 535.30 ng·g<sup>-1</sup> in vegetable field soils with an average of 364.56 ng·g<sup>-1</sup>. The spatial distribution of PAHs in dusts and soils was consistent. And the wind direction could affect the spatial distribution of PAHs. Organic matter content was found to be significantly positive correlation with PAHs concentration in dusts and soils. PAH isomer ratio method showed that combustion of grass, wood and coal was important source of PAHs in road dusts and vegetable field soils. Toxic equivalent concentrations (TEQ) of PAHs in the road dust ranged from 89.99 to 603.53 μg BaP<sub>eq</sub>·kg<sup>-1</sup>, while they varied from 33.04 to 65.92 μg BaP<sub>eq</sub>·kg<sup>-1</sup> in vegetable field soils. Toxic equivalent concentrations indicated 7 kinds of carcinogenetic PAHs were major TEQ contributors, accounting for 98% of TEQ, in the road dust and vegetable field soils. Incremental lifetime cancer risk (ILCR) estimation results showed that the PAHs in the dust and soil had potential cancer risk for children and adults by direct ingestion exposure.

### Key words:

PAHs; road dusts; vegetable field soils; typical industry areas; shanghai

## Spatial-temporal Characteristics of PM<sub>2.5</sub> and Correlations of PM<sub>2.5</sub> and Natural Factors of Cities in China in 2015

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### Abstract

Based on the observed PM<sub>2.5</sub> concentration data of 367 cities in 2015, our research reveals the spatial-temporal variations of PM<sub>2.5</sub> concentrations and the relationship between PM<sub>2.5</sub> and natural factors in China with the methods of exploratory spatial data analysis and Spearman correlation analysis. The results show that: (1) In 2015, PM<sub>2.5</sub> concentration has a periodical double peak, double valley type 24hour variation, huge difference daily variation as well as a U-shaped monthly variation with a higher level in autumn and winter while a lower one in spring and summer. (2) Concentration of PM<sub>2.5</sub> in urban China shows a significant spatial differentiation and formed two heavy pollution area: North China, central and the area of the south Tianshan Mountains in Xinjiang. From the point of view of the season, PM<sub>2.5</sub> exceeds the standard serious with a large range of coverage in winter and on the contrary in summer. From the point of view of the month, the standard of exceed rate and cover scope of PM<sub>2.5</sub> is significant different. The Beijing-Tianjin-Hebei-Henan was the most severely polluted region all the year round. From the point of view of spatial agglomeration, the high value areas are mainly concentrated in the Beijing, Tianjin, Hebei, Shandong and Henan. The low value areas are mainly concentrated in the Guangdong, Fujian, Yunnan, western Sichuan and Southeast of Tibet. (3) PM<sub>2.5</sub> concentration of the nationwide showed a significant negative correlation with average elevation and relief degree. PM<sub>2.5</sub> concentration of the nationwide, Beijing-Tianjin-Hebei-Shandong-Henan, Jiangsu-Anhui, Jilin-Liaoning and Chengdu-Chongqing urban agglomerations showed a negative correlation with temperature, humidity and wind power. Of those, correlation of PM<sub>2.5</sub> and wind power is not significant. The relationship between PM<sub>2.5</sub> and natural factors in Xinjiang is special. The PM<sub>2.5</sub> of Xinjiang was significant negative correlation with temperature, positively correlated with humidity, but no significant positive correlation with wind.

### Key words:

PM<sub>2.5</sub>; spatial-temporal characteristics; natural factors; meteorological factors; topography

## Spatio-temporal Visualization and Analysis of Environmental Monitoring Data

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### Abstract

The environmental monitor data acts as the integrated information of spatial location, time-series and multi-semantics. To map this kind of data needs multi-dimension visualization tools not only to display the data but also to interactively operate it by a real-time way. Taking the air quality visualization as an example, this study builds a multi-dimension visualization method for environmental monitoring data based on the web 2.0 technology. This research applies Leaflet, an extensible JavaScript mapping library, as the mapping engine to develop the dynamic map layer class for adaptive mutli-scale spatial visualization, and D3, a visualization JavaScript library, as the map symbol engine to create an interactive map symbol class for multi-granularity time-series visualization. Through this kind of software mashup, We use the air quality hourly reported data from 1497 monitor sites of China in 2014 to design a dynamic and interactive online map mashup, which visualizes the multivariate spatial-temporal air quality dataset effectively. By configuring spatial and temporal scale of different pollutant indexes, this mapping application helps to discover some significant spatio-temporal characteristics of air quality in China, and these findings show us clues for further study and analysis on air pollution in China. First, it illustrates a triangular region of bad air quality condition and a coastal line ribbon of fine air condition. Second, different pollutants show different temporal and spatial deterioration patterns which give researchers and administrators clues about forming mechanism of different air pollutants and the controlling strategies for them.

### Key words:

Environmental Monitoring; Multi-scale Mapping; Time-series Visualization; Visual Analysis

## A Comparison Research on VOC Components, Resources and Contribution to Ozone Formation in 9 Cities along Yangtze River

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### Abstract

Yangtze River Area is the third biggest river area around the world, and it contains most economy developed areas of China. As a result, it is important for the future joint governance and sustainable development to research the distribution and connection of VOC(volatile organic compound) pollution in different river reaches. We choose 9 cities along Yangtze River for observation, use Ratio Method to do qualitative analysis on resources of pollutants, and use PCA(principal components analysis) method to do quantitative analysis. Afterwards, we find that pollution resources and contribution rates obviously vary in different river reaches, which may be caused by different structure of production and geographical environment. By correlation analysis and backward trajectory simulation, we find pollutant transportation and shared resources among cities. Besides, ozone pollution become highlighted after strict control of PM2.5 in recent years. In our research, we use a zero-dimensional chemical model to make a simple discussion on contribution of VOC to ozone formation.

### Key words:

VOC; Yangtze River Area; ozone formation

## Aerosol Remote Sensing Research Based on Surface Partition Reflectivity Model in Pearl River Delta

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### Abstract

This study sets up the AOD (aerosol optical depth) inversion method of 250m resolution in Pearl River Delta (PRD) based on the selection of OPAC aerosol model and the establishment of ground surface reflectance model of ecological geographic partition to cover the shortage and limitation in urban areas and low resolution of traditional dark object method to realize the high-resolution and full coverage aerosol detection in Pearl River Delta by MODIS. Besides, the results has been verified and typically applied in this study. Conclusions are as follows:(1) The OPAC Continental Mean Type Model is better than the Non-absorbent Type Aerosol Model from NASA MODIS in Pearl River Delta;(2) Fine linear relation between MODIS red light and shortwave infrared reflectance (SWIR) exists in all types of ecological areas in Pearl River Delta, and this relation has spatial differentiation and seasonal similarity;(3) The 250m AOD products in this study has better accuracy and fuller spatial coverage than the 10km MODIS AOD products in Pearl River Delta.This study can help to optimize currant distribution of PM2.5 auto-monitoring stations.

### Key words:

MODIS; AOD; surface reflectivity model; remote sensing; Pearl River Delta

## Evaluation of Sources and Variation of Nitrate in Surface Water of the Weihe River

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### Abstract

Nitrate pollution in river water is a major problem in the Earth's surface environments. Concentrations of three forms of nitrogen and isotopic composition of nitrate are measured to analyze and evaluate the sources and variation of nitrate, sampled from Weihe River basin, China during the Oct, 2014. Approximately 32.4% of the water samples exceed the World Health Organization (WHO) drinking water standard for  $\text{NO}_3^-$ -N. The content of nitrate at the site of Qianhe River is highest in surface water, which might be influenced directly by sewage effluent. And  $\delta^{15}\text{N}-\text{NO}_3^-$  of water samples ranged from 8.3‰ to 27.0‰ during the test time. Results showed that denitrification had no significant effect on the shift in nitrogen isotopic values in most surface water, except in two samples. In the study, nitrate in surface water was mainly sourced from domestic sewage and agricultural activities. This study provides significant information to estimate the water quality and to develop a more sustainable water management of the Weihe River.

### Keywords:

nitrate composition; nitrogen isotope; water chemistry; pollution; river

## Impacts of Ambient Air Pollution on Roadside Vegetation: A Case study of Faisalabad-Pakistan

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### Abstract

Urban air pollution is a serious threat to all kinds of living organisms influenced by four major factors, namely industrialized expansion of the cities, increase in traffic, rapid economic development, and higher level of energy consumption. Motor vehicles emit a cocktail of pollutants that is pervasive phytotoxic dominating the air pollution climate in urban-industrialized areas of the World. Vehicular exhaust emissions being the dominant feature of urban environments, widely believed to have detrimental effects on plants. Roads and exhaust emissions can affect plant communities directly, for example via direct foliar uptake of exhaust products, or indirectly via changes to soil biogeochemistry and hydrology. Like many other mega cities in the world the ambient air quality of Faisalabad, Pakistan is also deteriorating nowadays due to industrialization and transportation. The present work deals with the evaluation of the effects of exposure to a vehicular exhaust emission on physiological and chemical parameters of three different grass varieties grown at three different sites of Faisalabad.

### Key words:

Ambient air pollution; vehicular exhaust emission; vegetation

## Nutrient Concentrations and Fluxes in The Upper Catchment of the Miyun Reservoir, China and Potential Nutrient Reduction Strategies

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### Abstract

The Miyun Reservoir is Beijing's main drinking water source. Increased nutrient levels in the reservoir have resulted in an increased risk of harmful algal blooms. One hundred and ten water samples were collected at a range of spatial scales in the upper catchment of the Miyun Reservoir and were analyzed for total nitrogen (TN), nitrate ( $\text{NO}_3^-$ -N), ammonium ( $\text{NH}_4^+$ -N), total phosphorus (TP) and the potassium permanganate index ( $\text{COD}_{\text{Mn}}$ ). Empirical equations were developed from relationships between nutrient concentrations and the main controls on nutrients, and were used to identify parts of the catchment that should be targeted with nutrient-load reduction measures. Cropland was the main source of sediment for the streams, and much of the phosphorus was associated with sediment. The annual mean TP concentrations were closely correlated with both the annual mean suspended sediment concentrations and the ratio of the cropland area to the total basin area. There was a linear relationship between the annual mean TN concentration and the population density in the basins. Soil conservation may play an important role in reducing TP concentrations in the upper reaches of the Chao and Bai Rivers. It may be useful to (1) construct natural riparian buffers and vegetated buffers along croplands close to the watercourses, (2) implement management strategies to reduce nitrogen (N) fertilizer applications, and (3) construct additional wetlands to reduce nutrient loads in the study area.

### Key words:

nutrient concentrations; influencing factors; empirical equations; control measures;

Miyun Reservoir

## Pollution Characteristics, Source Identification and Lung Cancer Risk of Ambient Atmospheric Polycyclic Aromatic Hydrocarbons in A Coking Industry City in Northern China

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### Abstract

Distinguished by diverse periods (heating period and non-heating period) and diverse districts (urban areas, rural areas and background areas), both gas phase and particle phase samples were collected in 2015 in Linfen, which is a coking industry city in Northern China, and the PAHs were extracted and analyzed by using microwave and gas chromatography-mass spectrometry, respectively, to study the pollution characteristics, sources and lung cancer risk of ambient atmospheric PAHs in Linfen. The results were as follows. (1). The spatial and temporal distribution characteristics of concentrations of PAHs and BaP<sub>eq</sub> were the same: heating period>non-heating period, urban areas>rural areas>background areas, whereas the phase characteristics of them were contrary as the concentrations of gas phase PAHs were lower than those of particle phase PAHs while the results of BaP<sub>eq</sub> concentrations were on the opposite. BaP<sub>eq</sub> concentrations of Linfen were much higher than the level of Chinese National Standard (GB 3095-2012). The PAHs and BaP<sub>eq</sub> concentrations were 67.06±18.82 and 0.29±0.06, 101.07±40.13 and 11.97±4.73, 168.13±56.62 and 12.27±4.78 in gas phase, particle phase and both phases, respectively. Compared with results from regions at both home and abroad, the pollution of atmospheric PAHs in Linfen were in a relatively high level. Gas phase PAHs were mainly composed of low molecular weight compounds as PHE and FLO were major compounds in urban and rural areas while ACY took a high proportion in background areas. Particle phase PAHs were mainly composed of moderate molecular weight compounds and CHR, BbF and BkF jointly took a higher proportion in diverse areas in diverse periods. Total atmospheric PAHs were mainly composed of lower molecular weight compounds, like ANT, PHE plus FLO and the concentrations of ACE plus ACY were extremely high in background areas in diverse periods. (2). Atmospheric PAHs in Linfen originated primarily from biomass fuel and coal combustion as well as traffic exhaust. In terms of traffic exhaust, gas phase PAHs were influenced mainly by diesel vehicle emissions, whereas particle phase PAHs were influenced primarily by gasoline vehicle emissions. In general, total atmospheric PAHs were primarily influenced by diesel powered vehicles. The sources of PAHs in background areas were complex as several non-traffic exhaust sources were included, such as petroleum and petroleum

combustion. (3). Temporal, spatial and population distribution characteristics of the daily inhalation exposure levels of atmospheric PAHs were obvious in Linfen: heating period>the whole year>non-heating period, urban areas>rural areas, adults>adolescents>seniors>children as well as males>females. Corresponding values were in a relatively high level compared with other results. Temporal, spatial and population distribution characteristics of ILCR values were also obvious: the whole year>heating period>non-heating period, urban areas>rural areas, adults>children>seniors>adolescents, females>males (except adults). All population groups had cancer risk and adults were the predominant. Necessary control measures ought to be taken to prevent the trend. The values of ILCR in Linfen were in a relatively high level among results from other regions.

**Key words:**

polycyclic aromatic hydrocarbons; pollution characteristics; source identification; lung cancer risk; ambient air

## Spatial Multi-Scale Variability of Heavy Metals in Surface Sediments in Radial Sand Ridge Field, Jiangsu Coast

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### Abstract

Surface sediments from radial sand ridge field, Jiangsu coast were analyzed for Cd, Cr, Cu, Hg, Ni, Pb and Zn. The contents of Cd, Cr, Cu, Hg, Ni, Pb and Zn in surface sediments of radial sand ridge field varied within the natural background, and came from natural sources. Factorial kriging analysis were applied to examine the spatial multi-scale variability of seven heavy metals and to identify environmental factors affecting spatial variability at each spatial scale. Linear model of coregionalization(LMC) fitting indicated that spatial variation of heavy metals in surface sediments of radial sand ridge field was composed of nugget effect, an exponential structure with the range of 7 km (local scale), as well as a spherical structure with the range of 25 km (regional scale). At local scale, the spatial variations of metals were dominated by grain sizes of surface sediments, and the patches with high values were distributed in the northwestern and southeastern parts of radial sand ridge field. At regional scale, the spatial variations of heavy metals were controlled by mineral composition. The sediments of radial sand ridge field showed good environmental quality, and had little environmental risk. The relative high risk was merely located in the region with fine grain size.

### Key words:

Heavy metals; Spatial multi-scale variability; radial sand ridge field

## The Hyperspectral Response of *Carex cinerascens* to Pb and its combined Pollution Stress

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### Abstract

To build a connection between spectral information from the Environmental Satellite and soil heavy metal stress, the hyper-spectral information captured by portable full spectrum spectrometer (SVC HR-1024) of *Carex cinerascens* (*C.cinerascens*), a dominant plant in Poyang lake wetland, response to the stress of heavy metal pollutant Lead (Pb) and its compound metals (Cu, Zn), was discussed in this study. Results showed that metals' content in plant and soil (bioactivity) raised significantly with the increasing of added Pb, Cu and Zn. The sensitive spectral bands and characteristic parameters of *C.cinerascens* response to single Pb stress were Green Peak Value (550 nm), Depth of Blue Valley (495 nm), Depth of Red Valley (675 nm), Peak Value of Red Edge and Red Edge Slope (725 nm), and Pb content of leaf was positive correlated with Green Peak Value, but were negative correlated with others. When Pb combined Cu, spectral parameters were mainly affected by Cu concentration. While Pb combined Zn, Value of Red Edge and Red Edge Slope were the sensitive spectral parameters. But when Pb combined with Cu and Zn together, no any spectral parameter had significant correlation with the concentrations of added compound metals. So when mention to monitoring heavy metals' pollution in the soil by remote sensing technique, which can catch hyper-spectral information of vegetation quickly in a large scale, the stress of vegetation caused by single metal or compound metals should be treated with caution, most spectral characteristic parameters have better relationship with single metal stress than that of compounds.

### Key words:

*Carex cinerascens*; Pb stress; spectral parameters; compound pollution

## The Impact of Iron Plaque on Rare Earth Elements Uptake and Translocation by Rice

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### Abstract

We studied the impact of iron plaque on uptake and translocation rare earth elements by rice, using hydroculture method. After soaking 12 pots of rice in  $\text{Fe}_2\text{SO}_4$  for 36 hours, the root surface appeared reddish brown substance deposition. Using ICP-OES measurements, the results suggest that the root surface of rice formed iron plaque. We added three different concentrations of lanthanum nitrate into 12 pots of rice with iron plaque and 12 pots of rice without iron plaque. 10 Days later, we found that the La content in the root system and stem leaf of the rice with iron plaque is lower than the rice without iron plaque. The results suggest that the iron plaque has inhibition on uptake and translocation rare earth elements by rice.

### Key words:

Iron Plaque; Rare Earth Element; Lanthanum; Rice

## The Potential of Seaweeds to Integrate the Remediation of Eutrophic Sea Waters with The Improvement of Inland Iodine Deficiency Environments

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### Abstract

How to effectively remediate the eutrophic sea waters, and to improve inland iodine deficiency, are two critical ecological problems to be solved urgently. The contents of main macrolelements and micronutrients of the kelp, a macroalgae growing in Bohai Sea, Yellow Sea, East China Sea, and South China Sea, were measured. Its regional differences in nutrient contents and purification ability for nitrogen and phosphorus in sea waters were analyzed. Meanwhile, the organic iodine fertilizer was made from kelp to cultivate iodine-rich vegetables, and the biogeochemical process of using exogenous iodine to improve soil iodine deficiency was revealed. At last, a kelp-based potential solution to remediate the ecological environment was proposed, which can connect the remediation of eutrophic sea waters and the improvement of inland iodine deficiency in series. This may provide a technical route to foster an environmentally friendly iodine industry chain, including large-scale cultivation of kelp, extraction of biomass energy from kelp fermentation, manufacture of organic iodine fertilizer, and cultivation of iodine-rich plant foods, etc.

### Keywords:

kelp; seaweed iodine fertilizer; ecological restoration; eco-industrial chain; biogeochemistry

## Environment-Health and Social Welfare

### Human health and wellbeing



Home

### Oral

1. [Competing Forces of Socioeconomic Development and Environmental Degradation On Health and Happiness: A Multilevel Analysis of China](#)  
Lijuan Gu (Hubei Key Lab. for Geographical Process Analysis and Simulation, Central China Normal University, China), Mark Rosenberg (Department of Geography and Planning, Queen's University, Canada), Juxin Zeng (Hubei Key Lab. for Geographical Process Analysis and Simulation, Central China Normal University, China)
2. [Dengue Spread in Pakistan; Facts and Factors Responsible for The Outbreak of This Disease and Its Mitigation Strategies](#)  
Abdul Ghaffar (COMSATS, Islamabad, Pakistan), Bushra Khalid (IIU, Islamabad, Pakistan)
3. [Global Environmental Change and Urban Health Analysis: Some Emerging Complexities for Interdisciplinary Discourse](#)  
Usman Raheem, Gbenga Awotayo (Department of Geography and Env Mgt, Univ of Ilorin, Nigeria)
4. [Health and Wellbeing in the Changing Urban Environment: A case study of New Delhi](#)  
Monika Vij (Miranda House University of Delhi, India)
5. [Impact of Drinking Water on Human Health, The Challenges Ahead: A Case Study of Tekelangjun of Karbianglong District](#)  
Minakshi Phookan Hazarika (JB College, Jorhat, India)
6. [Incorporating Social Vulnerability to Assess Population Health Risk Due to Heat and Cold Stress in China](#)  
Wenmin QIN, Aiwen LIN (School of Resource and Environmental Sciences, Wuhan University, China)
7. [Problems and Prospects of Disabled Population in India](#)  
Laxmi Kant Prem Prakassh (Jawaharlal Nehru University New Delhi, India)
8. [Relationship between Deprivation and Population Health Status. Case Study: Ialomita County \(Romania\)](#)  
Ana Maria Talos (Faculty of Geography, Bucharest University, Romania)
9. [The Effects of VOC On Cancer Rate: Evidence from Panel Data of Chinese Cities](#)  
Wenbo Guo (The University of Hong Kong, HongKong SAR, China)
10. [Urban Health and Well Being: A Case Study of Urban Delhi](#)

Sandesh Yadav (Jamia Millia Islamia, Delhi, India), Haseena Hashia (Jamia Millia Islamia, Delhi, India)

## Poster

1. [Correlates of Caesarean Section Delivery in West Bengal \(India\) - An Analysis Based on DLHS-3](#)  
Rayhan Sk; Somdutta Barua (India, Jawaharlal Nehru University, New Delhi)"
2. [Geographical Perspectives and Approaches to Human Health and well Being](#)  
Mohd Taqi; Mohd Mazhar Ali Khan (India, Jamia Millia Islamia University, New Delhi, 110025)
3. [Identifying the Spatio-Temporal Pattern of Avian Influenza a H7N9 in China 2013-2014](#)  
Ping Zhang (China, JiLin University)
4. [Knowledge and Practice of Non Pharmacological Management of Pain among Sickle Cell Clients in Selected Hospitals, Southwestern Nigeria](#)  
Oluwatoyin Adeleke (Nigeria, State Hospital, Oyo State, Oyo State Ministry of Health, Nigeria)

## Competing forces of socioeconomic development and environmental degradation on health and happiness: A multilevel analysis of China

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### Abstract

China's rapid socioeconomic development in recent years and its accompanied environmental degradation are altering the conditions of residents' well-being. This paper applies multilevel analysis to 2013 China General Social Survey data on social development and health. Multilevel models are developed to investigate the competing forces of socioeconomic development and environmental degradation on self-reported health (SRH) and self-reported happiness (SRHP) and the unique situation encountered by low, middle and high income groups. Geographical distributions show significant spatial patterns with northern China having the highest levels of SRH and SRHP compared with low SRH in the southwest and low SRHP in southern coastal China. Logit multilevel analysis demonstrates that community environmental hazards mainly harm happiness of low and middle income groups while provincial-level greenspace coverage is linked to good health for all. Contrary to expectations, subjective and objective measures of pollutants are linked to good health, especially for high income groups, and developed provinces are connected to lower odds of happiness. The positive role of government and income on health and happiness are only significant for low and middle income groups. Employment is health protective for all while having basic health insurance is linked to SRHP of the low income group. These outcomes indicate the complex interconnections among economic development, environmental degradation and government policy have differential effects on SRH and SRHP in different parts of China and among different income groups.

### Key words:

China; income; health and happiness; development; environment; multilevel modelling

## Dengue spread in Pakistan; Facts and Factors responsible for the outbreak of this disease and its mitigation strategies

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### Abstract

Climate is an important factor as temperature, rainfall, winds and humidity play a crucial role in the vector borne disease outbreak that shows the direct and indirect economic loss of millions of USD each year and are inextricably related to human health as well as human mortality and morbidity. An increase in temperature, rainfall and humidity in Monsoon months in Pakistan has been associated with an increase in the incidence of dengue cases. In north-east Punjab, vector borne disease epidemics increase fivefold in the year following an El Niño event. The present study reveals the Dengue spread in Pakistan from the four big cities at macro-level as well as at micro-level based on the climate, social covariates and on the environmental risk factors. In one part of this study we have presented a data for the four years (i-e 2009-2012) while in second part we have selected a high endemic year of Dengue spread (i-e 2011) and based on the results we have suggested the mitigation strategies as well as the early warning system to save our community from this dreadful disease. Moreover, this study also focuses on the extension of Dengue, based on the above mentioned parameters (climate, social and environmental risk factors) in different regions of Pakistan.

### Key words:

Dengue spread; Climate covariates; social covariates; mitigation strategies

## Global Environmental Change and Urban Health Analysis: Some Emerging Complexities for Interdisciplinary Discourse

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### Abstract

There is a strong scientific consensus that warming of the climate system is a fact that can no longer be ignored for human health particularly in cities of developing countries. For instance, evidences show that climate change is shifting the overall temperature distribution and thus increasing the frequency of heat waves around the world. Despite these evidences and the need for decisive actions on climate change impacts many issues remain as conceptual and methodological complexities that are open for multidisciplinary discourse. These puzzles serve to cast aspersions on the ability of analysts of climate and health relationships to be able to produce concrete and flawless evidences of the postulated impacts. This paper examines some of these puzzles, using the example of urban health analysis in most cases, with a view to challenging meaningful academic discourse in a multidisciplinary environment. The paper draws on grey literature from both the climate and public health sciences to identify largely unresolved issues in the climate change and human health nexus. The implications of the challenges described in the paper are enormous for the kind of progress made in climate and environmental change research particularly as it affects urban health analysis. An immediate implication of the complexity is the development of the climate skeptics who claim that the argument that the present-day processes of global warming are produced by human activity is not proven. The paper posits that it would be profitable to adopt the concept of Global environmental change instead of Climate change. The former is broader and much flexible in interdisciplinary discourse while the latter is narrower and susceptible to dispute by climate skeptics. This will allow us to emphasize the effects of 'Environmental' rather than 'climate' in the issue of urban health.

### Key words:

GEC; Health; Interdisciplinary; methodology

## Health and Wellbeing in the Changing Urban Environment: A case study of New Delhi

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### Abstract

The world has passed the demographic milestone of becoming predominantly urban. Over half of the world's population lives in urban areas and the urban population is increasing by over 2% annually. Whatever be the size or function, cities are, first and foremost, human habitat-not mere engines of economic production and growth. Understanding of the dynamics of the biophysical components of the city and the way their functioning impinges on people is a vital part of urban studies.

The grouping of people together in confined spaces has always produced discomfort, risks of disease, problems of food and water supply, disposal of waste and so on. As cities have grown, these environmental problems have become so severe that the liberation the cities provide appears to be reduced by the restrictions imposed by the urban environment. Although the urban dweller has benefitted from the greater opportunities for economic growth, cultural enrichment and social enjoyment, the quality of urban life appear to have been deteriorated as the citizen feels more and more threatened by polluted air and water, crowding and noise. Currently there is limited understanding of the complex causal processes that shape urban population health and inequalities in health at local, regional and global scales. Food, nutrition, water, landscape, waste, transport, infrastructure, housing, energy, safety, security, access to health care and the urbanization process itself are interdependently linked to urban health, each influencing the other. Running through all these aspects of health and well being are power inequalities and differential impacts on age, income, gender, race, migrant status and social class.

As India's capital city, New Delhi is experiencing unprecedented population growth. The rise in population has also been associated with growth in economic activities leading to environmental problems. The growth in civic amenities has not kept pace with the rising population. Unabated in-migration has compounded the problem. Land use regulations have been flouted in many cases and the green cover of the area is also dwindling- all raising very serious questions about the sustainability of the city and its resultant impact on the human health. For the purpose of this study following question emerge: How does the urban environment determine the health status of the urban people? What are the correlates and determinants of health and well being in urban environment? How does governance affect the issues of urban health and wellbeing?

### Key words:

Governance; climate change

## Impact of Drinking Water on Human Health, the Challenges Ahead: A Case Study of Tekelangjun of Karbianglong District

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### Abstract

Clean and fresh drinking water is one of our most vital resource. The human body is made up of over 70% water and our energy level is greatly affected by the amount of water we drink. Health on the other hand as defined by WHO is “a state of complete physical, mental, social and spiritual well being and not merely the absence of disease and infirmity”. It is experienced by disease free people living in harmony with their environment and with one another. Thus, good health is profoundly influenced by both external and internal conditions of life. External factors of the physical environment are climate, toxins and others, which play an increasingly important role. The accessibility and availability of basic amenities such as water supply is definitely an important indicator of the quality of life. Drinking water is a key factor influencing the health status of an individual and is the most often cause of disease and death especially in developing countries.

This study is done in Tekelangjun area of Karbi-Anglong district in Assam. Generally, fluoride exists fairly abundantly in the earth's crust and can enter groundwater by natural processes. The 1984 WHO guidelines suggested that in areas with a warm climate, the optimal fluoride concentration in drinking water should remain below 1 mg/litre (1ppm or part per million). High concentrations of fluoride occurring naturally in groundwater have caused widespread fluorosis among local populations. Thus, in this paper, the researcher tires to assess the outcome on the health of the residents located on the Karbi Hills with warm sub-tropical climate.

### Key words:

Health; water

## **Incorporating Social Vulnerability to Assess Population Health Risk Due to Heat and Cold Stress in China**

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### **Abstract**

This paper presented a new conceptual framework by taking account of heat and cold stress, social vulnerability, and population exposure. Meanwhile, an index system combining environmental data, demographics data and socioeconomic data has been built for the quantitative assessment of county-level heat stress risk pattern of China. Using a factor analytic approach, the evaluation variables were reduced to fewer independent factors. Felt air temperature index was used to improve the evaluation of heat and cold stress.

### **Key words:**

social vulnerability; population health risk; heat and cold stress; China

## Problems and Prospects of Disabled Population in India

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### Abstract

It is a utopian notion of a 'Harmonious World' until world's 15 percent disabled population (WHO 2015) is developed in all aspects of life. Since the disabled population is subjected to multiple deprivation, they are most oppressed, most backward, weakest of the weakest, utterly neglected, less served, less loved, less respected, in the world. The present paper is an attempt to study the socioeconomic and demographic status of the disabled population in India. The factors associated with disabled have also been discussed. The spatial variation at sub-national level has also been explored with the help of the maps. To accomplish this task, the latest data has been collected from 'Census of India 2011'. The cross tabulations and Arc GIS techniques have been used to meet the objective of the paper. The major findings reveal that the male population is more disabled compared to female disabled population and the percentage of not-movement disabled population is the highest in the country. Findings across the social-strata bring home the glaring disparities on various counts in regard to the disabled population amongst the lowest rung of the society. The larger chunk of the disabled population belongs to the 10-15 years old age group. The illiteracy particularly, female illiteracy and unemployment are the major concern of the disabled population in the country. Maximum disabled population is unmarried and males exceed than that of the females. Loopholes have been identified and Policy implications are well charted out.

### Key words:

Disability; Education; employment; caste; Attitudes

## **Relationship between Deprivation and Population Health Status. Case Study: Ialomița County (Romania), Health and Health Care**

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### **Abstract**

Compared to other European countries, Romania has a precarious health status. One of the main determinants are socio-economic factors (education, housing endowment, occupation, income etc.). The main objective of the present study is to reveal the territorial differences in population health status in relationship with deprivation, trying to demonstrate that socio-economic factors are influencing health status.

The study area is Ialomița county, located in a plain region of SE part of Romania, being characterized by precarious population health status compared to other Romanian counties.

The study was based on statistical and spatial analysis. The territorial differences in health status have been analyzed using a complex aggregated indicator (deprivation index) resulting from aggregation and standardization of different indicators (occupation, housing endowment, education). The outcomes have been processed using the programs Quantum GIS 2.2.

Preliminary results point out a significant influence of socio-economic factors on health status of various groups of population, factors such as education level, housing endowment and occupation could explain the existing differences in population health status.

### **Key words:**

deprivation; population health status; Ialomița county; health indicators; territorial inequalities

## The effects of VOCs on cancer rate: evidence from panel data of Chinese cities

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### Abstract

The issue of population health has drawn increasing attention from geographies of health and health. The links between health risks and health responses both at population-level and individual-level within multi-scaled lenses is now becoming critical in geospatial health researches. PM<sub>2.5</sub> and other pollutants has been extendedly explored their relationships between health results, but the relationships of VOCs and cancer rate is far-to-sufficient to be revealed. This paper dissects this question by first stressing the spatial turn in health researches and reviewing the literature of air pollution's health effects on human being mainly based on the work by geographers, and examines the effects of VOCs on cancer rate based on the panel data, of which the VOCs data are collected and modelled into city-level concentration according to the industrial share and GDP contributions, and the cancer rate data are derived from Statistical Yearbook of Chinese cities. On the basis of spatial statistic feature of VOCs and population's cancer rate data, statistic modelling and spatial analysis are employed in revealing the linkage between VOCs and cancer rate. It is demonstrated the effect of VOCs on population's cancer rates and differentiation in different areas.

### Key words:

Health; geo-spatial; VOCs; cancer rates, effects

## Urban Health and Well Being: A Case Study of Urban Delhi

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### Abstract

The fast pace of urbanization and tremendously increasing urban population have direct impact on the health of urban dwellers. If we go through the World Health Index (WHI), India is lagging behind even than some of the African Countries. The NCT of Delhi is characterized by the 97.5% of urban population and only 2.5% rural population as per census 2011 and such a huge urban population have created enormous pressure on the urban health system which in lieu have resulted in poor health of the urban dwellers. The immigration is an important factor which contributes heavily to this problem in the NCT of Delhi and the risks associated with this migrated population. The deteriorating environmental conditions, creation of different types of wastes and pollutions, continuing social fragmentation and overburdened urban infrastructure are some urban health determinants which got transformed drastically.

The present research study begins with a brief description of the urbanization process in NCT of Delhi. The study moves further to examine the role of urban environments, urban society and urban health systems. In its main course, the research study will focus on the various determinants causing health hazards for urban population, growing disparities in urban health services and role of various agencies including government, which urgently need to be addressed for a future urban health agenda. The research study closes with recommendations and suggestions on the overall urban health status of NCT of Delhi.

### Keywords:

Urbanization; World Health Index; Immigration; Social Fragmentation.

## Correlates of Caesarean Section Delivery in West Bengal (India): An Analysis Based on DLHS-3

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### Abstract

It has been well recognized that medically unnecessary caesarean section could increase morbidity risks for both the mother and her child and also could put strain on both institutional and individual assets. On the basis of these observations, the present study tried to assess the levels and trends of C-section delivery rates and to examine the factors associated with C-section delivery in West Bengal. Data from the third round of the District Level Health Survey 2007-08, covering 6,447 ever-married women of age 15-49 years has been used. The predicted probabilities from logistic regression analysis have been computed to measure the net effect of independent variables on the dependent variable. The results have shown that about 12 percent women delivered their babies by caesarean section and rest of the 88 percent women delivered their babies normally or through assistance in West Bengal during the reference period preceding the survey (DLHS, 2007-2008). The results of estimated predicted probability computed from logistic regression reveal that delivery in private health facilities, lower birth order and higher level of education are the strongest predictors of caesarean section delivery. Besides, higher number of ANC visits and higher maternal age are also significant factors of caesarean section delivery. For the betterment of women and child health and appropriate use of resources the universal guidelines, protocols and medical audit on caesarean section should be implemented. Further, the maternal and child health related educational programme should be implemented for educated women as well as uneducated women.

### Key words:

caesarean section delivery

## Geographical Perspectives and Approaches to Human Health and Well Being

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### Abstract

Geography and health are intrinsically linked. The place where we born, live, and work, the social, built and natural environment which surrounds us directly influences our health and exposure to various diseases. Environmental factors play a fundamental role in shaping human health. A variety of place based attributes like physical (altitude, temperature, water, air, pollution etc.), social (religion, language, race, perception of risk behavior, social access to care etc.), and economic (quality of nutrition, access to better healthcare services etc.) affect health at a greater extend. Understanding the health impacts of these attributes of place is one of the most challenging yet important contemporary geographical problems. Geography has a crucial role to play in advancing understanding of spatial variations in the spread of disease, access to care, treatment and prevention of illness. Various approaches specific to geography can provide insights into locational factors affecting health and diffusion of diseases. In this context the paper aims to explore how and why space and place are important for health and well being and provides an overview of geographical approaches to interpret the complex relationship between health and socio-physical environment. The paper also aims to review a rich body of theory and research to show how attributes of space and place are associated with human health and well being and illness.

### Key words:

Geographical approach; human health; wellbeing; disease

## Identifying the Spatio-Temporal Pattern of Avian Influenza A H7N9 in China 2013-2014

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### Abstract

The novel avian influenza A subtype H7N9 has posed a potential epidemic threat for human beings in both China and the rest of the world. So the whole world has been concerned about it. This paper used *Moran's I* index to analyze the spatial autocorrelation of the avian influenza A subtype H7N9's average annual incidence rates in China, and applied the Bayesian hierarchal model to predict the relative risk of avian influenza A subtype H7N9 infection in human of China at county level during 2013 to 2014. The results showed that the average annual incidence rates of avian influenza A subtype H7N9 at county level had the positive spatial autocorrelation because their *Moran's I* indexes were all larger than zero with their *P*-values not larger than 0.05. And their spatial point pattern took on the clustered distribution. Moreover, the county number of relative higher risks of avian influenza A subtype H7N9 infection in human for the year of 2014 has decreased comparing to those in the year of 2013, with their maximum value and minimum value of relative risk were all declining. It could illustrate that the relative risk of avian influenza A subtype H7N9 infection in human of China at county level had reduced from 2013 to 2014.

### Keywords:

avian influenza A subtype H7N9; Bayesian hierarchal model; spatial autocorrelation; spatio-temporal pattern

## Knowledge and Practice of Non Pharmacological Management of Pain among Sickle Cell Clients in Selected Hospitals, Southwestern Nigeria

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### Abstract

Nigeria is among the major endemic countries where Sickle Cell Disease (SCD) causes serious psychological pains to the patients. The management of pain in SCD involves multitasking and multidisciplinary approach. Over the years, management of the pains usually involves pharmacological approach; empirical studies have shown that Non Pharmacological Approach has been practised worldwide but still new in tropical sub-Saharan countries including Nigeria. Hence, this study examines the Non Pharmacological approach combines with biofeedback, self-hypnosis, relaxation therapy and cognitive-behavioural interventions. The study adopted a descriptive research design targeted at sickle cell clients between the ages of 10-60 years attending haematological clinics at Obafemi Awolowo University, Ile-Ife and Ladoke Akintola University Teaching Hospital, Osogbo both in Osun State, Southwestern, Nigeria. Sample Size was derived using Taro Yamane's formular with a structured Questionnaire through accidental sampling methods to 200 respondents. The data were analysed using Statistical Packages for Social Providers (SPSS). The study clearly reveals 56% of the total respondents were female clients while 44% were male respondents. The study also revealed that clients engaged in eight major Non Pharmacological Management of Pain (NPMP) with Application of Ice Block to the painful locations of the body with 73%, Massage 68.4%, Dancing 11.5%, Swimming 20.7%, Self- hypnosis 10.3%, Acupuncture 37.9%, Physical Exercise 29.9%, Heater Usage 69.5% and Others 1.1%. The study also revealed that 37.5% of the respondents have poor knowledge about NPMP, 25% with good knowledge, 20% with fair knowledge and 17.5 % with very good knowledge. The study concludes that majority of the respondents are not satisfied with the use of NPMP for the management of SCD. Hence, the study suggest that health providers should take into cognizance awareness campaign on various methods of Non Phamacological Management of Pain (NPMP).

### Key words:

Geospatial; database; primary health care facilities; Oyo city; Nigeria

## Environment-Health and Social Welfare

### Public services and social welfare



Home

#### Oral

1. [Mapping The Dynamics of Global Physical Aluminium Economy](#)  
Gang Liu (Centre for Life Cycle Engineering, University of Southern Denmark, Denmark)
2. [Production and Consumption of Calories in India and Implications for Food Security: A Spatial-Temporal Analysis](#)  
Ruchira Bhattacharya, Joseph Ravi (Jawaharlal Nehru University, India)
3. [Research on the Dynamic Impact of Public Service Expenditure on Residents' Consumption](#)  
Jinying WANG, Zhuang Yuan LI (School of Economics, Hebei University, China)
4. [Spatial Analysis of Public Education and Average Private Household Expenditure on Education in India](#)  
Ruchira Bhattacharya (JNU, India)
5. [The Study on the Suitable Planning Index System of Non-profit Public Facilities in County Seat at the Eastern of Northwest China](#)  
Xin Wu, Peng Cui (College of Urban and Environmental Sciences, Northwest University, China)

#### Poster

1. [Accessibility and Spatial Equalization of Rural Public Services in Jiangnan Plains](#)  
Jing Luo; Lingling Tian; Juxin Zeng (China, Central China Normal University)
2. [Study on Spatial Pattern and Spatial Effect of Basic Public Services Supply Efficiency in China](#)  
Di Wu; Lin Zhao; Yang Li (China, Beijing Normal University)
3. [The Spatial Organization of Sated-owned Bank Outlets in China](#)  
Yan Chen; Lin Mei (China, Northeast Normal University)

## Mapping the Dynamics of Global Physical Aluminium Economy

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### Abstract

Material cycles have become increasingly coupled and interconnected in a globalizing era. While material flow analysis (MFA) has been widely used to characterize stocks and flows along technological life cycle within a specific geo- graphical area, trade networks among individual cycles have remained largely unexplored. Here we developed a trade- linked multilevel MFA model to map the contemporary global journey of anthropogenic aluminum. We demonstrate that the anthropogenic aluminum cycle depends substantially on inter- national trade of aluminum in all forms and becomes highly interconnected in nature. While the Southern hemisphere is the main primary resource supplier, aluminum production and consumption concentrate in the Northern hemisphere, where we also find the largest potential for recycling. The more developed countries tend to have a substantial and increasing presence throughout the stages after bauxite refining and possess highly consumption-based cycles, thus maintaining advantages both economically and environmentally. A small group of countries plays a key role in the global redistribution of aluminum and in the connectivity of the network, which may render some countries vulnerable to supply disruption. The model provides potential insights to inform government and industry policies in resource criticality, supply chain security, value chain management, and cross-boundary environmental impacts mitigation.

### Key words:

Material flow analysis; global production network; trade analysis; aluminium; physical economy

## **Production and Consumption of Calories in India and Implications for Food Security: A Spatial-Temporal Analysis**

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### **Abstract**

We attempt to analyse the changing patterns of calorie, protein and fat intake both nationally and regionally for rural India and relate it to the changing patterns of production. We divide total nutrient intake in cereals, pulses, animal and vegetables and observe the change in balance of calorie, protein and fat in household's own production and purchases of food. We observe that consumption of staple calories from PDS and Home grown stock are supplementary. Households with access to these sources purchase a lesser proportion of staple calories from market. In both the irrigated and unirrigated regions there is evidence of overall increase of percentage of non-market consumption between 2009 and 2011. Increase is mainly of consumption from PDS. We also observe that due to changes in content of production towards finer staples and lesser production of pulses or coarse grains household's access to own production has gone down. PDS has not been able to replenish the same. We find an association between regional production and nutrient balance in consumption. The irrigated coarse grain and cotton producing regions produce a higher percentage of protein and lesser percentage of carbohydrate. Consumption of carbohydrate, protein and fat in these regions is close to WHO norm. But the rice growing irrigated and rainfed regions which produce an excess of carbohydrate show imbalance in nutrient intake. The study emphasises the need for procurement of alternative food grains and regional distribution and also coverage of small farmers of non-food crop producing regions in food policy.

### **Keywords:**

Calorie Intake; Protein Intake; Home Grown Production; Public Distribution System; Regional Calorie Production; Nutrient Balance; Food Security, Procurement

## Research on the Dynamic Impact of Public Service Expenditure on Residents'

### Consumption

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#### Abstract

Consumption, investment and net exports are to promote economic growth in the “three carriages”. Among them, consumer demand is the biggest driving force of economic growth, investment is a kind of consumer demand, if there is no support for consumption, the investment will become invalid investment. For a long time, the final consumption rate of Chinese residents all the way down, from 50% in 1990 down to 46% in 2014, during the period had slipped to 33.8% in 2010.

Scholars at home and abroad through various economic models analysis shows that public expenditure has a certain impact on the consumer. In this paper, we will integrate the financial education expenditure, health-care expenditure and social security expenditure into the public service expenditure, and analyze the mechanism of the impact on the consumption of the residents, based on 31 provincial data of China during 1998-2014, established a quantitative analysis of the impact of the data panel model on the consumption of the residents in China's provincial public service expenditure, and expect to explain the following questions: 1.The public service expenditure of resident consumption in our country has what effect? 2. In the short-term and long-term economic growth, public service expenditures whether can play a role in promoting economic development? What is the meaning and function of? 3. Public service expenditure on residential consumption and economic growth? It is concluded that the increase of public service expenditure promotes the consumption level of residents, and points out that the level of public service expenditure is limited, not unlimited.

#### Key Words:

Public service expenditure; Residents' consumption; Panel Data

## Spatial Analysis of Public Education and Average Private Household Expenditure on Education in India

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### Abstract

The paper is an attempt to analyse up to what extent free education can reduce households' burden of private expenditure on education. Such an analysis is important in current government policy drive of reducing subsidies from social sectors and providing targeted free education to poor. Analysis on NSSO data on Participation and Expenditure on Education, 2007-08 reveals that free education is available only at elementary level and at that level also free education is not universal. Using decomposed Gini coefficient for free and paid education subgroups we compare up to what extent free education exempts students from private expenditure. Component wise gini decomposition has been used for each state to understand the particular item that is responsible for most of the expenditure and inequality between households. It has been observed that above elementary level free education is almost inexistent and expenditure on education is incurred on all consumption expenditure quartiles. Doing a region specific comparison of supply of public funded education and demand for private education we observe that household private expenditure on education is not entirely "choice" driven. From a policy perspective it comes out that quality of public educational institutions have to be improved so that private tuition does not remain a necessity and overall education from primary to highest level have to be provided by government to relieve households from expenditure burden.

### Keywords:

household consumption; education expenditure; free-education; private-expenditure; gini coefficient; gini decomposition

## The Study on the Suitable Planning Index System of Non-profit Public Facilities in County Seat at the Eastern of Northwest China

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### Abstract

As an important guarantee of the daily life of urban and rural residents, the non-profit public facilities are the basic instruments to realize public service of government, and promote social fairness and justice. A scientific and rational non-profit public facilities planning is the premise to enhance the level and the degree of equalization of basic public services. A complete specifically planning index system for non-profit public facilities is not exist, the planning indexes are scattered around various related standards. Most of the existing standards on the planning of public facilities is suit for large and medium-sized cities, towns and villages, and is not caring the non-profit public facilities in county seat not only serve the town itself but also the whole county. It also should take some characteristic of the county seat into account in their non-profit public facilities planning, as the limited government investment, lacked county seat construction land and low-level socio-economic development. It is conducive to promoting the region to establish and improve sustainable basic public service system in line with national and region conditions, and gradually promote the equalization of basic public services. This study summarizes and sorts out the related indexes from existing standards, and builds a planning index system of non-profit public facilities. It also has an analysis of the suitability on its use in the county seats at the eastern of Northwest China. Then, the study builds the framework and content of the suitable planning index system, and explores the suitable of the planning index. The index system can be used as guidance to plan and construct non-profit public facilities of countries. It is also the practice of urban planning as a society fair and equitable public policy as well as improving the level of common service, promoting the regional community as a whole, balancing regional development and building a harmonious society. All of these have a very important theoretical and practical significance.

### Key words:

eastern of Northwest China; non-profit public facilities; suitable planning index system; county seat

## Accessibility and spatial equalization of rural public services in Jiangnan Plains

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### Abstract

Public education, health care and culture services are the stable and persistent demands that farmers need, which means that their accessibilities are significant indexes of the rural life quality, and Spatial equalization is the developmental orientation of new village construction. (1) This paper, which focus on the main rural areas in Jiangnan plains and its representative counties, is concentrating on the public education, health care and culture services in rural areas, taking the administrative villages as basic spatial units. It will found a spatial analysis model on population, settlements, services to exhibit people's public service demand and spatial behaviours, distribution of public facilities and resources, road network structure and mobility pattern in a multi-scale by using the geographimetrics and geovisulization method. (2) The accessibility will be calculated by the integration of availability, proximity and mobility, and will be classified by spatial cluster. Also, the spatial autocorrelation model is to be found to analyse spatial equalization. The above methods are to explore the spatial portfolio and diversity of accessibility and equalization, and thus to detect the shortage areas of public services. (3) According to the projectin of rural population and demand changes, targeting to the new village construction and equalization of basic public sevice, and taking the service radius and service population as key index, the project carry out simulation of public service facilities and spatial distribution of resources to analyse the responding mechanism of accessiblity and spatial equalization, and thus provide scientific theory and tools to rural education, health care and culture spatial planning .

### Key words:

public services; location; spatial analysis model; new village

## Study on Spatial Pattern and Spatial Effect of Basic Public Services Supply Efficiency in China

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### Abstract

This paper estimates the provincial supply efficiency of public service in China from 2007 to 2014, based on the super efficiency DEA model, then the exploratory spatial data analysis method is used to discuss its spatial autocorrelation, and finally, uses spatial Durbin model to analyze the spatial spillover effect and influencing factors of basic public service supply efficiency. Research shows that: (1) China's basic public service supply efficiency displayed a "U" type evolution trend from the year 2007 to 2014. Both absolute gap and relative gap among provinces showed a trend that became wider. Areas with low efficiency were still showing a significant difference from areas with had high efficiency. Gap between provinces was kind of revealing a pattern of Matthew effect. (2) Basic public service supply efficiency was showing an uneven characteristic on spatial pattern, a decreasing gradient feature was quite obvious from east to west. Global trend of supply efficiency was showing a falling trend from east to west, as for north-south direction, the pattern was an inverted "U" type. (3) Global autocorrelation analysis showed that the interprovincial basic public service supply efficiency had a positive spatial correlation, a mode of scattered- agglomeration- scattered- agglomeration can be observed as time advances. High-High agglomeration area mainly located in the Yangtze River Delta, the Pearl River Delta and other eastern regions. Low-Low agglomeration area is the west and northeast China. High-Low and Low-High agglomeration were mainly focused on the transition area. (4) Spatial spillover effect of basic public service supply did exist. Urbanization level, industrial structure, the level of opening to the outside world, as well as urban transportation development level, together they had significant positive effect on regional basic public service supply efficiency.

### Key words:

basic public services supply efficiency; super efficiency DEA model; spatial pattern; spatial spillover effect

## The Spatial Organization of Sated-owned Bank Outlets in China: Taking Changchun as an Example

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### Abstract

Case studies in select large cities in China have found that bank outlets are usually clustering around the well-developed area and traditional banks are more accessible to high density neighborhoods. However, many analyses neglect the different levels of banking service and the special strategies made by each banking company. This study employs mean center, standard deviation ellipse and Ripley's K to untangle the relationship between the serving levels and spatial distribution and influence factors in Changchun. We found that the serving levels are indeed powerful determinants of bank location, the main four stated owned banks in high levels are all clustering in certain area, while the distribution characters of fringe bank outlets in lower levels are mainly effected by population base, commercial activities, zoning and developmental strategies. Furthermore, the number of bank outlets in both the highest and lowest levels is much smaller than the one in the other serving levels.

### Key words:

stated-owned bank outlets; spatial organization; serving level; Changchun City



## Environment-Health and Social Welfare

### Resource efficiency and equity



[Home](#)

### Poster

1. [A Framework of Efficiency and Spatial Equality Analysis on Reclassified Urban Parks in Wuhan](#)

Lijun Xing; Yanfang Liu (China, School of Resource and Environment Science, Wuhan University)

## **A framework of efficiency and spatial equality analysis on reclassified urban parks in Wuhan**

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### **Abstract**

Urban parks connect natural and city residents, may influence the physical and mental well-being of them. Many researches focus on the fairness of urban parks while limits on the efficiency of actual usage in cities of developing countries. This study establishes a framework of efficiency and spatial equality analysis on urban parks in Wuhan based on the check-in dataset and population census. A multidimensional reclassification of urban parks instead of urban planning classification is first processed by the construction of supply and demand variables including natural features, traffic conditions, policy, social context and people's preference, for different kind's needs of residents may be correspond to different park services. The efficiency analysis using check-in density and equality analysis using Gini coefficient compare the reclassifying and urban planing park types to neighborhood social groups. The result reveals four distinct park types in study area and each with a unique mix of natural, spatial, land cover and building characteristics. The reclassification park types are less efficiency and equality than urban planning types, as well as each different level types. A discussion section probes into the causes of inefficient and inequality. The findings can inform sustainable and equitable urban park policy, planning and management.

### **Key words:**

Urban parks; Framework; Multidimensional reclassification; Efficiency and spatial equality analysis.

## Geographical Science and Future Earth

### China's Changing Food System



#### Oral

1. [Approaching Sustainable Urban Development in China Through a Food System Planning Lens](#)  
Steffanie Scott (University of Waterloo, Canada), Zhenzhong Si (Balsillie School of International Affairs, Canada), Taiyang Zhong (Nanjing University, China)
2. [Feedback Between Virtual Land Embedded in Food Trade and Farmland Loss of China](#)  
Zhiying Xu, Taiyang Zhong, Guoliang Xu (School of Geographic and Oceanographic Sciences, Nanjing University, China)
3. [Food Safety and Trust: A Survey of Consumer Perception in Hong Kong](#)  
Raymond Yu Wang (The University of Hong Kong, HongKong SAR, China)
4. [Food Safety in Daily Lives: Perceptions, Coping Strategies and Improving Opportunities](#)  
Zhenzhong Si (Wilfrid Laurier University, Canada)
5. [Food Security, Inclusive Growth and Governance of Public Space: The Case of Food Vendors in Nanjing, China](#)  
Ning Dai (University of Waterloo, Canada)
6. [Organic Agriculture—alternative way of small-scale Farmers To Sustainable Agriculture: Case Study in Wanzai County, Jiangxi Province, China](#)  
Friederike MARTIN, xueqing HE, yuhui qiao (China Agricultural University, China), Seth COOK, Niels Halberg (International Institute for Environment and Development, London, UK )
7. [Transformation of Rural Livelihoods with the Agro-industrialization and Capitalization of Tea Industry in Tongmu Village in China](#)  
Huaqing Huang (Tsinghua University, China)
8. [Understanding Community Building and its Impacts on Community Supported Agriculture \(CSA\) Farms in China](#)  
Danshu Qi (University of Waterloo, Canada), Weiping Chen (Renmin University of China, China)

#### Poster

1. [Linking Farmer Cooperatives Through CSA to Market](#)  
Yiching Song; Yanyan Zhang (China, Center for Chinese Agricultural Policy, CAS); Lila Buckley (China, International Institute for Environment and Development)



2. [Ensuring Food Security with Lower Environmental Cost Under Intensive Agricultural Land Use Patterns: a Case Study on Taojiang County](#)

Xiaoxing Qi (China, Sun Yat-sen University); Laiyuan Zhong (China, Guangdong Ocean University);

Liming Liu (China, China Agricultural University)

## Approaching Sustainable Urban Development in China through a Food System

### Planning Lens

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#### Abstract

After more than two decades of rapid urbanization, Chinese cities now face severe sustainability challenges in terms of balancing economic viability, social justice, and environmental protection goals. While various types of planning have long been adopted to cope with these challenges, food as a centerpiece of daily life and of social and economic activity in cities has rarely been considered as a focus of urban planning in China, despite a lot of recent attention to food waste and food safety concerns. In contrast, over the past decade or more, cities in the west have seen food system planning emerge as a holistic lens to promote multifaceted urban development strategies. Community gardens and neighbourhood farmers' markets are two common examples. In these strategies, food has been recognized as a powerful element that links closely with multiple economic, social, health, and environmental issues. This paper thus calls for an integration of food issues into urban planning in Chinese cities. Our paper provides a preliminary assessment of urban food systems in China. The analysis brings together various priorities: connecting people to the local food system, community economic development, access to healthy food, ecological health, and integrated food policy. By applying this framework to examine urban food systems in China, our paper identifies strengths and challenges in terms of achieving sustainability goals. This analysis also sets the stage for future research on urban food systems in China.

#### Key words:

Food systems; urbanization; China; sustainability; urban planning; cities; farmers; rural-urban connections; food safety

## Feedback between Virtual Land Embedded in Food Trade and Farmland Loss of China

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### Abstract

China has experienced both notable farmland loss and increases in food imports during past 25 years. Food trade is the transfer of virtual land and water resources that embedded in traded commodities. Existing studies focused on the impact of farmland loss in China on significant increase in virtual land imports, while the impact of virtual land change on farmland loss was ignored. The aim of this study is to reexamine the relationship between the change of virtual land embedded in food trade and farmland loss in China, especially whether a reciprocal feedback exists or not. First, we calculate the virtual land embedded in China's food trade. Then we employ vector error correction (VEC) model and Granger causal analysis to investigate the interaction between them. The results show that China's net virtual land imports embedded in food trade has grown from 2.37 Mha in 1987 to 33.28Mha in 2012, especially a sharp increase since China's entrance into WTO in 2001. The bidirectional causal link between virtual land imports increase and change of farmland occupied for construction suggests positive mutual feedback between them. Specifically, aggravated farmland conversion stimulates net increase of virtual land, which in turn results in a further increase in farmland occupied for construction. Our analysis suggests intense tension exists between economic development and food self-sufficiency in the process of rapid urbanization.

### Key words:

virtual land; food trade; farmland loss; positive feedback; China

## Food Safety and Trust: A Survey of Consumer Perception in Hong Kong

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### Abstract

Food safety is concerns people's daily life and health. Yet the issue of food safety only peripherally relates to foods themselves. With social division of labor and globalization, general consumers do not have absolutely accurate and full knowledge about the cultivation, production and distribution process of foods; as a result, their collective behavior of food consumption is essentially affected by an implicit trust placed in various actors in food networks, such as farmers, vendors, retailers, manufactures and regulatory institutions. Therefore, one of the key to disentangling the puzzles of food safety and its implications lies in the underlying mechanisms which account for the general public's trust in food. Trust in food is not only a complex multi-dimensional construct which is built upon diverse trust-relevant attributes (i.e. competence, willingness, care, fairness and openness) of different actors, it also involves an evolutionary process during which consumers' trust varies under a number of social, economic, political and environmental conditions. The Hong Kong Special Administrative Region (HKSAR) is a unique place which vividly illustrates all of the forgoing aspects of trust in food. As a highly urbanized city, Hong Kong has very limited agricultural industry and thus is heavily dependent on imported food. To what extent Hong Kong consumers are trustful in their food and in what ways they react to food safety problems? This study will present preliminary results of a city-wide survey to address these questions.

### Key words:

food safety; trust; consumer perception; Hong Kong

## Food Safety in Daily Lives: Perceptions, Coping Strategies and Improving Opportunities

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### Abstract

Food safety has become an increasingly pressing sociopolitical issue in China largely due to the outbreak of food safety scandals in the past 8 years. Existing studies have highlighted the socioeconomic backgrounds of its emergence, and drivers and implications of the heightened food safety anxiety. Yet, few studies have examined the perceptions of food safety conditions and strategies undertaken by consumers in their daily lives to cope with the challenges. Based on a city wide survey of 1200 households in Nanjing, China, this research presents findings regarding Nanjing residents' perceptions of, and strategies to cope with, food safety problems, understanding of traceability, and their trust of certified and imported foods. Coping strategies investigated included Nanjing residents' participation in urban agriculture and alternative food networks. The results of the study enabled a better understanding of how food safety problems play out in people's daily lives. It tests previous assertions about food safety problems (e.g., higher trust of locally produced food; higher trust with clear traceability) and identifies opportunities for future practices. This research also examines various rural issues through the lens of consumer perspectives. These issues include reduction of chemical usage, control of soil and water pollution, traceability of food supply chains, and connections between consumers and producers.

### Key words:

food safety; trust; certification; alternative food networks; food system; China

## Food Security, Inclusive Growth and Governance of Public Space: The Case of Food Vendors in Nanjing, China

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### Abstract

Urban food security is a rising challenge in populous Chinese cities such as Nanjing. Street vendors play an important role in the urban food system by providing affordable and diversified food options. Due to their informal nature, food vendors are perceived as illegal and disruptive to public order in modern Chinese cities. Thus public streets in Nanjing have been restrictive towards food vendors. In recent years the Nanjing government began to relax the restrictions of public space towards food vendors. At the same time, the central government incorporated inclusive growth in the national development agenda. This shift calls for attention to the logic behind the policy changes and the impacts on food vendors, yet few articles shed light on these issues. Through a study of the food vending policies in Nanjing, this research explores the rationale for policy changes and the practice of emerging concepts, including informal economy, inclusive growth and entrepreneurship. This research demonstrates the impacts of policy changes on the geography of food vendors. Street vendors have been resilient in the face of changes in urban governance. They conduct business on a mobile and flexible basis to cope with regulations. By navigating the spatial patterns and mobility of street vendors, the research captures the reconstruction of social norms as an outcome of formal institutions and self-rule. Combining the two findings, this research determines the disconnects between food vendors and policy makers in the governance of public space.

### Key words:

Urban food security; street food vending; governance of public space; inclusive growth; Nanjing

## **Organic Agriculture—alternative way of small-scale farmersto sustainable agriculture: case study in Wanzai County, Jiangxi Province, China**

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### **Abstract**

Organic agriculture can support and sustain rural development and ease poverty in regions with low economic productivity, as in Wanzai County in Jiangxi Province. Due to the commitment of the local government, parts of Wanzai County have become one of the most important organic agricultural zones in China. By using the Sustainable Livelihood Approach (SLA), a conceptual framework for understanding and addressing poverty, the livelihood situation of organic farmers in Wanzai County from two studies from 2007 and 2014 is compared as well as presented and discussed. Small-scale farmers with less than 0.5 ha of land are still the most prevalent in the region. While their overall household net income has increased since 2007 from USD 2,065 to USD 6,159, it is just enough to meet their basic needs. Furthermore, the share of agricultural income has decreased. However, farmers with one to five hectare of agricultural land get not only more than half of their household net income from farming activities, but also reached the average Jiangxi rural household net income only with profits from cash crops and livestock. This paper analyses the question, which alternatives do small-scale farmers have in their hometown or in the region to improve their livelihood situation.

### **Key words:**

Organic agriculture; China; Income; Sustainable livelihood approach

## Transformation of Rural Livelihoods with the Agro-industrialization and Capitalization of Tea Industry in Tongmu Village in China

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### Abstract

This article studies the agro-industrialization and capitalization of tea industry and its influence on rural livelihoods, based on architectural and anthropological investigation of a historical tea village in Fujian, China. Tongmu village boasts the hometown of Lapsang Souchong, whose history of tea production could be dated back to 16th century. Its social and spatial form had barely changed until the 1980s, when the privatization of the collectively-owned tea industry gave rise to transformations in the scopes of socio-economy and agro-food system. Moreover, a luxury tea called “Jin Jun Mei” was successfully developed ten years ago, which not only ignited the prosperity of private tea business, but also paradoxically lead to the “re-collectivization” of local agro-industry when expanding tea manufacturers incorporated other smaller ones, putting the balance of social ecology at risk.

A “food system perspective” is adopted to understand how the transformation of local tea industry has changed the social, ecological and spatial form of the village. It is crystallized in a historical wooden tea factory, “Qinglou”, which is not only where tea is traditionally produced, but also recently recast as a “symbolic capital” of cultural distinction that local tea manufacturers try to sell together to costumers. Through the interpretation of both architectural and social-economic meanings of this industrial space, the article tries to show how tea manufacturers, workers and farmers adapted respectively to the trends of agro-industrialization and capitalization, and further reveal the limitations of agrarian transformation in rural China considering the improvement of rural livelihoods.

### Key words:

tea industry; rural livelihood; food system; agro-industrialization

## Understanding Community Building and its Impacts on Community Supported Agriculture (CSA) Farms in China

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### Abstract

In the context of extended food chains, broad use of chemical in farming, and food safety problems, Community Supported Agriculture (CSA) has sprouted and spread quickly in China as a new relationship between farmers and consumers. CSA operators prefer to form a sense of community rather than the transactional relationship with consumers. However, little research has focused on the role of community building in shaping CSAs. In this paper, we explore the community building practices of CSA operators and analyze how community building affects the financial profitability of CSAs, job satisfaction of CSA operators, and relationships with members. This research takes a nationwide survey of 77 CSA operators around China. By using factor analysis and structure equation model, we conceptualize the community building practices in CSAs and explore the influences of community building on performances of CSAs. The result shows that, firstly, community building consists of three components: bonding, participation, and shared values. Secondly, community building influences job satisfaction most strongly, profitability second, and affects relationships with members least. On one hand, the research is valuable for CSA operators who seek to conduct community building in their practices; on the other hand, the research provides insights for understanding future relations between producers and consumers in the pursuit of rural sustainability.

### Key words:

Community building; factor analysis; structure equation model; community supported agriculture

## Linking Farmer Cooperatives through CSA to Market

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### Abstract

In a remote mountainous area of Guangxi province, characterized by steep karst mountain formations and fast-running streams, sits the village of Shanggula – a ‘natural village’ in Mashan County. In addition to vegetables, farmers plant maize in minute pockets of soil on the steep slopes between rocks in flat, tiny fields. The topography makes irrigation water scarce. Heavy rains tend to cause floods, regularly damaging field crops. There are no major roads, and access to markets is limited. In recent decades, most households have relied heavily on income from temporary work in cities in south and southeast China.

This situation is starting to change, however, because of the work of a dynamic women’s organization and its collaboration with a non-governmental organization (NGO) in the provincial capital of Nanning, Guangxi province, and a policy-research centre in Beijing. This is the story of this community’s experiences, their laughter and their tears, starting from Participatory plant breeding (PPB), and then in exploring and adapting the Community-Supported Agriculture (CSA) approach to revitalizing agriculture in their village, and now they try to attend a project of Participatory security system (PGS) in Guangxi. Though this initiative is not a CSA in the conventional sense of networked members who pledge to support local farms, those involved feel that the term captures what they are trying to achieve and we have therefore remained consistent with their use of the term. Through this case study, we explore what lessons they have learned and how these may be useful more generally for strengthening sustainable agriculture in China and elsewhere.

### Key words:

Community-Supported Agriculture; farmer cooperatives; market

## Ensuring Food Security with Lower Environmental Cost under Intensive Agricultural Land Use Patterns: A Case Study on Taojiang County

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### Abstract

In the context of rapid population growth and environmental deterioration, ensuring food security with lower environmental cost is fundamental to realizing sustainable development in China. To provide an operational approach for regional policymakers to address the twin challenges of food security and environmental sustainability, based on the status of regional natural resources and socio-economic conditions, this paper took the perspective of farmers' decision-making behavior and established four foci-differentiated scenarios to explore how to achieve food security quantitatively with lower environmental cost. The results indicated that increasing grain yield while reducing environmental risks can be achieved when policymakers take differentiated and targeted policies and management measures to impel the transfer of farmland to farmers with advanced agronomic techniques. Meanwhile, actively promoting the construction of agricultural infrastructure would be a useful approach to resisting natural disasters, thereby enhancing the farmers' willingness regarding grain cultivation.

### Keywords:

Food security; Environmental sustainability; Farmers' decision-making behavior; Risk analysis; China

## Geographical Science and Future Earth

### Industrial Dynamics and Regional Industrial Restructuring



Home

#### Oral

1. [Based on The "Internet +" Agglomeration Characteristics of Used Car Industry in China](#)  
Jian Wang (Shaan'xi normal university, China)
2. [Geography of Adaptation of Industry on the Change of Socio-Economic System in Czechia in 1989](#)  
Ludvik Kopacka (Charles University Prague, Faculty of Science, Czech Republic)
3. [Local Market Effect of Producer Services in Central City, China: By a Firm-level Analysis of Guangzhou](#)  
Yun Zhong (Jinan University, China)
4. [Study on Renewable Energy Industrial Clusters in the Hexi Corridor based on CAS Theory](#)  
LV Rui, SHI Pei ji (Northwest Normal University, China)
5. [Technological Relatedness, Regional Institutions and Firm Survival in China](#)  
Canfei He (Peking University, China), Qi Guo (Peking University, China)
6. [The Dynamics of Agglomeration Economies from the Industrial Life Cycle Perspective](#)  
Yiwen QIU, Lin ZHOU, Tiyan SHEN (Peking University, China)
7. [The Spatial Polarization and its Influencing Factors of the Service Industry in Xuzhou Metropolitan Area](#)  
Fangdao Qiu (Jiangsu normal university, China)

#### Poster

1. [Evolution of Industrial Structure and Spatial-temporal Differentiation on Environmental Effect at the Traditional Industrial Area in Northeastern China](#)  
Chengpeng Lu; Bing XUE; Lu JIANG (China, Key Laboratory of Pollution Ecology and Environmental Engineering, Institute of Applied Ecology, Chinese Academy of Sciences)
2. [Spatial Patterns of Pollution-intensive Industries Transfer and its Effect on Pollution Emissions in the Yangtze River Delta, China](#)  
Hui Zou; Xuejun Duan (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences)

## Based on the "Internet +" Agglomeration Characteristics of Used Car Industry in China

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### Abstract

In the background of "Internet +" big data, information network has become an important platform for traditional secondary real economic growth. In this paper, we chose used car industry in China as the research object, and made full use of the internet's superiorities of time-sensitive information and wide coverage, and selected the sample data from the five most influential Internet platforms of used car consignment. The mathematical statistics, location entropy index methods were selected, from Jan 25 to 29, 2016, to analyze the spatial characteristics of model, mileage, price, age and brand of used cars among capital cities. The conclusions are as follows: the used car industry in China was dramatically uneven, the agglomeration degree in eastern region was higher than western region, in a few large cities, agglomerations were obvious and typical to gather the saloon cars; used car consignment factors had affecting a certain geographical features, good branding and high price models were more concentrated in the big cities, the distribution of different models had a certain regional directivity, such as aged SUV models and MPV models were concentrated in less developed regions and service-oriented city, respectively. Different factors of agglomeration consignment also owned different characteristics, such as used cars in each province were heavily concentrated in 3 to 8 year-old, prices were more concentrated in 3-100000 RMB. This study, in the background of "Internet +", is conducive to reveal the spatial layout disciplines and location factors of the traditional industry, provides empirical research foundations to optimize the various elements of spatial layout and promote efficient development of used car industry.

### Keywords:

Internet +; used car industry; location entropy index; Spatial Agglomeration

## Geography of Adaptation of Industry on the Change of Socio-Economic System in Czechia in 1989

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### Abstract

Process of socio-economic transformation was accompanied by deep changes of structure and geographical distribution of industry after the geo-political break in the contemporary Czech Republic on November 17, 1989. Events like disappearance of bipolar world, division of Czechoslovakia, becoming a member of European Union as well as processes of privatization and massive inflow of foreign direct investment evoked broad scale of concrete adaptations and re-orientation of whole Czech economy (sectors of economy), industry (especially proprietary, organizational and branch structure) and foreign economic relations (foreign trade). Parallel geographical distribution of industrial activities was re-localized substantially (macro-, mezzo- and micro-regional shifts; green-fields instead of brown-fields). Main aim of paper is to illustrate phases of development of industry in the course of transformation, changes and deformations, positive and negative tendencies.

### Key words:

Socio-economic transformation; sectors of economy; branch structure of industry; geographical distribution of industry; foreign direct investment; foreign trade

## Local Market Effect of Producer Services in Central City, China: By a Firm-level Analysis of Guangzhou

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### Abstract

The term *local market effect* is got from the one named as *home market effect*, which was proposed in New Economic Geography. Expanding from NEG theory, this paper assumes that once the scale of the local market is large enough and the local network of firms has been set up, the industry will be influenced by the market attractions, therefore, the firms will tend to locate in local market and industrial agglomeration will appear accordingly.

Based on the data got from the questionnaires to the producer services firms in Guangzhou, this paper tries to evaluate the local market effect of producer services and figure out the determinants of the local market effect. Guangzhou is a central city in South China and also a most developed city in China. The contents of the study involves: (1) by exploring the exportation behavior features of the producer services firms, to evaluate the network or the agglomeration of producer services firms in Guangzhou. The question that I try to answer in this part is: while the firms selling more and more of their services to the market outside the local city, will the local market effect still happen in this central city? (2) by setting up an ordinal regression model, to analyze the determinants of the local market effect. Based on the literature reviews, several factors reflecting globalization, governance, local policy, competition and so on will be applied to test the interaction. All indexes for the regression are available from the database of the questionnaires.

To study the local market effect by the producer services firms' behavior in Guangzhou can be helpful to understand the agglomeration of the producer service in China. Furthermore, to evaluate the local market effects by the service exportation can be taken as a new way to assess the development of the producer service, distinguished with the traditional assessment by the statistical data such as value-added and employees of the industry, or the index such as industrial structure and specialization.

### Key words:

local market effect; producer services; firm behavior; determinants

## Study on Renewable Energy Industrial Clusters in the Hexi Corridor based on CAS

### Theory

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### Abstract

Understand the development of renewable energy industry in China from the perspective of evolution of industrial cluster development based on the theory of self-organization theory. To explore the regularity of the different stage of renewable energy industrial clusters in China. Through the analysis of the renewable energy industrial clusters agglomeration degree in the typical area, the development phase and evolution law of the renewable energy industry cluster in the Hexi Corridor are compared. Through the research, it was found that the renewable energy industry cluster in the Hexi Corridor was promoted under the administration of exogenous forces. It has completed the resource elements of self-reinforcing stage agglomeration, is currently in the transition phase from enterprise agglomeration ability self-amplified to cluster system self-adjustment. To speed up the development of new energy industry cluster in hexicorridor should strengthen the government's strategic planning, incentive policy design, financial support and regulatory services. Attract enterprises to the Hexi corridor development while increasing the root of the enterprise, improve the supporting industry to extend the industrial chain, enhance the ability of self-organization of industrial clusters.

### Key words:

Renewable Energy Industrial Clusters; Self-organization; the Hexi Corridor; Agglomeration Degree

## Technological Relatedness, Regional Institutions and Firm Survival in China

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### Abstract

The importance of agglomeration externalities for economic activities is widely recognized. Recent developments highlight the importance of technological relatedness to the performance of firms, industries and regions. This study explores the determinants of firm survival in China and tests the significance of technological relatedness and regional institutions using firm-level data over the period 1999-2007. Technological relatedness is developed from the co-occurrence analysis of paired industries. Results based on Cox regression models show that technological relatedness sustain large firms in China. Technological relatedness plays a larger role in sustaining firms in regions with developed market-oriented institutions and strong economic and political incentives from local governments. Productive firms and market-oriented firms are more likely to exploit technological relatedness to sustain while SOEs have no incentives to do that. This study highlights the significant influence of local forces on firm dynamics and enriches our understanding of regional industrial restructuring in China.

### Key Words:

Technological Relatedness; Regional Institution; Firm Sustaining; Firm Heterogeneity; China

## The Dynamics of Agglomeration Economies from the Industrial Life Cycle Perspective

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### Abstract

With the researches on agglomeration economies going deeper, the industrial life cycle theory has recently argued that the varying role of agglomeration economies emerges from the stage-specific needs within the industrial life cycle and provided an evolutionary view to explore the dynamics of agglomeration economies along the industrial life cycle. Based on the database from China's Annual Survey of Industrial Firms (2000-2011), this paper focuses on three aspects, 'evolutionary patterns of the industrial life cycle', 'characteristics of industrial specialization and diversification' and 'changing benefits of agglomeration along the industrial life cycle' to analyze the industrial heterogeneity and dynamics of agglomeration economies. The results are as followed. (1) Three evolutionary patterns of industrial life cycles are identified (Growth, Regeneration and Stability), and labor-, capital- and technology-intensive industries are characterized by young, stable and mature trends respectively. (2) The industrial specialization and diversification patterns both present the inverted U shape; both specialization and diversification increase as the maturity of labor- and technology-intensive industries increases, but specialization first increases and then declines while diversification presents an opposite trend as capital-intensive industries get more mature. (3) Both localization economies and urbanization economies strengthen as the industrial life cycle evolves from a young stage to a mature one, but generate different benefits across sectors. Finally, the results can be applied in practice to diagnose the problems regarding industrial composition at the regional level and optimize agglomeration economies by adjusting the regional industrial structure in a reasonable way.

### Key words:

industrial life cycle; agglomeration economies; specialization; diversification; industrial heterogeneity

## The Spatial Polarization and its Influencing Factors of the Service Industry in Xuzhou Metropolitan Area

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### Abstract

Using a statistical panel data in Xuzhou Metropolitan Area from year 1995 to 2012, the spatial difference and polarization characteristics as well as driving factors of service industry are discussed by using the method of spatial polarization and spatial autocorrelation. The results show as follows: (1) The degree of spatial polarization and development difference of service industry showed the trend of fluctuating decreasing, On the contrary, the spatial agglomeration of service industry was improved greatly between the year 1995 and 2012. The service industry development pattern was formed with the core in the area of Xuzhou, Jinxing and Lianyungang urban area. Marginalization phenomenon of service industry was significant in the southern and western area. (2) The spatial polarization had a centre-peripheral pattern with high centre and high peripheral area. From the perspective of polarization direction, the spatial polarization degree was weak from the peripheral area to the core area. Obviously, the service industry centre had not yet formed. (3) The driving factors such as the level of development, industrialization, transportation accessibility and market presented a promoting effect and the level of industrialization was playing the leading role in the spatial polarization development of service industry.

### Key words:

service industry; spatial difference; spatial polarization; driving factors; Xuzhou Metropolitan Area

## **Evolution of industrial structure and spatial-temporal differentiation on environmental effect the traditional industrial area in Northeastern China**

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### **Abstract**

Based on the description of decoupling degrees between Northeastern China's environment and economic development, this paper makes a quantitative analysis of the relationship between the evolution of the traditional industrial area in Northeastern China's industrial structure and environment change. By using industrial characteristic bias(ICB) index and the data of 23 manufacturing sectors of each province in Northeastern China during 2000-2014, the paper emphatically describes the impact of environment-pollution characteristic of industrial structure on the disparities of the regional environmental effect. The results show that the wastewater-discharge intensity of industrial structure reduced during this period, but this trend tended to decrease. The industrial structure had a high level of industry solid waste discharge with constant intensification of the trend of SO<sub>2</sub> emissions. In addition, the paper also employed regression analysis model to analyze the impact of evolution of on the disparities of the regional environmental effect. The results show that the regional industry structure is closely related to the environment quality especially for edge zone which is experiencing a stage of lower economic development level. Finally, the paper brings forward some suggestions on the industrial restructuring and environmental protection policies.

### **Key words:**

industrial structure; environmental effect; spatial-temporal differentiation; industrial characteristic bias index; Northeastern China

## **Spatial patterns of pollution-intensive industries transfer and its effect on pollution emissions in the Yangtze River Delta, China**

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### **Abstract**

Pollution-intensive industries play an important role in regional economic growth and industrial restructuring, meanwhile they're also a principal source of industrial emissions. Recognition of spatial distribution relationship between pollution-intensive industries (PII) and pollution emissions (PE) contributes to industry transfer guidance and environmental pollution control. The Yangtze River Delta (YRD) is one of the most developed and serious environmental pollution areas in China. This paper takes the YRD as study area from 1999 to 2013. Results show as follows. (1) The proportion of PII output value in gross industrial output value declines. Spatial distribution of PII gradually disperse, spread to southern and northern Hydrostatical distribution of "processing of petroleum, coking and processing of nuclear fuel" industrial sector is most concentrated, "manufacture of non-metallic mineral products" industrial sector is on the contrary. Main cities with PII transfer-out include Shanghai, Nanjing and Wuxi, and main cities with PII transfer-in contain Suzhou, Hangzhou, etc. (2) PE of industrial waste water, COD and SO<sub>2</sub> have been rising trend after falling, PE of industrial waste gas and solid waste continue to rise. PE of COD concentrate mostly, PE of smoke is on the contrary. Shanghai, Suzhou and Nanjing are main industrial pollution intensive cities. Main cities with PE transfer-in main include Suzhou, Ningbo, Nantong and Shaoxing. (3) Impact of industrial transfer on patterns of pollution emissions showed significant temporal and spatial differences. Hence in-depth exploration on pollution-intensive industries transfer from a larger scope (e.g. the Pan-Yangtze River Delta, the Yangtze River Economic Belt) is the further efforts.

### **Key words:**

pollution-intensive industries; industry transfer; pollution emissions; spatial pattern; the Yangtze River Delta

## Geographical Science and Future Earth

### Integrated modeling of the human-nature system co-evolution and the interactions between different components of the human-nature system



Home

#### Oral

1. [A Conceptual Model for Considering Adaptive Behavior in Studying Human-Nature Interaction](#)  
Guangwei Huang (Sophia University, Japan)
2. [Sociohydrological Modeling to Understand the Coevolution of Coupled Human-Water System](#)  
Fuqiang Tian (Tsinghua University, China)
3. [A Theoretical System of Environmental Performance Evaluation Based on Big Data Environment](#)  
Malin Song (Anhui University of Finance & Economics, China)
4. [Assessing The Combined Impacts of Human Activities on the Environment: Integrating The Environmental Footprints into A Footprint Family](#)  
Kai Fang (Zhejiang University, China)
5. [Evolution of Human-nature Relationship in China's Old Industrial Area](#)  
Bing Xue, Wanxia Ren, Chengpeng Lu, Jingzhong Li (Institute of Applied Ecology, Chinese Academy of Sciences, China)
6. [Evolution of Societal Value On Water for Economic Development and Environmental Sustainability in Australia During 1843-2011](#)  
Yongping Wei (The University of Queensland, Australia)
7. [Impact Assessment of Land Use/Cover and Climate co-evolution on water resource in Heihe River Basin of Northwest China](#)  
Feng Wu (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Jinyan Zhan (Beijing Normal University, China), Xuezheng Zhang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
8. [Integrated Assessment of Climate Change Scenario Modeling and Livelihood Capital Security: A Case study of Himachal Pradesh, India](#)  
Ram Babu Singh, Swarnima Singh (University of Delhi, India)
9. [Integrated Modelling of Bioenergy Industry in China](#)  
Kesheng Shu, Uwe A. Schneider, Jürgen Scheffran (University of Hamburg, Germany)
10. [Integrated River Basin Management Strategies: A Global Perspective](#)

Xiangzheng Deng, Pei Wang (Institute of Geographic Sciences and Natural Resource Research, Chinese Academy of Sciences, China)

11. [Integrated Water-Economic Model for Simulating Water Use at a River Basin Level](#)  
Junguo Liu (, South University of Science and Technology of China, Shenzhen, 518055, China, China),  
Xu Zhao (Beijing Forestry University, Beijing, 100083, China, China)
12. [Integrating Root Dynamics into Noah-MP for Modeling Desert Phreatophytes](#)  
Ping Wang (Key Laboratory of Water Cycle & Related Land Surface Processes, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Guo Yue Niu (Department of Hydrology and Water Resources, University of Arizona)
13. [Modelling Praxis, Social Learning and Systemic Governance](#)  
Ray Ison (The Open University, United Kingdom)
14. [Optimizing Conjunctive Use of Surface Water and Groundwater for Irrigation to Address Human-Nature Water Conflicts: A Surrogate Modeling Approach](#)  
Yi Zheng (South University of Science and Technology of China, China), Xin Wu (Peking University, China), Bin Wu (Peking University, China), Yong Tian, Feng Han (South University of Science and Technology of China, China)
15. [The Assessment System of the Water Sustainable Development in Inland Arid Regions: Taking Theheihe River Basin as an Example](#)  
Yanqiang Wei, Xin Li, Yingchun Ge (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China),
16. [The Interrelation between Water and Social Economic Development: an Analysis Based on Water Social Accounting Matrix \(WSAM\)](#)  
Qing Zhou (Center for Chinese Agricultural Policy (CCAP), Institute of Geographic Sciences and Natural Resources Research (IGSNRR), University of Chinese Academy of Sciences (CAS), China),  
Xiangzheng Deng (Center for Chinese Agricultural Policy (CCAP), China)
17. [Trial of Current China Societal Risk Perception based on Baidu Hot News Search Words](#)  
Xijin Tang (CAS Academy of Mathematics & Systems Science, China)

## Poster

1. [Assesment of Ecological Sustainability in Arid Land, Northern China](#)  
Jie Lian (China, Cold and Arid Regions of Environmental and Engineering Research Institute, Chinese Academy of Sciences)

2. [Design and Development of a Prototype Decision Support System for River Basin Water Resources Management](#)  
Zhongyuan Li (China, Faculty of Resources and Environment Science, Hubei University); Xiangzheng DENG; Feng WU(China, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences)
3. [Landscapes Management towards Human Well-being: a Case Study in Zhangye Basin Northwest China](#)  
Youhua Ran; Xin Li (China, Cold and Arid Regions Environmental and Engineering Research Institute)
4. [Social–Ecological Systems: the Overlapping of Chaos and Quantum](#)  
Xiaofang Zhou (China, South China Normal University)
5. [Study on China’s Yellow River Delta Social Vulnerability Evaluation and Influence Factor](#)  
Ai Liu; Jianlan Ren; Yu Cheng (China, Shandong Normal University)

## **A Conceptual Model for Considering Adaptive Behavior in Studying Human-Nature Interaction**

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### **Abstract**

In behavioural ecology, an adaptive behaviour is defined as a behaviour contributing directly or indirectly to an individual's survival or reproductive success. Many animal and plant species have adapted to the new stresses, food sources, predators and threats in changing environments, where they thrive in close proximity to humans. However, adaptive behaviour has been given much less consideration in evaluating human's impact on environment. The present study is attempted to develop a conceptual model to consider adaptive behaviour for better environmental impact assessment. It was based on a case study on waterfowl's response to habitat degradation due to dam development. It provides evidence on the necessity of including adaptive behaviour in modelling human-nature interaction. Furthermore, it puts forward a new modelling framework for dealing with adaptive behaviour. It is a new and innovative initiative toward better explaining human-nature relationship.

### **Key words:**

Adaptive behaviour; conceptual modelling; environmental impact assessment

## Sociohydrological Modeling to Understand the Coevolution of Coupled Human-Water System

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### Abstract

Two-way coupling between human and water is much more apparent and influential in the Anthropocene, which calls for a new science, sociohydrology, to study its coupling dynamics. Understanding the emergent behavior from the coevolution of coupled human-water system is a key to move forward the sociohydrology. Models can serve as the diagnosing tools to enhance the sociohydrological process understanding. In this talk a framework for sociohydrological modeling was discussed, which includes hydrological, economic, political, and institutional components. Based on the framework, a simplified conceptual socio-hydrological model based on logistic growth curves was developed for the Tarim River basin in western China. The results showed a costly pendulum swing, an emergent behavior occurring at the century scale, between a balanced distribution of socio-economic and natural ecologic resources among the upper and lower reaches and a highly skewed distribution towards the upper reach. Also, a conceptual socio-hydrological model including four major components, i.e. policy actions, technology, irrigation land use and water use, was constructed to capture the governing rebound effect of technology and adaptation effect of human policy of the irrigation efficiency paradox, an emergent behaviour occurring at the decadal scale, in the Baying Olin Prefecture, Xinjiang Uygur Autonomous Region.

### Key words:

Sociohydrology; modelling; irrigation efficiency paradox; pendulum swing

## A Theoretical System of Environmental Performance Evaluation Based on Big Data Environment

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### Abstract

Today, environmental issues are one of the key challenges to sustainable development of the social economy of every country in the world. How to effectively solve environmental problems and prevent further deterioration of environment have attracted tremendous attention from scholars. In recent years, Big Data, that is, enormous volume of data, has developed quickly and widely and has brought great challenges as well as unprecedented opportunities to the world. For example, Big Data can be used to predict production processes more accurately. However, they make traditional environmental performance evaluation methods ineffective. Thus, studying and improving environmental efficiency evaluation under the background of Big Data are important to improve environmental efficiency apart from pushing forward discipline development. This study provides a set of scientific and axiomatised conditions for environmental performance evaluation based on Big Data environment. The findings of this study can provide references for environmental performance evaluation in the new era.

### Key words:

Big Data; Environmental efficiency; Data envelopment analysis; Life cycle assessment.

## Assessing the Combined Impacts of Human Activities on the Environment: Integrating the Environmental Footprints into a Footprint Family

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### Abstract

A growing number of environmental footprints have received considerable interest and discussions from academia, the public, organizations and governments as a tool for assessing the effects of anthropogenic activities on the planet's environment. Despite the worldwide popularity gained in the past two decades, the footprint communities are found to be isolated and disparate at the present moment, such as those of the ecological, water, and carbon footprints. Focusing on single footprints in isolation however runs the risk of shifting the environmental burden to other footprints. To address this concern, this paper conducts an in-depth investigation into the conceptual and mathematical structures behind different versions of the ecological, water and carbon footprints, with the aim of capturing the inherent distinction between various footprint accounts in terms of inventory analysis and impact characterization. On the basis of a dichotomy where environmental footprints are classified into the inventory-oriented and impact-oriented categories, this paper proposes a framework that brings together different impact-oriented footprint indicators into a truly integrated footprint family. A unifying approach for characterization, normalization and weighting of environmental footprints is therefore achieved, whereby the results of inventory analysis are first to be translated into single impact category indicators, and subsequently normalized, weighted and integrated into a composite footprint index. The research can be of great interest to policy makers as it allows for an overall picture of human-induced environmental impacts without losing the complexity of individual footprint accounting, thus contributing to the ongoing discourses on the integrated modelling of the human-nature system.

### Key words:

environmental footprints; footprint family; classification; characterization; integration

## Evolution of Human-nature Relationship in China's Old Industrial Area

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### Abstract

Understanding human-land relationships is essential for optimizing human activities in order to achieve local and global sustainability. China's rapid urbanization is attracting much global attention; however, one of the challenges to achieve sustainable urbanization in China is to determine appropriate development mechanisms related to human-land relationships. As one of the typical industrial bases in China, the Tiexi District in Shenyang suffered from serious decline but now is shifting its industrial structure from heavy to tertiary industries, along with essential improvement of natural ecosystems and re-structuring of land use. Using Tiexi District as a case study, this paper investigates the evolution of the human-land relationships in the context of urban spatial restructuring based on both qualitative and quantitative analysis of temporal and spatial elements. A database was built based on interpretations of aerial photographs of Tiexi in 2000 and of the Quickbird Images in 2005 and 2010, combined with a survey on existing buildings; spatial-restructuring analysis of human-land relationships was conducted; heavy-metal pollution in a significant brownfield redevelopment site was inventoried and mapped, the enrichment factors, pollution index and integrated Nemerow pollution index were used to assess the pollution levels; a four-level land-use coding system was proposed and may supply more detailed information for land use management and offer a more precious database for measuring performance.

### Key words:

human-nature relationship; land use change; ecological risk; land use coding system; brownfield redevelopment; old industrial area; Northeastern China

## Evolution of Societal Value on Water for Economic Development and Environmental Sustainability in Australia during 1843-2011

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### Abstract

Introduction: The earth has entered a new epoch, the Anthropocene, when humans constitute the dominant drivers of change to the Earth System (Crutzen 2002). The stress on freshwater resources around the world cast by the human activities now as well as in future requires a radical paradigm shift in approaches to water resources management.

Societal values, a set of common values, beliefs and attitudes shared by the majority of a regional population, represent the core societal practice within a region (Dietz et al, 2005). Changes in values are seen as leading to changes in decisions and thus to changes in behaviour. However, societal value has not been addressed adequately in current water management studies. For much of the twentieth century water catchment management was dominated by engineers and hydrologists. Hence, it has been blind to changes in the social drivers for, or societal responses to, management decisions. This seriously compromises our capacity to foster social–ecological sustainability of water catchments in the long term.

Aims: This paper aims to understand the evolution of societal value on water resources for economic development versus environmental sustainability in Australia. Newspapers are very commonly used as data sources to track the changes of societal values because news accounts are rich in description and they reflect and influence public values and opinion on certain issues at their time of publication. The Sydney Morning Herald with diversity of coverage and wide readership, one of the oldest continuously published newspapers in Australia is used as the data sources to track the changes of societal values on water resource between 1843 and 2011. Specifically, this paper will address the following three research questions:

- 1) How did the societal value on water for economic development versus environmental sustainability in Australia evolve over timescale of 169 years?
- 2): What was the transition pattern of the societal value?
- 3): In what context such transition occurs, and what factors possibly trigger such transition?

Methods: Three methods were used in this study to address the research questions include: 1) describing evolution of the societal value on water for economic development and environmental sustainability in Australia with content analysis of newspaper; 2) determining the pattern of evolution of the societal value on water for economic development and environmental sustainability in Australia since European settlement with both regression analysis and transition theory; 3) understanding the pattern of evolution of the societal value on water for economic development and environmental sustainability in Australia since 1900 with co-evolutionary framework.

Results: Overall, as shown in Figure 1, percentage of articles dedicated to economic development driven fluctuated throughout the study period. However, when comparing the percentage of attention, the importance of economic development has been declining with the arising attention given to environment. The vision for environmental sustainability were kept at a minimal level at the beginning, and stayed as a relatively low voice in the society until it took off at around 1960s and overweigh the voice of economic development in the last decade.

The regression analysis was conducted for two sets of societal value data. The model with the highest  $R^2$  was considered as the most fitted regression line. The results showed that societal value evolution follows closely in sigmoid function with  $R^2$  equal 0.722. The fitted sigmoid curve for societal value on economic development and societal value on environmental sustainability are described with the following equation (1) and Equation (2) respectively.

$$y = 0.34496 + (0.98654 - 0.34496) / (1 + \exp((x - 1980.5777) / 13.89785)) \quad (1)$$

$$y = 0.65504 + (0.01346 - 0.65504) / (1 + \exp((x - 1980.5777) / 13.89785)) \quad (2)$$

With the fitted transition curve, first and second derivatives were derived to measure the rate and direction of change of these two curves. Then derivatives results were used to explain the stages of social transition if they exist.

According to the derivatives, three stages were identified. The predevelopment stage of societal value on environmental sustainability when changes occurred only marginally was identified as the period during 1843-1961. The take-off stage was considered between 1962-1980. The take-off point was when the rate of change speed is maximized. The acceleration stage was identified during 1981-2011. It is a period of the absolute value of societal value is still increasing, the acceleration rate is negative and the rate of change is decreasing. Around

2000 a new process of the acceleration rate increase started. The stabilization stage did not appear because the rate of change of societal value has not come to zero.

The societal value on water resources in Australia has co-evolved with the variability of rainfall, and management policies and practice reforms.

The co-evolutionary processes are explained according to the stages of societal value transition identified above. They include the predevelopment (1900s-1960s)-societal value on water resources was dominated by economic development; take-off (1962-1980), Societal value on water resources reflected increasing awareness of the environment due to outbreak of pollution events; 1980-2011: Environment oriented societal value on water resources and the Millennium Drought triggered a package of policy initiatives and management practice towards sustainable water resource use.

Discussions and Conclusions: This study developed a new method in combination of qualitative and quantitative approach to measure the change of societal value on water, a "less tangible" variable, and its transition pattern with time. This combination of qualitative and quantitative approach, which enables mathematical analysis of the society value has made the milestone progress in measuring the societal value, potentially making it explanatory and predictable. However, It should be noted that the societal value we identified in this study is only an indicator of the reality. It should be also noted that only one newspaper was used in this study as an example.

In conclusion, we face a future with significant reductions in water availability as a result of a drier climate. Our study provided an understanding of the dynamical mechanism of transitions which can assist policy makers to identify management practices that require improvement by understanding how today's conditions and problems were created in the past. It could help policy makers, to a certain extent, to monitor and guide the societal value transit into sustainability in proactive way. (This study was funded by the Australian Research Council (project number is FT130100274).)

## Impact Assessment of Land Use/Cover and Climate co-evolution on water resource in Heihe River Basin of Northwest China

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### Abstract

This study evaluated hydrological impacts of potential climate and land use co-evolution in Heihe River Basin of Northwest China. The future climate data for the simulation with Soil and Water Assessment Tool (SWAT) were prepared using a dynamical downscaling method. The future land uses were simulated with the Dynamic Landuse System (DLS) model by establishing Multinomial Logistic Regression (MNL) model for six land use types. In 2006-2030, land uses in the basin will experience a significant change with a prominent increase in urban areas, a moderate increase in grassland, and a great decrease in unused land. Besides, the simulation results showed that in comparison to that during 1981-2005 the temperature and precipitation during 2006-2030 will change by +0.8°C and +10.8%, respectively. The land use change and climate change will jointly make the water yield change by +8.5%, while they will separately make the water yield change by -1.8% and +9.8%, respectively. The predicted large increase in future precipitation and the corresponding decrease in unused land will have substantial impacts on the watershed hydrology, especially on the surface runoff and streamflow. Therefore, to mitigate negative hydrological impacts and utilize positive impacts, both land use and climate changes should be considered in water resource planning for the Heihe River Basin.

### Key words:

Climate change; Land use system; Hydrological process; Land use change; oasis agriculture

## **Integrated Assessment of Climate Change Scenario Modeling and Livelihood Capital Security: A Case study of Himachal Pradesh, India**

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### **Abstract**

The study aims at integrated assessment of climate change scenario modeling and livelihood capital security taking empirical datasets of the Himachal Himalaya. In the region, most of the southern and western blocks together with extreme eastern blocks of this region are undergoing the lowest seasonal mean rainfall (<6 mm per day). It has been found that the winter season in this region befitting more snowy and mild whereas the season pertaining to summer months are characteristically getting hot and dry under the A<sub>2</sub> GHG scenario. Under B<sub>2</sub> scenario of GHG emission the general trend is nearly same and the only difference is that extent of change in the value which is quite small than A<sub>2</sub> emission scenario. As per PRECIS simulation the annual rainfall in the Kangra region is likely to vary between 1,268 +/- 224.2 and 1,606 +/- 145.2 mm in 2020s. The projected precipitation is likely to increase by 5 to 17 per cent in 2020s with respect to 1970s in the north-eastern parts, whereas the deficiency in rainfall has become a common feature of central and western parts. The livelihood pentagon has been made to analyze baseline and simulated future climate change scenario. Marked differences were observed between the two agro-climate zones. The composite indices have been presented for the individuals and cumulative livelihood assets. The total livelihood vulnerability has been calculated, grouped and ranked into five categories. The result may be replicated in other parts of the Himalayan region with similar bio-physical and human environment.

### **Key words:**

climate modeling; livelihood vulnerability; integrated modeling; Himachal Pradesh; India

## Integrated Modelling of Bioenergy Industry in China

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### Abstract

Along with our greatly enhanced capability of changing the environment which we rely on, the research on human-nature relationship becomes ever more important and faces a couple of challenges, for example, the existing models can rarely fully represent the interactions and two-way feedbacks between natural and human systems. In order to explore the co-evolution of both systems and meanwhile bring the complex and giant human-nature relationship to a feasible level, we focus on bioenergy industry that bridges both systems and contemplate a decision support system of the industry development.

To alleviate the possible side effects of first generation bioenergy production on food security and environment, this system particularly concentrates on the second generation- the lignocellulosic biomass and covers its entire supply chain from bioenergy feedstock cultivation, harvesting to biomass transportation, and finally to bioenergy products conversion, transportation and consumption. The allocation of natural resources and the socioeconomic behaviors are all set as endogenous and interacted with each other on the bioenergy market. In this way, we create the coupled model of the human-nature system co-evolution.

We further apply this model to the Jiangsu province of China and evaluate two possible directions of bioenergy development incentives: a universal taxation policy- carbon tax and a targeted subsidy- either on farmers or on bioenergy plants operators. The simulation results show that: (1) The policy effects of carbon tax are positively correlated to the imposed level of the tax, which helps biomass-based power plants to cement their leadership in the bioenergy market due to the greater greenhouse gas mitigation potential of bio-power than bioethanol. (2) The financial subsidy on mudflat reclamation has the highest rate of return and smallest scale and benefits both farmers and bioenergy plants operators.

### Key words:

Integrated modelling; human-nature relationship; bioenergy; China; incentive

## Integrated River Basin Management Strategies: A Global Perspective

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### Abstract

Aimed to integrated river basin management in the arid and rapid developing region, the Heihe River Basin (HRB) in Northwestern China, one of critical river basins were selected as a representative example, while the Murray-Darling Basin (MDB) in Australia and the Colorado River Basin (CRB) in the USA were selected for comparative study. Firstly, the comparable characters and hydrological contexts of these three watersheds were introduced in this paper. Then, an overview and comparison of the river basin management in the MDB, the CRB and the HRB was presented. Based on comparative study, the drought, intensive irrigation, and rapid industrialization were highlighted as challenges for integrated river basin management in the HRB. The river management strategies are compared in three aspects: water allocation, water organizations, water act and scientific projects. Finally, we proposed policy recommendations for integrated river basin management for the HRB: 1) Water allocation strategies based on laws and market on the whole basin; 2) Public participation should be stressed by the channels between governance organizations and local communities; 3) Scientific research should be integrated into river management to understand the interactions between the human and the nature.

### Key words:

river basin; river basin management; Heiheriver basin; Murray-Darling Basin; Colorado River Basin

## Integrated Water-Economic Model for Simulating Water Use at a River Basin Level

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### Abstract

Water has become a key constraint for economic development in many parts of the world, in particular in the arid and semi-arid regions. However, research on how water is interacted with economy is remains rare. In this paper, we integrated hydrological models with economic models to study the water use in different economic sectors for the Heihe River Basin, which is located in the arid Northwest China. We aim to understand: (1) how much water is available; how much water is used and whether such use is sustainable; (3) whether the water-saving society initiative is successful. By comparing water use with water resources, we show that water use in this river basin is not sustainable either on an annual or on a monthly basis. We also find that consumptive water use does not decrease much as expected. The integrated water-economic model show that while technology improvements decreased water use to a large extent, increasing amount of commodity exports from this river basin to other regions increased water use. As a result, consumptive water use did not change much at a river basin level. To implement the water-saving society development, emphasis also needs to be paid to adjustment of commodity trade. For arid regions, a high level of exports may not be sustainable from a perspective of water use.

### Key words:

Integrated model; hydrology; economy; water use; river basin

## Integrating Root Dynamics into Noah-MP for Modeling Desert Phreatophytes

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### Abstract

Plants' optimality through adjusting their root systems is a way for plants to adapt to harsh environments. However, most existing land surface models (LSMs) use a prescribed, static root profile, which cuts the interactions between soil moisture and root dynamics. In this paper, we implement an optimality-based model of root dynamics that is capable to adapt to soil moisture dynamics in meeting the water demand for plant transpiration into the Noah-MP LSM. The dynamic root model updates its vertical profile of the root surface area in conjunction with changes in the water stored in plant tissues and the soil moisture profile. Considering direct water uptake by roots from the matrix saturation zone above the water table and the underlying saturated zone, we introduced a "watered" root layer into the Noah-MP scheme to represent the overall root density within these two zones. We have tested the model against observations of a riparian *Tamarix* spp. stand under a hyper-arid climate (approximately 35 mm precipitation per year) in northwestern China. Compared with the original, static root profile, the dynamic root model significantly improves the energy and water flux simulations from the groundwater-soil-plant system to the atmosphere, particularly during the dry seasons. The improved model with root dynamic provides a powerful framework to understand and predict the responses of groundwater-dependent terrestrial ecosystems to climate change and groundwater extraction in arid and semi-arid regions.

### Key words:

Societal value; Media content analysis; Water catchment management

## Modelling Praxis, Social Learning and Systemic Governance

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### Abstract

Modelling, as a practice, is a contested domain of human activity. This is not to question the abilities of the many talented modellers that can be found around the world, but to invite a more substantial reflection on what moves modelling from practice to praxis (theory-informed practical action), and how, if at all it might be effectively used to transform what we humans do in our acts of governing human-nature relations as a co-evolutionary dynamic. This paper describes how modelling can move from practice to praxis, especially praxis that is transformative; this entails shifting the boundary of concern beyond the technicalities of model development and functioning so as to include the modeller and the modelling situation as part of the 'praxis system'. Building on recent research and action the possibilities for designing and enacting systemic co-inquiry laboratories, as platforms for integrated modelling and transformative praxis, are explored. The experiences upon which these design considerations are based arise from 40 years of Systems thinking in practice (STiP) pedagogy at The Open University (UK) and over 15 years researching by the author and colleagues of social learning as an alternative governance mechanism and praxis in the UK, Australia, China and South Africa.

### Key words:

Water governance; structural coupling; reframing; co-inquiry; learning lab; systemic praxis

## Optimizing Conjunctive Use of Surface Water and Groundwater for Irrigation to Address Human-Nature Water Conflicts: A Surrogate Modeling Approach

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### Abstract

In arid and semi-arid areas where agriculture competes keenly with ecosystem for water, integrated management of both surface water (SW) and groundwater (GW) resources at a basin scale is crucial, but often lacks scientific support. This study implemented physically-based, fully integrated SW-GW modeling in optimizing water management, and performed surrogate modeling to replace the computationally expensive model with simple response surfaces. Water use conflicts between agriculture and ecosystem in Heihe River Basin (HRB), the second largest inland river basin in China, were investigated. Based on the integrated model GSFLOW (Coupled Ground-Water and Surface-Water Flow Model), the conjunctive use of SW and GW for irrigation in the study area was optimized. Overall, the study demonstrated that, with the surrogate modeling approach, an expensive integrated model could be efficiently incorporated into an optimization analysis, and the integrated modeling would make feasible a physically based interpretation of the optimization results. In the HRB case study, the surrogate-based optimization analyses suggested very different time schedule and spatial allocations of water diversion in opposite to the existing ones, indicating the critical role of SW-GW interactions in the water cycle. With an optimization analysis, a basin-scale water saving could be achieved by reducing non-beneficial evapotranspiration. The current flow regulation in HRB may not be sustainable, because the ecosystem recovery in the lower HRB would be at the cost of the ecosystem degradation in the middle HRB. To address the current human-nature water conflicts in HRB, a change of the water management regime is necessary.

### Key words:

irrigation; water diversion; integrated surface water-groundwater modeling; surrogate modeling; optimization; Heihe River Basin

## The Assessment System of the Water Sustainable Development in Inland Arid Regions: Taking the heihe River Basin as an Example

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### Abstract

Sustainable development in inland river basins requires the basin to be considered as a whole, with the relationships between the upstream, midstream and downstream areas of the basin coordinated appropriately and taking the water resources as the heart in the whole basin development. So how to establish an appropriate and scientific assessment system to evaluate the sustainability of the water in the basin is important. The paper takes the fresh water safety and the economic sustainable development in the basin as the targets, by the means of improving water efficiency and maximizing the value of water, taking the inter-sectoral allocation of water as the main approach, to establish an assessment system to evaluate the sustainability of the development in the Heihe River Basin (HRB). Based on the assessment system, the sustainability in the HRB has been evaluated and put forward some advises for the DSS and water management.

### Key words:

water; sustainable development; assessment system; inland river basin; Heihe River Basin

## The Interrelation between Water and Social Economic Development: an Analysis Based on Water Social Accounting Matrix (WSAM)

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### Abstract

Water is a significant restraining factor for social and economic development in arid and semi-arid regions, whereas the social-economic attribute of water is rarely recognized. The relationship between water resource and regional industry structure and the social welfare is hardly explored from a macroscopic view. In this paper, the Zhangye City was chosen as the case study area, which is a typical arid and semi-arid region located in Heihe River Basin in Northwestern China. Firstly, we established the county level Social Accounting Matrix (SAM) and added water resource account into it to form the WSAM. Based on the SAM multiplier and decomposition analysis, we found that though the transfer effects of agriculture is small which indicates limited direct promotion in intersectional production, the closed-loop effects is larger than the secondary industry demonstrated that agriculture has the most potential influence on the whole regional economic system for the study area. Furthermore, since irrigation water price is far below the shadow price, and the price reform is considered an effective way to improve water use efficiency. By fully considering the economic attribute of water and its role as a fundamental factor for production, we try to figure out how irrigation water price reform will influence the whole industrial production chain through price multiplier analysis and how farmers' income will be influenced based on the WSAM price model. The results illustrate that one percent water price increase will lead to a 0.03 percent cost increase in agriculture production and 0.005 percent increase in CPI.

### Key words:

SAM; Water resource; irrigation water price; multiplier analysis

## Trial of Current China Societal Risk Perception based on Baidu Hot News Search

### Words

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### Abstract

Current China is undergoing great social transformations and facing tremendous emerging wicked problems across environment, food safety, governance, health, inequalities, national security, population, urbanization, etc. which cover every aspect of social living and timely expose to the public via BBS posts, blogs and microblogs, especially in Web 2.0 era, quickly turn into highlighted events beyond their original region, thus bring big challenges for government administration. Different from those studies on detecting and removing negative public opinions, we try to map those on-line community concerns into respective societal risks and aggregate all risky potentials over the whole concerns as the on-line societal risk perception. We collect the Baidu hot news search words (HNWS) released at Baidu News Portal every hour and map each hot news into either risk-free event or one risk event which belongs to national security, economy & finance, public morals, daily life, social stability, government management, resources and environment based on socio psychological study results. Then the daily risk level with the frequency of daily risky events over the frequency of the daily news is acquired. With the generated 4-year (2012-2015) daily societal risk dataset, not only a rough image toward China's societal risk is acquired from on-line public concerns, but the distributions of different risks events, such as resources and environment, along the time are studied in details. Such an approach may serve as one augment way to harmonious society measurement.

### Key words:

societal risk perception; Baidu hot news words; public opinions; resources and environmental hazards; measure of one harmony society



## Assessment of ecological sustainability in arid land, Northern China

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### Abstract

Soil and water are important elements in ecological processes and have played key roles in structure, development and sustained restoration of vegetation in arid and semi-arid region. In recent years, soil quality degradation and/or water shortage were found more severe in most regions in northern China.

### Key words:

arid land; sustainable development; soil quality

## Design and Development of a Prototype Decision Support System for River Basin Water Resources Management

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### Abstract

With the fast economic development, rapid growth of population and climate change, a series of environmental problems, such as the sharp decline in groundwater level, the well is running dry, ecological deterioration, have been caused in many river basins. Those are the results of lacking effective administrative and management of water resources. In this study, a prototype decision support system was designed and developed for supporting integrated water resources management in river basin (RB-WRMDSS). RB-WRMDSS is based on integrating Geographical Information Systems platform (ArcGIS), a database platform (Sql Server 2012) and a development framework of plug-in. Four subsystems are included in RB-WRMDSS, 1) basic information subsystem including spatiotemporal relations of social economy and water attributes; 2) scenarios simulation for change of climate, land and Oasis, industrial development and water resources management policy; 3) Data management subsystem for updating the latest water consumption data, land change data and social economy data to the database; 4) decision support subsystem for visualization and mapping the results of simulation and generate a decision report for decision makers. The prototype RB-WRMDSS was tested with a case study in Heihe River Basin, Northwest China. The developed DSS is very useful to deal with complex water resources management problems in river basin.

### Keywords:

Development; decision support system; river basin; water resources management

## Landscapes Management towards Human Well-being: a Case Study in Zhangye Basin Northwest China

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### Abstract

Ecosystem is essential for human well-being through their provisioning, regulating, cultural, and supporting services. There are increasingly being considered critical for decision making in resource management. Scientific management of water and soil resources by changing landscape configuration is the core of sustainable development, especially in arid region, such as Zhangye basin in northwest China. Due to the complexity of human-natural system, how integrating the ecosystem service into landscapes management practical is a frontier issue in this field. Despite the growing literature on ecosystem services, the study about integrate ecosystem services in landscape management is still limited, especially in developing country. This study provide a case that integrate ecosystem services into landscape management practical by tradeoff ecosystem service in Zhangye basin northwest China. We use the MESH (Mapping Ecosystem Services to Human well-being), an ecosystem service assessment and mapping toolkit developed by Bioversity International, the Consultative Group on International Agricultural Research (CGIAR), and the Natural Capital Project, to map, tradeoff ecosystem service and link ecosystem change to Sustainable Development Goals (SDGs) of United Nations under different landscape management scenarios. Ecosystem service include food production, crop pollination, water purification, habitat quality, wind protection and sand fixation, eco-tourism, and carbon storage are integrated in MESH framework. Water consumption model, landscape nutritional potential, and landscape degradation model are used to modelling the water cost of ecosystem service and ecosystem change. This will provide a useful exploration to support landscape design toward sustainable development in arid area of China.

### Key words:

ecosystem service; MESH; water; remote sensing

## Social–Ecological Systems: The Overlapping of Chaos and Quantum

### —Re-interpretation of SES Yin-Yang Model Based on the Book of Changes

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#### Abstract

This research sets up the Yin-Yang Model of SES based on the idea of “the separation and joining of Yin-Yang two poles of the Book of Changes from the perspective of the model development status-quo of SES, and interprets this model with the idea of “one begets two; two beget three; three beget all things” in Tao Te Ching. Since this model is three-dimensional, “The Six Directions”, a simple spatial idea of ancient China, is applied to conduct projection simplification to this model from three to two dimensions, thus making analysis and explanation easier. The result of this research indicates, as a complicated system, SES has different manifestations under optional time and space. It is a point on its starting surface, embodies chaotic characteristics on its development surface, and expresses quantum characteristics on its ending surface. The chaotic and quantum characteristics assume an obvious perpendicular relationship. The method of “The Six Directions” reflects the fact that the complexity of SES system not only lies in its own complexity and ever-changing complexity, but also lies in the complexity of optional time and space. Therefore, the complexity here refers to the overlapping of the complexity of the thing itself, the complexity of scale and the complexity of optional time and space.

#### Key words:

SES Yin-Yang Model; The Book of Changes; One begets two; two beget three; three beget all things; Quantum; Chaos; Complexity

## Study on China's Yellow River Delta Social Vulnerability Evaluation and Influence

### Factor

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### Abstract

Social vulnerability is one of vulnerability connotation's content and vulnerability's research direction, and social vulnerability research can provide guidance and reference for regional sustainable development. Taking ecological vulnerable Human-earth system China's Yellow River Delta as an example, its social vulnerability indicator system was set up from sensibility and responsibility, its social vulnerability and evolvement rule in 2000-2014 were analyzed by set pair analysis method and vulnerability evaluation model, the influence factors of social vulnerability, sensibility and responsibility were analyzed by mult-variable linear return analysis, correlation analysis and disorder degree model. The results show that: (1) Yellow River Delta's sensibility index shows a downward trend, responsibility index shows an increasing trend, social vulnerability index shows an increasing trend. The main reason is Yellow River Delta has been to China's national strategy and its ecological economy has realized development, the coordination degree of economy-society-ecotoperaises gradually. (2) Responsibility is social vulnerability's major influence factor; economy, society and ecological environment's disturbance to sensibility is balanced, but economic factor is relative prominence; infrastructure construction's hysteresis and industrial structure level's low that restrained by ecological environment are responsibility's obstacle factors. Countermeasure and suggestion were put forward from strengthen infrastructure support, perfect efficient ecological industrial system and cultivate new economic growth point, environmental protection and ecosystem conservation.

### Key words:

social vulnerability; vulnerability; influence factor; China's Yellow River Delta

## Geographical Science and Future Earth

### Urban Physical Geography: Theory, Practice and Progress



#### Oral

1. [An Approach to Simulate the Impacts of Fluvial Flood on Urban Traffic in a local Scale Network](#)  
Mengya Li, Qingyu Huang, Jun Wang (School of Geographic Sciences, East China Normal University, China)
2. [Analysis of Impact of Traffic Regulation on Spatial Extent and Intensity of Urban Heat Islands with Satellite Thermal Remote Sensing](#)  
Bo Yang, Hongxing Liu, Emily Kang (Department of Mathematical Sciences, University of Cincinnati, USA)
3. [Community Dynamics and Activity of Ammonia-Oxidizing Prokaryotes in Intertidal Sediments of the Yangtze Estuary](#)  
Yanling Zheng, Lijun Hou, Min Liu (East China Normal University, China)
4. [Differential Exposure to Flood Risk in Coastal Mega-Cities](#)  
Alex De Sherbinin (Columbia University, USA)
5. [Downscaling Land Surface Temperature by Fusing VIIRS and Landsat-8 Data](#)  
Yingfang Jia, Bailang Yu (Key Laboratory of Geographic Information Science (Ministry of Education) and School of Geographic Sciences, East China Normal University, China)
6. [Effect of Snowpack On the Concentrations of Pahas in The Soils](#)  
Zucheng Wang, Shasha Liu, Baohua Cai (Northeast Normal University, China)
7. [Effects of Thiamphenicol on Nitrate Reduction and N<sub>2</sub>O Release in Estuarine and Coastal Sediments](#)  
Guoyu Yin, Lijun Hou, Min Liu (East China Normal University, China)
8. [Extraction and Analysis of Titanium, Iron, Zinc and Lead Nanoparticles in Sediments Using Single Particle Inductively Coupled Plasma Mass Spectrometry](#)  
Feiyun Tou, Yi Yang, Hui Pan, Xingpan Guo, Yukun Qin, Jingnan Feng (East China Normal University, China)
9. [Global Urban Area Extraction from Multi-temporal Nighttime Light Data Using Support Vector Machine and Markov Random Field](#)  
Chengshu Yang, Bailang Yu (Key Laboratory of Geographic Information Science (Ministry of Education) and School of Geographic Sciences, East China Normal University, China)

10. [High-Resolution Modeling of Human and Climate Impacts on Global Urban Areas](#)  
Yoshihide Wada (Columbia University, USA)
11. [Impervious Surface Mapping: A Multivariate Regression Approach Employing Population Density](#)  
Anargha Dhorde (Department of Geography, Nowrosjee Wadia College (affiliated to S P Pune University), India)
12. [Integrating Multidisciplinary Data to Address Complex Urban Challenges in a Changing Global Environment](#)  
Robert S Chen, G Yetman, K MacManus (Columbia University, USA)
13. [Mapping and Geospatial Analysis of the Model Estimates of Emissions from Fossil Fuel Power Plants and Impacts to Urban Population in China](#)  
Xiaoshi Xing, E. Brugère (Columbia University, USA)
14. [Mapping the Spatial-temporal Dynamics of Global Cement, Steel, and Aluminum In-use Stocks Using Nighttime Light Data](#)  
Shunqiang Deng (Key Laboratory of Geographic Information Science (Ministry of Education) and School of Geographic Sciences, East China Normal University, China), Gang Liu (Centre for Life Cycle Engineering, University of Southern Denmark, Denmark), Bailan
15. [Modelling The Influence of Urbanization On Urban Rainstorm Waterlogging: A Scenario-Based Case Study in Shanghai, China](#)  
Qingyu Huang, Jun Wang, Jungang Dong, Mengya Li (School of Geographic Sciences, East China Normal University, China)
16. [Nanoparticles in Road Dust from Impervious Urban Surfaces: Distribution, Identification, And Environmental Implications](#)  
Yi Yang (East China Normal University, China), Marina Vance (Virginia Tech, USA), Feiyun Tou (East China Normal University, China), Andrea Tiwar (Virginia Tech, USA), Min Liu (East China Normal University, China), Michael Hochella (Virginia Tech, USA)
17. [Nitrate Reduction Processes and Associated Contribution to Nitrogen Removal in the Yangtze Estuary](#)  
Lijun Hou, Min Liu, Guoyu Yin, Yanling Zheng (East China Normal University, China)
18. [Occurrence and Concentrations of Antibiotic Resistance Genes in the surface sediments of the Yangtze Estuary](#)  
Xingpan Guo, Yi Yang, Min Liu, Feiyun Tou (East China Normal University, China)

19. [Polycyclic Aromatic Hydrocarbons and Heavy Metals: Pollution, Ecological Risk and Impact On Microbial Community in Yangtze River Estuary](#)  
Xinran Liu, Xing Chen, Min Liu (School of Geographic Sciences, East China Normal University, China)
20. [Satellite Altimetry for Flood and Storm Surge Studies in Waterfront Cities](#)  
Ming Pan (Princeton University, USA)
21. [The Risk of Sea-Level Rise for Coastal Cities](#)  
Sally Brown, Robert J Nicholls (University of Southampton, UK)
22. [Understanding the Impact of Sea Surface Temperature Variability on the Climate of New York City on the Interdecadal Scale](#)  
Haibo Liu (Columbia University, USA)
23. [Urban Physical Geography: Theory, Practice and Development](#)  
Min Liu (East China Normal University, China)

## Poster

1. [Abundance and Diversity of Polycyclic Aromatic Hydrocarbon Degradation Bacteria in Urban Roadside Soils in Shanghai](#)  
Li Xiaofei; Liu Min (China, College of Geographical Sciences, East China Normal University); Hou Lijun (China, State Key Laboratory of Estuarine and Coastal Research, East China Normal University)
2. [Correlations of Global Sea Surface Temperatures with the Solar Wind Speed and its Effect on Local Urban Environment in East China](#)  
Limin Zhou (China, East China Normal University); Brian Tinsley (University of Texas at Dallas); Xiangmin Zheng (China, East China Normal University)
3. [Diversity, Abundance, and Distribution of nirS-encoding Denitrifiers in the Coastal Wetlands of China](#)  
Juan Gao (China, State Key Laboratory of Estuarine and Coastal Research, East China Normal University)"
4. [Extreme Climate Event, Urban Social-ecological Systems and Disaster Resilience in Coastal Cities: A Comparative Study](#)  
Ruishan Chen (China, East China Normal University)
5. [Health Risk Assessment of Soil Heavy Metals in Housing Units Built on Brownfields in a City in China](#)



Xing Chen (China, East China Normal University); Jianhua Ma (China, Henan University)

6. [Investigation on Atmospheric PM<sub>2.5</sub>-borne PAHs in Eastern Cities of China: Concentration, Source Diagnosis and Health Risk Assessment](#)

Ye Li; Min Liu; Xinran Liu (China, School of Geographic Sciences/ East China Normal University)

7. [Modelling the Anthropogenic Impacts on Fluvial Flood Risks in a Coastal Mega-city: A Scenario-based case Study in Shanghai, China](#)

Jie Yin (China, East China Normal University); Dapeng Yu (United Kingdom, Loughborough University); Zhane Yin (China, Shanghai Normal University)

8. [Nitrogen Mineralization and Immobilization in Sediments of Shanghai River Networks: Spatiotemporal Variations and Environmental Implications](#)

Lin Xianbiao (China, College of Geographical Sciences, East China Normal University); Hou Lijun (China, State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai 200062, China); Liu Min (China, College of Geographical Sciences, East China Normal University)

9. [Spatio-temporal Variation and Source Apportionment of PAHs in Sediments of Huangpu River](#)

Huang Yanping (China, East China Normal University)

## An Approach to Simulate the Impacts of Fluvial Flood on Urban Traffic in a local Scale Network

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### Abstract

Fluvial flood is a considerable challenge for urban traffic and residents' livelihoods in many metropolitans worldwide, which makes it a public concern and study interest to discover the most vulnerable links to take adaptive measures. This paper presents a novel approach to simulate the impact of fluvial flood on urban traffic in a local scale network located in Huangpu District of Shanghai, China. Basically, the four-step travel demand forecast model is adopted for *trip generation*, *trip distribution* and *trip assignment*, while *mode choice* is absent given our focus on traffic of individual vehicles and taxis and also for simplicity. A modified A\* algorithm is used to calculate the travel routes in a virtual lane-based road topology and change the travel plans as soon as the individuals are informed of road conditions marked as *open* or *block*. The traffic volume is recorded on each road segment separately under a fine weather condition and a fluvial flood scenario. Computing and simulation work are implemented in a prototype program redeveloped based on GIS. Following are three major conclusions. (1) There is an increasing pattern of traffic volume on most non-flooded segments due to the reassignment of traffic flow in the fluvial flood scenario. (2) Minor streets with less utilization in fine weather would more possibly become vulnerable to congestion and bottlenecks in the whole network. (3) With the fluvial flood receding, the traffic volume on a flooded segment could recover in a timely fashion when the road state turns from block to open.

### Key words:

fluvial flood; urban traffic; four-step travel demand forecast model; virtual lane-based topology; prototype program

## Analysis of Impact of Traffic Regulation on Spatial Extent and Intensity of Urban Heat Islands with Satellite Thermal Remote Sensing

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### Abstract

Previous studies have suggested that many human and environmental factors have contributed to the spatial expansion and temporal evolution of urban heat islands. However, little research has been directed to the impacts of urban traffic flows on the heat island. This research examines the variation of urban heat island intensity and spatial extent with reference to the change in urban traffic. In this research, daily MODIS thermal data are used to map surface temperature distributions in Beijing metropolitan area, and urban traffic volume was regulated during 2008 Summer Olympics by the “Odd and Even Car Ban (OECB)” policy. The contribution of traffic volume to the urban heat is analysed using spatial statistical models for different parts of the metropolitan area. Our analysis suggests that the decrease in urban traffic volume can significantly reduce the spatial extent and intensity of the urban heat island. The “Odd and Even Car Ban (OECB)” policy is more effective for heat mitigation in inner city than in city outer rings and suburbs.

### Key words:

Urban heat island; thermal remote sensing; Beijing metropolitan; climate change

## Community Dynamics and Activity of Ammonia-Oxidizing Prokaryotes in Intertidal Sediments of the Yangtze Estuary

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### Abstract

Over the past several decades, anthropogenic production of reactive nitrogen has increased by 120 %, and global nitrogen overload has been identified as a main emerging environmental issue in this century. Much of anthropogenic nitrogen is transported into estuarine and coastal regions via rivers, groundwater and atmosphere, which has already exerted a serious threat to the environmental quality of estuarine and coastal ecosystems. Nitrification, the sequential oxidation of ammonia to nitrite and then to nitrate, is an important bioremediation process in these nitrogen-enriched environments. Excessive nitrogen load in these ecosystems can be greatly reduced via a tight coupling between nitrification and denitrification or anaerobic ammonium oxidation, thereby diminishing the risk of nitrogen pollution. However, the removal of nitrogen from aquatic environments often depends directly on the supply of products (nitrite and nitrate) from nitrification. Thus, nitrification plays a critical biogeochemical role in the estuarine and coastal ecosystems. As the first and rate-limiting step in nitrification, ammonia oxidation has been widely studied because of its ecological significance in the global nitrogen cycle and environmental implications. Ammonia oxidation is known to be mediated by both bacteria and archaea. However, in estuarine ecosystems their relative importance in ammonia oxidation remains more ambiguous and uncertain, which may imply a more complex interaction between dynamics of ammonia oxidizers and associated activity in these environments.

In the present study, diversity, abundance and activity of ammonia-oxidizing bacteria (AOB) and ammonia-oxidizing archaea (AOA) were investigated using ammonia monooxygenase- $\alpha$  subunit (*amoA*) in the intertidal sediments of the Yangtze Estuary. Generally, AOB had a lower diversity of *amoA* gene than AOA in this study. Clone library analysis revealed that AOB communities were dominated by *Nitrosomonas*, while AOA communities were dominated by the Marine group 1.1a. Clone library analysis also revealed great spatial variations in both AOB and AOA communities along the estuary. UniFrac distance matrix showed that all the AOB communities and 6 out of 7 AOA communities in the Yangtze Estuary were statistically indistinguishable

between summer and winter. The studied AOB and AOA community structures were observed to correlate with environmental parameters, of which salinity, pH, ammonium, total phosphorus and organic carbon had significant correlation with the composition and distribution of both communities. Also, the AOA communities were significantly correlated with sediment clay content. Quantitative PCR (qPCR) results indicated that the abundance of AOB *amoA* genes was greater than that of AOA *amoA* genes in 10 of the 14 samples analyzed in this study. Potential nitrification rates were significantly greater in summer than in winter and had a significant negative correlation with salinity. In addition, potential nitrification rates were only correlated strongly with archaeal *amoA* gene abundance but not with bacterial *amoA* gene abundance. However, no significant differences were observed between rates measured with and without ampicillin (AOB inhibitor). These results implied that archaea might play a more important role in mediating the oxidation of ammonia to nitrite in the Yangtze estuarine sediments. This work may provide novel insights into the biogeochemical cycle of nitrogen in estuarine and coastal areas.

**Key words:**

nitrogen; ammonia-oxidizing prokaryotes; intertidal marshes; Yangtze Estuary

## Differential Exposure to Flood Risk in Coastal Mega-Cities

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### Abstract

It is generally understood that selected population groups (the elderly, children, the poor, or those with health conditions) are more vulnerable than others to certain climate impacts, and that the specific vulnerability characteristics may differ from one type of impact to another (e.g., between flood and heatwaves). However, while it is often asserted that the poor or more vulnerable populations are disproportionately represented in highly exposed areas – what some have termed a poverty exposure bias – this assertion has rarely been tested empirically. The purpose of this paper is to present results of empirical testing of differential exposure to floods in three coastal mega-cities: New York, Mumbai, and Shanghai. Specifically we examine whether the most exposed populations are also the most socially vulnerable. First, we develop Social Vulnerability Indices (SoVIs) for each city with census data. We then overlay the SoVI scores onto modelled or actual flood extent maps for major flood events in each city. Results suggest a degree of differential exposure in New York, especially in the highest flood risk areas, and fairly clear evidence for differential exposure in Mumbai. (Results for Shanghai are pending.) The paper also explores how differences in the input resolution and confidence in the data sets across the cities affects the results. The paper concludes with a discussion of policy implications and data needs for urban spatial vulnerability assessment.

### Key words:

climate vulnerability; climate change; urban; natural hazards

## Downscaling Land Surface Temperature by Fusing VIIRS and Landsat-8 Data

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### Abstract

Land surface temperature (LST) is a key parameter for urban heat researches, especially for the Urban Heat Island (UHI). However, no single satellite sensors can provide TIR data at both high temporal and spatial resolution. I.e. TIR band from Landsat 8 has the spatial resolution of 30m, but its temporal resolution (16 days) is too coarse to be applied in researches of urban environment. Visible Infrared Imaging Radiometer (VIIRS) can provide daily TIR data but the spatial resolution is about 375m. To our knowledge, VIIRS TIR data had never been used in data fusing in TIR bands. This study generates daily LST images at Landsat-8 resolution by fusing the VIIRS and Landsat 8 data for the first time. The Spatial-temporal Adaptive Data Fusion Algorithm for Temperature mapping (SADFAT) was applied in this article, VIIRS and Landsat 8 data are used for predicting daily TIR radiance images with resolution of 30 m, with the generally single channel (SC) algorithms, the daily LST images of high spatial resolution can be retrieved. A case study was conducted with seven pair's data of Landsat 8 and VIIRS in Beijing, China from April 2014 to April 2015. Prediction accuracy for this study area was about 1 K to 2 K, and the correlation coefficients varied from 0.7116 to 0.8948. Results show that VIIRS data can be used in urban heat environmental study, especially in which require higher temporal resolution.

### Key words:

Land surface temperature; data fusion; Landsat 8; VIIRS

## Effect of Snowpack On the Concentrations of PAHs in The Soils

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### Abstract

The release of PAHs from a melting snowpack can result in temporary concentration peaks in urban environment. In this study, the concentrations of 16EPA priority PAHs in snowfall and snowpack are investigated, as well as those in soils before and after snowmelt. The concentrations of PAHs in snowfall range from 1100 to 7200ng L<sup>-1</sup> for dissolved phase and from 240 to 410μg g<sup>-1</sup> for particulate phase, respectively, reflecting various PAHs concentrations in the atmosphere during winter. The concentration of dissolved PAHs in snow increases in the first few days of snow accumulation, indicating absorption of gaseous PAHs to fresh snowpack. The decreased particulate PAHs in snowpack with time may be attributed to the photolysis, which can also be induced from low ratio of BaA to Chr in particles. The percentages of 2-4rings PAHs in both dissolved and particulate phase increase in snowpack comparing with those in new snowfall, suggesting faster loss of 5-6rings PAHs in snowpack than 2-4rings PAHs. The concentrations of PAHs in soils without plants and with buildings covered increase from 3.5 and 10.1μg g<sup>-1</sup> to 34.7 and 63.3μg g<sup>-1</sup> after snowpack melted, respectively, whereas those in soils with plants covered rarely change. Although 2-4rings PAHs account for more than 90% of both particulate and dissolved PAHs in snowpack, 5-6rings PAHs are dominated in soils. These results indicate that 5-6rings PAHs from snow pack may remain in soils in the end during snowmelt, while 2-4rings PAHs may be absorbed by plants or enter into water body with melt water.

### Key words:

polycyclic aromatic hydrocarbons; snow; snowmelt; soil

## Effects of Thiamphenicol on Nitrate Reduction and N<sub>2</sub>O Release in Estuarine and Coastal Sediments

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### Abstract

Nitrate overload is an important driver of water pollution in most estuarine and coastal ecosystems, and thus nitrate reduction processes have attracted considerable attention. Antibiotics contamination is also an emerging environmental problem in estuarine and coastal regions as a result of growing production and usage of antibiotics. However, the effects of antibiotics on nitrate reduction remain unclear in these aquatic ecosystems. In this study, continuous-flow experiments were conducted to examine the effects of thiamphenicol (TAP, a common chloramphenicol antibiotic) on nitrate reduction and greenhouse gas N<sub>2</sub>O release. Functional genes involved in nitrogen transformation were also quantified to explore the microbial mechanisms of the TAP influence. Production of N<sub>2</sub> were observed to be inhibited by TAP treatment, which implied the inhibition effect of TAP on nitrate reduction processes. As intermediate products of nitrogen transformation processes, nitrite and N<sub>2</sub>O were observed to accumulate during the incubation. Different TAP inhibition effects on related functional genes may be the microbial mechanism for the changes of nutrient fluxes, N<sub>2</sub> fluxes and N<sub>2</sub>O release rates. These results indicate that the antibiotics residues in estuarine and coastal ecosystems may contribute to nitrate retention and N<sub>2</sub>O release, which could be a major factor responsible for eutrophication and greenhouse effects.

### Key words:

Nitrate reduction; N<sub>2</sub>O, Sediment; Antibiotics; Estuarine and coastal zone

## Extraction and Analysis of Titanium, Iron, Zinc and Lead Nanoparticles in Sediments Using Single Particle Inductively Coupled Plasma Mass Spectrometry

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### Abstract

With the development of nanotechnology, more and more nanoparticles (NPs) will be inevitably discharged in the environment. Sediments could act as a significant sink of NPs, further control the stability, fate and toxicity of these NPs. Analytical methods to detect and characterize NPs at low concentrations, and in complex environmental matrices, such as sediments, are urgently needed. In the present study, we aim to develop a method to quantify and analyse the size distribution of NPs at low concentration in sediments, based on a new technique -- single particle inductively coupled plasma mass spectrometry (SP-ICP-MS). Sediments from Yangtze River Estuary were taken as a representative environmental matrix. NPs were extracted from sediments via ultrasonic with different water solid ratio. 60nm and 100nm citrate-stabilized Ag-NPs were spiked into the sediments to determine the extraction efficiency and recovery of ultrasonic extraction, including the optimized ultrasonic power, ultrasonic time and solid water ratio considering various NPs (such as Ti-, Fe-, Pb-, Zn-NPs) presented in sediments. Overall, SP-ICP-MS is an efficient approach and shows significant advantages over other techniques when sizing NPs consisting of various elements in environmental matrix, such as sediment in the present study.

### Key words:

SP-ICP-MS; Nanoparticles; Sediments

## Global Urban Area Extraction from Multi-temporal Nighttime Light Data Using Support Vector Machine and Markov Random Field

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### Abstract

Rapid urbanization has brought great pressure to the sustainable development and the global climate. Mapping multi-temporal urban extent distributions on a global scale is significant to extract urban areas. Closely related to human activities, the stable nighttime light (NTL) data from the Defense Meteorological Satellite Program (DMSP) Operational Line-scan System (OLS) provide a straightforward and convenient way to map the global distribution of urban areas. Considering the problems in the thresholding method and the characteristics of urban development in time and space, we proposed an method for global urban extents extraction from 2002 to 2012 based on support vector machine (SVM) and Markov random field (MRF) using the DMSP/OLS stable NTL data, the moderate-resolution imaging spectroradiometer (MODIS) enhanced vegetation index (EVI) data and the MODIS normalized difference built-up index (NDBI) data. Some urban and non-urban pixels were selected first as training seeds, and a SVM classification was used to identify urban pixels from unclassified ones according to the data combinations. Then, The MRF was adopted to make the temporal and spatial corrections, ensuring compliance with the law of urban development. The extracted urban areas were validated using the existing global land cover data and Landsat ETM+ images. The results showed that our proposed method is effective and efficient for time-series urban area extractions on a global scale.

### Key words:

Urban extent; Support vector machine; Markov random field; DMSP/OLS; NDVI; NDBI

## High-Resolution Modeling of Human and Climate Impacts on Global Urban Areas

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### Abstract

The number of global hydrological models (GHMs) have been developed in recent decades in order to understand the impacts of climate variability and human activities on water resources availability. The spatial resolution of GHMs is mostly constrained at a  $0.5^\circ$  by  $0.5^\circ$  grid ( $\sim 50\text{km}$  by  $\sim 50\text{km}$  at the equator). However, for many of the water-related problems facing urban society, the current spatial scale of GHMs is insufficient to provide locally relevant information. Here, using the PCR-GLOBWB model we present for the first time the analysis of human and climate impacts on global urban areas at a  $0.1^\circ$  by  $0.1^\circ$  grid ( $\sim 10\text{km}$  by  $\sim 10\text{km}$  at the equator) in order to depict more precisely regional variability in water availability and use. Most model input data (topography, vegetation, soil properties, routing, human water use) have been parameterized at a  $0.1^\circ$  global grid and feature a distinctively higher resolution. Distinct from many other GHMs, PCR-GLOBWB includes groundwater representation and simulates groundwater heads and lateral groundwater flows based on MODFLOW with existing geohydrological information. This study shows that global hydrological simulations at higher spatial resolutions are feasible for multi-decadal to century periods. Higher spatial simulation can distinctively identify urban water issues such as water scarcity and groundwater depletion more accurately.

### Key words:

High resolution modelling; climate impacts; urban water issues

## Impervious Surface Mapping: A Multivariate Regression Approach Employing

### Population Density

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#### Abstract

Present research involves assessment of land use/ land cover modifications with respect to increase in population density and its impact on impervious cover in one of the urbanized watersheds (Mula-Mutha watershed) using IRS LISS-III (2008) and Landsat TM images (1989). The extraction of impervious cover is performed with the help of multiple regression model having various parameters like band values (band 1 to 4), NDVI, tasseled cap (band 2) values, population density, slope and elevation. Final output predicts the percent area that is covered with impervious surfaces at pixel level. During the assessment period (1989-2008) it was observed that the watershed experienced significant growth in population impacting the land use pattern. Major increase in population density was noticed in the central region (Pune-Pimpri-Chinchwad area) where the population increased by 7-8 times. Built up area increased significantly by 10% in and around Pune city and Pimpri-Chichwad. On the other hand barren land drastically decreased (13.16%) due to increasing demand of land for residential and commercial purposes. More than 75% impervious cover is observed in centre of the watershed whereas surrounding villages are having moderate (40-60%) imperviousness. Along the major transportation routes, the land use pattern changed rapidly which is reflected in high imperviousness. The changing land use pattern observed in the Mula-Mutha basin may lead to changes in the watershed and its hydrological parameters. Thus conservation and proper management of the natural resources with their optimum use is required for the balanced growth of an area.

#### Key words:

Impervious surfaces; NDVI; TC band II; Population density; Mula-Mutha watershed; Pune



## Integrating Multidisciplinary Data to Address Complex Urban Challenges in a Changing Global Environment

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### Abstract

The world's cities are facing multiple challenges coming from a variety of directions, ranging from continued urban population growth, rapid economic change, and aging public infrastructure to new public health crises, changing political, cultural, and ethnic landscapes, growing threats from terrorism and conflict, and unprecedented environmental stresses, including climate change. Integrated approaches to urban risk management and sustainable development are essential for coping with these challenges—including managing interactions between them, avoiding disastrous outcomes, and developing and maintaining sustainable, equitable, and liveable cities. One necessary ingredient to such integrated approaches is the ability to pull together diverse types and sources of data – not only from the natural and social sciences but also from the engineering and health fields—into forms useful for analysis and decision making. Because of the different scientific and technical traditions of these fields, varied spatial and temporal scales and units of analysis, and diverse needs for data by different stakeholders, data integration is itself a major challenge, requiring significant effort to address issues of access, quality and provenance, interoperability, compatibility, and usability. We report here on a number of efforts to integrate urban data across disciplines, develop useful decision-focused data products, services, and indicators, and deliver geospatial information to scientists, decision makers, and the general public. Data types include high-resolution remote sensing imagery; georeferenced administrative data; model estimates and projections; scenarios of future population, economic development, and climate change; individual- and household-level social and health data; crowd-sourced data; and engineering and operational data on urban infrastructure.

### Key words:

Data integration; sustainable development; urban planning; remote sensing; GIS; DRM

## Mapping and Geospatial Analysis of the Model Estimates of Emissions from Fossil Fuel Power Plants and Impacts to Urban Population in China

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### Abstract

Since 1990s China has experienced rapid urban development as a key driver for the growth in electric power demand and supply. Fossil fuels are the main sources for power generation. Emissions from combustion have imposed great impact on the environment and human life, especially, of urban population. This study assesses major fossil fuel power facilities based on their capacities and other physical factors. In order to estimate power production and emissions, we use and optimize the model of Multivariate Adaptive Regression Splines (MARS). Based on officially disclosed data for all of the plants in the US, the physical specifications are adapted to the Chinese plants, such as age, capacity, technology and presence of control devices. The model is fitted on the data from the American plants for estimates of those in Chinese plants. The geospatial analysis is then conducted by combination of geolocations of the facilities and distribution of population. 700 Gigawatts (GW) plants are precisely geocoded and verified by remote sensing imagery. The distribution of the Chinese most polluting power plants is superimposed to population grids from the latest version of Gridded Population of the World (GPW) and Global Rural-Urban Mapping Project (GRUMP) created by CIESIN at Columbia University, USA. The results indicate that the power plants under operation are mainly installed in the most populated areas and that the planned plants in the future follow the same trend. Further analysis estimates that a significant portion of the urban area and population are exposed to the health hazards.

### Key words:

power plant emissions; urban; model optimization; geospatial analysis and mapping

## Mapping the Spatial-temporal Dynamics of Global Cement, Steel, and Aluminum In-use Stocks Using Nighttime Light Data

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### Abstract

Urbanization around the world largely relies on materials consumption, and in-use stock of materials can be an effective indicator to measure the level of urbanization. Therefore, spatial distribution of materials in-use stocks and their temporal dynamics are essential to the research on urbanization and sustainability. However, there is still a lack of spatially explicit and long-term time-series estimations of in-use stocks on the global scale. In this study, we collected global statistics of in-use stocks of aluminum, cement, and steel at country level. Utilizing DMSP/OLS nighttime light data, we build up a double-log linear relation between nighttime lights and in-use stocks based on strong positive correlations. Then we applied the model to estimate global distribution of in-use stocks. With time series of in-use stocks data and nighttime light images from 1992 to 2010, we conducted long period estimations of in-use stocks and mapped global in-use stocks distributions. Using the estimated result maps, the aggregation and dispersion of in-use stocks can be easily observed. Around the world, cities are holding the majority of in-use stocks which have been rapidly increasing in recent years and the disproportion of distribution can be discovered under a smaller scale. In-use stocks is a fundamental composition of urban facilities that support cities to work and a direct symbol that indicates urban developing level. With global in-use stocks estimations been conducted, we can understand urbanization more deeply viewed from material stocks.

### Key words:

Spatial-temporal analysis; mapping; in-use stocks; urbanization; nighttime light data

## Modelling the Influence of Urbanization on Urban Rainstorm Waterlogging: A Scenario-Based Case Study in Shanghai, China

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### Abstract

Rapid urbanization has brought great developments and challenges to Shanghai in the last few decades. This paper focuses on the influence of urbanization on rainstorm waterlogging which caused severe damage especially in the central urban area. In general, we quantitatively evaluated the impact of urbanization on the risk of urban waterlogging using method of scenario simulating. The involving scenarios were designed by incorporating two environmental variables (land subsidence and land-use/land-cover (LULC) change), three time points (2000, 2006 and 2012) and four degrees of rainfall intensity (with 5-, 10-, 50- and 100-year return period, respectively). A toolset was developed for modeling the hydrodynamic process of waterlogging. Inundation area and the average depth were selected as indices to estimate the severity of waterlogging. Besides, the corresponding F statistic and the Root Mean Square Deviation were employed to quantify the changes with the impact of all scenario variables.

Results suggest that the impacts of land subsidence and LULC change are the function of precipitation intensity, and display a spatial disparity across the entire area. LULC change is the key factor contributing to the risk of waterlogging, for all magnitude precipitation events. Nonetheless, the effects of different land use types are distinctive. Inundation aggravates within land use for industries and transportation, while alleviates within green land and waters. Besides, except for a slight change captured in the local water depth, the risk of waterlogging is less sensitive to the impact of land subsidence with the precipitation magnitude varying when compared to the LULC change.

### Key words:

urbanization; urban waterlogging; land-use and land-cover change; land subsidence; Shanghai

## Nanoparticles in Road Dust from Impervious Urban Surfaces: Distribution, Identification, and Environmental Implications

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### Abstract

Nanoparticles (NPs) resulting from urban road dust resuspension are an understudied class of pollutants in urban environments with strong potential for health hazards. The objective of this study was to conduct a comprehensive investigation of PM<sub>2.5</sub> generated in the laboratory using a novel aerosolization technique, paying particular attention to the NP-fraction of the resuspension. This was accomplished in this study using road dust collected throughout the mega-city of Shanghai (China). Sixty-six samples were collected and aerosolized in the laboratory. The samples were characterized using an array of techniques including inductively-coupled plasma mass spectrometry, aerosol size distribution instrumentation, and scanning and transmission electron microscopy coupled with elemental characterization. Principal metal concentrations were plotted geospatially. Results show that metals were generally enriched in aerosolized samples relative to the bulk dust. Elevated concentrations of metals were found mostly in downtown areas with intense traffic. Fe-, Pb-, and Ba-containing NPs were identified using electron microscopy. Pb-containing NPs were often associated with Sn and possibly originated from an e-waste plant. Size distributions of most aerosolized samples presented a peak in the ultrafine range (< 100 nm). We estimate that  $3.2 \pm 0.7$   $\mu\text{g}/\text{mg}$  of dust may become resuspended in the form of PM<sub>2.5</sub>. Aerosolization, as done in this study, seems to be a very useful approach to study NPs in dust.

### Key words:

Nanoparticles; road dust; Shanghai

## **Nitrate Reduction Processes and Associated Contribution to Nitrogen Removal in the Yangtze Estuary**

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### **Abstract**

Denitrification, anaerobic ammonium oxidation (anammox) and dissimilatory nitrate reduction to ammonium (DNRA) are important nitrate reduction processes, which play a crucial role in determining nitrate dynamics and fate in estuarine and coastal environments. However, the dynamics of these processes and controlling mechanisms remain unclear for a specific aquatic environment. In this study, we examined potential rates of denitrification, anammox and DNRA in the sediments of the Yangtze Estuary via slurry experiments combined with isotope-tracing techniques to reveal their respective contributions to total nitrate reduction in this hypereutrophic estuarine ecosystem. Measured rates of denitrification, anammox and DNRA ranged from 0.06 to 4.51  $\mu\text{mol N kg}^{-1} \text{h}^{-1}$ , 0.01 to 0.52  $\mu\text{mol N kg}^{-1} \text{h}^{-1}$ , and 0.03 to 0.89  $\mu\text{mol N kg}^{-1} \text{h}^{-1}$ , respectively. These potential dissimilatory nitrate reduction process rates correlated significantly with salinity, sulfide, organic carbon and nitrogen. Denitrification contributed 38 – 96 % total nitrate reduction in the Yangtze Estuary, as compared to 3 – 45 % for DNRA and 1 – 36 % for anammox. In total, the denitrification and anammox processes removed approximately 25% of the external inorganic nitrogen transported annually into the estuary. In contrast, most external inorganic nitrogen was retained in the estuary and contributes substantially to the severe eutrophication of the Yangtze Estuary.

### **Key words:**

Nitrogen; Denitrification; Anaerobic ammonium oxidation; Dissimilatory nitrate reduction to ammonium

## Occurrence and Concentrations of Antibiotic Resistance Genes in the surface sediments of the Yangtze Estuary

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### Abstract

As emerging environmental pollutants, antibiotic resistance genes(ARGs)could cause serious effect on the security and stability of ecosystem in natural environment. To investigate the occurrence and concentrations of ARGs in the surface sediments of the Yangtze Estuary, the qualitatively and quantitatively analysis of the 16s rDNA genes, sulphonamide-ARGs (sul1 and sul2), tetracycline-ARGs (tetAandtetW), Quinolone-ARGs (aac(6')-IbandQnrS),  $\beta$ -Lactam resistance genes and class 1 integrons (int1) were conducted. Furthermore, the correlation between the TOC, particle sizes, heavy metals, pH, salinity, DO and the concentration of the tested ARGs were analyzed. Results showed that all tested ARGs were detected in the eight samples taken along the Yangtze Estuary, except the plasmid mediated resistance gene QnrS, which had a lower concentration in SDK and WSK samples. Statistical analysis of the results indicated that the particle sizes, pH, salinity and several metals were correlated with the concentrations of tested ARGs in different degrees. However, there was no significantly correlation between the ARGs and the concentration of TOC, which suggested that the ARGs may exist in different forms. Furthermore, the abundance of sul1 and sul2were as high as  $10^7$  copies/g, and significantly correlated with the abundance of 16s rDNA which suggested that the propagation of sulphonamide-ARGs was affected by bacteria in estuary environments.

### Key words:

antibiotic resistance gene; the Yangtze Estuary; sediments; heavy metal

## Polycyclic Aromatic Hydrocarbons and Heavy Metals: Pollution, Ecological Risk and Impact On Microbial Community in Yangtze River Estuary

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### Abstract

Estuarine sediments are both sinks and secondary sources of terrestrially derived pollutants like PAHs and heavy metals. Yet the synergistic pollution pattern of pollutants and their impact on the estuarine microbial community have scarcely been studied. We thus investigated the latest pollution state of 16 priority PAHs and 7 heavy metals in the surface sediments of 11 sampling sites along the Yangtze River Estuary. Results showed that PAHs concentrations ranged from 195.5 to 4377.6 ng/g, with a mean content of 1770.3 ng/g. The pollution level of both PAHs and heavy metals showed a general trend that concentrations in fresh water area > transition area > seawater area. Source apportionments revealed that Cu, Zn and PAHs may have common anthropogenic sources (i.e. industrial production). The ecological risk associated with the heavy metals and PAHs in sediments was rated as low to moderate level using methods of Potential Ecological Risk Index ( $R_i$ ) and mean Sediment Quality Guidelines (mSQG), Ni, Zn and Hg are crucial pollutants in the studied area and should be put enough attention. Salt water area and transition area were found to have more similar microbial community, while fresh water area had a different community. pH values, TOC, N, P, PAHs and As concentrations were found strongly influenced the microbial species composition in sediments. For example, PAHs had a positive relationship with the diversity and abundance of microbial community of Jinshan, Fengxin, Luchaogang, Donghai, Chaoyang and Bai long gang, but have a negative relationship with that in Liuhekou, Qiyakou and Shidongkou.

### Key words:

Yangtze River Estuary; polycyclic aromatic hydrocarbons; heavy metals; microbial community; high-throughput sequencing



## Satellite Altimetry for Flood and Storm Surge Studies in Waterfront Cities

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### Abstract

Satellite remote sensing has been transforming the way we monitor and assess our environment in recent decades. One of the forefront of these applications is to use satellite altimetry sensors to monitor (and subsequently forecast) the height (level) of waterbodies like rivers, lakes, reservoirs, and coastal/near shore sea. Nowadays, a large number of cities are located along the waterfront, e.g., next to a major river, lake, river delta, or sea coast, for the benefit of abundant water resources supply, convenient transportation, scenery values, easier storm water/sewage management, and so on. At the same time, the growing urban population and steep concentration of assets has tremendously increased our stake/risk in these areas when natural disasters like flood or coastal storm surge strike. For example, when Hurricane/Super Storm Sandy hit the east coast of United States, hundreds of thousands of houses were damaged (due to a combination of coastal surge, river flood, and wind damage) and the loss amounted to billions of US dollars. Therefore, large-scale monitoring of these waterbodies can provide a large amount of critical information for us to analyze and understand the underlying physical processes, as well as to forecast and mitigate these risks. Here we give a brief introduction to this developing field of satellite altimetry, including the past efforts, current research, and new sensor technologies to be deployed in the very near future. We will also try to highlight the great opportunities in urban studies brought forth by the development and operation of new-generation satellite altimetry technology.

### Key words:

Flood; Storm Surge; urban; Waterfront cities

## The Risk of Sea-Level Rise for Coastal Cities

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### Abstract

Understanding and planning for the consequences of sea-level rise requires long lead-in times due to the complex political, financial, social and physical interactions happening at the city scale. Cities can evolve rapidly, with many new, large cities being built within the last few decades. This trend is likely to continue, with many new cities emerging, particularly on the Chinese coast. Simultaneously, cities evolve over long time scales and contain culturally important values and assets. Sea-level rise, potentially up to 1m by 2100 (with some high-end projections higher again) threatens low lying cities. Even if we mitigate for climate change, sea-levels will continue to rise due to the time lag between atmospheric temperature rise and oceanic response. With sea-level rise, flood risk levels increase as it raises the likelihood of extreme events, leading to increased damages. Without adaptation to existing infrastructure and integrating the threat of sea-level rise when planning new infrastructure, cities will be at risk from increasing saltwater intrusion and flooding. Past extreme events, such as Hurricane Katrina (2005) affecting New Orleans and Superstorm Sandy affecting New York provided a wake-up call for the need to adapt. This could mean increasing defence standards of improved emergency planning. Despite the need for adaptation action, climate change adaptation is slowly moving onto the political agenda. Yet still there remains physical/engineering, economic/financial and social/political limits to adaptation. The presentation discusses these challenges in relation to cities, focusing on Shanghai, New York and Kolkata.

### Key words:

Sea-level rise; coastal cities; New York; Shanghai; Kolkata

## Understanding the Impact of Sea Surface Temperature Variability on the Climate of New York City on the Interdecadal Scale

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### Abstract

New York City is located at the meeting of the Hudson River and the Atlantic Ocean; its climate patterns are affected by the Atlantic Multidecadal Oscillation (AMO), which influences the frequency and severity of hurricanes and coastal storms. Among many variables, the most dominant factor is the sea surface temperature (SST). To understand the impact of SST on the City's climate on the interdecadal scale, we analyze the Last Millennium Experiment (LME) conducted by the Coupled Model Inter comparison Project Phase 5 (CMIP5) program. There are seven models supplied the experiment results available to public. We propose a new method that uses data from all seven models to estimate the contribution of decadal noise to the interdecadal variability of climate variables, the decadal variability associated with the potentially predictable slow processes. Our analysis shows large potential SST interdecadal predictability in the extratropical region in both hemisphere, as well as in the subtropical/tropical Indian Ocean, the western Pacific and the Atlantic. In the tropical eastern Pacific, interdecadal variability is dominated by unpredictable decadal noise. The two leading unpredictable modes of interdecadal variability have features related to the two leading ENSO modes, and the PDO. The four leading potentially predictable modes of interdecadal variability are shown to be related to the external forcing, the IPO, inter-hemisphere SST fluctuations and the AMO, and decadal/multi-decadal AO/NAO variability.

### Key words:

interdecadal variability; SST; mode; climate; CMIP5; last millennium experiment

## Urban Physical Geography: Theory, Practice and Development

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### Abstract

Since the end of the 20th century, more and more people have been moving into the city, thereby increasing the complexity of relationship between the human and physical environments. Along with the urban development, the natural water system has been heavily modified, the natural topography has been levelled off, natural vegetation has been replaced, the regional climate has been changed by the built environment, and the river system has been severely polluted affecting drinking water. The significant changes in the natural environment of city require a comprehensive assessment to review and evaluate the impact of urban development and the changing nature of interactions and interrelationships between the human and physical environments. The occurring of problems of physical geography in urban areas shows a new stage of the evolution of human-earth interaction. Thus Urban Physical Geography, as a new discipline has been developed, which concentrates on the research of the spatial and temporal changes, evolution processes of natural elements, mutual coupling effects between physical environments and human activities, the response mode of urban system against physical environmental changes, and mutual feedback influencing mechanism in urban system, then makes simulation, prediction, and adaptation for urban development and management. Its main task is to study the evolving characteristics and the mechanisms of changed physical geography, to explore the changes in the level of physical geography elements, the functioning processes and mechanisms, as well as the relations and effects of mutual restraints, and to seek the sustainable development of the relationship between human and environment in urban areas. This study presents the concept, disciplinary system and framework, new developments, and future trend of Urban Physical Geography.

### Key words:

Urban physical geography; processes; mechanism; adaptation; new trends

## Abundance and diversity of polycyclic aromatic hydrocarbon degradation bacteria in urban roadside soils in Shanghai

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### Abstract

Understanding the impact of polycyclic aromatic hydrocarbons (PAHs) on soil environments is of increasingly important concern. Therefore, the microbial degradation of PAHs in soils has drawn considerable attention, but little is known about the PAH degradation genes in urban soils. In this study, we examined the diversity and abundance of the PAH degradation bacteria and evaluated whether the specific bacteria can reflect PAH contents in the soils from urban roadsides directly receiving traffic emission. The results of phylogenetic analysis indicated that low PAH degradation bacterial diversity occurred in the urban roadside soils, only including *Mycobacterium* sp., *Terrabacter* sp., and one novel cluster. The community composition diversity of PAH degradation bacteria did not show a significant difference across the sampling sites. The abundance of PAH degradation genes ranged from  $5.70 \times 10^6$  to  $6.44 \times 10^7$  gene copies  $g^{-1}$  dry soil, with an average abundance of  $1.43 \times 10^7$  gene copies  $g^{-1}$  dry soil, and their spatial variations were related significantly to PAH contents in the soils. The *Mycobacterium* sp. was the most widely detected and estimated to occupy 65.9–100 % of the total PAH degradation bacteria at most of the soil samples, implying that the *Mycobacterium* sp. might play a primary role in degrading PAHs in the contaminated urban soil environments.

### Key words:

Polycyclic aromatic hydrocarbons (PAHs); Bacterial community; Degradation; Urban soil; Shanghai

## Correlations of Global Sea Surface Temperatures with the Solar Wind Speed and Its Effect on Local Urban Environment in East China

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### Abstract

A significant correlation between the solar wind speed (SWS) and sea surface temperature (SST) in the region of the North Atlantic Ocean has been found for the Northern Hemisphere winter from 1963 to 2010, based on 3-month seasonal averages. The correlation is dependent on  $B_z$  (the interplanetary magnetic field component parallel to the Earth's magnetic dipole) as well as the SWS, and somewhat stronger in the stratospheric quasi-biennial oscillation (QBO) west phase than in the east phase. The correlations with the SWS are stronger than those with the F10.7 parameter representing solar UV inputs to the stratosphere. SST responds to changes in tropospheric dynamics via wind stress, and to changes in cloud cover affecting the radiative balance. Suggested mechanisms for the solar influence on SST include changes in atmospheric ionization and cloud microphysics affecting cloud cover, storm invigoration, and tropospheric dynamics. Such changes modify upward wave propagation to the stratosphere, affecting the dynamics of the polar vortex. Also, direct solar inputs, including energetic particles and solar UV, produce stratospheric dynamical changes. Downward propagation of stratospheric dynamical changes eventually further perturbs tropospheric dynamics and SST, whose effects on local urban environment in East China were addressed.

### Key words:

solar wind speed; sea surface temperature; clouds; global electric circuit; local response

## Diversity, Abundance, and Distribution of *nirS*-encoding Denitrifiers in the Coastal Wetlands of China

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### Abstract

For the past few decades, human activities have intensively increased the reactive nitrogen enrichment in China's coastal wetlands. Although denitrification is a critical pathway of nitrogen removal, the understanding of denitrifiers dynamics remains limited in the coastal wetlands. In this study, the diversity, abundance, and distribution of *nirS*-harboring denitrifiers in China's coastal wetlands were analyzed to reveal their variations along the latitudinal gradient. Diverse *nirS* sequences were obtained and most of them shared considerable phylogenetic similarity with sequences obtained from aquatic systems (marine/estuarine/coastal sediments and hypoxia sea water). Clone library analysis revealed that the distribution and composition of *nirS*-harboring denitrifiers had significant latitudinal differentiation, but without seasonal shift. Canonical correspondence analysis showed that the community structure of *nirS*-encoding denitrifiers was significantly related to temperature and ammonium concentration. Q-PCR results revealed that the *nirS* gene abundance ranged from  $4.3 \times 10^5$  to  $3.7 \times 10^7$  copies  $g^{-1}$  dry sediment with a significant spatial heterogeneity. Among all detected environmental factors, temperature was a key factor regulating not only the *nirS* gene abundance but also the community structure of *nirS*-harboring denitrifiers. Overall, this study provides valuable insights into the composition and dynamics of denitrifying community in the coastal wetlands of China.

### Key words:

Denitrification; reactive nitrogen

## **Extreme Climate Event, Urban Social-Ecological Systems and Disaster Resilience in Coastal Cities: A Comparative Study**

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### **Abstract**

The intensification, changing frequency and duration of climate extreme events such as heavy precipitation, tropical cyclones and intensified heat waves is currently emerging as one of the most important facets of climate change. The losses from extreme climate events are increasing in coastal urban area and urban societies are becoming more vulnerable to these events given their location, high concentration of people, and increasingly complex and interdependent infrastructure. And among these climate extremes, the compound or concurrent extreme event is most destructive and draw more attentions. Coastal cities in different countries have different capacity to cope with the disasters related to extreme climate event. This paper examine the history of extreme climate events in Shanghai and New York, the possibilities and magnitude of compound extreme events in these two cities, and the resilience of urban social-ecological system after mega events which illustrated with two extreme cases of Hurricane Sandy and Typhoon 9711. Impacts of Hurricane Sandy, and Typhoon 9711 demonstrate not just failures in built infrastructure, they highlight the inadequacy of institutions, resources, and information systems to prepare for and respond to events of this magnitude. Joint learning from the experiences of adaptation in two cities can make the cities stronger and more resilient.

### **Key words:**

Extreme climate event; social-ecological system; vulnerability; cascading impacts; disaster resilience

## Health Risk Assessment of Soil Heavy Metals in Housing Units Built on Brownfields in a City in China

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### Abstract

Nine housing units built on different brownfields in a city in Henan Province in China were chosen to investigate the health risks of soil heavy metals (As, Hg, Pb, Cd, Ni, Zn, Cr, and Cu) in 41 surface soils. Concentrations of soil heavy metals were measured by AAS, ICP-MS, and AFS. Based on the health risk models recommended by the US EPA, carcinogenic and non-carcinogenic health risks of soil heavy metals were assessed. Our results showed that compared with the original brownfields, soil heavy metal concentrations and their health risks in housing units built on brownfields have been improved after soil remediation. Nevertheless, the concentrations and health risks of soil heavy metals in these housing units are all higher than those in non-brownfield housing units. The hazard quotient (*HQ*) and hazard index (*HI*) values of soil heavy metals in each housing unit are lower than one, which indicates that there are no non-carcinogenic risks for the residents. However, the values of carcinogenic risk (*CR*) and total carcinogenic risk (*TCR*) are slightly higher than the standard suggested by the US EPA, indicating that there are slight carcinogenic risks for the residents in these housing units. The *HI* value of the heavy metals for children is exactly seven times higher than for adults. The contribution of  $HQ_{As}$  to *HI* is approximately 53%, and the contribution of  $CR_{As}$  to *TCR* is approximately 80%, indicating that arsenic is the crucial heavy metal for carcinogenic and non-carcinogenic risk in the residential quarters of the city.

### Key words:

brownfield; heavy metals; health risk; assessment; housing unit

## Investigation on Atmospheric PM<sub>2.5</sub>-borne PAHs in Eastern Cities of China: Concentration, Source Diagnosis and Health Risk Assessment

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### Abstract

This study has investigated on PM<sub>2.5</sub>-PAHs associations collected from Beijing, Jinan and Shanghai in Eastern China. Results indicated that PM<sub>2.5</sub> concentrations of Beijing, Jinan, and Shanghai were 126  $\mu\text{g m}^{-3}$  (19~356  $\mu\text{g m}^{-3}$ ), 116  $\mu\text{g m}^{-3}$  (44~345  $\mu\text{g m}^{-3}$ ) and 85  $\mu\text{g m}^{-3}$  (24~233  $\mu\text{g m}^{-3}$ ) respectively. The PAHs concentrations in PM<sub>2.5</sub> of Beijing, Jinan, and Shanghai ranged from 23 to 820  $\text{ng m}^{-3}$ , 26 to 727  $\text{ng m}^{-3}$  and 9 to 134  $\text{ng m}^{-3}$ , separately. PAHs concentrations were found to be positively correlated with PM<sub>2.5</sub> concentrations in Beijing and Shanghai. The compositions of PAHs in PM<sub>2.5</sub> in Beijing and Jinan were almost the same: 11% of low ring, 80%~82% of middle ring and 7%~9% of high ring. Yet Shanghai has a different composition. Source apportionment indicated that incomplete combustion of coal and diesel and gasoline emissions were main sources of PAHs in PM<sub>2.5</sub> in all three cities, while Shanghai has more contribution of liquid fossil fuels. The values of health risk assessment estimated by benzo[a]pyrene equivalent concentration of Beijing and Jinan were  $2.39 \times 10^{-6}$  and  $2.57 \times 10^{-6}$ , exceeding the  $1 \times 10^{-6}$  (USEPA), likely posing inhalation cancer risk to people. Shanghai has a risk estimate of  $5.05 \times 10^{-7}$ , which is still in a safe range. This study is first to simultaneously monitor the PAHs in PM<sub>2.5</sub> in three cities of Eastern China and points to a long-range transportation of PM<sub>2.5</sub>-PAH from Beijing to Jinan, and partially to Shanghai.

### Key words:

PAHs; PM<sub>2.5</sub>; sources; Eastern China; health risk assessment

## Modelling the Anthropogenic Impacts on Fluvial Flood Risks in A Coastal Mega-city: A Scenario-Based Case Study in Shanghai, China

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### Abstract

This paper describes a novel approach to the evaluation of anthropogenic impacts on flood risks in coastal mega-cities by incorporating three anthropogenic variables (land subsidence, urbanization and flooddefence) within a scenario-based framework where numerical modelling was undertaken to quantify the risks. The evolving risks at four time points (1979, 1990, 2000 and 2009) were assessed for the Huangpu River floodplain where the city of Shanghai is located. A 2D hydrodynamic model (FloodMap-Inertial) was used to estimate the flood risks associated with each scenario. Flood events with various return periods (10-, 100- and 1000-year) were designed based on a one in 50-year flood event that occurred in Shanghai on August 1997. Results demonstrate the individual as well as the combined impacts of the three anthropogenic factors on the changing fluvial flood risks in the Huangpu River basin over the last three decades during the city's transitional economy (1979–2009). Land subsidence and urbanization were found to lead to proportionate but non-linear impact on flood risks due to their complex spatial and temporal interaction. The impacts and their sensitivity are the function of the rate and spatial distribution of each evolving factor. While the pattern of response to individual anthropogenic variables is largely expected, the combined impacts demonstrate greater spatial and temporal variation. Flood defences offer considerable benefits in reducing the total inundated areas in the Huangpu River basin over the periods considered, for all magnitude floods. This, to a large extent, alleviates the adverse impacts arising from land subsidence and urbanization.

### Key words:

Anthropogenic impact; Urbanization; Land subsidence; Fluvial flood modelling; Huangpu River; Shanghai

## Nitrogen Mineralization and Immobilization in Sediments of Shanghai River Networks: Spatiotemporal Variations and Environmental Implications

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### Abstract

Nitrogen (N) mineralization and immobilization play crucial role in the N cycle in river sediments. Although these processes are critical to understand the N budgets and maintain the ecological environment security in river ecosystem, few studies have investigated them in the urban river networks of Shanghai. Sediment-slurry incubation experiments combined with <sup>15</sup>N isotope dilution technique were conducted to quantify the potential rates of N mineralization and immobilization in surface sediments. The gross N mineralization (GNM) and gross ammonium immobilization (GAI) rates ranged from 0.1 to 11.1 mg N kg<sup>-1</sup> d<sup>-1</sup> and 0.2 to 12.83 mg N kg<sup>-1</sup> d<sup>-1</sup> in surface sediments, respectively. In general, both the potential rates of GNM and GAI were greater in summer than in winter, and the relative high values were mainly detected in urban area. Both the rates of GNM and GAI were related closely to sediment temperature, pH, NH<sub>4</sub><sup>+</sup>-N, NO<sub>3</sub><sup>-</sup>-N, and TOC and TN contents in urban and suburban areas. In addition, the total mineralized and immobilized N in the were estimated to be approximately 1.3 × 10<sup>5</sup>t N yr<sup>-1</sup> and 1.4 × 10<sup>5</sup>t N yr<sup>-1</sup>, respectively. Compared with general dissolved inorganic nitrogen (DIN) fluxes from other sources, the potential mineralized N could become an important DIN source in the urban river networks of Shanghai, and N immobilization is crucial for maintaining the ecological environment security.

### Key words:

N mineralization and immobilization, isotope dilution technique, Shanghai river networks.

## Spatio-temporal Variation and Source Apportionment of PAHs in Sediments of Huangpu River

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### Abstract

Understanding the spatio-temporal distribution and sources of PAHs in sediments of urban rivers has been raised recently. In this work, principal component analysis with multiple linear regression model, hierarchical cluster analysis and diagnostic ratios were conducted to identify the potential PAHs source. The results indicated that total concentrations of PAHs ranged from 723.25 ngg<sup>-1</sup>dry weight (dw) to 38541.61 ngg<sup>-1</sup>dw with mean value of 7611.91 ngg<sup>-1</sup> dw in the dry season, while the average value of 1113.4 ngg<sup>-1</sup> was observed in the wet season. Generally, the concentrations of PAHs were higher in mainstreams than in the tributaries. The PAH compounds was dominated by 4-ring PAHs, contributing 42.41%±6.81% and 44.70%±7.73% of total PAHs, respectively. On the base of statistical methods, the sources of PAHs were mixed and derived mainly from vehicular emission, coal combustion and wood combustion. Risk assessment results indicated that the toxicity was higher in drought season than in wet season. Additionally, the BaP contributed (59.88%-55.91%)to TEQ<sub>PAH</sub> at most sites.

### Key words:

PAHs; Spatio-temporal variation; PCA-HCA; Risk quotient; Huangpu River

## Geographical Science and Future Earth

### River forms in different geographic regions



Home

#### Oral

1. [Bank Erosion along Lower Subansiri River, Assam: A Geospatial Analysis](#)  
Amritee Bora (North Eastern Hill University, India), Bijay Mipun (North Eastern Hill University, India)
2. [Changes of Siltation in Main Sediment Sinks and Sediment Load of the Yellow River](#)  
Changxing Shi (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
3. [Channel Patterns and Their Transformation in The First Bay of the Yellow River](#)  
Suiji Wang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
4. [Criticality in the Cutoff Behaviour of the Ganges River Meanders](#)  
Paul Carling (University of Southampton, United Kingdom)
5. [Influence of Cascade Hydropower Development on Fluvial Morphology Diversity in the Yellow River Source Zone](#)  
Huan Hong (Institute of International Rivers and Eco security, Yunnan University, China), Jinming Hu (Institute of International Rivers and Eco security, Yunnan University, China)
6. [Network Evolution and Fluvial Process of the Tarim River in China](#)  
Guo`an Yu (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), He Qing Huang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Markus Disse (Technical University of Munich, Germany)
7. [Shape of River Islands; A Variational Analytical Explanation in Terms of Equilibrium Theory](#)  
He Qing Huang (Chinese Academy of Sciences, China), Xiaofang Liu (Chinese Academy of Sciences, China), Gerald Nanson (University of Wollongong, Australia)

#### Poster

1. [Fluvial Response to Climate Variability and Human Interventions in the Damodar Valley, India during Anthropocene](#)  
Prasanta Kumar Ghosh; Sujay Bandyopadhyay; Narayan Chandra Jana (India, The University of Burdwan)

## Bank Erosion along Lower Subansiri River, Assam: A Geospatial Analysis

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### Abstract

Subansiri is the largest tributary of the river Brahmaputra and second largest river in Assam contributing as much as 11 percent of the total flow. The maximum discharge recorded at Chowldhoaghat is 18799 cubic meters per second in the year 1987 during its peak season. It is one of the most dynamic and unstable river originating in the Eastern Himalayan Region. Flood and drainage congestions are the major problems in the plains of the Lower Subansiri. The hydrological characteristics of the river and the geology of the surface indicate that it is an active zone of river bank erosion. The study shows that between the years 1956 to 1990 the annual rate of erosion is about 8.3 square kilometres. During the years 1990 to 2000 the annual erosion rate has gone up to 19.51 square kilometres. In the last decade, from the year 2000 to 2010 the annual erosion rate has decreased to 6.07 square kilometres. Every year a considerable amount of land loss has been due to bank erosion in the flood plain region. The primary aim of the present study is to assess the amount of land loss caused by the Lower Subansiri River and map the erosional areas between the years 1956 to 2010. The methodology is based on RS and GIS techniques with mathematical as well as statistical analysis. The channel behaviour and configuration of river undergoes dramatic changes in response to variation in flow regime. The study aims to project future bank erosion areas.

### Key words:

Bank; erosion; channel; hydrological; flow; geospatial

## Changes of Siltation in Main Sediment Sinks and Sediment Load of the Yellow River

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### Abstract

The Yellow River is one of the gigantic sediment delivery systems on the Earth. This study investigates the changes of siltation in three principal sediment sinks and sediment load of the river in history. It is displayed that the sediment load of the river undergone an accelerating increase after the Song Dynasty mainly resulting from a gradual enhancement of human activities and a decrease tendency in recent decades as a result of climate change and soil erosion control and water conservation practices. Before the middle of the 20<sup>th</sup> century, siltation in two sediment sinks (including the lower Yellow River and the lower Wei River and the Xiaobeiganliu reach of the middle Yellow River) showed an increase trend accompanying with the accelerating increase of the river's load. In recent decades, siltation rates in the two sediment sinks undulated due to the promotion of flood control capacity of artificial levees, changes in pool level of Sanmenxia Dam, and variations in the river's load. The sediment storage in the two sinks has continuously decreased since 2003. The Hetao plain is the largest sediment sink in the upper Yellow River. Siltation in the sink was approximately 900 million tons annually on average of over 400 years before 1949. In over 50 years after 1950, the mean siltation rate in the sink was higher than that before and rose and fell for two cycles due to changes in incoming sediment coefficient. It is low in recent years.

### Key words:

sediment delivery system; sediment sink; sediment storage; sediment load; Yellow River

## Channel Patterns and Their Transformation in The First Bay of the Yellow River

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### Abstract

The Yellow river is famous in the world because of its high-concentrated flow and high sedimentary rate on the channel bed of the lower reach. Furthermore, various channel patterns can be found along its trunk channel and many tributary channels. The first bay of the Yellow River, located in an intermountainous alluvial region of the eastern Qinghai-Tibetan Plateau, at least has three different channel patterns in a channel long about 200 km. Based on satellite images and field investigation, anastomosing, meandering and braided channel patterns have found in the first bay. Specially, although the anastomosing channels shows typical planform of anastomosing pattern, the sediments of channel bed and in channel bank-bottom are gravel materials which are different from the sediments on sandy bed and in muddy banks of reported anastomosing river systems, respectively. The channel pattern transformation in the first bay shows two modes, from anastomosing to meandering and from meandering to braided. The series transformations present a trend from very stable to very unstable channel patterns that is reverse with the normal trend from unstable to stable channel patterns downward stream in the world. These transformations are influenced by crustal rise, restriction of the gorges in upper and lower reaches of the first bay, hydrodynamic characteristics, sediment difference of channel boundary and regional distribution of vegetation cover. In the future, it needs to reveal the cause of formation of the anastomosing channel pattern with gravelly bed and bank-bottom.

### Key words:

Channel pattern; transformation; gravelly anastomosing channel bed; Yellow River

## Criticality in the Cutoff Behaviour of the Ganges River Meanders

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### Abstract

Changes in the planforms of large rivers often are considered unpredictable. In contrast, we demonstrate that the cutoff behaviour of meanders in the wandering Ganges is highly predictable. Historical maps indicate cutoffs occurred at intervals defined by multiple decades. Recent remote-sensing data indicate that four self-similar meanders cutoff, or attempted to cutoff, after approximately 31-35 years, primarily due to channel-aggradation. Meander planform behaviour is a form of self-organised criticality. As main-channels aggrade, sinuosity is maximized for broad channel widths ( $B$ ) and small radii ( $r$ ) of curvature and relaxes for bends of greater radii. Maximized form resistance occurs close to criticality and super-elevated flows develop along the outer banks of bends that promote cutoffs. Avulsions lead to main channel narrowing and prevent further bend tightening, relaxing the system by reducing sinuosity. Thus, wandering rivers oscillate in space and time from a more ordered to a more chaotic state. Planform behaviour is described using the Jerolmack-Mohrig mobility number and the Parker stability criterion. These parameters well-define the behaviour of the Ganges meanders as they approach criticality and then relax via partial or completed avulsions. In conclusion, the behaviour of the Ganges in the study reach is predictable in space and time. The results have significance for river engineering management and such an approach could be of practical value when predicting the behaviours of other major wandering rivers.

### Key words:

Criticality; Meander; Avulsion; Wandering; Anabranching

## Influence of Cascade Hydropower Development on Fluvial Morphology Diversity in the Yellow River Source Zone

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### Abstract

Fluvial morphology in the Yellow River Source Zone (YRSZ) has received more attention for its unique diversity. However, the newly planned Cascade Hydropower Development on the mainstream of the YRSZ will potentially change its fluvial morphology. Based on river patterns, the mainstream of the YRSZ between the Longyangxia and Huangheyuan reservoirs was divided into 14 sections. We adopted 8 indicators to establish an index system reflecting the spatial, inter-channel lands and boundary features for each section. DEM data, the location of dams and their normal pool levels were used to simulate the flooding impacts on fluvial morphology from the cascade reservoirs. Results document a huge change of fluvial morphology between pre- and post-dam construction. The length ratio of unnatural, multiple and single channels will be altered from 1:6:8 (now) to 9:5:1, with a greater rate of decrease (87%) of single channels than multiple channels (20%). The unnatural channels will account for 60% of the reach between the Longyangxia and Huangheyuan reservoirs. The sinuosity of the flooded sections will decline, and more than 50 km<sup>2</sup> of inter-channel lands will be submerged. To protect fluvial morphology diversity and the vulnerable river ecosystem, we need effective actions before the cascade dam construction.

### Key words:

Yellow River source zone; fluvial morphology diversity; cascade hydropower development

## Network Evolution and Fluvial Process of the Tarim River in China

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### Abstract

Historical literature/maps, gauged hydrological data and satellite images are analyzed to examine how river network and fluvial morphology of the Tarim River, the longest dryland river in an extremely arid region of China, have changed in recent centuries, particularly in the last decades due to ever-increasing human impacts. Gauged hydrological data from the past five decades shows an obvious reduction in runoff and sediment load in the Tarim River, even though the runoff from source tributaries exhibits a gentle increase. The annual occurrence of low flow events shows a significant increase, while the occurrence of moderate-high flow events follows a gentle decrease. The river network has disintegrated from a historically '(quasi-) centripetal' system with nine tributaries into several isolated branches, which have mainly developed since the 20th century. Currently, only four tributaries flow into the main river, leading to the development of a braided channel pattern in the upper reach and a meandering pattern in the middle reach. The braided reach is wandering and in aggradation. The mean width of the braided channel in the upper reach follows a gentle decrease mainly due to the reclamation of river flood plains into farmlands and embankments. The sinuosity of the current Tarim River channel is distinctively lower than those of the old channels that were abandoned decades or centuries ago, even though the sinuosity of the current channel exhibits a gentle increase in recent decades due to the increased occurrence of low flow events.

### Key words:

Channel network; fluvial processes; human impacts; dryland river; Tarim River

## Shape of River Islands; A Variational Analytical Explanation in Terms of Equilibrium

### Theory

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### Abstract

Studies on the behavior of anabranching rivers have been dominated with empirical analyses and it has not been clear so far how this type of rivers responds to environmental changes. For anabranching rivers formed of islands of a particular shape, this study applies a variational analytical approach to explain the morphology of the islands. A model is developed based on observations from the upper Yellow River and the middle and lower Yangtze River which alternate between single channel and two-channel anabranching with islands approximately triangular in planform. The equilibrium condition of the model river is derived from basic hydraulic relationships of flow continuity, channel boundary resistance, bedload transport and energy conservation in the model anabranching river. It is shown that when such an anabranching river reaches stationary equilibrium, the planform of the island is determined by the proportions of water and sediment discharges passing through the two channels. In comparison with field observations in the middle and lower Yangtze River, a remarkable consistency is achieved between theoretical predictions and the measured morphologies of islands.

### Key words:

anabranching rivers; river islands; equilibrium theory; variational approach; channel geometry; the Yellow and Yangtze Rivers

## Fluvial Response to Climate Variability and Human Interventions in The Damodar Valley, India During Anthropocene

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### Abstract

Field mapping, sedimentologic investigations and geomorphological analyses in combination with a series of temporal ancillary data i.e. hydro-meteorological data, sand excavation data and satellite data define a record of Anthropocene landscape change along 282.7 km stretch of the Damodar River in West Bengal, India. During the 20<sup>th</sup> Century, the Damodar Valley Corporation (DVC) came into existence and the Damodar basin was extensively engineered for irrigation and flood control. Since that time up until the present time, the hydrology and morphology of Damodar River has been controlled by dams and embankments, with these, now another intervention i.e. large-scale excavation of river sand has been added. The floodplain undergoes great changes as a result of the confinement of river flow due to construction of embankment. Through historical satellite image, hydro-meteorological data, and cross sectional surveys, we demonstrate that the influence of the upstream dam, embankment and sand mining is still a major control of river dynamics and adjacent landscape. Human alterations and their impacts on the system's ecology have also been considerable. In addition, sand mining disturbs the equilibrium of a river channel because it intercepts material load moving within a dynamic system and triggers an initial morphological response to regain the balance between supply and transport. The methodology also adapts various statistical approaches like Mann-Kendall test, Sen's Slope estimator to detect the possible trend in stream flow pattern. The results of this study would help in maintaining the health of rivers in the Anthropocene world.

### Key words:

Sand excavation; Anthropocene landscape; River dynamics; Fluvio-morphological respons; Damodar Valley

## Geographical Science and Future Earth

### Geography and innovation



Home

### Oral

1. [Advances in Terrestrial System Research in China](#)  
Shaohong Wu, Yunhe Yin, Du Zheng, Qinye Yang, Haoyu Deng (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
2. [Evaluation for Hyporheic Water Exchange Along Meandering Banks derived from The Multiple-Depth Temperature Datas](#)  
Zhang Guotao, Song Jinxi (Northwest University, China)
3. [Review of Innovation Studies of Western Human Geography: Based on the Quantitative Analysis of Mapping Knowledge Domain](#)  
Ziming Yan, Debin Du (East China Normal University, China)

## Advances in Terrestrial System Research in China

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### Abstract

Land surface is of temporal-spatial heterogeneity. Terrestrial system (TS) comprehensively studies on land surface and physical regionalization objectively describes geographical zonation of the system. China has vast area with apparent spatial variations in resources and environment conditions, which highly influence on social economic development. In this paper, progress of TS studies in China is overviewed and research priorities in the near future are prospected. Since 1950s, China has paid high attention to TS study as its social economic construction developing, and implements the researches on physical geographical regionalization, eco-geographical regionalization and comprehensive regionalization. Along with the deepening of global change research, dynamic of TS has been highly concerned. During the studies, methodology has been developed from qualitative research of integration of experts' brainpower gradually to quantitative research based on field observation and experimentation of the natural processes, including physical, chemical and biological processes, as well as application of information technology and mathematical simulation. In the near future, TS would combine with the ideology, objectives and key researches of Future Earth program, to focus on the mechanism and regional effects of interaction among land surface elements, the responds of TS to global change, the quantitative recognition on regional unit boundary, and the application of TS in sustainable social economic development.

### Key words:

terrestrial system; differentiation rules; global change; sustainable development; China

## Evaluation for Hyporheic Water Exchange Along Meandering Banks derived from The Multiple-Depth Temperature Datas

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### Abstract

The micro-topography features in riverine system can be the controlling attributes to induce the different patterns and magnitudes of hyporheic water exchange. The objective of study is to determine how hyporheic water exchange is affected by the meandering banks and riparian vegetation at small scales. The one dimensional heat steady-state transport model is applied to identify and quantify the hyporheic water exchange fluxes along the meandering bank and straight bank segmentations in January and July 2015, respectively. Moreover, on the basis of the curvature formula and the fitting mathematical equations, the curvatures are calculated. The results demonstrate that all water exchange patterns in test site are upward in both test times, and the higher fluxes mostly occur in January 2015. There are significant spatial variations for the water exchange fluxes along the different river banks. In terms of convex banks, larger curvatures of the measurement points along the either sides of convex bank are inclined to induce the higher fluxes, and the significantly higher water exchange fluxes would occur near the apex of bends. Additionally, a flow pattern from river bank discharging into stream is illustrated during the campaign in July 2015, and significantly higher fluxes is obtained along the straight bank where more riparian vegetation is adjacent to the bank line. It can be suggested that the bank curvatures, riparian vegetation are considered as the crucial attributes influencing the hyporheic water exchange.

### Key words:

Meandering bank; Hyporheic water exchange; Temperature; Riparian vegetation; The Weihe River

## Review of Innovation Studies of Western Human Geography: Based on the Quantitative Analysis of Mapping Knowledge Domain

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### Abstract

The innovation study is becoming more and more attention from western human geography scholars, and has become the new direction of western human geography studies in recent years. The paper chooses Web of Science (WOS) as the literature search engine, and 14 geography journals indexed by SSCI among the top 500 journals which published articles with innovation as the theme as literature sources. The data covers a total of 2,048 English literature records associated with the innovation topic from 1982 to 2015. The paper made co-occurrence analysis and cluster analysis for key words based on the platform of CiteSpace and Carrot2 to make the innovation knowledge mappings of western human geography, which made the knowledge base, development vein and research frontier visualized. We found that: (1) innovation studies of western human geography shows continuous development trend after the rise since the 1990s, the branches or gaps doesn't appear, and the research perspectives make a gradual transition from surface phenomenon to deep mechanism. (2) The research contents are broad and the research topics are not centered, and nine clusters has formed currently, including "market intelligence", "knowledge spillover", "region influence", "collective learning processe", "spatial technological adoption", "terra incognita", "multi-actor network analysis", "regional innovation system", and "literature review". (3) Recent research hotspots point to keywords "city", "firm", "technology", "research and development", and "network". (4) The researchers mainly from the UK and the US, researchers from Spain, Germany, Italy, and Sweden are also more active recently.

### Key words:

western human geography; innovation; mapping knowledge domain; CiteSpace; Carrot2

## Geographical Science and Future Earth

### Big data, GISciences and decision-making

#### Oral



Home

1. [A Partition-and-Filter Model for Crowdsourcing Trace Data Filter](#)  
Xue Yang (Wuhan University, China), Luliang Tang (Wuhan University, China)
2. [An Improved Method Based on Spatial Proximity Model to Discover the Urban Functional Areas Using Pedestrian Trajectories](#)  
Xuetao Song (NJU, China), Yingxia Pu (NJU, China)
3. [Applications and Challenges of GIS in the Era of Big Data](#)  
Gefei Wang (Northwest University, China), Peiyun Zhang (Northwest University, China), Liwen Liang (Northwest University, China), Jie Wang (Institute of Water Resources and Hydropower Research of Yunnan Province, China), Shiqiang Zhang (Northwest University, China)
4. [Assessment of Water Quality for Irrigation and their Impact on Cropping Quality Pattern using LISS-IV Sensor's based Geospatial Techniques](#)  
Amit Kumar (National Institute of Technology, Kurukshetra, India), Vandana Tomar (Haryana Institute of Public Administration, Gurgaon, India)
5. [Basin Approach to The Analysis of Environmental Problems of the Amur River](#)  
Evgenii Egidarev (Pacific Institute of Geography, FEB RAS, Russian Fed)

#### Poster

1. [A GIS-based Framework of Process Model for Soil Erosion](#)  
Zhang Chuancai; Qin Fen (China, Henan University)
2. [Advances in Technology and Methods of Land Disputed Area Demarcation Based on GIS](#)  
Feng Changqiang; Jiang Nan; Wang Pei (China, Institute of Geospatial Information, Information Engineer University)
3. [Construction and Precision Analysis of Isostatic Free Air Gravity Anomaly Model](#)  
Kai Wang; Xing Wu; Zi Zhong Liang (China, Beijing special engineering design and research institute)
4. [Despeckling Algorithm of High-Resolution Synthetic Aperture Radar Images Based on Partial Differential Equations Methods and Non-Local Means Filters](#)  
Zengguo Sun (China, School of Computer Science, Shaanxi Normal University); Liu Yang (China, College of Computer Science and Technology, Huaqiao University)
5. [Progress of Research on Information and communication Geography in China](#)



Zhongwei SUN (China, The Geographical Society of China)

6. [Spatial-temporal Evolution of Malls in Guangzhou City and Its Impact on Urban Commercial Spatial Structure](#)

Zhang Xiaoying (China, Guangzhaou Academy of Social Sciences)

7. [The Prediction of Spring Drought of the Typical Areas of Hulun Buir Based on the Grey Sequence Forecast Model](#)

Liu KunWang Ning; Yang Lingbin (China, The Northeast Normal University)

8. [Topic Model based Classification of Moderate-resolution Remote Sensing Images](#)

Hua Shao; Yang Li (China, Nanjing Normal University)

## A Partition-and-Filter Model for Crowdsourcing GPS Trace Data Filter

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### Abstract

Owing to the popularization of GPS, a massive amount of spatiotemporal GPS traces collected by mobile devices are being as a kind of new big data source for urban geographic information extraction. However, the quality of GPS data collected through crowdsourcing way is low, thus making it difficult to mine high-precision road information such as centerline-level, carriageway-level and lane-level road map. Therefore, it's very important and challenging to filter high quality GPS data from the crowdsourcing GPS trace based on its positional accuracy. To address the challenges, this paper proposes an efficient partition-and-filter model to filter trajectories, which includes trajectory Partition with Position and Angle Constrain algorithm (*PPAC*) and Trajectory Filtering with Expected Accuracy method (*TFEA*). For the partition part, *PPAC* is used to partition a trajectory into a set of sub-trajectories based on distance and angle constrains. Then, the *TFEA* is used to filter the sub-trajectories according to the similarity between GPS tracking points and GPS baselines constructed by random sample consensus algorithm (RANSAC). Experimental results demonstrate that the proposed partition-and-filtering model can effectively filter the high quality GPS data from various crowdsourcing trace data sets with the expected accuracy.

### Key words:

Crowdsourcing trace data; trace partition; data filter

## An Improved Method Based on Spatial Proximity Model to Discover the Urban Functional Areas Using Pedestrian Trajectories

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### Abstract

Mining the urban functional structure contained in a large amount of residents' moving trajectories is meaningful in the current big-data era. However, existing methods rarely take into account of the spatial association relationship among these functional areas during the classification process by using machine learning. In this paper, we propose an improved framework based on Spatial Proximity Model to identify the functionality of urban areas using GPS trajectories and POIs. We firstly apply a series of mathematical morphology operators to partition road network into basic semantic regions. Then we add spatial dependence of each region as a nonlinear factor to our classification model. The spatial dependence among each region and its neighbourhoods consists of two kinds of spatial proximities, one is spatial autocorrection and the other is co-location. After that, resilient backpropagation algorithm is applied to solve the model. The classification accuracy is verified with Moran's I index and BW joint count statistic. We demonstrate the framework using 100 thousand trajectories during three months and 46,000 POIs in Hefei city, China. The results show that the spatial dependence improves the precision of the classification significantly. We also discover the urban structure of the study region is in accordance with the classic concentric zone model.

### Key words:

Spatial Proximity Model; Machine Learning; Co-location; Spatial Autocorrection; Trajectories Mining; Urban Functional Area

## Applications and Challenges of GIS in the Era of Big Data

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### Abstract

With the rapid development of network infrastructure, the emergence of the new social networks and the coming of the intelligent devices, the number of mobile internet devices, equipments of the Internet of Things and high-definition cameras rises sharply. The data volume shows the trend of explosive growth. The era of big data is coming. And 80% of data produced in human life are closely related to spatial location, which has brought opportunities and challenges to the application of geographic information. This paper first explains the definition and characteristics of big data, and then discusses the application of GIS in the era of big data through several typical examples. Next it analyzes the challenges of GIS in data acquisition, data storage, data processing and analysis. Finally, the paper points out that the tight integration between GIS, mobile internet and decision support system is the key to improve the coupling of big data and GIS based on data filtering on the theory of probability, distributed cloud storage and data instant analysis.

### Keywords:

big data; GIS; geospatial big data; integration

## Assessment of Water Quality for Irrigation and their Impact on Cropping Quality Pattern using LISS-IV Sensor's based Geospatial Techniques

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### Abstract

The words "water quality" is a widely used expression, which has an extremely detailed scale of meanings. Green revolution introduced worldwide in preview of high crop yield. The Utilization of agricultural land efficiently for the production of the crops requires knowledge of the nutrient inconsistency. Geomatics has proven to be the pre-eminent technique to retrieve the synoptic and substantial changes in cropping pattern. Groundwater quality and crop yield potentials in Katihar and Bhagalpur districts of Bihar, India has special significance and needs great attention of all concerned since it is the major alternate source of domestic, industrial and irrigation water supply. The present study monitors the irrigation water quality, relates it to the crop production and maps such quality using geospatial techniques through LISS-IV sensors. Thematic maps for the study are prepared by spatial interpolation method and enhanced LISS-IV imagery using ERDAS IMAGINE and ARC/INFO software. Physico-chemical analysis data of the groundwater samples collected at predetermined locations forms the attribute database for the study, based on which, spatial distribution maps of major water quality parameters are prepared using inverse distance weighted (IDW) method in ArcGIS software. Water Quality Index (WQI) was then calculated to find the suitability of water for irrigation purpose. Using ground truth information, satellite images were analyzed and hazardous locations were determined to cultivate the selected crops in the study area. The EC map, WQI distribution map, pH map were overlaid and analyzed in GIS media to estimate the effect of water quality on crop yield potential.

### Key words:

Spatial Interpolation; Nutrient inconsistency; Environmental factors



## Basin Approach to The Analysis of Environmental Problems of the Amur River

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### Abstract

This reporter views various methods of collection, storing and analyzing spatial data pertaining to the Amur River Basin for the purpose of solving a number of conservation tasks. For many years the Pacific Institute of Geography together with international conservation organizations such as WWF, WCS and others, has been monitored ecological problems and the sustainable use of natural resources in this transboundary region. The report demonstrates the use of the basin approach for the creation of GIS which contains the most important data units regarding environmental condition and change of this large transboundary river. Such GIS with remote sensing data has been successfully used for environmental assessment in the areas of gold mining, hydropower, water use etc. Furthermore, the paper discusses the importance of the Amur River system for the neighbouring countries (Russia, Mongolia and China) from the natural resource and socio-economic point of view. The designing of a common geoinformation space for the unitary transboundary GIS on the Amur River Basin is an important task. It will serve as an informational basis for a sustainable natural resource use project that would take into consideration the principles of ecological safety adopted in transboundary regional planning and scientific research.

### Key words:

GIS analysis; river systems; environmental problems; anthropogenic impact; nature resources; remote sensing

## A GIS-based Framework of Process Model for Soil Erosion

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### Abstract

Modularization or componentization of the process model for soil erosion can improve the efficiency of the development of new soil erosion model, but the large granularity components of the process model for soil erosion will limit the improvement to the model. GIS and the process model for soil erosion have extremely different data structures, which limits the integration of the two applications. This paper builds a framework of the process model for soil erosion to solve the two problems mentioned above. The framework of process simulation for soil erosion includes mainly two aspects: the first, Fine-grained decomposition and composition of the model, the second, the shared data model of GIS and the process model for soil erosion. Formal concept analysis method is used to decompose and modularize the process model for soil erosion. Using the object-oriented model design method, the paper designs a shared data model in the level of data structure in order to facilitate the GIS and soil erosion model to access data efficiently each other on the basis of Arc Hydro data frame. On the basis of fine-grained decomposition of the process model for soil erosion, the paper improves the slope downscale method based on fractal theory, and then implements the scale transformation of the slope as internal parameters in the process model for soil erosion. Finally, the paper verifies the effectiveness of the framework of the process model for soil erosion by integration of scale transformation method and soil erosion model.

### Key words:

Shared data model; model decomposition; fine-grain; slope downscale; fractal

## Advances in Technology and Methods of Land Disputed Area Demarcation Based on GIS

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### Abstract

Under the era theme of peace and development, delimitation negotiation becomes the preferred method to resolve the territorial disputes. With the development of computer, database, GIS and so on, the demarcation method of disputed area has developed from manual demarcation based on paper maps to computer-aided demarcation relying on digital maps, which could effectively conduct organization, storage, management, analysis and visualization of delimitation data. Firstly, this paper summarizes the history and development of land dispute district demarcation. Secondly, it mainly introduces the automatic generation of delimitation line considering many constraints (such as agreed area ratio, the ascription of special area and unilateral demands for resources), the optimal adjustment of delimitation line making it go along with actual terrain features like ridge and valley under the constraints of agreed area ratio, and the evaluation of demarcation scheme taking into account important resources and agreed area ratio. Thirdly, comparisons and analyses are made among different methods of each technique above in terms of algorithm principle, performance and application, which reveal the essential characteristics of different methods. Finally, this article forecasts further studies on techniques and methods of land disputed area delimitation.

### Key words:

disputed area; computer-aided demarcation; automatic generation of demarcation line; optimal adjustment of demarcation line; evaluation of demarcation line

## Construction and Precision Analysis of Isostatic Free Air Gravity Anomaly Model

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### Abstract

Isostasy is widely used in the construction of gravity potential models and the estimation of gravity anomaly where no measurement data available. With the Earth divided into land area and ocean area, the series expressions of the first order derivation of exterior gravitational potential are derived, separately. The application of topographic data with different resolutions is studied, and the influence of the depth of compensation is analyzed. Finally, the spectrum characteristic of the estimated model is discussed. Results show that the best depth of compensation studied here is 30 km, of which the average difference towards that of EGM2008 is less than 1 mGal. The precision falls obviously with the growth of the depth of compensation.

### Key words:

Isostatic model; isostatic free air gravity anomaly; depth of compensation; radius derivation

## Despeckling Algorithm of High-Resolution Synthetic Aperture Radar Images Based on Partial Differential Equations Methods and Non-Local Means Filters

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### Abstract

Synthetic aperture radar (SAR) has been widely used in the ecology, hydrology, geography, ocean monitoring, terrain mapping and so on, with virtues of all-day, all-weather, multiple perspectives and penetration. However, owing to the coherence from radar waves, SAR images are inevitable to produce some speckle. The speckle makes it difficult for the understanding of images, and thus the features of targets are not easy to describe correctly. Especially for the high-resolution SAR images, the mechanism of imaging is much more complicated to that of the low-resolution SAR images. Therefore, it is worth constructing a new despeckling algorithm appropriate for the high-resolution SAR images.

Activated by partial differential equations (PDE) methods and non-local means (NLM) filters, how to achieve satisfying despeckling results for high-resolution SAR images is discussed in this paper. In PDE methods, AA model is popular despeckling method for SAR images, because it can effectively suppress speckle in homogeneous regions. However, the AA model usually owns poor performance in keeping edge information. On the contrary, the NLM filter has well performance in keeping edge information, but poor performance in suppressing speckle in homogeneous regions. Therefore, considering the AA model as well as the NLM filter, a new despeckling method is proposed with well balance between speckle suppression and edge preservation. Firstly, the non-local dirichlet function is taken as a linear regularization item, which constructs the weight by measuring the similarity of images. Then, the proposed despeckling model is constructed by combining the regularization item and the data item of AA model. Lastly, an iterative equation is deduced to numerically solve the new despeckling model. Despeckling experiments show that, compared with the AA model and NLM filter, the proposed model can not only suppress speckle effectively but also preserve edge information well, leading to satisfying despeckling performance for the high-resolution SAR images.

### Key words:

high-resolution synthetic aperture radar images; despeckling algorithm; partial differential equations methods; non-local means filters

## Progress of Research on Information and communication Geography in China

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### Abstract

Research on information and communication geography in China derived from three aspects: the historical background of great development of worldwide information and telecommunication technologies as well as arriving information society, introduction and response to relevant research conducted by European, American and Japanese geographers; and reflect on how Chinese scholars carry out follow-up research. Till 1989, China saw the first paper on information and communication geography research, while research results of two primary subjects, i.e. information industry and telecommunication geography sprung up after 1995. In 2000, research on information and communication geography in China entered the age of the internet/cyberspace. In the later decade, Chinese scholars conducted research on seven fields, specifically, internet geography of exterior level, new spatial form and spatial structure change, relationship between informatization and regional economic development, effect of ICT on urban internal and external space structure, reform of ICT and enterprise spatial organization, effect of ICT on human spatial behavior, website online services and location selection. With the arrival of big data era, information and communication geography research in China has entered big data stage over the past five years. The research results concentrate on five levels, i.e. enterprise location and spatial structure change, urban inner space organization and smart city construction, multi-perspective city network and grading, and regional digital divide and spatiality of social networks. In addition, Sun Zhongwei et.al systematically sorted out relevant research at home and abroad, and attempted to present subject name and subject nature.

### Key words:

information and communication geography; information and communication technologies ; research progress; China

## Spatial-temporal Evolution of Malls in Guangzhou and Its Impact on Urban Commercial Spatial Structure

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### Abstract

Employing ArcGIS and Spss to conduct spatial and statistic analysis, respectively, this article explores the spatial-temporal patterns of the development of shopping malls in Guangzhou City and their relationship with the change of urban commercial spatial structure. The following conclusions have been drawn from the research: Firstly, the increase in the number and scale of shopping malls takes on a cyclical and jumping pattern, which is closely related to urban development. As to the spatial pattern, they originally concentrated in the urban center and gradually diffuse outward to the urban outskirts over time. Analysis of the elements underlying the spatial-temporal evolution of shopping malls reveals that population size is positively correlated with the number and scale of shopping malls, while correlation between population density and distribution of shopping malls is not obvious. Their locations almost coincide with the places with good transportation accessibility. The location of metro stations greatly influence the spatial distribution of shopping malls. Secondly, the spatial-temporal pattern of shopping malls is also greatly determined by the government's strategy over urban spatial structure and the change in land uses. Thirdly, the rising of the commercial style of one-stop and experiential consumption also imposes large impact on the pattern. Finally, the paper examines the impacts of the development of shopping malls on urban commercial spatial structure. A flat ranking system of urban commercial centers has been brought about by the development of shopping malls, promoting the formation of polycentric urban commercial system and the upgrading of commercial levels.

### Key words:

shopping malls; urban commercial spatial structure; GIS analysis; Guangzhou City

## The Prediction of Spring Drought of the Typical Areas of Hulun Buir Based on the Grey Sequence Forecast Model

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### Abstract

Drought is the most common, the most widely distributed and the most affected kind of meteorological disaster in Hulun Buir, Inner Mongolia autonomous region. Humidity index is an effective index to divide the drought level in Hulun Buir area. In this paper, we use the grey sequence forecast model (GSFM) to analysis the humidity index of 4 typical areas of Hulun Buir, and predict the times which may occur spring drought in the 4 areas by using the grey system GM (1, 1) model in DPS. The research results provides theory basis for the prevention of spring drought in Hulun Buir area.

### Key words:

Spring drought; humidity index; grey sequence forecast model

## Topic Modelbased Classification of Moderate-resolution Remote Sensing Images

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### Abstract

Represented by Latent Dirichlet Allocation (LDA) model, probabilistic topic model showed a great success in the field of natural language processing and image processing, which can be used to effectively overcome the gap between low-level features and high-level semantic. In recent years it has also been introduced into remote sensing image analysis field, while most of the research focus on the analysis of high-resolution remote sensing images. This study analysed the weakness of traditional probabilistic topic model in reduced resolution remote sensing image classification and points out that low segmentation scale makes the image objects small and containing less pixels. We learn from the ability of inferring the semantic of sparse documents of Biterm Topic Model (BTM), which directly model the generation of word co-occurrence patterns in the corpus, making the inference effective with the rich corpus-level information. By segmenting the remote sensing image in two scales and regarding the image objects at two levels as short documents and visual words respectively, we introduce BTM to the classification of moderate resolution remote sensing image. We propose to use space adjacent visual word pairs as the observations in BTM called S-BTM reduces the quantity of observation objects. This framework turns to be effective solution in the target task, achieving better result than LDA model. Experiment results also show that S-BTM achieved a higher classification accuracy with a smaller amount of computation when using space adjacent word pairs than BTM.

### Key words:

probabilistic topic model; moderate resolution; remote sensing image classification; biterm topic model

## Geographical Science and Future Earth

### Ecosystem diversity and eco-civilization



Home

### Poster

1. [Characteristics of Bacterial Community and the Influencing Factors in Nanchang Section of Ganjiang River, China](#)

Wang Peng; Bo Chen; Chuangqiang Li (China, Jiangxi Normal University)

2. [Identify the Key of Ecological Land Based on GIS in the Valley](#)

Guan Chengwen (China, Yunnan University)

3. [The Study of Microbial Groups in Lake–River Ecotone of Poyang Lake, China](#)

Xiaolan Huang; Shuhua Qi; Baoqing Hu (China, Ministry of Education Key Laboratory of Poyang Lake Wetland and Watershed Research, Jiangxi Normal University)

## Characteristics of Bacterial Community and The Influencing Factors in an Urban River Water

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### Abstract

Bacteria play a critical role in environmental and ecological processes in urban river ecosystems. We studied the bacterial community in Ganjiang River, a major tributary of Yangtze River, when it flowed through Nanchang City, the largest city in Ganjiang River basin. Water was sampled at five sites monthly in wet season, and bacterial community was characterized using Illumina high-throughput sequencing. A total of 811 operational taxonomic units (OTUs) were observed for all samples, ranging from 321 to 519 for each sample. The bacterial communities were maintained by a core of OTUs that persisted longitudinally and monthly. *Actinobacteria* (41.17% of total sequences) and *Proteobacteria* (31.80%) were the dominated phyla, while *Firmicutes* became the most abundant when there was a flood. *Proteobacteria* (specifically *Betaproteobacteria*) was the only phylum whose abundance showed significant difference among sampling sites, and no significant difference among months. Temperature and runoff, rather than the water chemical parameters, were the main influencing factors of bacterial community in river water. Temperature had a higher correlation with the OTUs abundance, and runoff had a higher correlation with bacterial phyla community. The influence of urban landscape on the bacterial community was consistent with the river length through urban area, and the degrees of influence were estimated to be 17%-34%.

### Key words:

bacterial community; Ganjiang River; high-throughput sequencing; influencing factors

## Identify The Key of Ecological Land Based On GIS in The Valley: A Case Study of Xingyun Lake

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### Abstract

With the acceleration of urbanization process in China, human activities extended to the scope of basin. It has serious effects on the critical watershed ecological land. How to coordinate watershed economic development and ecological environment security has become a hot topic. Xingyun lake basin in Yunnan province as the study area, based on GIS spatial analysis technology, it uses service value calculation methods and the comprehensive index methods about Chinese terrestrial ecosystem, implements ecosystem services value estimation of land utilization and spatial distribution of ecological vulnerability index, and comprehensively identifies basin key of ecological land. Aiming at sustainable development of river basin and ecological security pattern can provide a scientific reference to build.

### Key words:

Critical ecological land; GIS; Ecological service value; Ecological vulnerability; Xingyun lake

## The Study of Microbial Groups in Lake–River Ecotone of Poyang Lake, China

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### Abstract

The ecological environment of lake–river ecotone is an important water purification area and pollution buffer zone, where the microorganisms play an important role in the mediation of material cycle, nutrition transfer, and element transformation. Microbial groups is sensitive to environmental changes. In this study, twelve water samples from the lake–river ecotone of the Poyang Lake in China were collected to determine microbial gene sequences employing next-generation DNA sequencing techniques. The results showed the major Poyang Lake has the largest microbial population, followed by Yao River, Gan River and Rao River. Based on the Shannon and Simpson Index, major Poyang Lake has the largest biodiversity of microbial communities, followed by Gan River, Yao Lake, and Rao River. Microbial characteristics vary with the TN and TP concentration, for instance, the nitrifying bacteria were relatively rich in Yao Lake and Ganjiang River ecotone, and the polyphosphate-accumulating organisms in Rao River were richer than those in Ganjiang River. The Tags number of Euryarchaeota, Acidobacteria, Chlamydiae and Proteobacteria in Gan River were more than in Rao River, while significant differences were found between the major Poyang Lake and other lake–river ecotone, the Operational Taxonomic Units number of major Poyang Lake have 3 047, which was far more than the others. The study indicates that the Poyang Lake serves as a huge microbial gene pool, including a large number of DNA from ammonia oxidizing bacteria to ammonia-oxidizing archaea. (This work was Supported by the National Natural Science Foundation of China (No.41561002), the Collaborative Innovation Center for Major Ecological Security Issues of Jiangxi Province and Monitoring Implementation (No.JXS-EW-00), the Opening Foundation of Key Laboratory of Environment Change and Resources Use in Beibu Gulf (Guangxi Teachers Education University), Ministry of Education, China (No.2014BGERLKF02).)

### Key words:

Poyang Lake; Lake–river ecotone; Microbial groups; Diversity

## Geographical Science and Future Earth GIS Data Integration and Harmonization



Home

### Oral

1. [An Efficient Hybrid Classification Approach for Assessment and Monitoring of Wetland using LANDSAT ETM+ Sensors](#)  
Vandana Tomar (Haryana Institute of Public Administration, Gurgaon, India), Amit Kumar (National Institute of Technology, Kurukshetra, India)
2. [Automated Matching Road Networks Utilized RBF Neural Network](#)  
Ningning Guo, Yehua Sheng, Haiyang Lyu, Baoqun HuanG (Nanjing Normal University, China)
3. [Image Fusion Based on Landsat and Images Derived from Unmanned Aerial Vehicle](#)  
Myung Sik Cho, Kang San Lee, Jin Mu Choi (Department of Geography, Kyung Hee University, South Korea)
4. [Suitability Assessment for Cassava Cultivation in Nigeria](#)  
Oluwagbenga Orimoogunje (Obafemi Awolowo University, Ile Ife, Nigeria), Olutoyin Fashae (University of Ibadan, Ibadan, Nigeria), Moses Adewole, Akinola Akinwumiju (Obafemi Awolowo University, Ile Ife, Nigeria)
5. [The Spatio-Temporal Characteristics of Downscaled 1km Resolution Soil Moisture Product from 2003 To 2010 Over China](#)  
Ru An (School of Earth Sciences and Engineering, Hohai University, China), Huilin Wang (School of Geographic and Oceanographic Sciences, Nanjing University, China)
6. [Unifying Inconsistent Multi-source Geospatial Data Through Conflation](#)  
Dan Lee (Esri Inc., United States)

### Poster

1. [Application of Geospatial Technology for Site Suitability Analysis of Overhead Tank Installation & Water Supply Line Alignment in Rural Chhattisgarh](#)  
Tisha Dey (India, Pt. Ravishankar Shukla University); Amit Prakash Multaniya; Harish Sinha (India, Chhattisgarh Space Application Center)



## **An Efficient Hybrid Classification Approach for Assessment and Monitoring of Wetland using LANDSAT ETM+ Sensors**

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### **Abstract**

Geographically isolated wetlands are a unique and significant part of the nation's wetlands resources and provide vital habitats for fish and wildlife. Wetlands are most prolific ecosystems besides being a rich repository of biodiversity and are known to play a significant role in carbon sequestration. Wetlands are halfway world between terrestrial and aquatic ecosystem and share properties of both. Wetland vegetation provides a natural barrier to fast moving water and therefore aids in flood speed reduction. A multiple purpose wetland inventory is being developed and promoted through partnerships and specific analyses at different scales in response to past uncertainties and gaps in inventory coverage. A partnership approach is being promoted through the Ramsar Convention on Wetlands to enable a global inventory database to be compiled from individual projects and analyses using remote sensing and GIS. Remote sensing offers a cost effective means for identifying and monitoring wetlands over a large area and at different moments of time. The present research paper describes the assessment and delineation of wetland area for Ranchi city of Jharkhand state for the year 1996-2015. The signatures of wetlands and associated land features are identified in hybrid and unsupervised classification approach based on their DN value using LANDSAT ETM+ sensors data. There are drastic change in between 1996 and 2015. The spatial distributions of the NDVI values were evaluated to determine the cut-off points for the water bodies, and wetted area.

### **Key words:**

NDVI; Hybrid Classification; Unsupervised Classification

## Automated Matching Road Networks Utilized RBF Neural Network

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### Abstract

Map matching is an important prerequisite for map integration, map updating, change detection and so on. The amount of volunteered geographic information (VGI) has increased in recent years, and VGI is drawing great attention with its superiority for map updating. In order to achieve the matching of VGI road network and the professional road network, this paper proposes a map matching algorithm based on radial basis function (RBF) neural network. It takes distance, orientation, shape and length as the evaluation factors to determinate whether the two road arcs are the same road or not. Add a scaling parameter to the basis function of the hidden layer to make the RBF neural network anisotropy and utilized sigmoid function in the output layer to make the calculation results normalization. Firstly, select samples from the professional road data and the VGI road data, calculate the four feature similarities of these samples, these four similarities with addition of the matching rate serving as learning modes. Secondly, calculate the mean value and variance of the each feature similarities. Thirdly, input the learning modes to train RBF neural network, get the connection weights between the hidden layer and the output layer. At last, input the VGI road network and the professional road network, calculate the matching rate of road arcs. Result shows that our algorithm achieves good performance even the quality of VGI data is not so good, besides, utilized RBF neural networks has a better efficient than utilized BP neural network in matching road networks.

### Key Words:

map matching; RBF neural network; RBF; VGI road networks

## Image Fusion Based on Landsat and Images Derived from Unmanned Aerial Vehicle

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### Abstract

Image fusion refers to the acquisition, processing and synergistic combination of information provided by various sensors or by the same sensor in many measuring contexts. The aim of this paper is to suggest the image fusion between Landsat Images and UAV images for meaningful usages in various areas. The Landsat Images are obtained by a multi-sensor and free for use, but characterized as low-resolution in spatial and temporal. In contrast, images derived from UAV have high-resolution in spatial and temporal, but limitation to the few sensors because of costs for equipping sensors and safety, like high-risk, of the UAV. For overcoming weaknesses in the both images, fusion can be facilitated. Since low-resolution and few sensors are supplemented image fusion, integrated images can have high-resolution and properties of the multi-sensor. Through this method, researchers can utilize UAV more in various areas.

### Key words:

Remote Sensing; Image fusion; Landsat Images; Unmanned Aerial Vehicle

## Suitability Assessment for cassava cultivation in Nigeria

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### Abstract

Identifying the best region for agricultural crops is an important step to ensure food security and enhance food sustainability. This study therefore modelled an agro-climatic zonation for cassava production in Nigeria using the similarity of soil conditions and their suitability potentials for cassava cultivation as selection criteria. Pattern of yield-climate and yield-soil relationships across the different agro-ecological zones were also assessed to map the climate-edaphic zonation for the crop. The study showed that soil conditions exert more influence on cassava yield performance than climatic conditions in Nigeria, and that the guinea savanna and upper region of the rainforest zones were the most favourable locations for cassava production in Nigeria. The mangrove swamp is the least suitable while the suitability of the remaining regions of Nigeria can produce from marginal to good rate of the crop. The study revealed the decision-support capacity of the geospatial approach to agricultural land selection. The study concluded that agricultural capacity of Nigeria can be enhanced by balanced informed decision based on geospatial information results such that best suitable crops can be cultivated at the different agro-ecological zones in the country.

### Key words:

Climate; Edaphic; Cassava; GIS; Suitability Assessment; Zoning

## The Spatio-Temporal Characteristics of Downscaled 1km Resolution Soil Moisture Product from 2003 To 2010 Over China

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### Abstract

Soil moisture plays a significant role in the ecological system, which is not only a key variable in the energy exchange regulating the air temperature, rainfall and the stability of the atmospheric boundary, but also an important part of the hydrology cycle providing essential materials for the vegetation and organisms in soil.

In this study, ECV\_SM (European Space Agency's Climate Change Initiative soil moisture product) from January, 2003 to December, 2010 over china was down-scaled to 1km resolution based on the methods of multiple step-wise regression and moving window. And two land surface parameters (NDVI and LST), the antecedent precipitation index (API), three terrain factors (DEM, SLOPE, ASPECT), two soil texture factor (SAND, CLAY) and brightness temperature (BT) were chosen as the model parameters. The down-scaling results of soil moisture were validated using in-situ observations and the spatial-temporal characteristics during the period 2003-2010 were analyzed.

It is discovered that the general spatial pattern of soil moisture in China is decreasing from the wet southeast to dry northwest; The spatial distributions of soil moisture varies in different land cover types, and the soil moisture is lower in the sparse vegetation area while higher in the dense vegetation area; Changes with seasons, soil moisture is generally low in winter and high in summer. But the trend of soil moisture varying as seasons in bare lands and sparse vegetation areas is not obvious.

### Key words:

Microwave Remote Sensing; Soil Moisture; Down-scaling; Accuracy Verification; Spatial-temporal Characteristics



## Unifying Inconsistent Multi-source Geospatial Data Through Conflation

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### Abstract

Good quality of geospatial data is essential to geographical analysis and mapping. However, many GIS organizations, mapping agencies, and data providers are facing a common problem: the geospatial data they have don't always line up with those they acquire from another source and need to use jointly. For example, roads owned by a local government or a company may differ in shape, position, and level of detail from those obtained through another source or agency; rivers or other features in one data area may not properly connect when crossing into adjacent data area. It is a challenge to identify the misaligned features, resolve the conflicts, and harmonize the needed features from various datasets for the intended analysis and mapping purposes.

The solution to such problems is conflation, which reconciles multi-source data for the best accuracy, completeness, and consistency. With the release of a set of conflation tools in ArcGIS Desktop 10.2.1, a number of use cases have been examined; workflows for specific tasks have been built and tested. This paper discusses a few typical conflation scenarios and presents the processing workflows and results. Some of the workflows involve spatial adjustment to bring spatially inconsistent data together; others transfer needed attributes between correspondent features. The conflation tools are built based on highly automated feature matching techniques, which we continue to improve. Efforts are also being made to evaluate the conflation results and facilitate post inspection and editing processes, which will be described in the paper.

### Key words:

Conflation; geospatial data; feature matching; spatial adjustment; attribute transfer

## Application of Geospatial Technology for Site Suitability Analysis of Overhead Tank Installation & Water Supply Line Alignment in Rural Chhattisgarh

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### Abstract

Over Head Tanks are one of the vertical assets which are regarded as one of the backbone of the water utility network. Site suitability analysis is an analytical technique used to present a coherent picture of how well particular location is suited for a specific purpose. The study proposes the existing gaps available in the area and suggests the government to construct the OHTs and suggest sites for OHTs on the basis of site suitability analysis. Thus, government can bridge the gap of water scarcity by constructing the tanks on proposed locations. The study area has been chosen as a part of rural Chhattisgarh. Two types of data has been used for the study are primary and historical data. Elevation profiles were taken from DEM along driven pipelines to verify feasibility of flow with respect the slope along which they are planned to build. Remote Sensing data can be very helpful in mapping existing OHTs shape, size, shadow, contrast, tone, texture. Age of OHTs can be estimated from temporal satellite images. Technology used for mapping existing OHTs includes DGPS, GPS, GIS and Interpretation of high resolution of satellite images. According to the study the most suitable sites for water tank is near to settlements as well as waste or open land. The study focuses on development of remote sensing and GIS based analysis and methodology in artificial groundwater recharge sites.

### Keywords:

DEM; GIS; Groundwater; Overhead Tanks; Remote Sensing; Utility

## Geographical Science and Future Earth

### VGE as a Key Component of Geographic Knowledge Engineering

#### Oral



Home

1. [An Overview of Research Activities in Choropleth](#)  
Alexander Klippel (The Pennsylvania State University, United States)
2. [Case-Based Method of Using Knowledge of Digital Terrain Analysis – Illustrated by Drainage Network Extraction](#)  
Cheng-Zhi QIN (IGSNRR, China)
3. [From Big to Smart Spatial Big Data with Support of VGEs](#)  
Milan Konecny (Masaryk University, Czech Republic)
4. [Knowledge Representation and Management in Virtual Geographic Environments Populated with Intelligent Agents](#)  
Mehdi Mekni (St. Cloud State University, United States)
5. [Maintenance Mechanism of Microbial Community Biodiversity Resulted from Niche Construction](#)  
Dawei HU (beihang university, China)
6. [Mobile Sensing based VGE for Regional Simulations](#)  
CHE Weitao (Shenzhen Research Institute, The Chinese University of Hong Kong, HongKong SAR, China)
7. [Scenario-Driven Approach for Orchestrating Distributed Geo-Analysis Model Services in an Open and Collaborative Modelling Environment](#)  
Songshan Yue (State Key Laboratory Cultivation Base of Geographical Environment Evolution, Nanjing Normal University, China)
8. [Simulation of Three-Dimensional Distribution of Light within Virtual Canopy Model](#)  
Liyu Tang (Fuzhou University, China)
9. [Spatial Behavioral Simulation Using Abstraction of Virtual Geographic Environments](#)  
Mehdi Mekni (St. Cloud State University, United States)
10. [Virtual Kyoto based on Digital Humanities](#)  
eiji Yano (Ritsumeikan University, Japan)

## An Overview of Research Activities in Chorophrónesis

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### Abstract

Recent developments in 3D virtual reality (VR) and augmented reality (AR) technologies have already begun to transform segments of industry, research, and education, and will soon affect, more so than before, the spatial sciences. While around for decades, the new ease of accessing 3D information through environmental sensors (such as LiDAR or 360 degree cameras) combined with geospatially aware 3D modelling software such as ESRI CityEngine or Google SketchUp, mean that efficient workflows from environments to digital, interactive 3D models are beginning to emerge. In parallel, VR and AR are beginning to enter both mainstream entertainment and academic research in unprecedented ways. New VR technologies such as Oculus Rift and Samsung GearVR provide compelling immersive and augmented experiences at a price point within reach of millions of consumers and researchers. Even though much of the VR/AR developments have been technology-driven, the opportunities for GIScience research and application are vast, and may result in nothing less than a paradigm shift in how we communicate and understand spatial environments. The immersive but relatively unconstrained nature of these environments allow for the exploration of unreachable spaces (e.g. under the oceans) and times (e.g. historical Rome) in engaging and natural ways. The talk will provide an overview of research activities in ChoroPhronesis addressing topics such as the value added by immersiveness, the visualization of LiDAR data in VR, the modeling of historic campuses at Penn State, and mobile VR applications.

## Case-Based Method of Using Knowledge of Digital Terrain Analysis – Illustrated by Drainage Network Extraction

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### Abstract

Digital terrain analysis (DTA) in application relies heavily on the domain knowledge on the match between the chosen algorithm (and its parameter-settings) and the application context (such as the target task, terrain condition of study area, DEM resolution, etc.), so-called application-context knowledge. However this type of knowledge in DTA has not been formalized to be available for inference in existing DTA-assisted tools. Therefore, DTA modeling process is still not easy for users, especially for non-expert users. In this abstract we propose a case-based method of using the application-context knowledge in DTA. The basic idea is to solve problem through referring the solution of a new problem to the solution of existing similar case. We take drainage network extraction, a typical DTA application, as example to evaluate the performance of the proposed method. The case base was prepared by extracting DTA application instances on determining the catchment area threshold for extracting drainage networks from the articles published in the peer-reviewed journals. The experimental result shows that the proposed case-based method can conduct reasonable result in general and thus is suitable for formalizing the application-context knowledge in DTA and using it to reduce the modeling burden greatly for users.

### Key words:

digital terrain analysis; domain knowledge; case-based reasoning; drainage network extraction

## From Big to Smart Spatial Big Data with Support of VGEs

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### Abstract

Big Data (BD) is an important phenomenon of the development of contemporary science and technology. Many scientists believe that it is continuation of the development line started by information superhighways through digital and intelligent data to Big and Smart Data. There is not exact definition of BD, the most famous says: "There is no rigorous definition of big data. Initially the idea was that the volume of information had grown so large that the quantity being examined no longer fit into the memory that computers use for processing, so engineers needed to revamp the tools they used for analyzing it all" (Mayer-Schönberger and Cukier, 2013). But almost all researches agrees with definitions and importance of "V's": "three Vs": *volume*, *velocity* and *variety* (structured) and unstructured data, described in various publications. The next very important fourth "V" is veracity. In order to harness true benefits, big data needs to be turned into actionable and smart data, with a clear focus on the purpose, (combined) insights, actions and resulting outcomes (Siemens) in both, business and science.

BD is a broad term including complex challenges which must be prioritized and addressed – such as "Fast Data" and "Smart Data." "Smart Data" (SD) means information that actually makes sense. SD is data from which signals and patterns have been extracted by intelligent algorithms. Collecting large amounts of statistics and numbers bring little benefit if there is no layer of added intelligence. By "Fast Data" we're talking about as-it-happens information enabling real-time decision-making (Alissa Lorentz, AUGIFY). But still in geography, geoinformatics and cartography is very important visualization and cross cooperation of the non-traditional disciplines and finding new solutions and explanations.

Virtual Geographic Environments (VGEs) are built on the foundations of geographic information systems (GIS) and geographic information science (GIScience) in which considerable attention is paid to the user in terms of the manner in which they interact with the software. User interaction is thus a key component of such systems (Li, Batty, 2008). The degree to which users are immersed in such systems defines major differences between VGEs.



In the situation we have BigData, we want transform them to Smart (Spatial or Geospatial) data and we are looking for more effective modelling, visualization and effective decision making based on inclusion of users, customers and generally inhabitants to the all process, authors of the paper would like to describe some basic principles and potentials of integration of existing approaches and their interpretation with assistance of context-based and adaptive approacheswith support of Virtual Geographic Environments (VGE).

**Key words:**

Big Data; Smart Data; VGE; visualization; context-based and adaptive cartography

## Knowledge Representation and Management in Virtual Geographic Environments Populated with Intelligent Agents

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### Abstract

In this paper, we propose a novel approach using Virtual Geographic Environment (VGE) models to effectively represent, integrate and manage knowledge about the environment and hence support agents' cognitive capabilities and spatial behaviours. Unlike conventional VGE models involving geographic data representation and manipulation for spatial analysis purposes, our approach evolves a new generation of decision-support oriented VGE models populated with cognitive situated-agents. This approach relies on well-established theories on human spatial behaviours and specific ways people apprehend the spatial characteristics of their surroundings in order to navigate and interact with the physical world. The main contributions of this paper include: (1) knowledge about the environment represented using Conceptual Graphs (CG); (2) tools and mechanisms allowing intelligent agents to acquire knowledge about the environment and the various geographic features it contains; and (3) capabilities for intelligent agents to reason about this knowledge and autonomously make decisions and finally act with respect to both their own and the virtual environment's characteristics.

### Key words:

Virtual Geographic Environments; Knowledge Representation and Management; Intelligent Software Agents; Conceptual Graphs

## Maintenance Mechanism of Microbial Community Biodiversity Resulted from Niche Construction

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### Abstract

The phenomenon of microbial niche construction has been discovered in our former works, namely the microbes can secrete extracellular enzyme to corrode surrounding materials for substrate production as food shortage, and the competitive exclusion between species significantly decreased in the course of niche construction, caused biodiversity characteristics in microbial community.

In this paper, we used system dynamics and cellular automata to model and simulate the formation process of microbial community biodiversity resulted from niche construction. Firstly, a highly valid system dynamics model expressing by continuous ordinary differential equations was developed to describe the local population quantity variation based on the relationships between neighboring species (such as competition, cheating and cooperation) and species characteristics (such as dispersal, kin selection, exclusive substrate storage and niche construction). Secondly, the continuous ordinary differential equations model was discretized to difference equations as update rules for cellular states calculation and transition. Finally, a microbial community composed of  $10^6$  species was seeded on a grid, the cellular automata simulation shows that whatever the initial structure of species network in microbial community, the number of microbial species is far more than the number of available substrates made by niche construction, derogating from the principle of competitive exclusion. Furthermore, depended on initial network structure of species and their initial population, different microbial community succession patterns are exhibited in the process of biodiversity formation caused by niche construction, such as asymptotic stability, periodical stability and chaotic stability.

### Keywords:

microbial community; biodiversity; niche construction; system dynamics; cellular automata; succession patterns

## Mobile Sensing based VGE for Regional Simulations

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### Abstract

Mobile sensing has been gradually applied for collection of environmental data with multiple granularities in space and time to improve the update frequency and reduce the cost of environmental data collection. However, mobile sensing data are generally contributed by vehicles or pedestrians at arbitrary locations and times in most cases. Consequently, collected samples are randomly distributed in space and time, thus making processing and management of these data difficult, especially for the purpose of supporting simulations. Therefore, effective organization and management of these mobile sensing data are needed to further support the data input for regional simulations.

This topic presents VGE for bridging the gap between mobile sensing. The aim of this topic is to effectively organize the mobile sensing data by VGE, and then to use the models managed by VGE to support regional simulations. In this topic, we first discuss mobile sensing system (MMS) and its potential limitations. Next, we introduce the VGE platform and its advantages of not only data handling but also model management. In which, mobile noise and air quality data are taken as examples. Spatial and temporal characteristics of the data are systematically investigated and spatio-temporal patterns are analyzed. Then these data are reorganized by using data reconstruction methods. After that, regional simulations based on the reconstructed data is processed. (The work was supported by National Key Basic Research Program of China(2015CB954103) and National Natural Science Foundation of China(41401459))

### Key words:

Mobile sensing; data reorganization; VGE; regional simulation

## Scenario-Driven Approach for Orchestrating Distributed Geo-Analysis Model Services in an Open and Collaborative Modelling Environment

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### Abstract

Along with the development of Web Service and Internet Technology, sharing variety geo-analysis models as model services (also called as geo-processing) has been widely approved as an efficient way to help researchers more conveniently work together. Through this Service Oriented Architecture (SOA) based approach, researchers from all around the world can more conveniently access and make use of different model resources, data resources and other modeling-related resources. For example, the Web Processing Service (WPS) specification proposed by the Open Geospatial Consortium (OGC) is one of the prominent studies that aimed at providing analysis abilities as web services. Based on these geo-analysis models resources, the integration of different model services is an efficient method to solve complicated geo-problems and simulate synthetic environment (given that the integrated models are scientific logical). Different from the traditional model-integration methods (executed in standalone computer) studied in the Integrating Model Framework (IMF) field, the integration of model services can take full advantage of the distributed resources and support modelers collaborate with each other. Many studies about the integration of different model services have been conducted (such as the geoprocessing web, service orchestration, services chaining, etc.).

However, these studies mainly focus on the linking and executing of variety model services, the modeling results are presented as workflows only. Modelers still meet difficulties when conduct some exploratory model-integration experiments (which means the workflow that contains different model services is unknown and a modeler tries to build a rational model-integration scene through a range of different models). In this paper, we proposed a scenario-based approach for orchestrating distributed geo-analysis models services in an open and collaborative modelling environment. The modeling work is treated as building a scenario to simulate the real geographic world. With this scenario-based approach, the exploratory modeling-integration

study is divided into three basic steps: the conceptual modeling step, the diagram modeling step and the workflow processing step.

In the conceptual modeling step, the method to construct the basic logical scenarios is studied. In the diagram modeling step, the method to build a scenario-based workflow is studied. In the workflow processing step, the method to execute the workflow is studied. By using the proposed method, a reusable model service architecture can be more easily constructed, and the difficulty of sharing and integrating geo-analysis models in web environment is reduced. Finally, a prototype system is established, the methods are implemented to verify the capability and practicability of such scenario-driven approach for orchestrating different model service.

**Key words:**

geo-analysis models; model sharing; model integration; model service

## Simulation of Three-Dimensional Distribution of Light within Virtual Canopy Model

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### Abstract

Light distribution plays an important role in interaction between tree physiological processes and natural environment. However, the complexity of tree architecture and long growth period makes it difficult to measure light distribution in a real tree. In this paper, we combine three-dimensional (3D) tree architectural model, ray tracing algorithm, turtle algorithm, and photosynthesis model to provide better quantitative analysis of light distribution within canopy and light interception. The detailed organ-based 3D canopy was built using ParaTree software (Tang et al, 2011). With a 3D virtual tree model, a ray tracing algorithm and turtle algorithm were utilized to simulate the 3D distribution of direct- and diffuse- radiation respectively. Furthermore, the photosynthetic active radiative (PAR) for each leaf unit can be calculated, which offers an opportunity to calculate photosynthesis rates. Taking young Chinese Fir (*Cunninghamia lanceolata*) and peach (*Amygdalus persica* L.) as examples, we built detailed 3D tree models. According to the sunlight properties, latitude, order of the day in a year and time in a day, the PAR at the top of the canopy was estimated. We estimated the net production rate at the whole canopy scale and the average net photosynthetic rate per unit leaf area at specified time step. Compared to other literature, the simulation result of net photosynthesis rate was reasonable. Light interception in canopy is the basis of further plant research. We believe that the proposed approach is useful for biomass estimation, ideotype design, growth simulation and remote sensing inversion.

### Key words:

light distribution; Virtual plant; canopy architecture; simulation

## Spatial Behavioral Simulation Using Abstraction of Virtual Geographic Environments

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### Abstract

In this paper, we address two challenging issues underlying spatial behavioral simulation using software agents immersed in Virtual Geographic Environments (VGE). First, the way to describe virtual VGE models using exact spatial decomposition approaches and graph theory techniques. Second, how to apply graph abstraction techniques to support realistic and efficient advanced navigation and path planning capabilities for software agents while considering the VGE's characteristics. In order to illustrate our contribution to the growing field of spatial behavioural simulation, we present and discuss a case study involving an urban VGE model populated with various agent types autonomously and differently interacting with multiple abstractions of the same physical environment.

### Key words:

Virtual Geographic Environments; Graph Theory; Graph Abstraction; Spatial Behavioral Simulation

## Virtual Kyoto based on Digital Humanities

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### Abstract

Virtual Kyoto is a virtual time-space created on the computer for the purpose of investigating the past, present and future of the historical city, Kyoto. Using the cutting-edge technologies in GIS and VR, we have conducted Virtual Kyoto as a 4D-GIS that comprises a series of 3D-GIS at various points in time. From a viewpoint of Digital Humanities, Virtual Kyoto is an infrastructure to place numerous digitally archived materials associated with the city, and to disseminate Kyoto's cultural assets to the world over the Internet (Yano et al., 2007; Yano et al. 2011). Virtual Kyoto consists of a wide variety of GIS-based geo-spatial data of Kyoto, whose most important data sources are historical maps and landscape paintings. A genre of screen paintings captures in detail Kyoto's famous temples and shrines, the Imperial Palace, warrior residences, and various shops as well as the townspeople (Kano, 1997). The collections were painted during the transition from the late Middle Ages (Muromachi era; 16 century) through the Modern Ages (Edo era; 18 century). At the moment, there still remain about 200 folding screens of *Rakuchu rakugai-zu*, owned by museums both in Japan and abroad. We are negotiating to use digital images of these *Rakuchu rakugai-zu* for creating their portal site, and the Web-GIS-based application for comparing folding screens of *Rakuchu rakugai-zu* with maps. This paper explores Virtual Kyoto as historical VGE using *Rakuchu rakugai-zu* based on the context of Digital Humanities as well as spatial humanities.

### Key words:

Virtual Kyoto; 4D GIS; Historical GIS; Digital Humanities; *Rakuchu Rakugai-zu*; Kyoto

## Geographical Science and Future Earth

### Ecological Security in Mongolian Plateau and Regional Coordinated Development Geography in Different Cultures



Home

#### Oral

1. [A Study on Drought Risk Assessment of Pastoral Area in Xilingol](#)  
Shuzhen Li (Inner Mongolia Normal University, China)
2. [Analysis of Different Terrain Factors in Abaga Banner'S Vegetation Index of Its North Central Region](#)  
Gaosurigug, Wulingdi (School of geography science, Inner Mongolia Normal University, China)
3. [Analysis of Land Use Change with Its Policy Driving During Recent Sixteen Years in Horchin Desert: An Example of Ar-Horchin Banner in Inner Mongolia, China](#)  
WuLanTuYa (Inner Mongolia Normal University, China)
4. [Analysis of West Ujimqin Barner Land Cover Change in Recent 40 Years](#)  
Ta na (Inner Mongolia Normal University, China)
5. [Carrying Capacity Study for Stockbreeding Population in Pastoral Areas in Xilin Gol](#)  
WuYinga, Hugejiletu (College of Geographical Science Inner Mongolia Normal University, China)
6. [Change Detection of Desert Steppe Ecosystem by Spatiotemporal Analysis Based on Estimated Net Primary Productivity in Inner Mongolia, China](#)  
Bayaer Wuliangha, Wulanqiqige Han, Guang Fu Sun (College of Geographical Science, Inner Mongolia Normal University, China)
7. [Comparison of Drought Monitoring Method in Pastoral Areas Based on the Meteorological Data: A Case Study of Xilingol League](#)  
Latengtuya A (Inner Mongolia Normal University, China)
8. [Ecological Mechanisms of Nomadic of Production in Mongolia Plateau](#)  
haishan (Inner mongolia normal university, China)
9. [ICESat/GLAS Derived Elevation Change of Hulun Lake in Arid Area of China \(2003-2009\)](#)  
Jun Wang (East China Normal University, China)
10. [Inter-Decadal Spatiotemporal Variations of Aridity Index Based On Temperature and Precipitation in Inner Mongolia, China](#)  
Yuhai Bao (Inner Mongolia Normal University, China)

11. [The Study on GIS Based Simulating Spatial Distribution of Mongolian Population in Inner Mongolia Region](#)

Xiyele Mu (Inner Mongolia Normal University, China)

12. [What Matters Most in Institutional Design for Community-Based Rangeland Management in Mongolia?](#)

Tungalag Ulambayar (Institute of Geography and Geoecology, Mongolia), Fernandez Gimenez Maria (Colorado State University, United States)

## Poster

1. [Dynamic Monitoring of Cross Border Grassland Fire Based on Multi-source Satellite Remote Sensing Data](#)

Lina Bai (China, Inner Mongolia Normal University)

2. [Spatio-temporal Characteristic and Driving Mechanism of Xiliingol League Settlement Since 1990](#)

Rong A; Cai CHen; Ji sheng Liu (China, School of Geographical Science, Northeast Normal University)

3. [The Study of Snow Area in Spatial and Temporal Changes in Cross-border Region of Mongolia and China](#)

Mulan Wang; Chula Sa; Yuhai Bao (China, College of Geographical Science Inner Mongolia Normal University)

4. [The Spatial and Temporal Changes of Snow of the Inner Mongolia Based on multi-source Remote Sensing Data](#)

Chula Sa (China, College of Geographical Science Inner Mongolia Normal University); Guixiang Liu (China, Grassland Research Institute of Chinese Academy of Agricultural Sciences); Mulan Wang (China, College of Geographical Science Inner Mongolia Normal University)

5. [What Explains Positive Social Outcomes of Community-based Rangeland Management in Mongolia?](#)

Tungalag Ulambayar (Mongolia, Institute of Geography and Geoecology); Fernandez-Gimenez Maria (United States, Colorado State University)

## A Study on Drought Risk Assessment of Pastoral Area in Xilingol

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### Abstract

Being a key element in all over the world, drought disaster is the second natural disaster in the world, which bring great harm to human's survival. Drought occur frequency, high intensity, long duration and large range, which caused huge losses. Drought caused lack of water resources, crops are die of dry. Ecological deterioration has threatened food security and social and economic development seriously. Xilingol league area is located in northern China-- the central part of Inner Mongolia autonomous region, which is a strong ecological security barrier in north China. Based on theory of regional natural disaster system, meteorological climatology, natural geography and disaster science and so on, the data concludes the environment essential graphic document of Xilingol, weather data of 29 stations from 1980 to 2013 around Xilingol, statistical annual social economy data in 2013 and the disaster data of Xilingol. The statistical analytic method, the superimposition analytic method and AHP are used to do the research. The natural factors which include landform, climate, soil, vegetation, water, temperature and precipitation are composed of drought risk system assessment. The humanity factors include the first industry, total cost of the first industry, animal husbandry quotas, population loss, livestock losses and economic damage. Hazard-formative environment, reciprocity among hazard and hazard affected bodies are used to establish the drought subsystem and evaluate indicator system. Then to analyze the drought subsystem, drought system, synthesizes the district, the appraisal district in Xilingol. Finally, the pastoral areas were conducted by the comprehensive assessment of drought risk, evaluation of comprehensive partition and partition management respectively in Xilingol.

### Key words:

Xilingol; Drought Risk; County

## **Analysis of Different Terrain Factors in Abaga Banner'S Vegetation Index of Its North Central Region**

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### **Abstract**

The vegetation index is an important parameter to describe the degree of vegetation. In this paper, we take North Central Plains of Abaga banner as the study area. In July 2002 and May 2007 and August 2011 we checked NDVI vegetation index by TM remote sensing image as remote sensing data sources by using envi software. NDVI was extracted from remote sensing images, and by using ArcGIS of NDVI spatial distribution characteristics of the research. Then, on this basis, combined with the altitude, slope geological factors, correlation between spatial distribution and NDVI respectively. The results show that the NDVI in the study area and elevation on the whole has a positive correlation, namely NDVI increased with increase of the elevation, and slope has no relationship with it, but in the local area have certain correlation. The research results are beneficial to the management department to grasp the distribution of vegetation in the area, and provide scientific basis for enhancing the vegetation protection of the grassland.

### **Key words:**

the North Central Plains; NDVI; AcrGIS;

## Analysis of Land Use Change with Its Policy Driving During Recent Sixteen Years in Horchin Desert: An Example of Ar-Horchin Banner in Inner Mongolia, China

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### Abstract

Horchin, originally as a tribe name of Mongolian ethnic, gradually being the name of grassland where the tribe was distributed. Here, the name of Horchin generally indicates the desert located in eastern Inner Mongolia, China. The modern agricultural prescribed form of the Horchin desert was formed in the middle Qing Dynasty, and then it developed through 20 century. The increasing or decreasing of farming area, increasing or decreasing of intensity of agricultural activities, are the direct causative factors for the land use changes in this region. Consequently, these factors caused quantitative and qualitative changes of grassland and farming area, being as the most intuitive expression of the Horchin desert land use changes.

The Ar-Horchin banner is located in the northern part of the Horchin desert. In this region, cultivation began in 1905, but only 5 period of assart were conducted up to the establishment of the Inner Mongolia Autonomous Region in 1947. In this study, we selectively analyzed farm land changes in Ar-Horchin Banner in recent 60 years using statistical data of farm land from 1946 to 2013, LANDSAT-5 TM images of 1986, 1996 and 2006, LANDSAT-8 OLI images of 2013; meanwhile, we discussed the driving relationship between the land policy changes and farm land, and we concluded as below.

(1) In recent 60 years, the area of reclamation in the Ar-Horchin has been gradually northing to high latitude region, and the farm land area has been increased, the scale of farm land area has been experienced a severe process. In the early stage of the establishment of Inner Mongolia Autonomous Region, the farm land in Ar-Horchin region was mostly distributed in the southern area from  $N43^{\circ}40'$ , but had been enlarged to  $N44^{\circ}20'$  in 1986 and now, it has reached to about  $N45^{\circ}00'$  in the north part of the region. During from 1946 to 2013, the farm land has been increased  $932.42 \text{ km}^2$ , in which, once in 1998, the farm land area had been reached to  $1018.69 \text{ km}^2$ , as its peak within the 20 century. Now, the farm land has been driven into its new cycle of increasing.

(2) From the establishment of Inner Mongolia Autonomous Region, the principle policies for agriculture, such as "The Land Reform" (from 1947 to 1952), "The Agricultural Collectivization" (from 1953 to 1977), "The Household Contract Responsibility System" (from 1978 to 1999), "The Return the Grain Plots to Forestry and Grassland" (from 2000 to now), have been conducted in the study area. For the agriculture itself, it has been expressed as "The Prohibition of Reclamation" or "the Encourage Reclamation". From the analysis, we can find the during the early 50s in 20 century of "The Agricultural Collectivization" and "The Return the Grain Plots to Forestry and Grassland" in 21 century, the scale of farm land in the Ar-Horchin Banner had been clearly



decreased. However, in the period of “The Household Contract Responsibility System” and after the end of the policy of “The Return the Grain Plots to Forestry and Grassland” in 2007, say now, the farm land is in its tremendous increasing period.

(3) Seen from the result of farm land scale change coincident with the tightness of agricultural policies in the study area, we considered the level of economical development, the consciousness of residents for ecological and environmental, agricultural technologies are also factors that cannot be ignored for land use change in the study area. Further work will be done on these subjects.

**Keywords:**

Horchin desert; land use, policy driven; Inner Mongolia Autonomous Region; China

## Analysis of West Ujimqin Barner Land Cover Change in Recent 40 Years

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### Abstract

In this paper, we take West Ujimqin barner as the study area, use the 1975,1990,2000,2005,2009,2015 five times sensing image as data source analyze the land cover change for nearly 40 years. This paper adopts the Dynamic model of a single land use type to analyze the land cover change process. And then, we get the transformation between land cover types from transfer matrix by using the ArcGIS soft. According to the number characteristics of land cover types change from 1975 to 2015 shows that nearly 40 years, the variation trend of grassland, forest land, water land area is decreasing and farmland, unutilized land is increasing. by using the transfer matrix, analysing land cover types change shows that the mainly transformations are transformation from grasslands to the sandy lands; from grasslands to the farmlands; and between farmland and forests. The driving force factors of land cover change is divided into natural and human factors.

## Carrying Capacity Study for Stockbreeding Population in Pastoral Areas in Xilin Gol

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### Abstract

After the politic of “The responsibility in contract of grassland and livestock” in the pastoral areas in Inner Mongolia, herdsman are required to graze in fixed meadows and the number of livestock should suitable for the carrying capacity of pasture. Livestock are the main economic source of herdsman, and there must be a certain area for livestock in grassland pastoral area. In order to improve the life qualities, they can only increase the number of livestock. However, due to the limited carrying capacity of grassland, the number of livestock are restricted. This is the reason why some herdman become poor as well as the deterioration of the contradiction (Land-Man-Livestock), lead to pastoral areas cannot achieve an overall well-off. The scientific prediction of population carrying capacity of animal husbandry and the innovative system utilizing pasture has great significace to achieve the sustainable development in pastoral area. The result of this paper show that the well-off population carrying capacity in animal husbandry is one person 153 hectare in southern Xilin Gol, while this figure in northern Xilin Gol is one person 350 hectare, which means there are marked differences in the southern and northern. The south region should merge the pasture and work together and transfer the remaining herdsman, because it is severe over-loading. However, the north region should develop the domestic pasture or work together to manage the grass resources.

This paper based on the theory, "man-land relationship", and main ideas, “output of grass decided the livestock number, number of livestock decided population”, measure the population of hersdman carrying capacity in different region in Inner Mongolia, and hope to provide a scientific basis for “aiding the poor” as well as to achieve a well-off in pastoral area.

### Key words:

Pastoral areas in Inner Mongolia; Population carrying capacity; Well-off society

## Change Detection of Desert Steppe Ecosystem by Spatiotemporal Analysis Based on Estimated Net Primary Productivity in Inner Mongolia, China

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### Abstract

Desert steppe ecosystem belongs to one of the fragile terrestrial ecosystems and it is easily affected by climate changes and human activities. Net primary productivity (NPP) is a quantitative measure of the carbon absorption by plants per unit time and space. NPP is defined as the accumulation of dry matters by green plants per unit time and space, and is equal to the difference between gross primary production (GPP) and autotrophic respiration. So NPP is a key indicator to evaluate the productivity of vegetation communities in the natural environment, and it could be an indicator to represent ecological situation of terrestrial ecosystems. This study performed change detection of desert steppe ecosystem during eighteen years from 1998 to 2015 in the Inner Mongolian Desert Steppe region of China through GIS spatiotemporal analysis based on estimated annual NPP for eighteen years which are derived from multiyear 10-day SPOT VEGETATION NDVI data and PROBA-V NDVI data, and meteorological observation data using a modified Carnegie-Ames-Stanford Approach (CASA) model. The study area Inner Mongolian Desert Steppe region (IMDSR) is located in the western part of the Inner Mongolia Autonomous Region, China, between 105°07'E and 115°12'E, and 37°37'N and 45°08'N. The final results show that the NPP had many obvious spatiotemporal changes during the period from 1998 to 2015 in the Inner Mongolian Desert Steppe region.

### Key words:

desertsteppe ecosystem; change detection; net primary productivity; Inner Mongolia

## Comparison of Drought Monitoring Method in Pastoral Areas Based on the Meteorological Data: A Case Study of Xilingol League

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### Abstract

Xilingol League belongs to arid and semi-arid regions, which the drought occurred in high frequency, widespread and long duration. Selecting scientific methods and collecting accurate information to monitor drought can reduce the impact it brings at the lowest limit and also has a propound influence on protection of eco-environment and the further development of husbandry production in pastoral area. Currently, there are various kinds of drought detection methods and metrological data. But due to the different formation mechanisms of drought, distribution characteristics of observation data, mathematical principles and assumptions, the outcome and applicability of drought index have showed some certain differences. This paper studies the Xilingol League in the territory of 15 meteorological stations monthly precipitation data for nearly 50 years and calculate five drought index, such as precipitation anomaly percentage, precipitation standard deviation index, Z index of precipitation, standardized precipitation index, precipitation percentile index. Furthermore, from the aspect of mathematics, choosing the 16 consistency tests to check-up and comparing with the results of remote sensing inversion from the point of surface characterization and also matching from the effects of the drought disaster situation respectively, and comparing such a variety of methods and aspects, the paper selected the most suitable drought index of the study area for drought monitoring. It is the Standardization Precipitation Index(SPI). The conclusion of this paper has high application value and practical significance to improve the accuracy of drought monitoring.

### Key words:

drought index; consistency check; drought index of temperature and vegetation; disastrous situation

## Ecological Mechanisms of Nomadic of Production in Mongolia Plateau

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### Abstract

In the past over thirty years, the drastic deterioration of grassland eco-environment in Inner Mongolia pasturing areas not only endangers the North ecologic safety, but also affects the eco-environment safety of neighboring countries; therefore, it has aroused great attention of people at home and abroad, especially academic circles.

With the deterioration of grassland eco-environment, reasons of grassland eco-environment deterioration have been become a focus of debate. And there are some theories about deterioration reasons, such as theory of over-grazing, theory of extensive management, theory of drought, theory of population overloading, theory of disappearance of nomadic (change of culture), theory of traditional nomadic, theory of meadow property rights, theory of goat-eating and theory of development of society and economy. In this all, the theory of over-grazing become the mainstream point and the fundamental basis for rules and policies by government.

By contrast the actual and theoretical animal number of the grasslands in Inner Mongolia for the past fifty years, we can draw a conclusion: the basic reason of the deterioration of grassland eco-environment in Inner Mongolia pasturing areas is “located herd” mode of production by the system of grassland contracted to households and un-herdsman destructive activities such as grass mowing, medical materials digging, unauthorized and wasteful mining; not overgrazing by herdsman and livestock. Especially, “located herd” mode of production by the system of grassland contracted to households is the basis; other predatory activities are appeared on the precondition of the policy of grassland contracted to households.

Some pursuing national policies is not fundamental control measures, such as Treatment Project of Sandstorm Sources of Beijing and Tianjin, keeping the balance of grassland and livestock, rest-grazing in spring, forbid-grazing and fencing and population migrating. Government must adapt policy about the pasturing areas. First, by grassland shareholding and national support, establish modern nomadic management, rebuild benign running mechanism of man-land relationship of pasturing areas, raise the overall efficiency of animal husbandry and recover dry grass layer of meadows. Second, issue certificates to certify the right to use the land that collectively owned by herdsman, resolve the main body to original herdsman. Third, the grassland is protected by government legislation. Government must improve the ecological efficiency compensation and



control mechanism, prohibit any destructive activities of grassland eco-environment.

**Key words:**

Mongolia plateau pasturing areas; grassland eco-environment; predatory management; sustainable development

## ICESat/GLAS Derived Elevation Change of Hulun Lake in Arid Area of China (2003-2009)

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### Abstract

In this paper, the altimetry data of ICESat/GLAS was used to approach the precise water level of the Hulun Lake during 2003-2009 to help reveal its variation. The inlier points of 31 tracks were employed by RANSAC process for detailed study to eliminate abnormal values introduced by outlier points. In addition, the NDWI method was proved the most appropriate method to obtain the area of water bodies and was then applied to study the area change of the lake. The research revealed that: (1) In spatially, during the study period, the shoreline of Hulun lake was mainly retreat, especially, in the south area. (2) In temporally, the area of Hulun lake was shrinking fast and the reduced rate is  $49.52\text{km}^2/\text{a}$  in 2003-2009. (3) Water level decreased with volatility from 530.72 m in 2003 to 529.22 m in 2009 and the mean decrement was 0.0759 m/a. (4) The decrement of volume experienced three stages: sharp, slight and then sharp. The general decrement was caused by high temperature, massive evaporation and low precipitation. Reduction of runoff was another reason. Fluctuation or even slight increment of water level was due to the intra-annual temperature drop, decreased evaporation and slightly increased precipitation. Meanwhile, anthropogenic factors including overgrazing and agricultural irrigation accelerated the decrement of water level. The variation of water level at Hulun Lake is a comprehensive result of compound factors of both nature and human beings.

### Key words:

ICESat/GLAS altimetry data; Water level change; Hulun lake; Arid area

## Inter-Decadal Spatiotemporal Variations of Aridity Index Based On Temperature and Precipitation in Inner Mongolia, China

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### Abstract

The study result was indicated that the mean aridity degree was increasing as west to east and was mainly characterized by moderate aridity; from 1961 to 2010, the change of aridity was decreasing while the aridity was increasing especially after the abrupt changing point at 1995. What's more, the decreasing area of aridity was taken up 82.6% as the increasing area was only occupied 17.4% of the whole area. During the 50 years' timescale, the annual mean aridity oscillation periodicity was at the 49a, 25a, and 7a. And Inner Mongolia was still at the stage of aridity and might last for a long time. As the different decadal, the climate of Inner Mongolia was relatively humidity in 1980s, however, as the time went by, the area of moderate aridity degree was increasing while the humidity area was decreasing entering the early 21<sup>st</sup> century. Therefore, it was clear that the climate was becoming dryness year after year. From 1960 to 2010, lower than 30 contours shift toward longitude direction and that of greater than 30 moving toward latitude direction.

### Key words:

climatic aridity index; spatiotemporal variation; aridification; Inner Mongolia

## The Study on GIS Based Simulating Spatial Distribution of Mongolian Population in Inner Mongolia Region

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### Abstract

Population data is one of the important indicators which reflect sustainable development of national, regional economy and culture. The spatial distribution of population means the distribution status in various regions based on a definite time and space and a form of expression in space of population data. Combining with the social and economic elements which include situation of study area and population, accurate and detailed spatial distribution information is an important component of the risk management of natural disaster in Inner Mongolia. Among of them, Mongolian population are the deeply affected objects of most important natural hazards in Inner Mongolia. Therefore, it is also the paramount basis on disaster prevention and mitigation process. Furthermore, to engage in effective disaster early warning and risk identification need to obtain accurate spatial distribution of risk population. Whether in theory or in practice, the traditional statistic methods of population distribution with administrative boundaries has many limitations. But, spacialization of statistical population data is an effective way to integrate statistical data and natural factors.

With Inner Mongolia autonomous region as research unit, this paper makes an elementary study on simulating spatial distribution of the Mongolian population in a large scale. By filtering the available data of Mongolian population distribution based on Inner Mongolia population census data in 2010, and making the correlation analysis combined the GIS spatial analysis function with SPSS software, found that strong correlation exists between the distribution of Mongolian population in different areas in inner Mongolia and macro-influence elements including altitude, land-use (farmland, construction land), climate condition, road and river system, and it also found that the impact of vegetation and soil types on the distribution of Mongolian population are more obviously. Meanwhile, residential point is an important indicator to distribution of Mongolian population. Based on it, Weight values of affecting factors are assigned objectively and multiple sources data fusion technology is applied to spacialization of population census data. Finally, a rasterized Mongolian population density map for Inner Mongolia district with a resolution of 1km×1km was calculated to verify and evaluate the accuracy and effectiveness of the Mongolian population spatial distribution simulation. It is found that the method can produce better simulation results and the operation is



of great significance in the practice application. The method used in this paper can be referenced by applied researches for county-scale Mongolian population distribution. At the same time, it is a great important significance for socio-economic development and ecological balance in Inner Mongolia Autonomous region.

**Key words:**

distribution of Mongolian population; affecting elements; GIS; spatial simulating

## What Matters Most in Institutional Design for Community-Based Rangeland Management in Mongolia?

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### Abstract

This study tested the effect of institutional design principles on social outcomes of evolving pastoral institutions in post-socialist Mongolia. Using data from 77 community-based rangeland management (CBRM) groups and 392 member households, we examined the effect of donor facilitation on institutional design. We found that donor facilitation approach significantly influenced group attributes and their external environment, but not institutional arrangements. The study confirmed that small group size, homogeneous interests, and heterogeneity of well-being are important group characteristics that predict higher levels of information diversity, leadership, and income diversity. Institutional arrangements such as the presence of sanctions, group-devised rules, frequent meetings, and recording documents increased cooperation, rules, and information diversity. Similarly, access to training and local government support provided a favourable external environment for increasing social outcomes. Furthermore, group characteristics such as dependence on livestock, homogeneity of interests, and leader legitimacy were critical for increasing social capital, livelihoods, sustainable rangeland practices, and proactive behaviour of members. More frequent meetings of leaders were the most influential for these outcomes. Local government support and available donor support were associated with increased trust and norms of reciprocity, sustainable rangeland management practices, proactiveness, and livestock holdings. Lastly, group attributes and external environment influenced social outcomes of pastoral CBRMs in Mongolia more than institutional arrangements.

### Key words:

Community-based rangeland management; pastoral institutions; institutional design principles; Mongolia

## Dynamic Monitoring of Cross Border Grassland Fire Based on Multi-Source Satellite Remote Sensing Data

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### Abstract

Grassland fire disaster are devastating burning of grasslands that bring some loss to grassland ecosystem and people. Providing information quickly and accurately for fire fighting and rescue work, using multi-source remote sensing data to monitoring the fire information. Comprehensive analysis multi-source satellite remote sensing data of MODIS data, meteorological satellite data(FY-3A/B), environmental disaster reduction satellite data(HJ-1A/1B) and conventional meteorological observation data(wind direction and wind speed), in total at 20 different time points during April 13-17, 2015 by fire point monitoring , sub-pixel fire area and burned scar region estimation method for dynamic monitoring of the process of cross border fire disaster on April 13, 2015 in Hulunbeier. Monitoring results indicated that, using multi-source satellite remote sensing data to dynamic monitoring the grassland fire disaster can be more accurate and comprehensive understanding of the process of cross border grassland fire. And the proposed monitoring method to provide the latest fire point information for the fire risk early warning.

### Key words:

Grassland fire ; Dynamic monitoring ; multi-source satellite remote sensing

## Spatiotemporal Characteristics and Driving Mechanism of Xilingol League

### Settlement Since 1990

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#### Abstract

With the rapid urbanization and industrialization, researching the temporal differentiation characteristics of settlement landscape in pastoral areas and driving mechanism can provide the scientific basis for settlement layout, reconstruction of settlement system and the close relationship of settlement system in pastoral areas. In this article, by using GIS spatial analysis, spatial statistics and landscape patterns, to analyze the evolution of the pastoral areas settlements, and their spatial distribution, scale of landscape pattern from 1990 to 2015, and to explore the main driving factors on the development of pastoral areas settlement in Xilingol league. (1) The total area and scale of pastoral area settlements in Xilingol league expanded significantly from 1990 to 2015. The shape of pastoral area settlement patches tend to be complex irregular development, there is not obey the rules of the objective of local conditions, its development has a certain randomness and leadership subjectivity. On the spatial distribution, the pastoral area settlement patches were characterized by obvious agglomeration situation. There was an obvious positive correlation between the density distributions of settlement patches and settlement patches of size distribution, specifying that there was a high density distribution of mass size settlement patches and a low density distribution of small size settlement patches. During 1990-2015, there was a small change in overall of pastoral settlement, but a change of local areas. These spatial patterns of settlement patches in pastoral area were affected by road adjacent advantage and water system, and socio-economic factors played an important role, by studying the driving mechanism, it was agreed that dynamic mechanism including regional economic development, industrial structure adjustment, urbanization and industrialization advancement and government policy and other macroeconomic regulation and control function.

#### Key words:

Pastoral Area Settlement; Settlement Patches; Spatial Pattern Characteristic; Driving Mechanism; Xilingol League

## The Study of Snow Area in Spatial and Temporal Changes in Cross-Border Region Of Mongolia And China

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### Abstract

snow cover information has important significance to determine the scope of the snow disaster and its classification in temporal and spatial monitoring of regional scale. In this paper, we put the cross-border area of Mongolia and China region as study area, include Mongolia and parts of Inner Mongolia, for the Inner Mongolia part, consist of Alxa League, Bayannao'er City, Baotou City, Xilin Gol League, Chifeng City, Xing'an League and Hulunbeier City in total of 7 League and City, at the same time, involving a total of 47 municipal districts and banners; Mongolia involving four League and City, distributed from east to west are Umnugovi, Dornogovi, Sukhbaatar and Dornot.

We using the MODIS snow products in recently 14 years and synthesis as method of monthly maximum area to analyze snow covered area from spatial and temporal variation in cross-border region of Mongolia and China. In time scale, the change of snow cover area began to accumulate in October, snow cover increased volatility before January, snow cover into the stage of melting after January. From the prospective of spatial, Mongolia's steady snow mainly distributed in Dornot, Sukhbaatar and Umnugovi-N in the northwestern part of the region. The region of stable snow in Inner Mongolia, mainly concentrate on the northeast and central Inner Mongolia regions.

### Key words:

spatial and temporal changes; snow area; cross-border region of Mongolia and China; MODIS

## The Spatial and Temporal Changes of Snow of the Inner Mongolia Based On Multi-Source Remote Sensing Data

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### Abstract

snow cover information has important significance to determine the scope of the snow disaster and its classification in temporal and spatial monitoring of regional scale. The snow cover temporal and spatial dynamics monitoring in the past 10 years (2003 - 2012) was investigated in the specific study. In time series period, the snow cover area changed significantly within an individual year, and the maximum snow cover area occurred in January and the smallest snow area occurred in October. In recent years, the total snow cover area of Inner Mongolia has a reducing trend and the annual average reduced rate was about 7km<sup>2</sup>. The first snow date was delayed and the snow end date became earlier and earlier. It indicated that the snow cover time period has reduced significantly. The annual average snow depth ranges from 2.29cm to 3.9cm. The snow cover has a maximum depth in 2003 and has a minimum depth in 2008. The average snow depth also has a slightly decreasing trend and its reduce rate was about 0.56cm/10a. In spatial distribution, the snow cover area changes in Xilinguoluo and Wulanchabu grassland were dominated the total snow cover area fluctuation in Inner Mongolia. In Inner Mongolia, the spatial covered more than 10cm snow depth were mainly distributed in Greater Khingan Range mountain area and this area has an early beginning snow date and late date of ending snow cover. So this area has a longer snow cover days.

### Key words:

spatial and temporal changes; snow area; snow cover time; snow depth

## What Explains Positive Social Outcomes of Community-Based Rangeland Management in Mongolia?

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### Abstract

The collapse of state cooperatives in early 90s created a gap for formal institutions of rangeland management in Mongolia. By 2007, 14 different donor programs supported formation of over 2000 herder community groups with the goals of effective resource management and livelihood improvement. However, results of donors' efforts have not been consistently successful, yet little is known about the factors that influence success or lack thereof. This research examined causal relationships of variables that influenced socio-economic outcomes of community groups. We studied 142 pastoral groups in 36 soums (counties) of 12 Mongolian provinces, where 77 of them were donor supported groups. We examined how the effect of formal organization on social outcomes was mediated by four intermediate variables, namely, information diversity, leadership, knowledge exchange and agreed rules given four different ecological regions. We found that traditional and innovative rangeland management practices, proactiveness and social networks were significantly mediated by the intermediate outcomes, while the same mediators did not influence levels of trust, norms of reciprocity and assets. Moreover, among these four interdependent mutually-enforcing mediators, information diversity had a triggering effect on other three variables creating a causal chain of information diversity→leadership→ knowledge exchange→rules. The study also revealed importance of ecological zone in achieving better social outcomes such as traditional and innovative rangeland practices, social capital and assets. However, a negative effect of rules on trust and norms of reciprocity as well as assets was a contradictory finding to the prevailing understanding in the field of the commons.

### Key words:

Community-based rangeland management, social outcomes, mediating, moderating factors, pastoralism, Mongolia

## Earth Geography in Different Cultures

### Cultural tourism in Saudi Arabia



Home

#### Oral

1. [Development of Heritage Conservation in Saudi Arabi](#)  
MohammedShawqi Makki (SGS/ KSU, Saudi Arabia)
2. [Riyadh and a Dramatic Increase in Tourism Attractiveness by 2020](#)  
Mohammed ALMOGARRY (King Saud University, Saudi Arabia)
3. [The Prospects of Cultural Tourism in the Kingdom of Saudi Arabia: Rock Arts as a Model](#)  
Badr Alfaqeer (King Saud University, Saudi Arabia)

## Development of heritage conservation in Saudi Arabia

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### Abstract

This paper attempts to consolidate the architectural heritage in the Kingdom of Saudi Arabia by giving examples of the components of urban civilization dating back to ancient times, then move to the gaps and discontinuity between the authenticity of this heritage and urban updated strange combinations on the local environment and that created some disharmony in cities components. There is an attempt to identify the causes of this disharmony.

Also the paper exposed to modern efforts formal and informal to create a kind of harmony in the cities combinations by undertaking several policies to maintain the architectural heritage. In spite of these efforts, it seems that there is a lot of work required to achieve balance in the urban growth that combines conservative and modernity for the benefit of human and place.

### Key words:

Saudi Arabia; heritage; development; tourism

## Riyadh and a Dramatic Increase in Tourism Attractiveness by 2020

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### Abstract

Riyadh has seen rapid growth in both population and urbanize during the second half of the twentieth century; making it one of the fastest growing cities in the world. But since the beginning of the third millennium, responsible authorities for the development of the city, continued in collaboration with the private sector, in implementation of major sustainable development projects of the city, it became a modern city, comparable to major cities in the world.

This research concerns with major development projects that are being implemented at present, and will completed by or before 2020. God willing. One of the main objectives of the review of the following major development projects:

- Transport Infrastructure projects, it comprises a huge and sustainable development projects, the most important of these projects is Riyadh Metro, and developing road network in the city, and projects to development of King Khalid International Airport.
- Hospitality projects.
- Recreational projects.
- Shopping and hospitality projects.
- Museums and educational projects.

In the same time, there is more concern about eco-tourism, and elements of natural and historic attractions. In Addition to the concern about the integration between the elements of human and natural attractions. Thus after completion of those major development projects in the city on or before 2020, it will become more attractive to tourists, in which they can meet the desires such as recreation, shopping, and education.

Therefore, Riyadh city in 2020 will have a variety of human and natural attractions, which will dramatically increase its attractiveness to tourists, either from Saudis and other residents, or from other countries.

### Key words:

Riyadh; Saudi Arabia; tourism; sustainable development

## The Prospects of cultural tourism in the Kingdom of Saudi Arabia: Rock Arts as a Model

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### Abstract

Saudi Arabia has abundant cultural resources, which include archaeological and historical sites, architectural heritage sites, sites in the depths of the seas that contain monuments in the sunken ships in the territorial waters of Saudi Arabia, the folkloric and literary heritage sites, museums and others.

The thousands of rock arts sites that abound in the territory of the Kingdom of Saudi Arabia are of the most important cultural heritage components in the Paleolithic, prehistoric and historic times and that they prove to be one of the first man habitations and corridors, which perpetuate their role in the march of international civilization.

Rock arts groups made up of two groups differ in their colors and techniques, the first group which is the largest of arts, executed by engraving, pecking, slitting and erosion on the surfaces of rocks. The second group, which is small, it had been painted with shades of red and yellow, in addition to the black color, which is mainly concentrated in the mountain caves.

Topics covered by numerous rock arts sites are multiple and can be classified according to the following groups: Animals arts group, human arts group, Different human activities arts such as hunting, dancing, dueling and others group, Signs, symbols such as hands, feet, tribal marks, plants and others. This precious archaeological inventory is an inexhaustible source for the archaeological and geographical researcher attempting to understand the nature and history of the region in the past centuries.

### Key words:

Cultural tourism; rockarts; successive civilizations; old lifestyles

## Earth Geography in Different Cultures

### Mobility of China Model



#### Oral

1. [A Hierarchical Spatial Structure Algorithm in Urban Agglomeration Study and a China Case](#)  
Fangqu NIU (Institute of Geographical Sciences and Natural Resources Research, China), Weidong LIU (Institute of Geographical Sciences and Natural Resources Research, China)
2. [Impacts of Institutional Change in China's Automotive Industry on Regional Development Since 1978](#)  
Jiamin Ren (University of Chinese Academy of Sciences; Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, China), Jie Huang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
3. [Impacts of the "Belt and Road Initiative" on China's Regional Development Disparity](#)  
Hui Liu (Institute of geographic sciences and natural resources research, CAS, China)
4. [Shrinking Cities in China: Preliminary Analysis of Scalar Processes of Population Shrinkage and Implications](#)  
Zhenshan Yang (Institute of Geographical Sciences and Natural Resources Research of Chinese Academy of Sciences, China), Michael Dunford (School of Global Studies, University of Sussex, China)
5. [Small Hydropower and The Making of China's Rural Green Development Model](#)  
Tyler Harlan (UCLA, United States)
6. [The Emergence of Local Product-Service Industry for A Second-Ranked City-Region: A Case Study of Xi'an-Xianyang-Xixian New Area, China](#)  
Tao Song, Weidong Liu, Mingxing Chen (Institute of Geographical Sciences and Natural Resources Research, CAS, China)
7. [Variegated Governance and the Development of Local Industry](#)  
Boyang Gao (Central University of Finance and Economics, China), Michael Dunford (Chinese Academy of Sciences, China), Glen Norcliffe (York University, Canada)

#### Poster

1. [The Pattern and Type of "China's New Normal" from the View of Economic Geography](#)  
Mingxing Chen; Dadao Lu; Yinghua Gong (China, Institute of Geographic Sciences and Natural Resources Research, CAS)

## A Hierarchical Spatial Structure Algorithm in Urban Agglomeration Study and a China Case

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### Abstract

Urban Agglomeration (UA) is now considered to be the elementary regional unit for China to participate in the global labour division and market competition. Relations among cities of an UA may form a complex network which causes difficulties for researchers and policy makers to study its spatial structure and make reasonable spatial policies accordingly. In this paper, we develop a novel algorithm to analyse the complex relational network among an UA and convert it to a hierarchical spatial structure. Firstly, overall capacity of each city and interaction between each city pair in a UA are estimated. Then an algorithm is developed to construct a so-called Hierarchical Spatial Structure Tree (HSS-Tree) from the relational network. Finally, the HSS-Tree is visualized and interpreted based on the UA map. The HSS-Tree generated describes a hierarchical spatial structure of a UA. In the end we applied this method to Guanzhong UA scenario, and results show that due to Xi'an's high overall capacity, cities around it have more interactions with it than among themselves. It is recommended that secondary-level core cities are needed to share the service provision burden of Xi'an. The HSS-Tree of Guanzhong UA could be of great help to understand the spatial structure of this area, and provides a good reference for the authority to draw regional policies.

### Key words:

HSS-Tree, overall capacity, Guanzhong Area, urban agglomeration, urban ranking system

## Impacts of Institutional Change in China's Automotive Industry on Regional Development Since 1978

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### Abstract

Since 2014, China has entered 'New Normal' which means a new stage different from that in the past 30 years. So, it is essential to find out new driving forces for China's economic growth. As the basic factor of the long-term economic performance, institutions play fundamental roles in regional development. The study firstly reviewed the central and local automobile industrial strategies in China since 1978 and then compared formal regulations, business culture and conventions of the main provinces and municipalities for automobile manufacturing including *Jilin, Hubei, Shanghai, Guangdong, Zhejiang, Jiangsu, Beijing, Chongqing, Anhui and Shangdong*. Lastly, different responses to the institutional changes and their impacts on regional development were discussed. The results showed that (1) since 1978, the institutional change shows the dynamic relationship between the central government and local authorities in orienting foreign direct investment and training the native enterprises. (2) Different responses to the national strategies induce different developmental outcomes. Relying on training native enterprises during the decentralization of the central governments, *Zhejiang, Jiangsu, Anhui and Chongqing* have grasped the opportunities to regional development while some regions like *Jilin* missed the chance to improve the automobile industry. (3) In the same provinces or municipalities, the informal institutions such as local convention and business culture have profound influence on regional development, especially in *Jilin*, it is difficult to change it in a short time. This study will help the central government and local authorities to make effective policies and select differentiated solutions for regional development.

### Key words:

institutional change; institutions innovation; automotive industry; regional development; China mode

## Impacts of the “Belt and Road Initiative” on China’s Regional Development

### Disparity

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#### Abstract

The "Belt and Road Initiative" is and will continue to be an overall strategy of China's all round opening-up for a long time into the future. It will have great impacts on China’s regional development disparity. This study examines the influence of the "Belt and Road Initiative" on China's regional development with regard to the all round opening-up, improvement of facilities connectivity, changes of energy supply system, trade, and social and culture exchanges. Based on the great international transport and economic corridors proposed by the Chinese government in the "Vision and Action on Jointly Building Silk Road Economic Belt and 21st-Century Maritime Silk Road," this article also analyzes the impacts of different international economic corridors on territory development in different regions. The main results are as follows. (1) Although different international economic corridors influence different regions, the western region of China will benefit the most from the "Belt and Road Initiative", which is beneficial to reduce regional disparity in China. (2) The "Belt and Road Initiative" will facilitate the formation of several metropolitan economic areas and economically highly developed areas in the inland area that open to the outside. (3) The "Belt and Road Initiative" will accelerate the development of port of entry and inland border cities and promote the development of cross-border economic cooperation areas, which will drive the development of border areas.

#### Key words:

the Belt and Road Initiative; regional development; international economic corridors; China

## Shrinking Cities in China: Preliminary Analysis of Scalar Processes of Population

### Shrinkage and Implications

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#### Abstract

Analysis of the latest Census data for 2000 and 2010 shows that 88 out of 336 prefecture cities suffered population loss at different levels. These cities are mainly located in the Northeast, East Coast, South Coast, and Middle Yangtze River regions. A General Ordered Logit model captures scalar processes of total, urban and Hukou population loss, which are associated with economic state, low population production, economic growth, de-manufacturing, and promoting services at different courses and different levels. The complex and varied mechanism leading to population shrinkages are revealed, which offers a preliminary analysis, but calls for future studies and policy modification against past growth-themed China.

#### Key words:

city shrinkage; China; ageing; city and regional development; general ordered logit model

## Small Hydropower and The Making of China's Rural Green Development Model

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### Abstract

What is the 'China model' of rural development? This question, long the subject of scholarly work, has more recently garnered interest from those seeking to replicate China's successes in other countries. Amidst the many reports on China's rural reforms, a recurring theme – though an often overlooked one – is the government's extension of electricity access to 99% of rural households, much of this through small hydropower (SHP). SHP holds a special place in China as a symbol of rural self-sufficiency, even as grid extension has replaced its role supplying power for villages and industry. In the last decade, however, the government has re-framed small hydropower as a clean energy source for 'green' development, resulting in a construction spree by private investors. Meanwhile, the government and international agencies have begun promoting SHP in other countries as a clean, low-carbon technology for rural development and poverty alleviation, and one in which China has recognized expertise.

This paper investigates how small hydropower is implemented in rural China and packaged as a set of 'green' technologies and practices that other countries can follow. I argue that the official view in China of rural development as a staged process affects the kind of small hydropower practices Chinese officials promote, and the impacts that result. Drawing on interviews with officials, investors, and international training staff, I suggest that the green rural development advocated by Chinese actors does not match China's own experience; rather, it serves as a way to internationalize China's SHP industry.

### Key words:

Green rural development; China; renewable energy; small hydropower; international aid

## The Emergence of Local Product-Service Industry for A Second-Ranked City-Region: A Case Study of Xi'an-Xianyang-Xixian New Area, China

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### Abstract

This article examines the role of urban product-service industry in the economic transformation of a second-ranked city, developing a conceptual framework that identifies the spatial expanding and industrial features of urban product-service industry to enhance a city's global status and manufacturing competitiveness. The paper focuses on a case study of Xi'an-Xianyang-Xixian New Area, China. It is argued that the latest urban product-service industry might serve as a boost for diverse local interests to achieve a more competitive development, which could be seen as an aspect of China's decentralization. However, various political divisions of government make this race uncompetitive and unsustainable on contemporary city-regions.

### Key words:

Product-service industry; Fragmented governance; City-region; Globalization

## Variegated Governance and the Development of Local Industry

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### Abstract

In the neoliberal age many commentators have argued that laissez-faire capitalism offers the only route to economic development. The state is portrayed as an obstacle to development, and wasteful in allocating scarce resources. Yet in practice state governance can play a crucial role in initiating development, although the strategies adopted in different settings are necessarily variegated, being framed with respect to local laws, policies, culture, and histories. In recent years, China's spatial governance has continued to evolve. Since China's Western Development Plan was launched in 2000, the central government has encouraged western governments to take local initiatives. An example is Chongqing Municipality and its strategy for developing a notebook computer cluster. These initiatives in some ways resemble Foucault's interpretation of governmentality as a set of organized practices involving ways or thinking, types of rationality and techniques through which subjects are governed and govern themselves. These practices and governance tools reflect however the specific configuration of the Chinese state system and are therefore an example of variegated governance.

### Key words:

Variegated Governance; Spatial Governance; China; Industrial Development; Computer Industry; Chongqing

## The Pattern and Type of “China’s New Normal” from The View of Economic Geography

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### Abstract

In face of the decreasing external demand and the population, resources and environment bonuses, the economic growth in China will gradually dipped to a low growth. The researches on objects and pattern of “China’s New Normal” from the view of Economic Geography have great influence on the development of China. Through certain key indexes, this paper focused on the trend of economy and the regional type in the 31 provinces. The result indicated that: In the past few years, the growth rate of fiscal revenue, electricity consumption, and volume of railway freight has declined sharply, and meanwhile, many primary industries and “three carriages” (fixed asset investment, export, and total retail sales of consumer goods) as well. Many provinces have the same tendency as the whole China. Moreover, the total 31 provinces are divided into three types: relatively fast growth, light downward pressure, and great downward pressure individually. Provinces with great downward pressure are further divided into four types: developing regions, overall declining regions, energy-owned regions, and others. The same type of regions is geographic agglomeration obviously. Faced with this round of economic downside, different regions should take different measures, and the developing risks of Northeast China and energy-owned regions such as Shanxi should be emphasized on.

### Keywords:

China’s New Normal; Pattern; Type; Economic Geography

## Earth Geography in Different Cultures Historical Geography in Multi-Perspectives



Home

### Oral

1. [Economic Geography Study in Modern Times and the Spatial Pattern of Chinese Economy](#)  
SONGDI WU (FUDAN UNIVERSITY, China)
2. [Family Geography and Genealogy: Can Assemblage Thinking Aid the Understanding of the ‘Social World’ of 18th Century Ballinakill, Ireland?](#)  
Robert Gale (James Cook University, Australia)
3. [Geographical Education and its impact on Colonial Taiwan China and Korea](#)  
CHIENWEI YEH (Ibaraki University, Japan)
4. [Multi-Agent Model-Based Historical Cropland Spatial Pattern Reconstruction: Methods and Case Study](#)  
Xuhong Yang; Xiaobin Jin (Nanjing University, China)
5. [The Study of the Dissemination and Distribution of the Catholic Church in Northwest Yunnan in Late Qing Dynasty](#)  
Xiaohong Zhang (Institute of Chinese Historical Geography, Fudan University, China)
6. [Vernacular Culture Regions in China: Its Forms and Indicators](#)  
Weiran Zhang (Fudan University, China)



## Economic Geography Study in Modern Times and the Spatial Pattern of Chinese

### Economy

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#### Abstract

In recent years, with the series publications of China's economic geography in modern times (9 volumes), we had comprehended basically both the economic spatial pattern in modern times and the factors of Chinese economic spatial pattern from modern times to right now. Up until recently, many aspects of China's economic spatial pattern, such as the regional economic differences, the direction of spatial economic development, the formation and expansion of urban agglomeration, are all subject to the constraints of modern economic geography. Therefore, we should understand further both the economic geography in modern times and its influence on current economic development.

#### Key words:

Chinese Economy; Spatial Pattern

## Family Geography and Genealogy: Can Assemblage Thinking Aid the Understanding of the ‘Social World’ of 18<sup>th</sup> Century Ballinakill, Ireland?

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### Abstract

A framed, embroidered, 1815 map of Ireland passed down through successive generations is in my charge. The name of the small 1612 ‘charter town’ of Ballinakill, Queen’s County, stitched on the map – almost as the centre of Ireland – is a cultural statement of attachment to place. Drawing on genealogical, census and property records, I report some surname geographies and show how attachment to place might be problematic for a given family with a mere one hundred year history living in the area.

Given the relations between power, politics and space, my interest in the ‘social world’ of Ballinakill can quickly become a quagmire of fixed notions of Irish identity in nationalist historiography. I test a view that assemblage affords a more processual and socio-material perspective in my argument that ‘family geography’ is less about heritage and more about situational place-based change, and that ‘family geography’ can augment traditional ‘family history’ studies of lineages based on marriage and progeny in genealogical research.

The study reveals Ballinakill to be both a real and imagined place. It is real because of British military rule, large estates, landed gentry, middle class merchants, vast poverty, the Great Frost famine of 1739-1741, and the 1798 rebellion. It is imaginary because it is historical and British rule no longer exists. The vestiges and imprints of 18<sup>th</sup> century life, which are still physically present in the landscape and archives, mean that a genealogical inquiry can be given a geographical interpretation aided by insights from assemblage thinking.

### Key words:

Family geography; surname geography; historical geography; genealogy; assemblage; Ireland; Place



## Geographical Education and Its Impact on Colonial Taiwan China and Korea

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### Abstract

This paper discusses the role of geography education upon the development of colonialism and its impact on the people of Japanese colonies: Taiwan China and Korea. Taiwan was the first colony of Japan from 1895-1945 and Korea from 1912-1945. Taiwan China and Korea were, as Peattie (1984) put it, 'the most important colonies' where 'were well populated lands whose inhabitants were racially akin to their Japanese rulers with whom they shared a common cultural heritage'<sup>7</sup>. Taking advantage of this cultural affinity, Japan developed a unique colonial policy: Pan-Asianism. The Japanese aimed to assimilate the colonized people and transform people into 'Japanese'. Education was one of the key factors in Japanese colonial policy to promote the assimilation and geography was a core subject in elementary school education to foster patriotic spirit among children in the colonies. Although both Taiwan China and Korea were 'assimilated', their development of colonial policies and the way of acceptance/resistance by the people were differ in each colony. The difference was also reflected in geography education.

By comparing geography textbooks and educational policies in Taiwan China and Korea, I will discuss how the geography education and its difference affected on the development of colonialism and the people in each colony.

### Key words:

colonialism, geography; elementary school; education; Taiwan China; Korea

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<sup>7</sup>Peattie, Mark R. (1984) Japanese Attitudes Toward Colonialism, 1895-1945. In *The Japanese Colonial Empire, 1895-1945*, edited by R. H. Myers and M. R. Peattie. Princeton University Press.

## Multi-Agent Model-Based Historical Cropland Spatial Pattern Reconstruction:

### Methods and Case Study

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#### Abstract

To advance the research of global land use/cover change (LUCC), biodiversity, global carbon cycle, and other aspects of the earth system, it is essential to reconstruct changes in historical cropland cover with long time series and high-resolution grid. Currently, it is a general approach which is based on the view of combining the overall control of cropland area, selecting grid of high land suitability, and 'top-down' decision-making behaviors to reconstruct the historical cropland. Considering various factors that influenced cropland distribution, including behavioral agent's selection by itself and the limitation of nature and human factors, a spatiotemporal dynamical reconstruction model of historical cropland based on the multi-agent systems has been developed from the perspective of 'bottom-up', which combine macroscopic and microscopic decision-making behaviors of agents to simulate the government and farmer autonomously implementing the selection behaviors of farming area. Taking Shandong Province as the study area, this model was used to imitate its cropland spatiotemporal pattern with 1km grid-resolution from 1661 combining the contemporary pattern and reconstructed amount of historical cropland as a maximum potential scope and control variable of reconstruction model, respectively, furthermore, followed the accuracy valuation and comparative analysis. The reconstructed results show that: 1) It is properly suitable for Multi-Agent to simulate and reconstruct the spatial distribution of historical cropland; 2) Compared with historical map datasets (1930s) from the view of point to point, the correctly classified producer accuracy, user accuracy and overall accuracy of reconstructed result totally up to 59.09%, 80.62% and 62.31%, respectively, and shows our reconstruction map achieved a better agreement with the historical maps; 3) From the view of grid-level or county-level, our reconstruction approach can effectively keep away from the grid with mountain-hilly and easily flooding probability, it showed a good similarity and higher consistency when compared with the research result based on archives and historical records in overall pattern and tendency of cultivation, and difference error decrease gradually, moreover, the cultivation ratios in county-level is more close to the historical situation.

#### Key words:

Multi-Agent; historical cropland; reconstructing spatial pattern; Shandong Province



## The Study of the Dissemination and Distribution of the Catholic Church in Northwest Yunnan in Late Qing Dynasty

Xiaohong Zhang

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### Abstract

In the late Qing Dynasty, there were about three kind of forces in Northwest Yunnan: one was the Buddhist which expanded during Ming and Qing Dynasties from Tibetan Plateau and had acquired a monopoly in the area; one was the Catholic Church which missionaries came from France had spread in the lower classes by renting the farmland to the poor; one was the local government who were going to bulldoze through national authority. In the struggle among the three forces, the Catholic Church united with the local government and diminished the power of Buddhist, so that the Buddhist had to share the local power with the Catholic Church and local authority. In the political pattern in the area, there was no clear and definite geographic border line between the distribution of the Catholic Church and Buddhist. And the corresponding relationship between the religion and the ethnic group was broken out. The geographical distribution of the religion and ethnic groups in the area had been changed and showed a mosaic pattern.

### Key words:

Catholic Church; Distribution; Northwest Yunnan; Late Qing Dynasty



## Vernacular Culture Regions in China: Its Forms and Indicators

Zhang Weiran

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### Abstract

As an academic item, the concept of Vernacular Culture Region came from America. It is perceived to exist by its inhabitants, as evidenced by the widespread acceptance and use of a special regional name. The most popular case is “Dixie” region which was formed since Civil war in south-eastern of United States. It is determined by “Dixie” symbol appeared in telephone directories as part of the name of business establishments, and so it has no clear bounds, no central points. According to its definition, in China, there are many alike cultural regions such as Qin (秦) cultural region, Chu (楚) cultural region and so on, which come from some traditional region concepts. Another kind of such regions is determined by some physical symbols such as mountains and rivers. For example, Jiangnan, Shandong and Jiangnan. Differing from it in United States, most of such regions in China have notable edges and remarkable central places. And most of them had very deep relationship with administrative regions.

### Key words:

Vernacular Culture Region; Chinese Culture Region

## Earth Geography in Different Cultures

### Chinese culture and geography



Home

### Poster

1. [A Study on the Age of Ancient City Bajiaocheng in Gansu Province, Northwest China](#)  
Qiang Wang; Dongju Zhang; Duo Wu (China, Lanzhou University)
2. [Folk Belief and Village Boundary: A Study Centered on Fenghuang Village, Chaozhou, Guangdong Province](#)  
Feng Huang (China, Sun Yat-sen University)
3. [Multi-ethnic Residential Segregation in Urumqi, China, 1982-2010](#)  
LI Song (China, Xinjiang Agricultural University)
4. [Study on Traditional Settlement and Regional Culture of Henan Province Based on Space syntax](#)  
Zhang Chenming (China, College of Environment and Planning, Henan University); Gao Jianhua (China, 1. College of Environment and Planning, Henan University 2. Key Research Institute of Yellow River Civilization and Sustainable Development, Henan University); Li Guoliang (China, College of Environment and Planning, Henan University)
5. [Sustainable Development and Resilience: a 3D SES Based on the Theory of Yin-Yang in the Book of Changes](#)  
Xiaofang Zhou (China, South China Normal University)
6. [The Sustainable Development of Historical and Cultural Resources of The Yellow River Estuary](#)  
Congcong Liu (China, Capital Normal University)

## A Study on the Age of Ancient City Bajiaocheng in Gansu Province, Northwest China

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### Abstract

Bajiaocheng, a well preserved ancient city, located in Xiahe County Gansu Province, was one of the important cities on the western road of Chinese ancient Silk Road. It has great value not only in the history of the relationship between central government and northwest minorities but also in the architectural significance. The city was built and occupied by ancient Tibetan Empire for a long time, however, when the city was built is still unclear as both the Western Han Dynasty based on some archaeological artifacts inside and outside the city and the Northern Song Dynasty according to some local historical documents are possible. Here we try to use chronology method to confirm the accurate age of the city. After investigating Bajiaocheng city, around 36 plant remains and charcoal samples were collected from main body of the wall. In order to obtain the age of the city, 8 of them from the base of wall were picked for radiocarbon dating by using accelerator mass spectrometry (AMS) method. Combined with the dating results and historical documents, we finally draw a conclusion that the Bajiaocheng city was built at least in 766 ( $\pm 47$ ) AD which is corresponding to Chinese Tang Dynasty.

### Key words:

Bajiaochengcity; Tang Dynasty; Tibetan Empire; Radiocarbon dating

## **Folk Belief and Village Boundary: A Study Centered on Fenghuang Village, Chaozhou, Guangdong Province**

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### **Abstract**

This paper is a comparison of the folk religious activities in Fenghuang Village and other 4 nearby villages. By taking the God Games as an example, to throw light on the significance of folk religion in constructing internal identity as well as outer boundary for a village. Folk religion is an important factor in internal identity, which makes sense in the promotion of the integrity of a village. Also, it is an important factor in the construction of the boundary of a village. The otherwise vacancy of group activities has been filled by the folk religious activities during the traditional festivals. Individual, families and villages are reunited by such folk religious activities at which expressions of care for the fortune of the village can be readily found. In addition, relationship between villages can also find its expression at the games which is an opportunity to coordinate village relations and construct boundaries.

### **Key words:**

folk religion, village boundaries, sacrificial offering circle, God Games

## Multi-Ethnic Residential Segregation in Urumqi, China, 1982-2010

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### Abstract

The ethnic landscape of Urumqi has undergone significant changes since 1980's, which has fostered greater ethnic diversity. However, little is known about the changing patterns of spatial differentiation among ethnic groups. Using the Urumqi census data from 1982 to 2010, we examine the level of residential segregation of Uighur from Han and the level of residential segregation of Kazak, Hui, Mongolia and other ethnic minority groups from the majority Han and Uygur population by the indices of dissimilarity and exposure. We then assess a regression between residential segregation and the percentage of the ethnic groups. Finally, we find out whether a regression between residential segregation and the percentage of the ethnic groups. The result reveal that Kazak population are most segregated group from Han and Uygur, although, the level segregation have declined from 1982 to 2010. Uighur people experienced lower level of segregation from Han between 1982 and 2000, but has gradually increase, particularly from 2000 to 2010, this unexpected change of the segregation for Uighur group might be associated with 7.5 events. The findings of the study show the growth of the Han population negatively associated with segregation of the ethnic groups in a district, and that the association between the percentage of population and segregation was uniform for Uighur, Hui and Kazak: the higher percentage of an ethnic group in a district, the lower level of segregation.

### Key words:

Ethnic clusters; Residential segregation; Multi-ethnic city ; Urumqi; China

## Study on Traditional Settlement and Regional Culture of Henan

### Province Based on Space Syntax

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#### Abstract

Based on space syntax theory and “convex space model”, this paper measured the courtyard space structure of typical traditional vernacular dwellings of Henan province, analyzing its spatial features and elucidating its regional cultural connotation. The results are as follows: ①The four dwellings bear some similarities. *GI*: central axis or node > courtyards > entrance; halls > principal rooms > wing rooms. *LI*: halls > principal rooms > wing rooms in the back yards > wing rooms in the front yards. ②The distribution of the convex spaces with higher *LI* deviate from the convex spaces with higher *GI*, existing a “Core-periphery” phenomenon. ③Different building structures have strong or weak coupling relationships with different residential cultures: “living in the west and worship in the east”、 “family glory”、 “living in the central”、 “the Confucian culture”、 “the spatial culture of taking advantage of the terrain”、 “cultivation and read to bequeath to the family”、 “the concept of no financial exposure”, appearing different characteristics of regional cultures.

#### Key words:

traditional settlements; space syntax; spatial integration; regional culture; Henan province



## **Sustainable Development or Resilience: a Model of Social-Ecological Systems Based on the “One Begets Two” Theory of Yin-Yang in the Book of Changes**

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### **Abstract**

Nowadays, the theory of Resilience encounters the same plight that the theory of Sustainable Development and becomes a targeted and descriptive concept which continuously endows human value. The reason lies in that these two theories are based on the hypothesis of human center. With the help of the Yin and Yang ideology in the traditional Chinese culture of the Book of Changes, this thesis establishes and analyzes the Social–Ecological Systems (SESs). First, with the method of bisection (“one begets two” of Yin-Yang), this thesis corrects the error of the theory of Resilience and Sustainable Development centering on human society, and takes the Yin-Yang ideology which is both mutually-centered and non-mutually-centered as the hypothesis for setting up the socio-ecosystem model. Next, the thesis sets up the socio-ecosystem model with the help of the division-combination relationship of Yin-Yang after “one begets two”. Then, based on the “six-directions” projection of the model, the thesis acquires the development track of SESs, the Yin-Yang unification line and the “mutual promotion and restraint” line of SESs, and nonlinear power and chaos features of the SESs as a complicated system. Researches show that Sustainable Development is the Yin-Yang unification line in essence, and Resilience is the Yin-Yang mutual promotion and restraint line in essence. That is to say, there is a vertical relationship between sustainable development and resilience.

### **Key words:**

Yin-Yang; the Book of Changes; Social–Ecological Systems (SESs); Sustainable Development; Resilience

## The Sustainable Development of Historical and Cultural Resources of the Yellow River Estuary

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### Abstract

Historical and cultural resources are an important part of human historical and cultural heritage of many entities, which possesses unique features, the value of modern wealth, can also be developed and used by scientific and rational ways, and even sublation and sublimation. The sustainable development of historical and cultural resources for the development of the economy, education and spiritual civilization construction is of great significance. Selecting the Yellow River estuary as demonstration area, using the method of spatial analysis and combining with the relevant data, studying the situation of the historical and cultural resources and researching the advantages and difficulties of historical and cultural resources faced by the development, summing up the historical and cultural resources of the Yellow River mouth still exist many problems in the process of sustainable development. And giving countermeasures and suggestions from three aspects including increase investment, build the Yellow River estuary's cultural card and promote the development of the cultural industry of the Yellow River mouth, which can promote the sustainable development of historical cultural resources of the Yellow River estuary.

### Key words:

historical and cultural resources; the sustainable development; the Yellow River estuary; spatial analysis

## Urbanization and Sustainable Development

### Urban soils



Home

### Poster

1. [Technosols Classification in Areas of Old Municipal Solid Waste Deposits in Presidente Prudente - São Paulo-Brazil](#)  
Janaina Natali Antonio (Australia, UNSW); José Tadeu Garcia Tommaselli (Brazil, UNESP); Graciela Metternicht (Australia, UNSW)
2. [The Red Book of Soil in Landscape Protected Area](#)  
Amir Guseinov; Anton Robert (Russian Fed, Russian State Geological Prospecting University n.a. Sergo Ordzhonikidze, Moscow, Russia)

## Technosols Classification in Areas of Old Municipal Solid Waste Deposits in

### PresidentePrudente - São Paulo-Brazil

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#### Abstract

The purpose of this study is to develop a method to classify technosols in areas of old municipal solid waste in PresidentePrudente – São Paulo – Brazil. The technosols are a new category of soils with its natural characteristics modified by anthropogenic activities. These soils are characterized by the presence of artefacts and technic hard materials composed of different materials among them there may be to occur toxic materials. In this study we are evaluated areas which have been used for the disposal of municipal solid waste and it caused changes in your landscape. Currently there are several problems for the people who lives nearby. To verify the changes in the landscape were used aerial photographs of the area in the years 1962, 1995, 2000 and field work to verify these changes. The area is on the course of the river which was grounded by solid waste and currently the area has many problems such as erosion and soil contamination. Additional relief data are being used to make the classification of technosols such as geomorphometric data obtained from a DEM as slope, curvature, aspect, flow direction and added chemical and physical analysis of soils in order to verify the area of influence of contamination of these soils. The application of a methodology for technosols classification can be applied in other areas and can be used for purposes of planning and land use planning as well as for other activities and studies.

#### Key words:

Technosols; geomorphometry; landscape; soil contamination

## The Red Book of Soil in Landscape Protected Area

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### Abstract

The standard SPNR conditions do not prevent soil degradation and its destruction as well as do not take into account the specific basic role of the soil in ecosystem components protection (plants, birds, animals etc.). Here we can ask an appropriate question – is it possible to protect plants, animals and mushrooms simultaneously without taking care of their natural surroundings – the soil? Today, the danger of non-refundable extinction of some kinds of soil seems real. «Tepliy Stan» landscape protected area was chosen as a model for the research, which is located in the south-west of Moscow and its soils suffer from an intensive recreational influence in all the seasons. On the ground of field works was compiled and digitized the soil map in scale 1:10000. The map showed 3 types of soil: podzolic, soddy and inundable (alluvial). We researched the affinity coefficient as the most accurate index of recreational influence and it made a foundation to create a recreational influence map in scale 1:10000. During the field ecological works we discovered some fire-pit locations and put them on the same map. Sod-podzolic soil areas suffer from maximum anthropogenic influence where affinity index is from 3000 to 4200 m / 0,08 km<sup>2</sup>. According to this as well as the data of fire-pits locations and intended for construction areas locations, these sod-podzolic soils were brought to extinction category. We believe that the proposed approach will have significant implications for similar ecological studies, and to open a new washed SPNR.

### Key words:

soil; urban; Red book

## Urbanization and Sustainable Development

### Hong Kong and the Pearl River Delta at the Cross Road



#### Oral

1. [Changing Regional Division of Labor between Hong Kong and the Pearl River Delta: From “Front Shop, Back Factory” to “Front Office, Back Desk”?](#)  
Anthony G.O. Yeh; Fiona F. Yang (Dept of Urban Planning and Design, The University of Hong Kong, HongKong SAR, China)
2. [Eco-City in the Making: The Ambiguity of Environment and the Planning Practices in the Cities of the Pearl River Delta](#)  
Yanyan Chen (CUHK, HongKong SAR, China)
3. [Finding the Fix in Changes and Flows: The Urban Political Ecology of Greenway Development in the Pearl River Delta](#)  
Calvin King Lam Chung (Bartlett School of Planning, University College London, United Kingdom)
4. [Going beyond the Politics of Scale: Planning Intercity Railway System in China’s Pearl River Delta](#)  
Jiang Xu (The Chinese University of Hong Kong, HongKong SAR, China)
5. [Urban Development and Land Use Governance in the Pearl River Delta: A Regional Perspective](#)  
Roger C K Chan (The University of Hong Kong, HongKong SAR, China)
6. [Urban Shrinkage in the Pearl River Delta: Pattern, Typology and Influencing Factors](#)  
Li Xun; Yang Jinkun (Sun Yat-sen University, China)

#### Poster

1. [Industrial Agglomeration Models’ Experiences of Some Famous Bay Areas in the World and Their Enlightenment Function to the Development of Guangdong, Hong Kong and Macao Bay Area](#)  
Wei Han; Jianming Cai (China, Institute of Geographic Sciences and Natural Resources Research)

## **Changing Regional Division of Labor between Hong Kong and the Pearl River Delta: From “Front Shop, Back Factory” to “Front Office, Back Desk”?**

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### **Abstract**

Hong Kong and the Pearl River Delta (PRD) has developed a well-known collaborative relationship, namely the “Front Shop, Back Factory” (FSBF) model, since the 1980s. However, the effects of this partnership have been in a process of decline over the past decade as a result of economic transition and rapid growth of producer services in mainland China. This paper examines the industrial linkages of producer services between Hong Kong and the PRD to see whether a new type of regional division of labour exists between these two places. The emphasis is placed on the utilization of producer services from Hong Kong and the competitive advantages and disadvantages of Hong Kong suppliers in the mainland. We find out that a “Front Office, Back Desk” (FOBD) pattern between the two sides of the boundary is emerging but its effects are not as significant as that of the FSBF model. In the theorization of international division of labour, the interconnectedness of the global economy is based on comparative advantages arising from geographically differentiated labour power. This study not only reveals some new tendencies of development, namely the connection of producer services between two places on a basis of competitive advantages, but also unravel the impacts of the difference in politico-economic context on the competitive performance of producer service suppliers.

### **Key words:**

regional division of labour; Hong Kong; the Pearl River Delta

## Eco-City in the Making: The Ambiguity of Environment and the Planning Practices in the Cities of the Pearl River Delta

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### Abstract

After decades of rapidly economic growth, the cities of the Pearl River Delta have confronted with a dilemma of treating environment: to prioritize high-speed economic growth by ignoring environment or to address environment and its relationship with development before it is too late. Since 2000, the jurisdictions in the Pearl River Delta have spent numerous efforts in making so called 'Eco-city', attempting to integrate more environmental concerns into development strategies. A series of new vocabularies related to ecological development are adopted in such massively planning activities, such as Ecological Corridor, Eco-Park, and Greenway. Nevertheless, the meanings of these environment discourses adopted in the planning document are ambiguous, and even contrasting, resulted in problematic planning practices in realities. On the hand, the environment discourse denotes a place where primitive nature is well preserved because of its lack of development; On the other hand, the environment is taken as a branding cover of development projects which require more natural space. This study attempts to examine how the municipal governments in the Pearl River Delta have adapted to the changing environmental problems through urban planning in the past two decades. The specific focus is on the incompatible meanings of environment implied in the planning policies, and the relevant environmental practices. Through an engagement with the discussion of discourse, the argument is made that the conflicted discourse should not simply taken as a result of incompatible desires of the jurisdictions, but a mechanism for the municipalities to flexibly rework their powers to reconstruct the cities to counter the backward economy as well as to meet the challenge from other competitive cities.

### Key words:

Environment discourse; cities of Pearl River Delta; Eco-city

## Finding the Fix in Changes and Flows: The Urban Political Ecology of Greenway Development in the Pearl River Delta

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### Abstract

From the perspective of urban political ecology, the search for a sustainability fix to cities confronted by the dual imperative to promote economic growth and champion environmental qualities involves the provision of new physical infrastructure to mediate the socio-ecological metabolism of nature upon which urban fortunes predicate. This paper draws on such perspective to offer a critical interrogation of the extensive development of greenways in the Pearl River Delta (PRD) since 2010. It argues that, to fix the sustainability demands on the urbanisation of PRD cities, the Guangdong provincial government has heralded greenways as 'metabolic vehicles' which, in three ways, facilitate and enhance the transformation and circulation of part and parcel of the rural environment as object and idea. To urban dwellers, greenways serve as cost-effective conduits to replenish their severely strained supply of collective consumption with rural open spaces. To rural villagers, greenways as spaces of movement of people create opportunities for the commodification of the idyllic beauty and soil fertility of their territories. And to property developers, greenways provide them with the imaginary threads to capitalise on the rural nature at a distance. These findings enunciate the promise to contour in a more nuanced manner the political and economic dynamics of the development of the PRD, as with any other hotspots of urbanisation, by giving analytical attention to their biophysical embeddedness.

### Key words:

urban political ecology; sustainability fix; urban metabolism; Pearl River Delta; greenway

## Going beyond the Politics of Scale: Planning Intercity Railway System in China's Pearl River Delta

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### Abstract

There is a recent blossom of scholarly work on the political-economic approach to scale by human geographers who study the changing state spatiality in China. This research explored the social construction of scale to overturn the old-fashioned conception of scales as neutral, pre-given, fixed, and external to social activities. In its arguments, scale is relationally produced. Thus, it is essential to deploy a relational thinking to understand the dynamic and fluidity of scale in the policy process of Chinese state regime. Such highly illuminating work of political economy of scale is inspiring, but it might place too much emphasis on the ontological (or material) existence of scale while ignoring the epistemological construction of scale (scale as social practice or a representational trope). Using the 'scale politics' thesis which combines the sensible arguments of both political economic tradition and post-structuralist approach, this presentation will use the intercity railway systems (ICRS) in China's Pearl River Delta as an example to illustrate the two moments of scale in policy process – i.e. scale as material political-environmental relations being shaped and as device shaping political-environmental relations. The impacts of such 'scale politics' will also be discussed using a recent large-scale questionnaire survey on Guangzhou-Zhuhai Line.

### Key words:

Scale politics; Intercity Railway System; Pearl River Delta

## Urban Development and Land Use Governance in the Pearl River Delta: A Regional Perspective

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### Abstract

The process of land development has close linkages and interactions with politics, society, economy and urban form. Land development process has been the driving force behind China's economic and urban development, as illustrated by the experience in the Greater Pearl River Delta region. The process has brought about changes in the land tenure and management system, which are due to the fiscal relationship between the central and local governments and the resulting adoption of land-based local finance. Increasing capitalization of land has generated huge demand for development. This paper will probe into how the land tenure and management system may be improved and the direction for changes to the current relationship between local governments' land-based fiscal policy and urban development.

### Key words:

Land development and land use management; governance; Pearl River Delta

## Urban Shrinkage in the Pearl River Delta: Pattern, Typology and Influencing Factors

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### Abstract

In an increasingly urbanised world, the coupling of urban growth and shrinkage has been a common phenomenon. Relative to urban growth, urban shrinkage has often been understudied by most mainstream scholars. Since China's reform and opening-up, while the Pearl River Delta (PRD) is usually being described as “a miracle of growth”, the problem of urban shrinkage has also become apparent in parts of the region. Drawing on China's 5th and 6th national censuses data, this paper investigates the current situation of urban shrinkage in 595 towns across the PRD. By assessing the effects of changing resident population, permanent population and urbanised areas on the shrinkage of the PRD region, this research aims to reveal its shrinking feature and pattern. Based on cross tabulation analysis of population loss and the extent of urban expansion, this research has categorized all territorial units at town levels in the PRD region into the following four types: Type I (significant loss of population with noticeable expansion), Type II (significant loss of population with insignificant space expansion), Type III (slight loss of population with noticeable expansion), and Type IV (slight loss of population with insignificant spatial expansion). On the basis of this typology, an attempt has been made to offer some theoretical explanations for the influencing factors of such urban shrinkage.

### Key words:

urban shrinkage; Pearl River Delta; typology; influencing factors

## **Industrial Agglomeration Models' Experiences of Some Famous Bay Areas in the World and Their Enlightenment Function to the Development of Guangdong, Hong Kong and Macao Bay Area**

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### **Abstract**

This paper takes industrial cluster as the theoretical framework and analyzes the industrial agglomeration models of San Francisco Bay Area, New York Harbor, Tokyo Bay area, Port of Rotterdam and some other world-famous Bay Areas in order to provides ideas and suggestions for the development of Guangdong, Hong Kong and Macao Bay Area. The analysis revealed that this bay area had some problems like the different constitution, unclear labor division and other issues. There are three aspects given by this paper to improve the industrial models of Guangdong, Hong Kong and Macao Bay Area: 1) correct understanding the position of Hong Kong, 2) a reasonable improvement of regional division, 3)actively promoting production city integration of the whole region.

### **Key words:**

bay areas; industrial agglomeraion models; industrial development experiences

## Urbanization and Sustainable Development Space-time Behavior and Planning in Urban China



### Oral

1. [Are People Less Likely to Own Cars in a City with More Bus Stops?](#)  
Fenglong Wang (East China Normal University, China)
2. [Becoming Active Traveler in Urban Space: The Use of Social Media Data in Public Housing Estates of Guangzhou](#)  
Tingting Chen (Sun Yat sen University, China); Feng Zhen (Nanjing University, China); Zongcai Wei (The University of Hong Kong, HongKong SAR, China)
3. [Built Environment, Non-Work Activity Participation and Travel: A Case Study of Suburban Beijing](#)  
Na Ta (East China Normal University, China); Yanwei Chai (Peking University, China)
4. [Built Environmental Impacts on Individual BMI: Evidence from China](#)  
Bindong Sun; Hong Yan; Tinglin Zhang (East China Normal University, China)
5. [Carbon Emissions from Shopping Trips to Different Commercial Centers on Weekend](#)  
Jing LI (Northeast Institute of Geography and Agroecology, CAS, China)
6. [Characteristics of commuting pattern in Xining: Based on the comparison of different types of urban communities](#)  
Xue Zhang (Peking University, China); Yanwei Chai (Peking University; Qinghai Normal University, China); Xiaomei Wang (Qinghai Normal University, China)
7. [Examining the Role of Out-Of-Vehicle Time Use on Travel-Related Satisfaction Using a GPS-Enhanced Dataset: The Case Study of Beijing](#)  
Wenbo Guo; Weifeng Li (HKU, Hong Kong SAR, China); Yanwei Chai (PKU, China)
8. [Exploring the Spatiotemporal Variation of Urban Travel Characteristics of Public Transit Passengers Using Smart Card Data](#)  
Rui Cao; Wei Tu (Shenzhen Key Laboratory of Spatial Smart Sensing and Services, College of Civil Engineering, Shenzhen University, China)
9. [Inferring Urban Functional Regions Dynamics from Mobile Phone Location Data and Social Media Data](#)  
Jinzhou CAO (Wuhan University, China); Wei TU; Qingquan LI (Shenzhen Univeristy, China)
10. [Lost in Urbanization: the Employment Outcomes of Land-lost Farmers in China](#)  
Pengyu Zhu (Masdar Institute); Songnian Zhao (Zhejiang University, China)

11. [Modeling Household Residential and Mobility Decisions: Household Time Allocation Approach](#)  
Mingzhu Yao; Donggen Wang (Hong Kong Baptist University, China)
12. [Real-time Interactive Space-Time Integration and the Spatiotemporal Data Explosion](#)  
Douglas Richardson (American Association of Geographers, United States)
13. [Redefining the Concept of Daily Activity Area and its Depiction: From Perspective of Individual Behavior](#)  
Daosheng Sun; Yanwei Chai (Peking University, China)
14. [Refueling Behavior Identification and Fuel-Consumption/Emissions Estimation from GPS Trace Data](#)  
Luliang Tang; Zihan Kan (Wuhan University, China); Qingquan Li (Wuhan University; Shenzhen University, China)
15. [Research on Traffic Impact of Commuting Behavior of Suburban Mega-Community Residents](#)  
Linzhi MA; De WANG; Wei ZHU (Tongji University, China)
16. [Spatial-temporal figures of suburban workers' daily activities from the perspective of employment suburbanization: case of Shangdi-Qinghe area in Beijing](#)  
Wenrui Ma (Peking university, China), Yanwei Chai (Peking University, China)
17. [Study on the Representativeness of Mobiles Positioning Data to Tourists in Tourism City](#)  
Ying Zhao; Chaozhi Zhang; Yuhua Jin (School of Tourism Management, Sun Yat-sen University, China)
18. [Study on the Travel Elasticity Based on IC DATA in Beijing](#)  
Bin MENG (Beijing Union University, China); Qin YIN (Capital Normal University, China)
19. [The Effect Model of Multilevel Variables and Mechanism on Car Travel of Residents' Working-Day Activities in Guangzhou](#)  
JiangYu Song; Suhong Zhou; Guangwen Song (Sun Yat-sen University, China)
20. [The Relationship between Icts and Flexibility of Daily Activity and Travel: A Case Study of Beijing, China](#)  
Yue Shen; Na Ta (East China Normal University, China); Yanwei Chai (Peking University, China)
21. [The Social Implications of Home-Work Separation: Investigating the Links of Commuting and Neighborhood Social Capital of Low-Income Residents in Beijing, China](#)  
Zhilin LIU (Tsinghua University, China); Yan ZHANG (Beijing Union University, China)
22. [The Study on the Temporal-spatial Characteristics of the Activities of Quanzhou Residents at Night](#)

Jing Chen; Chunshan Zhou (Sun Yat-sen University, China)

23. [Three Types of Commuters towards Suburb and Their Commuting Behavior Features: A Case Study of Shangdi-Qinghe Area in Beijing](#)

Xinlin Ma; Yanwei Chai (Peking University, China)

24. [Understanding the Suburbanization of Daily Activity Space: Case Studies from Three Suburban Areas in Beijing](#)

Yan Zhang (Beijing Union University, China); Yanwei Chai (Peking University, China)

25. [Urban Form, Suburbanization, and Car Ownership in Chinese and US Cities: Exploring Sustainable Urban Futures](#)

Meipo Kwan (University of Illinois at Urbana Champaign, United States); Yanwei Chai (Peking University, China)

## Poster

1. [Analysis of the Built Environment of Urban Primary School Service Circle Based on Household Pick Up Behavior](#)

XIA WANG (China, Xi'an University of Architecture & Technologies)

2. [Characteristics of Jobs-Housing Space of Wuhan](#)

Wen Liu; Zhengdong Huang (China, School of Urban Design, Wuhan University); Mingjun Peng (China, Wuhan Urban Planning and Land Administration Information Center, Wuhan)

3. [Comparative Research of Cross-strait Industrial Community Form- Illustrated by Two Industrial Communities in Beijing and Kaohsiung](#)

Chiao-Fen Chang (China, Taiwan, Peking University); Yanwei Chai (China, Peking University)

4. [Considering the Fast Charging Duration and Queue Time in Locating Electric Vehicle Charging Stations](#)

Shulin Zhang; K Liu; J Pang (China, Dalian University of Technology)

5. [Differentiation in Daily Activity Spaces of Residents on the Scale of Residential Area in Transitional Xining, China](#)

Bochu Liu (China, 1. School of Urban and Environmental Sciences, Peking University); Yanwei Chai (China, 1. School of Urban and Environmental Sciences, Peking University; 2. School of Life and Geographical Sciences, Qinghai Normal University); Xiaomei Wang (China, School of Life and Geographical Sciences, Qinghai Normal University)

6. [National Demonstration Zone of Ecological Protection and Construction of "production-eco-life"](#)

[space optimization analysis](#)

Kaicheng Huang (China, Jiangxi Normal University)

7. [Overview of Residents' Daily Activity Spaces Research in the Perspective of Space-Behavior Interaction](#)

Jiao Jian (China, College of Architecture, Xi'an University of Architecture & Technology, Xi'an Shaanxi)

8. [Product Follows Behavior: A Tourism Time Product Planning Approach](#)

Xiaoting Huang (China, Shandong University)

9. [Research of Spatiotemporal Variation Characteristics of Dunhuang's Night Market](#)

Xiaofeng Dong (China, Beijing Jiaotong University); Yanyan Li; yi zheng (China, Lanzhou University)

10. [Research on Temporal and Spatial Decision-making Process and Influencing Factors of Residents' Comprehensive Shopping Behavior: a Case Study of Guangzhou Based on Consumer Survey in 43 Shopping malls](#)

Chenhao Fu; Suhong Zhou (China, School of Geography and Planning, Sun Yet-sen University)

11. [Scaling Law between Mobility and Facility: Spatiotemporal Data Mining of Guangzhou Subway Data](#)

Shili Chen;Xun Li (China, Sun Yat-sen University); Haohui Chen (Australia, Commonwealth Scientific and Industrial Research Organisation Data61)"

12. [Scenario Simulation and the Prediction of Land Use and Land Cover Change in Beijing, China](#)

Huiran Han (China, College of Territorial Resources and Tourism, Anhui Normal University); Chengfeng Yang (China, School of Geography, Beijing Normal University); Jinping Song (China, School of Geography, Beijing Normal University)

13. [The Socio-Spatial Dimension of Behavior Analysis: Frontiers and Progress in Chinese Behavioral Geography](#)

Yanwei Chai (China, Peking University); Na Ta (China, East China Normal University);Jing Ma (China, Beijing Normal University)

14. [The Time-space Matching of Community Facilities Supply and Residents' Demand in Beijing Suburbs](#)

Yibo Duanmu; Yanwei Chai (China, Peking University)

15. [Transformation Pattern and Influential Factors of Mature Coal Resource-based City Based on the Perspective of Social Space: A Case Study of Huainan city in Anhui province](#)

Haufu Jiao; Jili Xu (China, College of Territorial Resources and Tourism, Anhui Normal University)

## Are People Less Likely to Own Cars in a City with More Bus Stops?

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### Abstract

Car ownership is increasing rapidly in urban China. This is considered as an important contributor to the serious traffic congestion and air pollution. Therefore, control of car ownership is an hot topic in many Chinese cities. Development of public transportation is usually adopted as an important policy for this aim. However, not many studies have examined the relationship between car ownership and accessibility to public transportation empirically. In this paper, we explored the effects of accessibility of bus stops on car ownership using a linear regression model at the city level and a multi-level logistic regression model at the household level. The results suggest that accessibility to bus stop is a factor when people considering to own a car. However, the effects are differential in different regions. We believe the finding in this paper have significant implications for policy makers and urban planners.

### Key words:

Car ownership; built environment; bus stop; urban China

## Becoming Active Traveler in Urban Space: The Use of Social Media Data in Public Housing Estates of Guangzhou

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### Abstract

This study investigates the interaction between the travel behavior of public housing residents and the Internet in Guangzhou, China. It examines how the public housing residents make use the Internet and weave it into their everyday life (including working trip & non-working trip) to improve active travel. The study analyzes the use of social media (like wechat, QQ, weibo) with a special reference to Guangzhou, based on the analysis of computer-assisted monitoring online communication platform from September to December 2015, and in-depth interviews. We argue that the social media provide a platform within which information exchange, organization of collective actions, and social interactions to tackle the difficulties of travel because of a disadvantaged location of public housing. In addition, residents' activity pattern and routes become more flexible in pursuit of the Internet. The emergence and use of social media is one of attempts and endeavors by public housing residents to improve their quality of life under new public housing regime. The findings would facilitate an understanding that a quantitative assessment of the use and impact of the Internet on people's time and space is needed in the future research, and provide some recommendation on urban planning and housing policy.

### Key words:

Travel; Social media; Public housing residents; Guangzhou

## Built Environment, Non-Work Activity Participation and Travel: A Case Study of Suburban Beijing

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### Abstract

Urban planning have been trying to create relatively compact and complete communities in order to facilitate non-work activities in daily lives. However, so far many studies have focused on reducing the motor travel, but few focus on opportunity to engage in activities. This studies examines the impact of built environment at micro level on participation and related travel of out-of-home non-work activities using an activity diary survey data collected in suburban Beijing. The participation in non-work activities are measured using the episode and location and tours of out-of-home non-work activities after work. After descriptive analysis, we explored the relationship between the residential built environment and participation in non-work activities by regression models, controlling for social-economic attributes. The expected research findings are that suburban residents engage in few out-of-home non-work activities after work and most of the non-work activities are conducted during commuting. Neighbourhood characteristics have significant influence on participation in non-work activities, but the influence varies among social groups. Taken together, our results suggest that if cities use urban planning and policies to facilitate activity participation should also consider the attributes of residents.

### Key words:

Space-time behaviour; non-work activities; built environment; suburb; Beijing

## Built Environmental Impacts on Individual BMI: Evidence from China

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### Abstract

Although the link between obesity and the built environment has long been of research interest, how the built environment affects health in China, which has a 37-percent obesity and overweight rate, has rarely been studied. By applying a structural equation model on the data from China Family Panel Survey, this paper examines the effects of neighborhood built environment on the body mass index (BMI) in China. We find that controlling for socio-economic attributes, population density and the densities of public service facilities and retail shops have positive influence on BMI, which is inconsistent with the findings in developed countries. The further analyses show that higher densities in population and public service or retail businesses indeed increase the likelihood of choosing active travel modes including walking and cycling which show negative association with BMI in the estimation, but at the same time, lead to shorter travel distance. The positive relation between density and BMI may result from the net effect dominated by travel distance. In addition, the distance to the nearest bus station positively influences non-transit mode choice and negatively influences BMI controlling for mode choice. This again indicates the role of travel distance on BMI. The different findings in China from developed countries can be attributed to the fact that most neighborhoods in China are characterized by high density and compact development pattern.

### Key words:

built environment; BMI; travel distance; mode choice; China

## Carbon Emissions from Shopping Trips to Different Commercial Centers on Weekend

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### Abstract

The objective of this study was to estimate carbon emissions induced by shopping trips to different commercial centers in Shenyang, one of the most important metropolitan areas in China by the questionnaire surveys and interviews on weekends. Results showed that firstly shopping carbon emissions to the two professional wholesale commercial centers were the highest, about 312.73g and 274.57g per capita on average. The carbon emissions induced by suburban shopping center of Hunnan was relatively higher than commercial centers of Middle street and Taiyuan business street in downtown. And the regional traditional commercial centers of Xita-Beishi, Beihang and Tiexi in inner city produced least carbon emissions, about 184.14g, 134.43g and 115.80g per capita on average. Secondly, for the total commercial centers, private car emitted six times more carbon emission than those by public transport. Thirdly, there were particular characteristics of high-income, undergraduate or above education level and typically white-collar individuals that explained the likelihood of using private cars for shopping. We concluded that rational distribution and balanced development of commercial centers in downtown, inner city and suburbs, improvement of urban public transit and low carbon education of citizens would be a feasible and effective strategy to reduce urban transport emissions.

### Key words:

transport carbon emissions; shopping; commercial center; travel mode

## Characteristics of Commuting Pattern in Xining: Based on the Comparison of Different Types of Urban Communities

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### Abstract

Since the reform and opening up, with the disintegration of the Chinese Danwei welfare housing system and the deepening reform of urban land and housing market, the process of rapid suburbanization and urban sprawl, great changes have taken place on jobs -housing spatial origination in Chinese city , which has already led to commuting problems and changes of urban commuting pattern. Based on the survey in 11 typical communities of Xining in 2013, this paper describes basic features of commuting behavior of Xining citizens, and focuses on the comparison of the disparity of commuting pattern by five types of communities, trying to reflect the micro process of jobs-housing relationship changes. Our study shows that, firstly, obvious differences on commuting pattern lie in different types of communities. Secondly, the residues and invisibility of Chinese Danwei welfare housing system still has a significant impact on residents' commuting pattern in Xining. Thirdly, the facts that about one fourth surveyed residents in in central city community who are experiencing long distance outward commuting, as well as a higher proportion of residents in suburb communities experiencing long distance inward commuting, may show that the separation of home and work has already come into being in Xining.

### Key words:

commuting pattern; urban structure; comparison of different types of urban communities; Xining

## Examining the Role of Out-Of-Vehicle Time Use on Travel-Related Satisfaction Using a GPS-Enhanced Dataset: The Case Study of Beijing

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### Abstract

Travel experience has increasingly become a debatable issue among human geography and transport studies. The relationship between travel behaviour and subjective wellbeing has been revealed from many aspects, however less is known about the role of out-of-vehicle travel time use (walking, waiting, transferring, etc.) on individual satisfaction. Out-of-vehicle travel time use are usually considered as an index reflecting the effectiveness of transit travel, but this “onerous” process could be explored of its effects on in-vehicle experiences for travels taken subsequently. This paper examines this question by reviewing the literature on the role of out-of-vehicle travel time use and travel-related subjective wellbeing, and offers insights into the role of out-of-vehicle time use on travel satisfaction. The data will be derived from the Beijing 2012 GPS-based activity-travel diary survey, and out-of-vehicle travel will be analyzed in three categories of walking, waiting and transferring. The out-of-vehicle time use and travel satisfaction are first demonstrated through descriptive statistics, and the relationships between out-of-vehicle time and travel satisfaction are explored by deploying a structural equation model. Individual and household socio-economic information are set as exogenous variables, and the effects of out-of-vehicle time on satisfaction with travel are examined separately in three categories in regards to their effects on subsequent travels under different travel modes and travel purposes. It is revealed the difference in direct/indirect effects of three different out-of-vehicle time use on travel satisfaction, and the limited effect of out-of-vehicle time on intermodal transition.

### Key words:

travel behaviour; out-of-vehicle; subjective wellbeing; Beijing

## Exploring the Spatiotemporal Variation of Urban Travel Characteristics of Public Transit Passengers Using Smart Card Data

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### Abstract

Studies on travel characteristics benefit understanding of travel status quo, trends, and driven forces. Traditional researches mainly focus on travel survey data. Nowadays, the emerging of big spatiotemporal data gives us an opportunity to explore travel characteristics in finer granularity both in space and time. This research explores the spatial and temporal variation of public transit passengers' travel characteristics with smart card data of Shenzhen. Travel movements are firstly inferred from long-time smart card transaction data of metro and bus. Then indicators of travel characteristics like travel volume, average travel distance and time are extracted at traffic analysis zone (TAZ) level from derived movements. To explore the spatiotemporal variation of passengers' travel characteristics, comparisons between temporal and spatial changes are made, and further analysis is conducted on these indicators to measure spatiotemporal autocorrelation using method of the improved Moran's I index. The results illustrate that, in the study area, the inhabitants' travel characteristics vary in space and time noticeably, and travel generation exhibits significant spatial cluster patterns with temporal changes. This research not only helps to better understand the spatiotemporal variance of travel characteristics, but also explores the possibility of the use of spatiotemporal smart card data.

### Key words:

spatiotemporal variation; travel characteristics; public transit; smart card data; spatiotemporal autocorrelation; space-time GIS

## Inferring Urban Functional Regions Dynamics from Mobile Phone Location Data and Social Media Data

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### Abstract

Understanding spatio-temporal dynamics of urban function is essential for urban planning and urban governing. The explosive big spatio-temporal data, such as mobile phone location data and social media data, have the potential to capture city-wide human activities interacted with urban regions. In light of the close correlation between urban functional regions and human activities, this article proposes a novel bottom-to-top approach to infer urban functional regions dynamics by aggregating human activities identified from mobile phone location data and social media data. Activities at home and working places are firstly extracted from mobile phone location data with spatial-temporal regulations. Other social activities are then labelled by a temporal-varying hidden Markov model combining with social media data. By aggregating identified human activities at base tower station level, city-wide spatio-temporal dynamics of urban functional region is revealed. An experiment in Shenzhen, China was conducted and the obtained result illustrated the presented approach can uncover the spatial and temporal dynamics of urban functional regions. Spatio-temporal activity pattern analysis verified that our approach can uncover more detailed human dynamic across space and time than traditional land use. The proposed approach and the obtained results provide a new perspective to bridge the gap between land use and human dynamics and benefit both long term policy-making in urban planning and short term decision-making in urban governing.

### Key words:

Daily Activity; Functional region; Mobile phone location data; Social media data; HMM



## Lost in Urbanization: the Employment Outcomes of Land-lost Farmers in China

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### Abstract

With the acceleration of industrialization and urbanization in China, large amounts of rural land are expropriated and a growing number of farmers have lost their farmland. As of 2012, it is estimated that the number of farmers who have lost their farmland has exceeded 60 million, excluding those caused by illegal land expropriation. The governments at all levels introduced various employment policies for land-lost farmers to help their transition, encourage their reemployment in the non-agricultural sectors, and solve related economic and social problems. These employment policies include government organized job training, job recommendations from government, preferential employment licenses, preferential employment agreements from the land using business, as well as small loans and tax exemptions to start their own business. Through empirical analysis, the paper examines the effectiveness of these employment policies implemented by local governments. This study uses data collected from a survey conducted in four major economic regions in China in 2009. We use multinomial logit model to investigate the impact of local government's employment policies on the employment outcomes of farmers who have lost their land during land requisition.

### Key words:

Residential Segregation; migrant workers

## Modeling Household Residential and Mobility Decisions: Household Time Allocation

### Approach

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### Abstract

Household residence and car ownership problem have been widely explored over the past decades. However, individual differences and intra-household interactions in these important household decisions jointly made by household members have rarely been considered. In this paper, we develop a multi-dimensional household decision model that consolidates the correlated long-term residential choice, middle-term car ownership decision and short-term time allocation decision, explicitly incorporating interactions among household members by adopting group decision approaches. Both the selection of residence and car ownership level are supposed to be collective decisions made by household members so as to meet their mobility and amenity preferences. Meanwhile, these two decisions are explored from the perspective of household members' time allocation patterns, because they may directly influence their travel-based activities through travel distance and travel speed. In families with tightened monetary budget, the tradeoff between housing expenditure and car ownership expenditure is captured to investigate their complex interrelationship. Data collected in Beijing will be used to calibrate parameters in the proposed simultaneous multi-dimensional decision model. Findings from this study are expected to provide insights on how residence-related urban form influence household car ownership and household members' lifestyle in terms of their time allocated to various daily activities.

### Key words:

residential selection; car ownership; time allocation; intra-household interaction

## Real-time Interactive Space-Time Integration and the Spatiotemporal Data

### Explosion

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#### Abstract

Real-time spatiotemporal data are now being generated almost ubiquitously, and their applications in research and commerce are widespread and rapidly accelerating. However, the ability to continuously create and interact with fused space–time data in geography and GIScience is a relatively recent phenomenon, made possible by the invention and development of real-time interactive (RTI) GPS/GIS technology and functionality in the late 1980s and early 1990s. This innovation has since functioned as a core change agent in geography, cartography, GIScience, and many related fields, profoundly realigning traditional relationships and structures, expanding research horizons, and transforming the ways in which geographic data are now collected, mapped, modeled, and used, both in geography and in science and society more broadly. Real-time space–time interactive functionality remains today the underlying process generating the current explosion of fused spatiotemporal data, new geographic research initiatives, and myriad geospatial applications in governments, businesses, and society. This presentation addresses briefly the development of these real-time space–time functions and capabilities; their impact on geography, cartography, and GIScience; and some implications for how discovery and change can occur in geography and GIScience and how we might foster continued innovation in these fields.

## **Redefining the Concept of Daily Activity Area and its Depiction: From Perspective of Individual Behavior**

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### **Abstract**

Marketing-oriented and giving priority to efficiency, China's urban planning and construction of the space organization takes more consideration of production and functionalism from a macro-scale, and less concerns about the urban residents' daily lives from a micro-scale. But it cannot be ignored that the behavioral characteristics of residents and their concrete day-to-day life demand should be taken into account of as a ruler to advance the innovation of planning from below. Focusing on life space based on the individual behavior, taking a new understanding of the suburban space, and conducting neighborhood community planning around the daily life of residents, is response to social transformation, and an important idea to guide Chinese cities as human centered.

This research firstly put forward the concept of neighborhood life area after combing the development of the concept of life area abroad and home. Then on the basis of the aforementioned concept, this paper applies one-week GPS-facilitated activity-travel survey data obtained in Beijing Qinghe area in 2012, with ARCGIS visualization methods, conducts the empirical definition of daily activity area of suburban residents, and analyze their basic features. The results show that, in accordance with the different nature of the activity and its spatial accessibility, activity area of suburban communities can be divided into neighborhood activity area, commuting activity area, extended activity area three spheres. In addition, the study also found that after the superposition the neighborhood activity areas of residents in one same community, the spatial extent of common usage selected by a certain percentage threshold, can be used as the basic unit of community living space planning.

### **Key words:**

Behavioral perspective; Community planning; Daily activity area; GPS data

## Refueling Behavior Identification and Fuel-Consumption/Emissions Estimation from GPS Trace Data

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### Abstract

The accelerating urbanization indicates the prominence of problems of urban transportation and environment issues. Reports show that 20%—30% of the total production of greenhouse gases (GHGs) is released from urban transportation operation. Energy consumption and polluting gases releasing from urban transportation represents a severe challenge. To deal with this challenge, we propose approaches for understanding the patterns of energy consumption, emissions as well as refueling activities in urban transport system.

First of all, we represent vehicles' traces with their space-time path and study the characteristics and patterns of vehicles're fueling behaviors under Time-geography frame. Second, we identify and detect refuelling behaviors of vehicles from their space-time paths. Finally, taking the refuelling behaviors as anchor points of their belonging traces, we estimate the energy consumption and emissions between anchor points. As a result, energy/emissions in different scale (from a single trace to a city level) can be estimated and revealed.

With GPS-tagged trace data from taxis in Wuhan, China, we detected their fueling behaviour successfully. Energy consumption/emissions were then obtained in individual level, street level and city level. This study holds the potential of accessing information about vehicles' energy/emission in various scales, and supporting strategies and policies about the energy, environment and transportation network operation.

### Key words:

Space-time analysis; human activity; Time-geography; refuelling behavior; energy consumption; emission estimation

## Research on Traffic Impact of Commuting Behavior of Suburban Mega-Community Residents: Evidence from Sanxiangsiji Community in Shanghai Songjiang New Town

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### Abstract

Performance evaluation of suburban new town development has been widely concerned by researchers after its initiative more than ten years ago in China. The traffic impact of population suburbanization is one of the hot topics, existing literatures on commuting widely assumed that its impact is negative, because population suburbanization (1) caused jobs-housing imbalance problem in urban areas even worse, which led to significant increase in residents' transportation costs (include commuting time and fees) (2) caused rapid expansion of car transit, which resulted in greater traffic congestions in urban area (3) generated more public transit, thus added pressure and challenges to urban public transit. Whereas, these arguments are derived from personal observations more than empirical study, especially, case studies on residents' dynamic commuting behavior change between before and after their migration to suburban community. Besides, studies based on traffic statistical data usually neglect personal behavior and socio-economic related analysis, as well as specific community group analysis. This paper takes a mega-community which is located in Songjiang new town-a far-suburban new town of Shanghai metropolitan area as a case, collects the first-hand data through household questionnaire survey. First, this paper analysed the dynamic changes of residents' job-work relationship, commuting behavior of all population groups, then different population groups, results indicate that (1) residents' jobs-housing imbalance increased about 8% (2) average commuting time and fees increasing slightly, separately 3 minutes and 2 yuan, while 54.5% residents' travel tools did not change (3) there are significant variations among different populations of their commuting time, fees and travel tool choices. Furthermore, the behavioral impact of residents come from central city-because it plays a major role-is investigated in this paper, by four aspects of commuting time, fees, car dependency, public transit dependency. The results demonstrate (1) Suburbanization may not lead to the increase of residents' commuting time and fees, as well as dependence on cars (2) Even there is a high degree of dependence on cars, the condition of traffic congestion in central city may not be aggravated. On the contrary, it can play a role in alleviating the bad situation (3) Suburbanization does not result in a significant increase of dependence on public transport (actually only increased by 0.1%), but it leads to great changes in the composition and structure of public transport, the dependence on bus and rail transit get a 11.5% increase and 11.6% decrease respectively, which make the rail transit toward to the suburban new town become very crowded. The research results may provide basis for policy decision-making on far-suburban new town housing and transport development.

### Key words:

Mega-community; commuting behaviour; traffic impact; Suburban areas of Shanghai metropolitan

## **Spatial-Temporal Figures of Suburban Workers' Daily Activities from the Perspective of Employment Suburbanization: Case of Shangdi-Qinghe Area in Beijing**

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### **Abstract**

With the rapid change of socio-spatial structure in urban China, the issue of employment suburbanization has drawn increasing attention from urban geographers. The limited supply of shopping, leisure and transportation facilities in suburban areas are faced with great mismatch with the fast-growing demand of suburban workers. However, the spatial-temporal demands of suburban workers are often overlooked by researchers and planners. Individual spatial-temporal figures are able to reflect the needs of urban space utilization, and to indicate accessibility and reach by suburban workers.

The study employs the data of 2012 GPS-based activity-travel survey in Beijing, and the samples include 203 workers in Shangdi who live in suburban area. By combining urban social geography, time geography, and using methods of statistics and space-time GIS, this paper describes the spatial-temporal figures of workers' daily activities, and analyze their demands under employment suburbanization. Based on the findings, suggestions for optimizing urban space and managing time are provided.

The study shows that 1) suburban workers work longer with more regularity; 2) the work places, downtown and large shopping malls in suburbs are the main places where suburban workers' daily activities take place; 3) due to the strong restriction by work, their non-work activities happen closer to the working places on work days, but take place far from both homes and working places on weekends. The findings confirm that urban sprawl structure of Beijing is still dominated by inner city and that suburban employment and supporting facilities greatly lag behind the industrial development.

### **Key words:**

suburban workers; employment suburbanization; daily activity; spatial-temporal features

## Study on the Representativeness of Mobiles Positioning Data to Tourists in Tourism City

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### Abstract

As the popularization of mobile communications and mobile Internet, big data which carries a number of geospatial information has taken more attention of human geography scholars. However, it's also questioned about the hybridity and applicability of big data. This research focus on the value of mobile positioning data in tourism research, based on the case study of Wulingyuan district and Cili county of Zhangjiajie. It uses aggregated mobile positioning data from China Mobile and China Unicom, and analyses the characteristics of the mobile positioning data of tourism area and residential area by analyzing the time rhythm of the roaming user number and the amount of mobile positioning data. It establishes a correlativity among actual visitors and telephone traffic and internet traffic to explore the representativeness of mobile positioning data to tourists. It is pointed out that the characteristics of the mobile positioning data has significant differences between tourism area and residential area. The roaming user number has a larger volatility and the time rhythm of mobile positioning data is more convergent in a single day in tourism area, which means the mobile positioning data is more representative for the fluctuation of tourists in tourism area. On account of the habit that tourists use mobile phones during visiting, internet traffic is more representative for actual visitors than telephone traffic, even if the telephone traffic and internet traffic is highly positively correlated. The findings provide a reference for us to comprehend the application value of big data in tourism and scientifically establish tourism statistics system based on the mobile positioning data.

### Key words:

big data; tourists; internet traffic; telephone traffic; correlativity; Zhangjiajie

## Study on the Travel Elasticity Based on IC DATA in Beijing

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### Abstract

Along with the rapid development of city transition, more and more researches focus on the travel problems in the city. The spatial-temporal data provides a special perspective for travel behaviour research. Based on the IC data of subway passes in Beijing, this study analyses the elastic spatial-temporal characteristic with the statistical and spatial analysis. We define the elasticity and formula from the perspective of probability, the result has confirmed that this method's validity in dealing with travel problem with big data. As a whole, the residents' elasticity of departure time choices is more flexible and more elastic in Beijing. We also find that the elasticity of departure time choices has clear temporal and spatial differences. It reflects the temporal and spatial differences of residents' travel behaviour in Beijing. Based on the research of travel elasticity, it is helpful to further interpret different residents' social behaviour characteristics. The relationship between commuting distance and elasticity is inverted "U" type. Which means that the short distance traveller (commuting time takes 45 minutes or less), the shorter distance, the smaller elasticity. For long distance traveller (more than 45 minutes commuting time), the longer distance, the smaller elasticity. The elasticity of departure time choices is not only affected by the residents' individual characteristics, and also closely related to its spatial features. The elasticity is affected by many factors, mainly includes the traveller attribute, travel characteristic, transportation system, social economy, and other related environmental factors.

### Key words:

Travel elasticity; travel behaviour; spatial-temporal characteristics; IC DATA; Beijing

## The Effect Model of Multilevel Variables and Mechanism on Car Travel of Residents' Working-Day Activities in Guangzhou

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### Abstract

Urban residents' working-day activities are the direct reason for car travel. Under the stronger market effect on urban residential space, differentiation of residents' travel mode appears between communities inevitably. Previous stress on traveler individual attributes to explain the influence of car travel fatigue. And the existing residents travel data acquired by the method of stratified sampling, which results in its multilevel structure and statistical bias. For the sake of further analysis on car travel of work activities and maintaining activities in working day, it is necessary to build a Logit multilevel model which contains individual variables and community variables. It is concluded that urban residents' working-day car travel is influenced by multilevel variables. As for the individual level, lower personal income level, collective unit profession, less minors in a family, less family housing area and shorter travel distance may help refrain the choice of automobile travel. As for the community level, improving bus stops density, floating population proportion may help reduce car use ratio of two types of activities' travel. The community elderly population increase to reduce car use in work activities while it has less impact on maintaining activities' travel. The increased land mixing degree and decreased business center distance may reduce automobile travel in maintaining activities, while these don't have significant impact on work travel. These conclusions help us to have a deeper understanding of the mechanism behind the urban residents' working-day car travel and provide suggestions to alleviate the traffic problem by adjusting the multilevel variables.

### Key words:

car travel; community differentiation; multilevel variables; GuangZhou

## The Relationship between Icts and Flexibility of Daily Activity and Travel: A Case Study of Beijing, China

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### Abstract

Information and communication technologies (ICTs) are playing a significant role in everyday life, and the relationships between ICTs and daily activity-travel behavior have been studied extensively. ICTs, especially mobile ICTs, make it possible to rearrange activity schedules more often, so it is argued the use of ICTs allow more flexibility in the spatiotemporal distribution of daily activities. However, the direct empirical studies are not sufficient, and how the use of ICTs influence temporal and modal flexibility of travels are still not clear.

This study examines how ICTs become embedded in the practice of everyday activities and travels, and how ICTs influence the flexibility of individuals' activities and travels. 7-day activity-travel diaries of 709 respondents in Beijing suburbs collected in 2012 were used, and the use of ICTs for each activity or travel was asked. Using multilevel models, this study discusses how daily ICT use influence the flexibility of individuals' daily schedule, and how ICT use influence the flexibility of activities and travels, after the socio-economic attributes of individuals and the attributes of activities and travels are controlled for. The role of ICTs in everyday lives and some possible application directions are discussed.

### Key words:

ICTs; activity; travel; flexibility; Beijing

## **The Social Implications of Home-Work Separation: Investigating the Links of Commuting and Neighborhood Social Capital of Low-Income Residents in Beijing, China**

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### **Abstract**

In developed and developing countries alike, scholars have endeavored to theorize and test the adverse impacts of urban spatial restructuring on the daily life of low-income residents. Recently, empirical literature has shown that Chinese urban residents also began to suffer from declined job accessibility and endure longer commuting amid dramatic urban expansion. However, empirical evidence is often limited to commuting behavior without fully accounting for how commuting may link to the social experiences of low-income residents.

In this paper, we seek to extend from this literature by further revealing the adverse impacts of home-work separation on neighborhood-based social capital building of low-income residents in urban China. Using data from a household survey in nine low- to moderate-income neighborhoods in Beijing in 2010, we examine to what extent longer commuting may lead to a lower level of neighborhood-based social capital and sense of attachment possessed by a low-income resident? Statistical analysis from structural equation modeling reveals that those low-income residents who have never moved since 1988 or those who relocated only because of government housing programs tend to endure longer commuting distance and time, and that long-distance or 'early-bird' commuters are less active in neighborhood-based social interaction, thereby possessing a lower level of neighborhood attachment. Planning measures aiming at reducing home-work separation may lead to such additional benefits as to mitigate the decline of neighborhood social capital in Chinese cities, thus contributing to the human-oriented, harmonious urbanization agenda.

### **Key words:**

Spatial mismatch; commuting; neighborhood social capital; low-income residents; Beijing

## The Study on the Temporal-spatial Characteristics of the Activities of Quanzhou Residents at Night

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### Abstract

This paper is concerned with activities at night, which has long been neglected in geographical studies in china. Based on the questionnaire survey and interviews of Quanzhou residents, the authors analyzed the type of the activities at night, especially their temporal-spatial characteristics. Consumer activities, leisure activities and learning activities are the main types of activities of Quanzhou residents at night. Further, the author made correlated analyses in terms of residents' attributes. The characteristics of these activities of Quanzhou residents at night can be summarized as follows:(1)the consumer activities of Quanzhou residents at night flourish in general and the average consuming time does not last long and the frequency of consuming activities at night is relatively low; and(2)the spatial characteristic of leisure activities at night is according to the distance decay law and can be abstracted as a concentric circle structure; and(3)the learning activities affected by the distance is not obvious, and the time characteristics of learning activities is fixed; and(4) the activity space of different types of activities at night also varies.

### Key words:

activities at night; time rhythm; spatial structure; Quanzhou city

## Three Types of Commuters towards Suburb and Their Commuting Behavior

### Features: A Case Study of Shangdi-Qinghe Area in Beijing

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#### Abstract

In the process of functional transfer of job centres, from inner city to suburb area in urban China, supporting service and facilities lags far behind the development of industry. As a result, it creates diverse commuting patterns, including reserve commuting (from suburb to inner city), parallel commuting (from suburb to suburb), and traditional ones (from inner city to suburb). To depict these three types of commuters helps us understand commuting space, suburb area centred.

This research carries out a case study of a typical suburban new town in Beijing, resulting from the GPS-based activity diary data collected in 2012 and the data of transportation network and POIs. The paper applies a spatial-temporal analytical method, along with proposing a conceptual model. It aims to reveal the commuting features, of 229 suburban job seekers of three types, who work in Shangdi-Qinghe area. Further, to illustrate their status of job-housing balance, to demonstrate the interaction of suburban commuting space and its geographical background.

This empirical study was found that 1) public transportation is the first choice of suburb commuters, especially the traditional commuters; 2) among parallel commuters, stationary activity tends to be more varied and frequent in the evening; 3) commuting time and distance is largely affected by commuting patterns, following are income, age and gender. The findings confirm that urban sprawl structure of Beijing is still dominated by inner city, suburban employment and supporting facilities greatly lags behind the speed of industrial development, which leads to the dislocation of the living space and employment space, traffic congestion and so on.

#### Key words:

space-time behavior; commuters; suburban China

## Understanding the Suburbanization of Daily Activity Space: Case Studies from Three Suburban Areas in Beijing

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### Abstract

In the last three decades, there have been experiencing rapid suburbanization in most large Chinese cities, such as Beijing, Shanghai and Guangzhou. A large number of studies had already focused on the suburbanization process of urban population, manufacturing industry, office industry, retailing industry et al. and its implications on the changing urban spatial structures at the macro-level. However, less attention had been paid to the suburbanization of daily activity space at the individual level, which revealed the functional link between the suburb and the other urban space through individuals' activity and travel pattern.

This paper attempts to reveal the relationship between suburban areas and other parts of urban areas in Beijing by investigating the space-time activity and mobility pattern of the inhabitants of suburban districts. How individuals' daily activities were spatially and temporally allocated at different urban space, such as their homes, suburban neighborhoods, other suburban areas, central area, city center? And how individuals traveled among these territories to fulfill different activities? Are there any differences between weekdays and weekends? The empirical data utilized in this paper are primarily based on two GPS-facilitated activity-travel survey datasets successively collected at Tiantongyuan and Yizhuang in Beijing in 2010 and at Shangdi-Qinghearea in Beijing in 2012. Everyday context, geographical context as well of social context of resident's daily activities were visualized and made comparisons within time-geography framework. Finally, we found these three suburban areas were quite different from each other in the degree of suburbanization of everyday life and in term of suburb-city relationship.

### Key words:

Suburbanization; daily activity space; time-geography; suburb-city relation; Beijing

## Urban Form, Suburbanization, and Car Ownership in Chinese and US Cities:

### Exploring Sustainable Urban Futures

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#### Abstract

Recent urban development in China suggests significant departure from the traditional high-density, pedestrian- and cyclist-oriented urban form that used to characterize Chinese cities. While there are many differences between Chinese and U.S. cities, the rapid rate of suburbanization and increase in car dependence in China seem to be leading to urban issues that are also common in U.S. cities. These issues include worsening jobs-housing balance, longer commute time and distance, traffic congestion, and air pollution. This presentation explores how urban form, car ownership, household structure, and individual attributes like gender may influence people's activity-travel behavior and activity space in the context of suburban China. Based on recent case studies of cities in China and the U.S., it explores the implications of recent suburbanization trends for sustainable urban development in China.

#### Key words:

Urban Form; Suburbanization

## Analysis of the Built Environment of Urban Primary School Service Circle Based on Household Pick Up Behavior

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### Abstract

Urban primary schools are social public welfare resource whose spatial allocation has great influence on social justice, family life quality and urban structure. The spatial allocation principles of China's primary school are greatly affected by "neighborhood units", and the regional and scale spatial allocation is based on spatial service radius and service population over a long period of time. However, it lacks their viewing on the rationality of public service facilities layout from the behavior pattern of residents. In recent years, urban built environment are changing greatly and the ways of traveling between home and school are becoming diverse. Taking Xi'an as an example, the study selected three types of urban primary school on a basis of different built environments and attributes of urban primary school, and defined the research scope of urban primary school service circle as a range of 15 minutes walking or public transportation. It analyzed the influence of the built environment on travel behavior of home-to-school to establish the foundation for the improved urban primary school layout which promotes household low-carbon travels. (Foundation: National Natural Science Foundation of China, No 51178371)

### Key words:

urban primary school; household travel; pick up behavior; primary school layout method

## Characteristics of Jobs-Housing Space of Wuhan

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### Abstract

Jobs-housing spatial distribution is one of the most important factors for shaping a city's spatial structure. In the past decades, researches mainly concern with the distribution and the dynamic change characteristics of jobs-housing space, urban commuting, and the population and land use. Less study has been carried out on the spatial relationship between employment and residence.

Based on Wuhan Social Security Information, the sixth census and the third economic census data, the study is carried out from the systematic maxims, such as the total jobs-housing ratio, independent index, outgoing commuting rate, and inward commuting rate. The paper analyzes and evaluates the spatial features and jobs-housing matching relations in the peripheral areas, main city, and new town groups of Wuhan, summarizes and tests the problems existing in the jobs-housing space.

Through the results we found that: The jobs-housing mismatch situation of Wuhan is not serious, but not better than that of based on the questionnaire; Population and employment are still concentrated in the central city; Residents are still gathering in the main city; Different spheres of the jobs-housing space match well generally; The functional groups of main city is quite different; walking and public transportation are major means for urban commuting, which happens in the contiguous town groups.

Jobs-housing characteristics have great impact on urban distribution and mobility. Reasonable spatial distribution of employment and residential location needs to be achieved by improving urban land use planning, housing policies, and urban transport networks.

### Key words:

jobs-housing space; jobs-housing characteristics; jobs-housing mismatch; Wuhan

## Comparative Research of Cross-Strait Industrial Community Form- Illustrated by Two Industrial Communities in Beijing and Kaohsiung

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### Abstract

Since the Nationalist Government moved to Taiwan in 1949, cross-strait policy regimes have been deeply impact on local development and residential forms. Also, there are special close relationships between the differences of residential forms and the life style of the residents. Research of the urban space relies on the relationship between human and society-space, it is the container of people's social life, but it also restricts people's social life style. Therefore, research on community forms must take the human-centered guideline and consider the fundamental problems such as the mutual relationship between individuals and between human and environment.

This article focuses on cross-strait industrial communities which emerged during the industrialization periods. We select two cases, one is Kaohsiung Refinery of CPC Corporation in Taiwan and the other is Beijing No. 2 Textile Factory in Mainland. We merge the behavioral geography research method into the Conzenian approach in urban morphology. To understand the relationships between the work, shopping, travel, leisure behavior and the land use. To conclude how the non-physical factors such as economy, culture and policy affect residents' behavior. To clarify the relationships between residents and environments, and interpret the interaction mechanism between residents' behavior and the urban community form from a microscope perspective. Further reflects on the city's growth and spatial evolution of cross-strait, and puts forward a new view point of urban morphology studies: the comprehensive urban morphology could be composed by behavioral space and physical space.

### Key words:

cross-strait; industrial community; urban morphology; Conzenian; behavioral space

## Considering the Fast Charging Duration and Queue Time in Locating Electric Vehicle Charging Stations

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### Abstract

As a key feature of Electric Vehicles (EVs), the relative longer charging duration aggravate the uncertainties of temporal and spatial energy demands distribution. Therefore, the precise prediction of EV charging duration definitely have a significant influence on the EV charging station launching strategy, which will help energy providers to make a feasible plan for network design. However, the feature mentioned above is always ignored in previous models. This paper presents an integrated model that combine a duration model for predicting fast charging duration and queue time and a multi-agents simulation based optimization model for location charging stations. A total of 209 EVs' GPS tracking data were recorded from Japan, which is used for understanding the duration time of fast charging and the choice of charging stations. To develop the duration prediction model, this study utilizes the Gamma accelerated failure time (AFT) model to investigate the relationship between the fast charging duration and the impact of factors, such as residual SOC, charging quantity, usage of air condition and heater, expected remained distance and so on. The proposed model aims to reproduce the EV drivers' choice behavior during the fast charging and, therefore, to optimize the locating problem.

### Key words:

ElectricVehicle; fast charging duration; AFT model

## Differentiation in Daily Activity Spaces of Residents on the Scale of Residential Area in Transitional Xining, China

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### Abstract

From the perspective of daily activity space, we can explore social space differentiation of Xining city in transition from individuals with the aid of indicators measuring activity space, as well as reveal the roles Danwei and new town development play in differentiation of social space. In this paper, where 5 different types of residential areas are surveyed and analysed, trend surfaces of spatiotemporal activities illustrate spatiotemporal distribution of daily activities, and indicators of activity space demonstrate characteristics in area, spatial concentration and relationship to residence. Research shows that unique built environment in Xining city leads to more short-distance and directional travel of residents. The location and socio-economic properties of residential area are important factors influencing the range of areas representing residents' activity spaces. Activity spaces of residents in Commercial Housing Residential Area coverage those of Danwei and Compound Residential Area; activity spaces of residents in Danwei Residential Area appear higher spatial concentration than those of Commercial Housing and Compound Residential Area. It is implied that residents in suburban residential area acquire greater range of area of activity space than urban residents while residents living in the city gain higher rate of spatial concentration than suburban residents.

### Key words:

daily activity space; differentiation; residential area; residents; Xining

## National Demonstration Zone of Ecological Protection and Construction of "Production-Eco-Life" Space Optimization Analysis: A Case Study of Ji'an City in Jiangxi Province

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### Abstract

The combination of ecological protection, urban development, spatial distribution and other related theories, scientific definition of production space, living space, meaning on the basis of ecological space, based on Ji'an city, profile, based on space evaluation model of the "San Sheng" spatial Division index system, using technologies such as GIS, remote sensing and mathematical statistics methods, quantitative delimitation "San Sheng" space. Through field research, combined with the Township development planning system, amended the programme in township on quantity, resulting in Ji'an city, "San Sheng" spatial Division. Eventually construct "San Sheng" legal guarantee system for spatial, ecological assessment mechanism; clear compensation rules, building ecological compensation policy platform and red line, ecological constraints, such as the red line, aimed at building intensive and efficient production of Ji'an city spaces, livable a moderate amount of living space, a beautiful eco-space, in order to achieve the optimal development of their production, living and ecological space.

### Key words:

spatiotemporal analysis; ecological space; urban development

## Overview of Residents' Daily Activity Spaces Research in the Perspective of Space-Behavior Interaction

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### Abstract

In the process of transformation from quantity expansion to quality improvement, how to improve the quality of urbanization and the quality of residents' life has become the focus of academic research in China. As the projection of residents' daily activities, daily activity space reflects the quality and space utilization of urban space directly and meanwhile is an important medium to understand the interaction between living activities and urban space, associated with sustainability issues such as social exclusion, transportation equity and social isolation, and thus received attentions from human geography, urban planning, sociology and other fields. The domestic researches on daily activity space is developed under the support of the theory of behavioral geography and activity-based approach in the West. This paper reviews the evolution of research contents, methods and theoretical foundations of daily activity space and summarizes the existing problems in the current researches and challenges, to provide inspiration and reference for future research of space-behavior interaction.

### Key words:

daily activity space; behavioural space; behavioral geography; space-behavior interaction

## Product Follows Behavior: A Tourism Time Product Planning Approach

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### Abstract

By discussion about the relationship between tourist spatial-temporal behaviour and tourism products, this paper puts forward the concept and logical framework of tourism time product advocating planning idea of “Product Follows Behaviour”, and shows the feasibility of the new tourism time product planning approach using a case study of Ocean Park Hong Kong. Based on the GPS tracking investigation and analysis of the tourists in Ocean Park, subject areas and product types of Hong Kong Ocean Park which need to be adjusted are recognized according to the spatial and temporal distribution characteristics of tourists and tourist spatial-temporal behaviour patterns. And then a preliminary tourism time product plan and combination of tourism product plan are proposed as to the data analysis results. From the perspective of methodology, this paper contributes a new approach of tourism product planning under the framework of tourism time planning, which diversifies the theories and methods of tourism product planning. From the perspective of planning practice, the approach of tourism time product planning provides a new perspective and tool for the tourism product planning practice, which supports the innovation of tourism product planning theoretically and technically.

### Key words:

tourism time product; tourism time product planning; tourism planning method; tourist spatial-temporal behaviour

## Research of Spatiotemporal Variation Characteristics of Dunhuang's Night Market

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### Abstract

Many foreign cities have made the night economy as the important strategy of urban space rejuvenation and economic revitalization. The night economy is a focus and a new research hotspot of domestic and international urban development. The night economic activities have obvious characteristics of the time, but they have intersections in the space and the city during the day and space in economic activity, it is also influenced by the climate and other environmental conditions, and makes the time and space of the night economy with different characteristics. The night economy of the tourist cities is the most typical type, and their space and time of the activities are closely related to the tourist activities. The night market in Dunhuang is a beautiful landscape in Dunhuang, and the regularity and climate of the tourism industry in Dunhuang night market are more and more evident.

Based on the social investigation method, this paper provides the market research and questionnaire analysis, discussing the spatial structure features in Dunhuang night market, the operations and customer activity rules, from the 'daily cycle', 'half of the week - week in short-term cycle', 'annual cycle' of three typical time scale in the tourist season in Dunhuang. This paper analyses the operations and customer behavior of the time and space characteristics, revealing the characteristics and rules of time and space in Dunhuang night market.

The results show that, 1) The Dunhuang night market plays an important role in economic development and urban construction in Dunhuang; 2) the night market is comprehensive and functional zoning; 3) The development in Dunhuang night market is suffered indignities about temperature environment effect, and it changes periodically; 4) The night market structure of the time and space continues to adapt the demand in the market and reform perfectly.

### Key words:

night economy; spatial structure; temporal-spatial change; Dunhuang night market

## Research on Temporal and Spatial Decision-Making Process and influencing Factors of Residents' Comprehensive Shopping Behavior: A Case Study of Guangzhou Based on Consumer Survey in 43 Shopping Malls

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### Abstract

In China, urban residents' consumption is experiencing a shift from single shopping function to comprehensive consumption combining shopping, catering, leisure and recreation. In this context, temporal and spatial decision-making process of shopping behaviour has become a focus of certain fields such as urban geography, urban planning, urban sociology and urban economics. Although scholars both at home and abroad have discussed whether the different factors, such as social and economic properties, commercial location and commercial space characteristics, have significant roles in the decision-making process of shopping behaviour, they failed to explain whether there is a mutual influence between the certain factors, as well the research on the impact of emerging influencing factors, such as online shopping, development of emerging business format on shopping location decision is relatively lack. In this paper, we conclude the related influencing factors of residents' comprehensive shopping behavior decision-making and then put forward the conceptual model on temporal and spatial decision-making process of shopping behavior. Based on the residents' shopping decision-making theory, the data from the interview and questionnaire survey on residents' shopping behavior in 43 shopping malls, and the established structural equation model, this paper analyses the residents' decision-making process and its influencing factors in the following four aspects: shopping starting time, shopping destination, shopping travel mode, and potential scope of shopping activities. Conclusions of this paper can provide theoretical suggestions on optimizing the urban commercial space hierarchy, improving shopping transportation and promoting the quality of residents' daily life.

### Key words:

comprehensive shopping behavior; temporal and spatial decision-making process; structural equation model; shoppingmall; Guangzhou

## Scaling Law between Mobility and Facility: Spatiotemporal Data Mining of Guangzhou Subway Data

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### Abstract

With the acceleration and intensification of China's urbanisation as well as its continuing urban population growth, needs for necessary city facilities have been changing accordingly. While relevant research has pointed to a correlation between urban population and the associated facilities, this paper takes Guangzhou as an example and explores the scaling relationship between census data and the point of interest (POI) data at the street-office/town level across the city. Drawing on statistical data from every subway station in Guangzhou, it makes use of correlation analysis and multiple regression model to investigate the correlations between various POIs surrounding the subway station, the dynamic data of subway mobility, and the power law exponent of static population data. Research findings show that: (1) there exists a relationship of  $D \sim \rho^{2/3}$  between the population in every street-office area/town and the amount of its urban facilities across Guangzhou; (2) the types of facilities provided near and around subway stations have indicated a similar pattern; and (3) the power law relationship between the dynamic data of subway mobility and the POIs from subway surroundings is rather insignificant. This research reveals that the density of not-for-profit facility tends to decrease along with the increase of population, whereas for-profit facilities bears a super-linear relationship to population. As people's mobility pattern is an indication of whether facilities are appropriately provided in the city, this research represents an effort along this line to offer some useful evidence for better urban planning.

### Key words:

Scaling law; subway data; point of interest; dynamic mobility; Guangzhou

## Scenario Simulation and the Prediction of Land Use and Land Cover Change in Beijing, China

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### Abstract

Land use and land cover (LULC) models are essential for analyzing LULC change and predicting land use requirements and are valuable for guiding reasonable land use planning and management. However, each LULC model has its own advantages and constraints. In this paper, we explore the characteristics of LULC change and simulate future land use demand by combining a CLUE-S model with a Markov model to deal with some shortcomings of existing LULC models. Using Beijing as a case study, we describe the related driving factors from land-adaptive variables, regional spatial variables and socio-economic variables and then simulate future land use scenarios from 2010 to 2020, which include a development scenario (natural development and rapid development) and protection scenarios (ecological and cultivated land protection). The results indicate good consistency between predicted results and actual land use situations according to a Kappa statistic. The conversion of cultivated land to urban built-up land will form the primary features of LULC change in the future. The prediction for land use demand shows the differences under different scenarios. At higher elevations, the geographical environment limits the expansion of urban built-up land, but the conversion of cultivated land to built-up land in mountainous areas will be more prevalent by 2020; Beijing, however, still faces the most pressure in terms of ecological and cultivated land protection.

### Key words:

LULC change; spatial pattern; CLUE-S model; Markov model; scenario simulation and prediction; Beijing

## The Socio-Spatial Dimension of Behavior Analysis: Frontiers and Progress in Chinese Behavioral Geography

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### Abstract

The interaction between urban space and individual behavior has led to essential social, economic and environmental consequences. Behavioral geography provides a new effective theoretical and methodological framework to investigate behavior patterns in cities. In recent years, behavior approach has become an influential analytical paradigm in Chinese urban geography, as urban geographers and planners have attempted to interpret the dynamic interactions between individual life experiences and urban socio-spatial transformations. This paper provides an overview of behavioral geography research in China, by introducing the theoretical and empirical progress in behavior analysis. It is argued that behavioral approach offers a new perspective to understanding China's urban socio-spatial reconstruction and addressing social and environmental issues at micro scale. This paper also provides an overview of new trends in Chinese behavioral geography that has started to apply the behavioral approach to urban social, economic and environmental issues. It is suggested that social dimensions of behavior should be addressed more comprehensively and rigorously by using interdisciplinary theoretical and methodological frameworks, to better understand the critical social and environmental issues of Chinese cities.

### Key words:

Behavioral geography, socio-spatial reconstruction, urban sustainability, Chinese cities

## The Time-space Matching of Community Facilities Supply and Residents' Demand in Beijing Suburbs

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### Abstract

The community is the basic space carrier for people's daily activities and the smallest unit in urban planning. The supply of facilities is closely related to the quality of life of residents. Most of the community planning practices in China are according to 'Thousands of indicators', which overlooking the residents' demand, and cause many problems such as mismatch of community facilities supply and residents' demand, ignoring of the facilities' opening time and so on.

The study employs the data of 2012 GPS-based activity-travel survey in Beijing, and the samples include 480 residents in Qinghe who live in suburban area. By combining behavior geography, time geography, and using methods of statistics and space-time GIS, this paper analyses the spatial and temporal characteristics of residents' outdoor activities, and the residents' demand of different kinds of facilities. Based on the findings, this paper chooses a community, which named Qing-Shang Park, as a sample to analyze the spatial and temporal characteristics of community facilities supply and the demand of residents. By comparing the facilities supply and demand, this paper tries to find out whether the facilities supply can fit residents' demand in this community.

The study shows 1) there is a strong corresponding relationship between the distribution of different kinds of activities and the related facilities; 2) the demand structures of residents from different communities are different; 3) the demand structures of residents varies in a day, for example, the demands for restaurants concentrate in the moon and evening. The findings can guide us to achieve a more rational allocation of community facilities supply in time and space.

### Key words:

Facilities; Activities; Space-time Behavior; Supply and Demand Matching

## Transformation Pattern and Influential Factors of Mature Coal Resource-based City Based on the Perspective of Social Space: A Case Study of Huainan city in Anhui province

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### Abstract

Under the background of new industrialization, new-type urbanization and ecological civilization construction, comprehensive transformation and sustainable development of resource-based city has become a significant strategy. Avoiding transformation of mature resource-based cities will effectively promote the prospective, scientificity and operability of resource-based cities' transformation development. Based on the perspective of social space, taking Huainan city as an example, dividing urban regional function structure, analyzing urban transformation-level and exploring influential factors. Results indicate that: 1) Urban regional function structure of Huainan city consists of five functional groups, polarization effect of urban transformation has not formed, single approach, dependent path, limited space and hysteretic notion make up the overall pattern, 2) Administrative clerk, commercial service staff, people who get a graduate degree, 20-39 year-old individuals, exotic shifting people and purchasing commercial houses are the main 5 factors which drive transformation, the path should be converted from service as a single drive to technology and innovation as multiple drives, it is considerable to positively boosting the process of new city areas, urban-rural integration and rural towns' living quality in mining districts, 3) Social service industry staff drive rural commercialization and agricultural modernization, young people lead social culture and elaboration of mining industry, exotic people promote the status of third and alternative industry and propel multi-core transition of urban space will become effective scientific transformation paths of Huainan city in the future.

### Key words:

Resource-based city; Coal resource-based city; Social space; Urban transformation; Huainan city

## Urbanization and Sustainable Development

### Rethinking Urban Transformations from the Perspective of Geography in an Urban Era



Home

#### Oral

1. [A Comparative Study for the National Man-land Relationship](#)  
Lei Zhang (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Yi Liu (Institute of Geographic Sciences and Natural Resources Research, CAS, China), Bo Yang (Beijing Academy of Social Sciences, China)
2. [A Dea-Based Analysis for Regional Eco - Efficiency of China from 2007 to 2014](#)  
zhou xiaoxue (Beijing forestry university, China)
3. [Adaptive capacity based water quality resilience transformation and policy implications in rapidly urbanizing landscapes](#)  
Yi Li (Institute of Geography, Georg August University of Goettingen, Goettingen, Germany), Jan Degener (Institute of Geography, Georg August University of Goettingen, Goettingen, Germany), Matthew Gaudreau (Faculty of Environment, University of Waterloo, Canada)
4. [Analysis of water demand and water pollutant discharge using a regional input–output table: An application to the City of Shanghai](#)  
Fan Zhang (Beijing Normal University, China), Jinyan Zhan (Beijing Normal University, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
5. [Assessing spatial vulnerability from rapid urbanization to inform coastal urban regional planning](#)  
Li Yangfan (Xiamen University, China), Xiaoxiang Zhang (Hohai University, China)
6. [Citizenization Characteristics of Local Rural Families Amidst in Situ Urbanization: Survey in Xinjie, Wuxi City, Southern Jiangsu Province](#)  
Hu Liang (China Architecture Design Group, China), Wang Xuejiao (China Center for Urban Development, China)
7. [Demodernization and Development: Transformations of Uzbek Urbanism](#)  
Garrett Wolf (Manchester Architecture Research Centre, The University of Manchester, United Kingdom)
8. [Dynamic changes of ecological footprint and its component analysis response to land use in Wuhan, China](#)

Xiaowei Yao (China University of Geosciences (Wuhan), China)

9. [Eco-efficiency assessment of cities in China: a stochastic metafrontier approach](#)

Yuping Bai (Institute of Geographic Sciences and Natural Resources Research, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, China)

10. [Ecological constraints of urban sprawl and land intensive use model - a case study of Dianchi Lake](#)

Hong Zhang (Yunnan University of Finance and Economics, China), Jie Jin (Yunnan University of Finance and Economics, China)

11. [Ecological Intercorrelation in Urban-Rural Development: An Eco-City of China](#)

Zhan Wang (IGSNRR, China), Xiangzheng Deng (IGSNRR, China), Pei Wang (IGSNRR, China), Jiancheng Chen (Beijing Forestry University, China)

12. [Economic dynamics, value chains and metabolisms of urban and peri-urban agriculture in Sub-Saharan Africa: a review](#)

Alexander Follmann (University of Cologne, Germany), Maximilian Willkomm (University of Cologne, Germany), Peter Dannenberg (University of Cologne, Germany)

13. [Emergy analysis of urban metabolism at county level in Beijing](#)

Wei Qi (1. Institute of Geographic Sciences and Natural Resources Research, CAS, China), Xiangzheng Deng (1. Institute of Geographic Sciences and Natural Resources Research, CAS, China), Deshu Xu (Beijing Normal University, China)

14. [Energy consumption and greenhouse gas emissions for transmission infrastructure in China: from a micro-to-macro perspective](#)

Wendong Wei (College of Government, Peking University, China), Xudong Wu (College of Engineering, Peking University, China), Guoqian Chen (College of Engineering, Peking University, China), Guoping Li (College of Government, Peking University, China)

15. [Future Urbanization and Climate Change Related Heat Risk in Asia](#)

Peter Marcotullio (Hunter College, CUNY, United States), Carsten Kessler (Hunter College, CUNY, United States)

16. [Impact of urbanization on ecological security in Jing-Jin-Ji Region, China](#)

Xi Chu (Faculty of Resources and Environmental Science, Hubei University, China)

17. [Impacts of Urbanization on Ecosystem services in Pakistan](#)

dongdong chen (Hubei University, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences; Center for Chinese Agricultural Policy, Chinese Academy of Sciences, China), Qian Zhang

18. [Mapping dynamic and growth of class 1 cities in India](#)

Ravindra Chowdhary (International Institute for Population Sciences, Mumbai, India), Rakesh Kumar (International Institute for Population Sciences, Mumbai, India)

19. [Patterns of household transport and domestic energy consumptions and policy implications, a perspective of fast developing City](#)

Jianquan Cheng (Manchester Metropolitan University, United Kingdom)

20. [Rethinking Sustainability in a More Urbanized World: Comparison in “BIC” Countries](#)

Chen Zeng (Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Xiangzheng Deng (Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Jianing Dong (Huazhong Agricultural University, China)

21. [Songdo \(South Korea\), a mega-project in the making: residential neighborhoods of an urban utopia](#)

Valérie Gelézeau (EHESS, France)

22. [Spatial patterns of urbanization at the prefectural level in China, 2004-2013](#)

David Karacsonyi (Geographical Institute, Hungarian Academy of Sciences, Hungary), Kang tsung Chang (Department of Geography, Taiwan University, Taiwan, China), Yurui Li (Chinese Academy of Sciences, China)

23. [Study on Ecology Efficiency in Rapid Urbanization Area](#)

Gui Jin (Hubei University, China), Zhaohua Li (Hubei University, China)

24. [Study on economic development model of Ordos](#)

Rui Dong (Institute for the History of Science and Technology, Inner Mongolia Normal University, China), Yun hu Xie (College of Geographical Science, Inner Mongolia Normal University, China), Chun xing Hai (College of Geographical Science, Inner Mongolia

25. [Supporting the Development of China’s Urbanization: A Review of Trends and Knowledge Gaps in Urban Studies](#)

Qian Zhang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China), Karen Seto (Yale University)

26. [The study on ecological sustainable development of Chengdu](#)

Yifan Li (Beijing Normal University, China), Jinyan Zhan (Beijing Normal University, China), Fan Zhang (Beijing Normal University, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, CAS, China)

27. [Urban Development in Uganda: Causes, Process and implications](#)

Pei Wang (Zhongnan University of Economics and Law, China), Xiangzheng Deng (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

28. [Urban Transition in West Bengal, India: 'Polarization Reversal'?](#)

Debarshi Guin (Centre for the Study of Regional Development, Jawaharlal Nehru University, India)

29. [The role of greenspace in regulating land surface temperature in the megacities of Southeast Asia](#)

Ronald C. Estoque (Faculty of Life and Environmental Sciences, University of Tsukuba, Japan, Japan), Yuji Murayama (Faculty of Life and Environmental Sciences, University of Tsukuba, Japan, Japan)

## Poster

1. [Study on Population - Economy - Space Perspective of Space-time Evolution of Urbanization in Shandong province](#)

Baodi Gao; Chengxin Wang; Xuegang Cui (China, Shandong Normal University)

2. [Territorial Strategies of the Madrid Metropolitan Region Universities: The Establishment of Business Schools and MBA Offer](#)

Rubén Camilo Lois González (Spain, University of Santiago de Compostela); Guillermo Morales-Matos (Spain, University Carlos III); María Angeles Piñeiro-Antelo (Spain, University of Santiago de Compostela)

## A Comparative Study for the National Man-land Relationship

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### Abstract

As a part of the earth's living creatures, our human has been making use natural resources and environment as its first need for survival and development, and this remains all the same, even in the modern period. In fact, with the rapid growth of social wealth and population, maintaining a stable of the so-called man-land relationship is always the primary task and basic goal for national sustainable development, especially for big countries. An integrated factor analysis covered natural endowment (fresh water, arable land, grass land, wood land, energy and minerals) and human activity (population, GDP and CO<sub>2</sub> emission) shows that there has one thing in common for all the 11 selected countries (>100 million people). Under the polarization effects of natural resources use, the national man-land relationship of these countries today have been proven to be aggravating and worsening in various degree, although the characteristics of their natural endowments are very differences. Regarding such changes, the Japanese practice is of the most convincing.

### Key words:

national man-land relationship; natural endowment; integrated factor analysis

## A Dea-Based Analysis for Regional Eco - Efficiency of China from 2005 to 2014

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### Abstract

Eco-efficiency is an instrument for sustainability analysis, indicating how efficient the economic activity is with regard to nature's goods and services. This paper conducts an eco-efficiency analysis for regional socio-economic, resource consumption and environmental management in China by developing data envelopment analysis (DEA) based models, which reflect the efficiency of utilizing natural resources and improve the estimation accuracy. From a macroscopic point of view, the measure and evaluation were made upon regional eco-efficiency in 30 provinces in china from 2005 to 2014. Special attention was paid to resources and energy consumption, waste emissions as inputs, Gross Domestic Product as outputs. The results also show that, Beijing, Tianjin, Shanghai, Guangdong and Hainan are relatively eco-efficient, and provinces with higher level GDP per capita will have higher eco-efficiency than other regions. The study provides the updated data with high equality and makes comparative and complementary for other researches.

### Key words:

Eco-efficiency; Data envelopment analysis (DEA); environmental management; China

## **Adaptive capacity based water quality resilience transformation and policy implications in rapidly urbanizing landscapes**

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### **Abstract**

Resilience-based management focuses on specific attributes or drivers of complex social-ecological systems, in order to operationalize and promote guiding principles for water quality management, and predict potential threats and vulnerabilities of the urban system. We therefore propose a resilience lens drawing on adaptive capacity theory to evaluate the urban resilience between water quality and land use type in relation to urban development plans. Our findings show that: (1) The resilience of water quality variables, which were calculated based on their adaptive capacities, showed adaptive and sustainable trends with dramatic fluctuation; (2) NH<sub>3</sub>-N, Cadmium and Total Phosphorus experienced the most venerable shifts in the built-up area under rapid urbanization; (3) Analogous resilient transition states occurred in the agricultural and bare land; (4) National and regional planning practices (City Development Plan and China's Five-Year-Plan) contribute to ongoing shifts (Ammoniacal Nitrogen, Cadmium, Total Phosphorus and Oil) in different resilient transition states. Ultimately, we pointed to political underpinnings for building and managing resilient urban system in a particular coastal urban setting.

### **Key words:**

Adaptive capacity; Water quality; Land use; Urban resilience; Urban planning

## **Analysis of water demand and water pollutant discharge using a regional input–output table: An application to the City of Shanghai**

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### **Abstract**

China's urbanization has faced serious water problems as a result of economic growth and some development projects and it is widely thought that integrated management, including socio-economic factors in each basin unit, is effective. Hence, the target of this paper is to evaluate the structures of water demand and water pollutant discharge with socio-economic activities in the City of Shanghai. First we have developed a methodology for estimating water demand and water pollutants (carbon, nitrogen and phosphorus) based on an input-output analysis model, and then applied it to the City of Shanghai. As a result, we conclude that industry is the largest source of water demand and water pollutants in the City of Shanghai and accounts for more than 50% of the total of each. Water demand from agriculture, forestry and livestock accounts for 35% of the total, and about 20% of water pollutants are discharged from agriculture, forestry and livestock. Furthermore, water pollutants from households constitute more than 20% of the total in the City of Shanghai though water demand and wastewater account for less than 15% of each total. In addition, it becomes clear that about 20% of the water demand and water pollutant discharge in the City of Shanghai is caused by other provinces and foreign countries, with most of the demand and discharge being industrial.

### **Key words:**

water demand; water pollutant; The City of Shanghai; Input output analysis

## Assessing spatial vulnerability from rapid urbanization to inform coastal urban regional planning

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### Abstract

This study delves into the development of a Geographic Information System (GIS) based vulnerability assessment tool for assessing coastal vulnerability and making prescriptive recommendations on urban planning in coastal regions at a local level. The framework of "exposure-sensitivity-resilience" (ESR) is not only applied, but also improved and refined to take into account a suite of social-ecological indicators. The results demonstrate that vulnerability was not evenly distributed across Haikou's coastal zones, which may be linked to the different stages of ongoing urban planning for coastal Haikou. For the case study areas, vulnerability tends to increase with higher levels of urbanization, but may decrease once the speed of urban expansion is under control. The most vulnerable area is the main city zone where urban residents are concentrated and a developed transportation network exists. Our study contributes to the development of a general methodology to assess vulnerability in rapid urbanization and to apply it to coastal cities around the world.

### Key words:

Spatial vulnerability; urbanization; coastal areas; regional planning

## **Citizenization Characteristics of Local Rural Families Amidst InSitu Urbanization : Survey in Xinjie, Wuxi City, Southern Jiangsu Province**

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### **Abstract**

Insitu urbanization is a phenomenon of population and settlements transition from rural pattern to urban or quasi urban pattern without large scale migration. In southern Jiangsu area, Cutinisation is one of the significant characteristics of insitu urbanization, which is also a considerable cause of timing and stage diversities of urbanization on employment, residence and social security dimensions. This paper conducts in-depth analysis on insitu urbanization characteristics of local family based on a case study of Xinjie township and its surrounding villages in Yixing, Wuxi City. The research reveals that during insitu urbanization process, the township has been expanding with mainly industrial lands, and some commercial housing estate and resettlement communities emerge recently, while the villages have always been all residential lands. The huge influx of external population and arrangement for relocation household has complicated the social space instead of displacing local residents. It is remarkable that the identities of local rural family members are transiting from farmers to citizens reflected by three aspects: (1) Most local family members are able to obtain jobs and education in need within 30-minute distance. while a few members of some families still have to migrate far away for better or higher education; (2) Housing Demolition and Relocation is the main reason that forced local families to migrate to township, which is rarely consistent with neither their will of choice nor their consumption capacity; (3) Urban social insurance coverage for rural families has been increasing, though, the gap between family members still remains significantly.

### **Key words:**

Citizenization; Local Family; InSitu Urbanization; Rural Area

## Demodernization and Development: Transformations of Uzbek Urbanism

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### Abstract

This research looks at the co-production of urban space and urban everyday life in Uzbekistan during the periods/processes of demodernization and urban development that followed the fall of the Soviet Union. These processes lasted approximately from 1991-1998 and 2008-present respectively, and involved significant changes to the production of urban space and urban everyday life.

Using spaces and structures this study looks at how networks produce physical, mental and the social urban spaces in Samarkand and Tashkent. I analyze changing networks, and processes of demodernization and urban development, since the fall of the Soviet Union, and how they altered how space is conceived, perceived, and lived in urban Uzbekistan. Samarkand and Tashkent possess diverse urban forms resulting from varied histories and Soviet interventions, and thus differing relations of social and spatial production. Samarkand retains much of its historic urban form, which is predominantly influenced by Persianate urbanism. The city of Tashkent, following extensive damage by an earthquake in 1966, was then rebuilt by the Soviet government, and remains a prime example of a Soviet built city.

Exploring how urban everyday life in Uzbekistan interacted with the form and the condition of urban Uzbekistan in various periods of time and undergoing various processes allows us to see how urban transformations impact form and practice of the urban. This comparison across both space and time can illustrate changing relations of actors and how space and practice interact within these relations to co-produce urban spaces and structures in Uzbekistan.

### Keywords:

Demodernization; urban development; everyday life; Uzbekistan; urban; culture; post-Soviet

## Dynamic changes of ecological footprint and its component analysis response to land use in Wuhan, China

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### Abstract

Human's demand for biological resources and energies has always been increasing, whereas evidence has shown that this demand is outpacing the regenerative and absorptive capacity of the planet. Since China is experiencing unprecedented urbanization and industrialization process, how much impact it imposed on the earth system during economic development is worldwide conspicuous. Therefore, we tried to examine the environmental impact in detail and track its changes in a typical city of Central China, Wuhan, based on ecological footprint analysis. Generally, the ecological footprint increased in fluctuations from 1.48 gha per capita to 2.10 gha per capita. The research revealed that the footprints of the productive lands increased most of the time in the region, especially the grazing land, water bodies, carbon uptake land and built-up area, showing there is greater impact on the ecosystem induced by human's manufacturing and consumption. Among the six footprint components, carbon footprint contributed most within the whole time period, implying a relatively high level of energy consumption. Comparing to the declining biocapacity, it was found that there existed gradually aggravated ecological deficit in the region, which increase from 1.12 gha per capita in 1995 to 1.79 gha per capita in 2008. As the population grows in the city, which already reached 10.33 million in 2014 from 8.33 million in 2008, the quick growth of energy consumption may lead to exaggeration of carbon footprint in future. The results implied that cutting down the consumption of fossil fuels could play a very important role in reducing the overall ecological deficit of the city.

### Key words:

ecological footprint; carbon footprint, biological resource; urbanization; Wuhan

## Eco-efficiency assessment of cities in China: a stochastic metafrontier approach

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### Abstract

With the rapid development of urbanization, inefficient natural resource utilization and massive energy consumption exerts great pressures on ecological environment. In this context, tremendous efforts have been devoted to seeking opportunities to reduce environmental impacts and improve productivity simultaneously, whereby assessing eco-efficiency has received more and more attentions by researchers and policy-makers alike. But to our knowledge, a common limitation of several previous studies is that they hardly take the variation of technologies caused by regional difference into account, thereby leading to the biased estimates and misleading policy implications. Moreover, conventional measures in China tend to focus on the provincial differences and almost no studies have researched at the urban scale. But in fact, urban eco-efficiency is more worthy of attention towards more efficient and sustainable urban development. In this paper, we measured eco-efficiency of China's 282 cities over the period from 2003 to 2012, using a parametric approach of stochastic frontier analysis (SFA). For further analysis, we introduced a meta frontier approach which assumes that a meta-technology-frontier exists and represents potential outputs available to all cities given inputs. The metafrontier is for four city groups, 1st-tier cities, 2nd-tier cities, 3rd-tier cities, and 4th-tier cities. We found that 1st-tier cities have the highest eco-efficiency score and take the lead in terms of metatechnology ratio while the 4th-tier cities is particularly low due to their backward technology. Moreover, the general approach of SFA, which ignores the technological difference among the groups, is prone to underestimate the eco-efficiency.

### Key words:

Eco-efficiency; stochastic frontier analysis; metafrontier approach; cities

## Ecological constraints of urban sprawl and land intensive use model - a case study of Dianchi Lake

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### Abstract

The sustainable development of regional economy and urbanization in Plateau Lake basins must limit the scale of City-Town-Village (CTV), conservation and intensive land, keep the ecological land and green space, in order to maintain a sound ecological system of Plateau Lake. In this paper, taking Dianchi River as an example, through constructing a theory framework that the ecological constraints of urban sprawl and land intensive use model, designing four scenario model of CTV' land use: the natural development, ecological constraints, intensive development, and the ecological-intensive development, using SLEUTH model to make empirical study. The results show: the ecological-intensive development scenario model is the optimal model, which coordinates the CTV' land intensive use and protection of the ecological environment in a plateau lake basins, and presents the relevant policy suggestions for the development of CTV in Dianchi basin. From the view of land use to explore a new approach of economic development and ecological protection in plateau lake urbanizing area.

### Key words:

Ecological constraints; City-Town-Village; intensive land use; scenario model; SLEUTH

## Ecological Intercorrelation in Urban-Rural Development: An Eco-City of China

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### Abstract

This study reveals that ecological intercorrelation in urban-rural area is a key role in changes of unobserved environmental effects of urban environmental pollution, energy use inefficiency, and cultivated land loss. In a deductive model, we find that inequivalent economic growth in urban-rural area results in the variability of eco-efficiency of industrial production in urban area, which increases the risks of environmental effect in adjacent suburban and rural area, and directly affects changes of unobserved environmental effect spatial-temporally. Through ecological intercorrelation, both observed and unobserved environmental effects in this dynamic mechanism are formed, consequently intensify the regional inequality of environmental pollution, and frustrate the future coordinative development of regional economy. By employing the data of a case study area in Gaoyou of China, estimations show that observed eco-efficiency is getting better but unobserved eco-efficiency is getting worse until this place becomes an eco-city. This study proved that ecological intercorrelation in some extent sustains unobserved environmental effects to affect regional environmental degradation.

### Key words:

ecological intercorrelation; eco-city; eco-efficiency; environmental effect; environmental pollution; urbanization

## **Economic dynamics, value chains and metabolisms of urban and peri-urban agriculture in Sub-Saharan Africa: a review**

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### **Abstract**

Different types of urban and peri-urban agriculture exist in the Global South, in particular in Sub-Saharan Africa. Besides positive impacts on urban food security, empirical studies have documented an increasing economic potential of urban and peri-urban agriculture in the Global South. Dynamics of urbanization and agricultural intensification at the rural-urban interface result in changes in flows and metabolisms which have social-ecological effects on urban and regional sustainability and human health. Based on extensive literature review and explorative studies on medium-sized Kenyan cities (Nyeri and Nakuru), the paper discusses emerging economic dynamics of urban and peri-urban agriculture with a special focus on the diffusion of supermarkets and their impacts on value chains in the fresh fruit and vegetable production (FFV) sector. First findings suggest that an intensification and commercialization of agricultural production is evident which in turn is linked to the adaptation of technologies (e.g. greenhouses, vertical farming) and increasing inputs including pesticides, mineral fertilizers, irrigation systems and wage labour. Overall, the paper aims to contribute to a better understanding of urban and peri-urban agricultural production systems and their associated flows and metabolisms in the context of dynamic urbanization in Sub-Saharan Africa.

### **Key words:**

urban and peri-urban agriculture; metabolism; value chains; supermarkets, Sub-Saharan Africa; Kenya

## Emergy analysis of urban metabolism at county level in Beijing

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### Abstract

Urban metabolism is a self-organizing system within materials, energy, money and human labor flows, which can be used as an index of urban sustainable development. Based on the emergy theory, we analysed the structure, intensities, environment pressures and output efficiencies of urban metabolic emergy system at county level between 2005 and 2013. The primary results are as follows, the import and export emergy growth contributed mostly to the emergy consumptions of Beijing metabolic system. Emergy use intensities of Beijing had increased with the rapid rise in the non-renewable resource emergy and import emergy, which resulted in the increasing environmental pressures and gradually declining of output efficiency and sustainability. Facing the growing resource and energy shortage, Beijing should encourage the exploitation and utilization of renewable resources and energy, increase the consumption efficiency of non-renewable resources and energy, establish the mechanism to re-use wastes of resources and energy to promote the urban metabolism in Beijing.

### Key words:

urban metabolism; emergy analysis; Beijing; sustainable development

## Energy consumption and greenhouse gas emissions for transmission infrastructure in China: from a micro-to-macro perspective

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### Abstract

In recent years, the ultra-high-voltage electricity transmission and strong smart grid projects have gained wide exposure in China. It serves a strong impetus to safeguard urban electricity security, optimize urban energy structure and invigorate urban industry development, which helps build a solid consolidation for new urbanization and smart city progress. To optimize the structure and comply with the low-carbon strategy, this paper has for the first time undertaken a comprehensive accounting for the energy consumption and greenhouse gas (GHG) emissions of transmission infrastructure from a micro-to-macro perspective. Supported by the ecological input-output database and state grid data, the energy consumption and GHG emissions for micro grid projects in different terrains and voltage classes are calculated. The result suggests that under the same voltage, grid network across the plateau and river swamp seem to be with the highest energy cost and GHG emissions for per unit distance. Besides, based on regional input-output table and provincial grid data, we further account for the energy cost and GHG emissions that are induced by macro regional grid construction and the incremental economic benefits in various sectors. By taking the year 2007 as a case study, the energy consumption and GHG emissions triggered by direct investment of China macro grid are respectively calculated to be  $7.88E+17$ J and  $8.50E+07$ tCO<sub>2</sub> Eq./t. Meanwhile, for investment pulling, spatial spillover effects could be witnessed between the different provinces. The outcomes will be provide valuable policy implications and scientific basis for grid infrastructure and spatial planning for building low-carbon cities.

### Key words:

Ultra-high-voltage electricity transmission; smart grid; energy consumption; greenhouse gas emissions

## Future Urbanization and Climate Change Related Heat Risk in Asia

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### Abstract

We present a spatially explicit urbanization scenario baselines for Asia to 2100 and relate these findings to projected temperature increases. Using GRUMP (global rural urban mapping project) data for the identification of urban areas and national boundaries (2000) and GPW4 (Gridded Population of the World Version 4) data on land mass and population values (2010), and UN data for population to 2100 and urbanization to 2050 along with our own series of urbanization estimates from 2050 to 2100, we project the spatial distribution of urban population across the region in 10 year intervals. We spatially allocate population based on three different methods: random by urban-non-urban split, by current share of total urban population, random by urban-non-urban split but constrained by cell densities. These baseline data provide a starting point for more detailed urbanization modeling. With these preliminary data, we associate population levels for Asian cities with average temperature model outputs from over 30 GCMs for 2030, 2050 and 2080. We choose the three hottest consecutive monthly temperatures per year and average them for each model and then spatially associate these values with urbanization scenario data to identify potential future locations of urban climate change vulnerability. We find that by 2050 a large and growing urban population may be experiencing average summer (3 months) temperatures of over 35° C (95° F).

### Keywords:

Urbanization; Heat-related risk; Asia; Future scenarios

## Impact of urbanization on ecological security in Jing-Jin-Ji Region, China

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### Abstract

Based on ecological footprint, which has been extensively applied in recent years to quantitatively measure human pressure on ecosystems, this paper combined urbanization level with ecological tension index to analysis the impact of urbanization on ecological security. Jing-Jin-Ji region was taken as the study area, which is one of the most rapid economic regions in China. Firstly, the paper analysed urbanization level selecting per capita GDP, urbanization rate, non-agriculture payroll employment, household consumption, proportion of built-up land and energy intensity and so on. Then, ecological tension index, which was on the basis of the ecological footprint theory, was calculated to assess the ecological security. Finally, the relationship between urbanization level and ecological security was conduct to analysis the impacts of urbanization on ecological security. The result shows that the urbanization has a negative impact on ecological security. Economic structure and consumption structure should be improved so that the ecological security could be harmony with urbanization process. The study will provide academic references of ecological security analysis, sustainable development evaluation to our country and other fast-urbanizing regions in the world. As well as to offer the scientific basis and decision support for ecological construction in these areas.

### Key words:

urbanization; ecological security; ecological footprint; Jing-Jin-Ji region

## Impacts of Urbanization on Ecosystem services in Pakistan

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### Abstract

Ecosystem services research is a hot and key issues at home and abroad. With the intensification of human activities, the structure and function of ecosystem affected by the human activities are more profound. Urbanization is the most typical representative of the natural process of human interference, with the acceleration of urbanization, domain of landscape types and the landscape structure inevitable great changes, also inevitable of regional geophysical processes and earth chemical process and biological process produced a corresponding impact. It will inevitably affect the quality of the regional ecosystem services. Pakistan is located in South Asia, is China's land neighbors, and is "The Belt and Road" construction in key areas and start, also the target area of "Pakistan Economic Corridor" construction. With the implementation of "The Belt and Road" and Pakistan Economic Corridor", Pakistan will face a huge infrastructure construction and urbanization. Under this background, the research is of great significance to influence of Pakistan's urbanization construction of Pakistan ecological system. So this paper chooses Pakistan as the study area, using GIS as a platform, predict Pakistan land use change by DLS model. At the same time, application the InVEST model and combined with land use types and other factors, conduct an in-depth investigation on ecosystem services in Pakistan and realizes spatial quantitative assessment of ecosystem services.

### Key words:

Urbanization; Land use/cover change; Scenario-based simulation; Ecosystem service

## Mapping dynamic and growth of class 1 cities in India

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### Abstract

Using the available source of census data on relevant context. This study examine the dynamic change and growth of class I cities in India. Over the last decade it has been observed that the population of class I cities increasing as compare to other class at very high proposition. The reason behind this may be urbanization process and employment opportunities in the cities. Using secondary census data sets of (Town directory) 2001 and 2011 respectively with the several indicator like hospital facilities, infrastructure (road, railways, availability of government and Private College, and other facilities etc.). However allocate the actual location and identify the regime of urban process with the help of ARC GIS tools and technique. Mapping the growth of class I cities will be helpful for town or urban planner as well as government body to apprehend the real change of urban dynamic. Result indicate that there are some class I cities have better advancement of facilities attract more number of people. 264.9 million Persons, constituting 70% of the total urban population, live in these Class I UAs/Towns. The proportion has increased considerable over the last Census. Million plus UAs/Towns: Out of 468 UAs/Towns belonging to Class I category, 53 UAs/Towns each has a population of one million or above each Known as Million plus UAs/Cities, these are the major urban centres in the country. 160.7 million Persons (or 42.6% of the urban population) live in these Million plus UAs/Cities. 18 new UAs/Towns have been added to this list since the last Census.

### Keywords:

Dynamic and Growth; Cities; GIS

## **Patterns of household transport and domestic energy consumptions and policy implications, a perspective of fast developing City**

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### **Abstract**

There have been numerous studies in the literature on urban household energy consumption in Chinese cities but very few studies are focused on the interactions between household transport and domestic energy consumptions and particularly at micro level. This study, to fill the gap defined above, is based on a large-scale household questionnaire survey conducted in 2010 across Wuhan city that is a mega city in Central China. 1200 questionnaires, based on a stratified random spatial sampling strategy, were validly collected and processed with numerous items included, such as demographic, travel, domestic energy spending, employment, spatial proximity, local environment, and neighbourhood. First of all, both transport and domestic energy consumptions at household level are estimated for the entire survey population. Second, the statistical and spatial patterns of each type of energy consumption and their relationships are analysed using statistical and GIS (geographic information system) methods, aiming to detect any hidden interaction and differentiation. Third, all the households are classified into four categories (high in transport and domestic, high and low, low and high, and low and low). The different demographic, economic and environmental determinants between the four categories are modelled to reveal the roles of these factors in shaping the interaction patterns. All these results are utilized to analyse the policy implications for urban planning and management, and examine if Chinese cities demonstrate different patterns of energy consumptions from the developed countries. These may contribute to the global understanding of urban energy and transport poverty.

### **Keywords:**

household transport consumption; household domestic energy consumptions; spatial pattern; transport poverty; Wuhan; GIS

## Rethinking Sustainability in a More Urbanized World: Comparison in “BIC”

### Countries

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### Abstract

The urbanized world has brought social, economic and environmental sustainability into more challenged surroundings which necessitate the exploration on their intertwined relationships, in the rapidly rising countries in particular. In our study, we used Brazil, India and China as “BIC” countries to be our representative study areas for the investigation of sustainability in the context of rapid urbanization. In general, we synthesized our studies into a comparison framework from four aspects: rural-urban relation, industrial development, city development and urban landscape pattern. Through the exploration of the trajectories of urbanization and related sustainable issues in these three countries, distinguishing features are revealed for comparisons and policy implications. We found that urban-rural dichotomy exists in all these countries with India and China to a higher degree. China is revealed to be manufacturing-based in the past half-century whereas service sector turns out to be the primary industry in Brazil and India. The distribution of large cities follows regional pattern with Brazil northeast-focused and China southeast-focused whereas it is comparatively balanced in India. The Amazon forest in the north brings great challenges to Brazil with respect to the conservation of the biodiversity and eco-environment. India and China encounter with tremendous urban expansion/sprawl in the past several decades and the loss of arable land has made food security a critical issue for the large and growing population. In the end, we summarized the sustainability issues in social, economic and environmental aspect for Brazil, India and China in the context of rapid urbanization to provide references for other countries.

### Keywords:

Urbanization; Sustainability; Brazil; India; China

## **Songdo (South Korea), a mega-project in the making: residential neighborhoods of an urban utopia**

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### **Abstract**

Near Seoul (South Korea), a new city emerges on a vast reclaimed zone from the sea: Songdo, a mega-urban project that is to house about 200 000 inhabitants by 2020. In the globalized competition of large metropolises and global cities (Sassen), this new “International City” is part of the South Korean public policies that try to promote the Seoul capital region as a major hub in North East Asia. The development of Songdo also derives from the opening to foreign investments that followed the financial crisis of 1998 and is at the core of so-called “IFEZ” (Incheon Free Economic Zone). In the programmatic or analytic discourse of planners and developers, Songdo appears as an urban utopia of the 21st century, combining digital technologies (“U-City”, “smart city”) and sustainable development (“green city”). Today, over 70 000 people already settled in – and live between construction sites, brand new skyscrapers, or a public space often referring to foreign locations (the “Central Park”).

This paper intends to expose the preliminary findings of a research aiming at discussing the process of place construction in a mega-project considered typical of Asian contemporary urban development within globalization (KIM Jun-Woo & Ahn Young-Jin 2012). Anchored in the perspective of cultural geography and grounded on ethnographic research crossing planning narratives with dwellers’ residential trajectories, it will particularly focus on the production dynamics of residential neighborhoods where the planning of housing and public facilities meets the actual practices of the pioneering residents of the new city.

### **Key words:**

Korea; Songdo; megacity; mega-project; capital region; globalization; residential neighbourhood; housing

## Spatial patterns of urbanization at the prefectural level in China, 2004-2013

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### Abstract

It has been reported that, from 1970 to 2000, China had the highest rates of urban land expansion in the world, ranging from 13.3% for the coastal areas to 3.9% for the western regions annually. Although China accounts for less than 20% of the global urban population at present, close to one third of the global urban population growth between 2000 and 2010 was realized in China.

Because of the rapid rate of urban land expansion and its implications in China, compact city and sustainable urban growth has also received attention in the literature (e.g., Chen et al., 2008; Zhao et al., 2011).

Urbanization has been linked to a variety of resource and environmental problems worldwide such as habitat loss, species extinction, land-cover change, and alteration of hydrological systems (Seto et al., 2011). In China, because large amounts of agricultural lands have been converted to urban land use, food security can also become an important issue in the future (Angel et al., 2011; Wang and Fang 2011).

Our presentation proposes different methods for measuring and modelling urban sprawl (urban expansion rate and intensity, weighted expansion intensity etc.) using built-up area data on prefecture level from 2004 and 2013. Comparison of different growth speed of population and built-up area on prefecture level in China provide a picture about sustainability of urban growth and we can understand better the development stages of urban land use intensity on the coastal, central and western regions of China.

Urban land expansion (UR) measures the average expansion rate in a given time period (Schneider and Woodcock, 2008; Seto et al., 2011; Xu and Min, 2013); urban expansion intensity (UI) quantifies the average expansion intensity in a given time period (Schneider and Woodcock, 2008; Seto et al., 2011; Xu and Min, 2013); population growth rate (PR) measures the average growth rate in a given time period; population growth to urban expansion ratio (PU) is the ratio of PR to UR; and urban population density (PD) is calculated by dividing the total urban population divided by the total built-up area (i.e., urban land) in a year. We are using hot spot analysis to understand the different spatial pattern of built-up area and population growth on prefecture level in China.



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To understand the processes on closer range, we will also cover case studies of selected cities from the coastal, central, and western regions. As urbanization continues at a fast pace in China, the findings from this comparative study can help us better understand urbanization and sustainable urban growth in different parts of the country focusing on urbanization and sustainable urban growth in different parts of China.

**Keyword:**

urban land expansion, spatial patterns, prefectural level, regional level, sustainable urban growth



## Study on Ecology Efficiency in Rapid Urbanization Area

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### Abstract

With the rapid development of urbanization in China, spatial problems such as deterioration of ecological environment, unbalanced development between the urban and rural areas are getting increasingly serious, becoming the major obstacles of sustainable development. How to obtain the biggest economic and social benefits with the minimum ecological loss is an important basis for optimizing development of national spatial territory. Taking Hubei province as the study area. This is a link-up between land use and economic benefits from the perspective of ecological efficiency. We consider the NDVI as the ecological variable by utilizing cross-sectional data in county scale. Based on SFA (Stochastic Frontier Analysis), we not only make measurement on ecological efficiency, environment performance index and total factor productivity but also quantify the relationship between the land use ecosystem service which aims to analyze the interactive mechanism and balance their conflict. Research results can provide reference for socio-economic development and sustainable development of territorial resources.

### Key words:

Ecology Efficiency; Rapid Urbanization Area

## Study on economic development model of Ordos

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### Abstract

Mineral resources are occupying dominant in the process of industrialization and urbanization in terms of city development law. Ordos, with the enrichment of mineral resources, which located in the southwest of Inner Mongolia in China, with the help of the opportunity of the national macro-economic policy and the domestic coal market integration, realized the leap forward development of Ordos economic. This article analysis the relationship among economic development of Ordos, national macro-economic policy, resources development, informal finance and estate with the methods of document inquiry, statistical analysis, comparative analysis and field tripping. Finding that it has formed a giant circle of funds among the private lending activities, resources development and estate, and the industrial structure is excessively single, it exists huge risks of economic development, and had fall into the dilemma of financial crisis. Future Ordos will has a new development cycle through the transformation of economic structure, the sustainable development and use of coal and nature gas, and the development of coal gas and Shale gas in Ordos which resources are so rich.

### Keywords:

model of Ordos; resources; economic transformation; urbanization

## Supporting the Development of China's Urbanization: A Review of Trends and Knowledge Gaps in Urban Studies

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### Abstract

The magnitude and extent of China's urbanization is unparalleled anywhere in human history. Studies of the nation's urbanization have consequently caught the interest and close attention of international and domestic researchers, Chinese officials, and the public. The objective of this review paper is to synthesize the key findings and gaps in knowledge concerning China's urbanization and environmental change as revealed by projects funded by scientific foundations since 2010. This review provides an additional channel for examination and communication as well as a fresh, comprehensive, and timely insight into urban studies in China beyond the more conventional review mode involving journal publications. The review demonstrates that urbanization and environmental studies projects funded by China have made considerable contributions in the categories of urban transportation, spatial dimensions, processes, and mechanisms of urban development, as China experiences rapid and early-middle stage of urban development. In spite of the fact that a "people-centered" urban development pathway has been highlighted in China's New-type Urbanization Plan, research on the quality of life in urban areas is very limited. The review also indicates that it is imperative to systematically examine the coupled natural-human urban system beyond the individual case studies. The prevalent specific-problem-oriented way of thinking in Chinese studies should be transitional to a systematic way of thinking and the adoption of comprehensive strategies from multiple perspectives to tackle the problems. The findings should shed light on current and future urban development and issues not only in China but also in other rapidly urbanizing countries.

### Key words:

Review; Trends; Knowledge gaps; Urban studies; China

## The study on ecological sustainable development of Chengdu

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### Abstract

Since the concept of sustainable development of urban was put forward, quantitative measurement of urban sustainable development has become one of the main research contents of relevant scholars in various countries. Ecological footprint method is one of the most important cases in it. However, the traditional ecological footprint method focuses on the static measure of the sustainable development of the city at the present stage, and it can not to predict the development of ecological footprint dynamically. At present, the trend prediction method has not considered the impact of economic development to the calculation index, which leads to inaccurate prediction results. And in this study, we using the traditional ecological footprint method to calculate the ecological footprint supply and demand of Chengdu in 2013. And considering the impact of economic development on the selected indicators, we using the system dynamics (SD) software STELLA to predict the ecological deficit of Chengdu city in 2013-2021, which results shows that the degree of ecological deficit in Chengdu was reduced from 1.43 million  $\text{hm}^2$  to 1.24 million  $\text{hm}^2$  in 2013-2018. And after 2018, it began to increase, which is 1.32 million  $\text{hm}^2$  in 2021.

### Key words:

Ecological footprint; Chengdu; STELLA; Sustainable development; System dynamics

## UrbanDevelopment in Uganda: Causes, Process and implications

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### Abstract

Uganda is the world's second most populous landlocked country in East Africa which is the only region where the population is projected to keep increasing throughout the 21st century. Uganda is one of the countries which have the lowest level of industrialization and its urban population will increase from six million in 2013 to over 20 million in 2040. About 60% of the population still lives in the countryside with a poor life, less employment opportunity, low per capita income and poor infrastructure, thus a large number of rural population rushed into cities to seek more job opportunities. With expanding built-up area and rising urbanization rate, Uganda becomes one of countries with the fastest urbanization process in Africa. However, lots of problems need to be solved in the process of urbanization in Uganda. Our research indicates shows there is an urgent need for decision makers in Uganda to act now to ensure that this rapid population and urbanization are managed well to grantee its sustainable and inclusive development.

### Key words:

urbanization; urban development; Uganda

## Urban Transition in West Bengal, India: ‘Polarization Reversal’?

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### Abstract

Contemporary urbanization in India is in transition which along with the continuation of ‘top heavy’ urban structure and gradual deindustrialization is characterized by faster growth of informal employment, declining trend of urban-ward migration of the males, slowing down of the growth of cities and towns and emergence of new urban centres among others. Given this backdrop, the paper, in relation to the ‘polarization reversal’ theory, examines the contemporary processes and emerging form of urban transition in West Bengal which has a longstanding history of ‘mono-centric’ urbanization. The study is based on secondary data about urban population, migration, employment and unemployment situations, industrial dynamics and investment patterns collected from various sources like population census, National Sample Surveys, Annual Survey of Industries and Centre for Monitoring Indian Economy’s CapEx database. It reveals that the demographic process and emerging form of urbanization indicate a tendency towards ‘polarization reversal’ where large cities are growing at slower rate than the towns and a polycentric urban system is emerging. But the underlying factors of this transition are not associated with similar dispersion of economic activities and employment opportunities away from the metropolitan core and its immediate surroundings as prescribed in the above mentioned theory. Thus, the contemporary urban transition in the state reflects a pseudo ‘polarization reversal’. Furthermore, the study is sceptical about the significance of this emerging form of urbanization fuelled by the growth of small cities and towns which have weak economic base, crisis of urban governance and inadequate access to basic amenities.

### Key words:

‘polarization reversal’; polycentric urban form; census towns; deindustrialization; urban governance

## The role of greenspace in regulating land surface temperature in the megacities of Southeast Asia

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### Abstract

Urban greenspaces (e.g. forests, grasslands, etc.) are the main ‘provider’ of various urban ecosystem services, including their role in mitigating urban heat island effects. This study aims to examine the role of greenspace in regulating land surface temperature in the megacities of Southeast Asia (Bangkok, Thailand; Jakarta, Indonesia; and Manila, Philippines). Specifically, it aims to determine the relationship between the mean land surface temperature and the density of greenspace and impervious surface based on grids and along the urban-rural gradient. Landsat 8 imagery and geospatial techniques (multiresolution grid-based and urban-rural gradient analysis techniques) were used to facilitate the analysis.

### Key words:

land surface temperature; urban heat island; greenspace; remote sensing; spatial analysis; ecosystem services; Southeast Asia

## Study on population - economy - space perspective of space-time evolution of urbanization in Shandong province

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### Abstract

Urbanization, is a "population - economy - space" 3 d integration process, and its internal coordination or not is the key to sustainable urban development. Based on the retrospective analysis of the existing about the quality of urbanization, the urbanization, the urbanization process of each subsystem, on the basis of related research, from the economic urbanization, population urbanization, space urbanization three dimensions and its related relation, establishes the evaluation system of urbanization. This article selects 2006, 2013, two years of data, using the mean square error method and coupling analysis method, studies the Shandong province coupling coordination degree of population, economy, urbanization and the temporal and spatial evolution. The research results show that the urbanization level of Shandong province has rapidly developed in recent years, but the current is still in town into a dominant population, in the stage of rapid development of urbanization. Urbanization degree of coupling in urban systems, but the coupling level is not high. It is still in the stage of development of antagonism, and gradually tend to be coordinated development. However, in the west of Shandong Liaocheng, Heze, development level, degree of coupling between subsystems there is still a large gap compared with the eastern cities. Finally, from the scientific planning and population development, economic development, urban space in Shandong province using four aspects proposed "the population - economy - space" the coordinated development of the related countermeasures.

### Key words:

The population - economy - space urbanization; The evolution of time and space; The coupling coordination; Shandong province

## **Territorial strategies of the Madrid Metropolitan Region universities: the establishment of business schools and MBA offer**

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### **Abstract**

During the last years, educational offer has significantly grown in the Madrid Metropolitan Region. The increase number of private universities and centres is to be highlighted, accompanied by a dynamic of segregation with regard to public and private universities. In this context, the growth of private business schools, addressed to specific social groups of the Madrid Metropolitan Region, reinforces the “elite” aspect of this offer.

The localisation of these private business schools will be analysed. They are usually a) around the more valued areas in the city centre and the metropolitan region (North and West); b) in coincidence with the localisation of the private universities of the metropolitan region.

As regards to MBAs, concurrence is even stronger, as some public universities seek to offer these prestigious courses. It will be analysed if the localisation of public and private MBAs register the same segregation process of the one identified between public and private universities.

### **Key words:**

Territorial strategies; Universities; Segregation

## Urbanization and Sustainable Development

### Developmental Dilemma in the Third World Cities



Home

#### Oral

1. [Functional and Spatial Transformations of City Nodal Areas \(Kyiv, as an Example\)](#)  
Olena Dronova; Dmytro Poleshko (Taras Shevchenko Kyiv National University, Ukraine)
2. [Modernizing Urban Villages In Transportational Corridors: A Study In Delhi, India](#)  
ANJANA MATHUR JAGMOHAN (Assistant Professor, Department of Geography, Dyal Singh College, University of Delhi, India); JAG MOHAN ARYA (Assistant Professor, B.R. Ambedkar College, University Of Delhi, India)
3. [Spatial Expression of Inequalities in Kolkata city: the Political Economy Perspective](#)  
Sohel Firdos (Sikkim University, India)
4. [Strategy for Municipal Solid Waste Management for Class II Towns of Uttar Pradesh, India: A Case Study](#)  
Masood Ahsan Siddiqui; Lubna Siddiqui (Department of Geography, Jamia Millia Islamia, India); L. Mirana DEVI (Department of Geography, Shaheed Bhagat Singh College (Evening), Delhi University, India)
5. [The Addis Ababa Urbanism: Poverty and Momentum](#)  
Elena Givental (California State University, East Bay, United States)
6. [Urban Sprawl and Transport Blockages in Developing World: A Case Study of Ranchi City in India](#)  
SURAJ PRASAD; ANJAN SEN (University of Delhi, India)

#### Poster

1. [The Viability and Necessity of Smart City in the Third World](#)  
Jiang Qiongyu (China, College of Earth Sciences, Chengdu University of Technology); He Zhengwei (China, Key Laboratory of Land and Natural Resources to Spatial Information Technology); Zhu shu (China, College of Earth Sciences, Chengdu University of Technology)
2. [Urban Services Provision in the Peri-Urban Areas of Faridabad City, India: Issues and Challenges](#)  
Bhawna Bali (India, TERI University, New Delhi)

## Functional and Spatial Transformations of City Nodal Areas (Kyiv, as an Example)

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### Abstract

In this paper we propose our conception of city nodal areas (CNA) and how neoliberal globalization changes them. CNA is a territory which plays the leading role in the urban structure because of processes, essential for city vital functions are focused there. These are cross roads of material and spiritual ways, people streams and traffic roads, information and communication links, meeting centers of different ownership interests, places where conflicts are occurred and resolved. The processes intersection leads to the concentration of specific functions (transportation, cultural, social, management, communication, etc.). We outline the main features of CNA. They include: pedestrian and transport accessibility, historical formation, individuality, specialization, attraction to any kind of activities, social value domination, a high risk of conflicts and self-development. Some CNA has therealization function and becomes the spiritual center of the city (L.Mumford). Theoretically, because of the historical significance, CNAs have to acquire more cultural and symbolic value. However, we select and analyze the 6 types of CNAs in Kyiv and discover functions replacement and constant dynamic spatial changes there. Neoliberal urban functions displace less relevant for business ones. Service and commercial functions, spatial homogenization and loss of public spaces inherent for most number of Kyiv CNAs. Luxury mall Mandarin Plaza in the city center caused the social fragmentation. The distinctive identity of Kyiv depends upon CNAs, but these spaces are the most vulnerable now. Citizens should perceive their right to the city and responsibility for its development towards future generations.

### Key words:

City nodal area; urban structure; spatial transformation; distinctive identity; neoliberal functions; spatial homogenization; cultural value

## Modernizing Urban Villages in Transportational Corridors: A Study in Delhi, India

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### Abstract

Urban villages, located along the major transport corridors in Delhi are perpetually in a stage of transition. Villages that are part of the proposed urban extension area or fall within the existing urban area, also faces the threat of losing their character or identity due to the market forces. The urban villages of Delhi carry 5-6 times more the population density than the non-village areas and caters for mixed land use, with residential, commercial and also, industrial (small or household industries), based on the demands of the surrounding localities. "Unfortunately, the urban villages suffer from a lack of infrastructure such as sewerage, water, power supply - due to non development of infrastructure within these areas. The acuteness of the situation is magnified by the high population densities, and leads to horrible living conditions during periods of seasonal stress as in high summer or heavy rains." (Hindustan Times, 24 May, 2003, hindustantimes.com). The study area of east Delhi is very vast. There are national highways passing through it (GT road cuts it through the middle). But accessibility to the villages varies from area to area. Three villages form the study area have been chosen to show case the transition of a rural area into a totally urbanized village due to the dominating role played by the proximity to metalled roads. The three villages - Badarpur Khadar, Garhi Mendu and Shamaspur Jagir- represent the three stages development of a village into an urban area respectively- its rural stage; the middle stage and the totally urbanized stage. The locations of the villages are slightly away from the main road, slightly away but an important road passing through it; and the third village is located on the main National Highway 24. It is a totally urbanized village with little or negligible agricultural land remaining. The paper highlights the unmistakable differences in the skylines, landscapes and the resident socio-economic character of the population brought out through personal interviews and pictures. The paper also tries to suggest policy decisions so as to level out the differences in villages and their planned overall development. Keywords: transport lines, differential urban transformation.

### Key words:

Urban villages; converting land uses; transportation lines

## Spatial Expression of Inequalities in Kolkata City: the Political Economy Perspective

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### Abstract

Anyone who moves through cities, not only knows that space organises and strengthens inequalities between urban areas, but also can observe the contrast between the rich and poor within them, perhaps more so than even before. In this paper, we discuss about inequalities and their spatial expressions - segregation in Kolkata, one of the largest metropolitan cities located in the eastern part of the country. We introduce the vertical and horizontal paradigms for understanding social structure in this city. Then, we discuss segregation, suburbanisation, gentrification and ghettoisation theories as they aim to explain the spatial expression of stratification in contemporary cities. We show also how these processes have created similarities among social strata across cities in various parts of the world and huge distances between them within cities. As we see, the vertical paradigm points us to socio-economic status hierarchies, now often expanded to include not just income or assets but also forms of social, economic and political capital, resulting in a perspective of capabilities and resources informed by scholars such as Amartya Sen. We note that the spatial expression of inequalities in Kolkata was initially the product of colonial urbanisation but subsequently has been strengthened by capitalism, including its supportive patriarchy, and government as supporting the capitalist system. Subsequently, we employ socio-spatial perspective to ask what role economic, political and social institutions play in creating and changing settlements, and through what processes they are given meaning by local residents.

### Key words:

Spatial expression; inequality; Kolkata; political economy

## Strategy for Municipal Solid Waste Management for Class II Towns of Uttar Pradesh, India: A Case Study

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### Abstract

The economic development, urbanization and improved living standards in cities increase the quantity and complexity of generated solid waste. If accumulated, it leads to degradation of urban environment, stresses natural resources and leads to health problems. The study deals with management of solid waste in an emerging class II town of Uttar Pradesh, India. The focus of the study is to examine the existing solid waste management system and to estimate the municipal waste generation per head per day in Akbarpur town with the aim to identify suitable sites for waste disposal. The spatial and non-spatial data has been obtained from Survey of India and Census of India respectively. The primary data regarding income, solid waste generation, collection, transportation and disposal has been collected through ward wise household sample survey with the help of structured questionnaire. For the identification of new disposal site constraints mapping was done to minimize the search area. The study illustrates that the town generates about 18 tons of waste daily i.e. 206 grams per head per day. The collection and disposal efficiency is quite low. The civic agency has been collecting and unhygienically disposing about 55 per cent waste. There is neither a defined landfill site nor transportation route. The waste is generally dumped in ditches along roads and low lying areas. Two engineering dump sites have been identified and subsequently collection and disposal routes are identified. It has been estimated that if the proposed plan is implemented the collection and disposal efficiency will be increased by 75 per cent.

### Key words:

solid waste; constraint mapping; landfill site; route planning

## The Addis Ababa Urbanism: Poverty and Momentum

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### Abstract

Addis Ababa, the capital of Ethiopia, the tenth largest city in Africa, is the indigenous African creation in the country that had never been colonized but endured almost two decades of a violent military regime implementing a command economy. Most research on African urbanism is conducted from the perspective of post-colonial development in the conditions of neoliberal globalization. Though Addis Ababa provides a research fabric for different path dependence, it demonstrates urban attributes typical for the majority of urban areas in the developing countries, such as high slum incidence, informalization, and vast income inequality. On the other hand, Addis Ababa is a vibrant evolving metropolis that is an epitome of 21st century African momentum. The convergence of Addis Ababa's urban traits with those of many post-colonial African cities indicates a possible link between the production of poverty and poor governance in non-democratic authoritarian regimes resulting in lack of investment in public housing and infrastructure. While Addis Ababa's urbanization creates a positive uplifting momentum for Ethiopia, country-wide economic and city-specific urban policies are required for poverty reduction. The author's recommendations include increased investment in residential construction and infrastructure, promotion of foreign direct investment, and creation of jobs in manufacturing sector.

### Key words:

Addis Ababa; urbanism; slum incidence; informalization; foreign direct investment; infrastructure; urban policies

## Urban Sprawl and Transport Blockages in Developing World: A Case Study of Ranchi City in India

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### Abstract

Post-liberalisation, India has witnessed high economic growth associated with rapid Urbanisation. However, urbanisation in India has more been a product of haphazard rural to urban migration than some planned growth of urban area. This has given rise to the phenomena of Urban Sprawl. Urban sprawl is a multifaceted concept, which includes the spreading outwards of a city and its suburbs to the low-density, auto dependent outskirts, that encroach upon rural land and encourages car dependency. However, urban sprawl without proper planning, and devoid of good transport infrastructure, results into traffic congestion and bottleneck and other transportation issues. The present study will assess the pattern of urban growth in the previous decade and find out the planning gap through the case study of Ranchi district. Since becoming the capital of the newly formed state of Jharkhand, Ranchi has witness rapid economic and urban growth that has turned the small town of Ranchi into an urban behemoth of Jharkhand. The objective of this paper is to determine the specific impact of urban sprawl on daily life in Ranchi by assessing the Land Use / Land Cover change in Ranchi through LANDSAT images of 1995 (TM), 2005 (ETM+) and 2015 (OLI), and to find out the measures that should be taken to tackle these issues efficiently and in a cost effective manner.

### Key words:

Urban Sprawl; Transportation; Migration; Ranchi

## The Viability and Necessity of Smart City in the Third World

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### Abstract

Smart City is the advanced stage of urban informatization development following the digital city, which is designed for people to create a better living environment and for the benefit of mankind. With the development of science and technology, the realization of digital city and the emergence of the combination of Internet, Internet of things and other network and cloud computing make the construction of smart city possible. The third World refers to more than 130 developing countries in Asia, Africa and other regions. For developing countries, almost cities are in a state of sprawl. Through a summary of previous researches, we realized that the urban sprawl tends to stimulate economic growth and the improvement of social living standard. But at the meanwhile urban sprawl has brought about a series of problems: the large area disappearance of arable land and greenbelt, river pollution and other environmental problems, thus people have to be faced with the increasingly severe headaches of the world, like resource constraints, environmental pollution, population growth, traffic congestion and etc. The smart city is a kind of powerful weapon to solve the problems above. In this paper, to solve traffic congestion, we divided the development of intelligent transportation into three stages: traffic Internet based (primary), traffic intelligent(intermediate), auto-pilot(advanced)by combining analysis of the Internet technology, networking, GIS, RS, big data and communications technologies. And we also describe the objectives with their viability and dependent technique at each stage respectively.

### Key words:

Smart city; The third world; urban informatization development; Urban sprawl; traffic congestion; intelligent transportation

## Urban Services Provision in the Peri-Urban Areas of Faridabad City, India: Issues and Challenges

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### Abstract

Cities in the Third World are on account of rapid urbanization are expanding and encroaching upon the surrounding rural areas, thereby, obscuring the distinction between the urban and rural. Villages at the periphery of large cities whose agricultural lands have already been acquired and the villages which are facing imminent acquisition of their agricultural land are witnessing transformations in their socio-economic, cultural and natural environments. The study aims at examining the existing situation of urban services, and governance issues in selected peri-urban areas of one of the major industrial cities in north western India and soon to be developed as a smart city in the State of Haryana-Faridabad. The study is based on secondary data on the household amenities and facilities, and field work based information generated through semi-structured interviews and discussions with peri-urban residents on urban services provision. The study identifies that unregulated building activities within and outside the *abadis* (inhabited areas) proliferate to the detriment of healthy living conditions, in particular the provision of basic services. The heightened focus on the Smart Cities Mission and in making India clean under the Swachh Bharat Abhiyaan, it is expected that the peri-urban areas will receive attention of planners, policy makers and implementing agencies.

### Key words:

Peri-urban; governance; urban services; Smart Cities Mission; Swachh Bharat Abhiyaan

## Urbanization and Sustainable Development

### Urban Climate and urban planning



Home

### Oral

1. [Analysis of the effects of Urbanisation on the microclimate of Lagos, Nigeria: Perspective on Urban Heat island](#)  
Vincent OJEH (WASCAL GRP WACS, Federal University of Technology, Nigeria; Department of Meteorology and Climate Science, Federal University of Technology, Nigeria), Ahmed Balogun (Department of Meteorology and Climate Science, Nigeria)
2. [Cities and Climate Changes](#)  
Morteza Ghourchi (Assistant professor of Shahid Beheshti university of Iran, Iran), Roghayeh Samadi (Master student of Shahid Beheshti university of Iran, Iran)
3. [Heat Vulnerability and Adaptation Solutions for Shenzhen](#)  
Miaomiao Xie (China University of Geosciences, China), Yun Gao (China University of Geosciences, China), Yucong Tang (China University of Geosciences, China)
4. [Mitigating potentials, the Urban Heat Islands effect in Esfahan](#)  
Aliakbar Shamsipour (Faculty of Geography, University of Tehran, Iran), Ehsan Navaei Borujeni (Faculty of Geography, University of Tehran, Iran), Hossein Mohammadi (Faculty of Geography, University of Tehran, Iran), Saeid Hamzeh (Faculty of Geography, University of Tehran, Iran)
5. [Parisian eco-districts: Low energy and "affordable" housing?](#)  
Elise Machline (Ben Gurion University, Israel)

### Poster

1. [Mapping the Historical Changing Wind of Open Spaces: Case Study of Nanjing, China](#)  
Lingyun Han (China, Jiangsu Second Normal University); Zhen Xu (China, Nanjing Forestry University)
2. [Simulation of Airflow Around Xi'an City Wall and Ventilation of Surrounding Residence Using CFD](#)  
QIAN LU; LU YANG (China, Tsinghua University)

## Analysis of the effects of Urbanisation on the microclimate of Lagos, Nigeria:

### Perspective on Urban Heat island

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#### Abstract

The study of Urban Heat Island (UHI) is important as it affects health, comfort and energy consumption in urbanized areas as the city's temperature is modified by the human activities. In this study, the hourly temperature differences between City Hall (urban) and Okeafu (rural) in Lagos, Nigeria were calculated using one year of meteorological observation, from June 2014 to May, 2015. The two sites were carefully selected to match the exact representative of their climate zones. Results on the Lagos UHI shows that it varies with days of the week, seasons, solar radiation, direction and speed of wind as well as noon and midnight conditions. The UHI exists throughout the day in the rainy season but both the UHI and Urban Cool Island (UCI) occurs during the day and night respectively in the dry season and in the pre-rainy/dry season transition months. The UCI occurs between 5-6 hours in the afternoon in the dry season and transition season. During weekdays heat island intensity of 7.0°C at midnight on Fridays and as high as 8.3°C early morning on Mondays have been observed. The heat island effect is observed at midnight in all months of the year with the maximum of 6.5°C in January (dry season) and minimum of 0.7°C in June (rainy season). However, at noon, both the UHI and UCI effect were observed.

#### Keywords:

Temperature Difference; Urban Climatology; Heat Island; Lagos

## Cities and Climate Changes

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### Abstract

Urbanization has enormous environmental consequences, both global and local. Already city dwellers are thought the responsible for up to 70% of the world's greenhouse gas emissions. Sprawling urban development consumes arable land and vital green spaces. Growing numbers of city residents put pressure on energy and water resources, waste management, sewer systems, and transport networks. Therefore, in order to tackle climate change, avoid lasting damage to vital ecosystems and improve the health and wellbeing of billions of people, solutions to these problems must be sought at the municipal level. At the same time, environmental sustainability must go hand-in-hand with other important goals such as promoting economic development, reducing poverty and improving quality of life. Indeed, the green agenda is a necessary part of holistic, city-led strategies for economic, social and environmental sustainability.

### Key words:

environmental consequences; greenhouse gas emissions; green spaces; climate change; quality of life; green agenda

## Heat Vulnerability and Adaptation Solutions for Shenzhen

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### Abstract

With increasing evidence of global warming, many cities have focused attention on assessing heat vulnerability and its solutions. We developed a heat vulnerability index based on sensitivity, adaptability and exposure, which is suitable for a rapidly urbanized city in China. Different causes of high vulnerability were distinguished for choosing adaptation solutions. ASTER image, data of China Population Census-2010, standard land price etc are the data source of heat vulnerability index.

The results indicate that, urban heat vulnerability in Shenzhen western is medium and the value distributes uniform. Local spatial autocorrelation analysis reveals that the spatial distribution of heat vulnerability hot spots shows an aggregative pattern. In consideration of land use types, dominant factor analysis of heat vulnerability indicates: sensitivity is the dominant factor of heat vulnerability in the south of study area because this area lives much more extreme heat sensitive people. There is almost no large hospital in the area of Longhua center, so adaptability is the dominant factor in this area. Industrial park, aviation land, port, and logistics land is the main land use patterns in the west of study area. Western Industry Cluster which result higher impervious surface area and lower vegetation coverage, so exposure is the dominant factor in the western study area. These can provide reference for urban heat wave hazards mitigation and adaptation solutions.

### Key words:

Vulnerability assessment; adaptation; land surface temperature(LST); Local Spatial Autocorrelation Analysis; Shenzhen

## Mitigating potentials the Urban Heat Islands effect in Esfahan

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### Abstract

Urbanization has effect on urban microclimate through increasing air and surface temperature, which impact on increasing energy demand. Urban Heat Island is created when natural surface is replaced by manmade surfaces like Asphalt, Cement, paving. Today the urban heat island phenomenon is one of the greatest challenges, regarding the sustainability of cities and settlements. The first for detect heat islands Landsat-8 satellite images (OLI and TIRS bands) is used. Then, images of the Earth's surface temperature were normalized and these normalized images were divided into five categories of thermal class. At last, LST is obtained from Landsat-8 in daytime is compared on LST results of MODIS in nighttime. The results of processing images show in the cool season, city area has average temperature less than surrounding nature areas. During daytime, downtown in parts where the vegetation has been appropriate and minimum barren lands are obtained Lower temperatures and are showed cool islands. However, this pattern is vies versa at night so that city area is shown the formation of heat island. It seems UHI in cities are located in desert and arid climate zones have different pattern in comparison on the UHI in moist areas. With overlaying LST and Land use, were identified surface characteristics of lands is showing with high temperature. Bare-lands in the suburban area have high temperature in daytime, built up spaces, vegetation and water bodies recognised by low temperature. Nevertheless, on night built up spaces have inverse condition.

### Key words:

Urban Heat Island; Landsat; TM; MODIS; Esfahan; Iran

## Parisian eco-districts: Low energy and "affordable" housing?

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### Abstract

From the 1960's onward, many middle and working class households have left Paris. The deindustrialization of the city explains why many of the working class households have left it and are unlikely to come back. The middle classes, however, have been driven away by the city's high housing costs. To prevent Paris from becoming 'a city just for the "richest and the poorest", the new socialist city council (since 2001) has officially pursued a housing policy of social diversity. Social housing has been its main policy tool' The Municipality has become involved not only in its location, but also in its allocation. In France, public housing supply is legally mandatory and compared to international standards, the income ceilings for having access to it are very high. This allows to house families who have no need for state subsidy to access housing. Thus in working-class neighbourhoods, the Municipality is pursuing urban renovation policy and constructs social housing for the middle classes to replace sub-standard buildings previously populated by low-income populations. Furthermore, as part of its sustainable urbanism policy, the Paris municipality has implemented few eco-district projects called "ecoquartiers". In that national eco-district program, the neighbourhoods must meet environmental performance criteria, show potential for economic development and, provide social and functional diversity. Thus housing location and price must meet the needs of the residents. This paper attempts to explain how national policies aimed at providing housing and especially green housing to the poor and thus intended to prevent "greentrification" are subverted to serve specific Parisian goals of retaining the upper middle class in the city by providing it with green housing while promoting the "greentrification" of lower class neighbourhoods.

### Key words:

Eco-districts; social diversity; social housing policies; green buildings

## Mapping the Historical Changing Wind of Open Spaces: Case Study of Nanjing, China

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### Abstract

Climate is one of the prominent and persistent factors affecting the human settlement configuration. During the civilization especially the recent 100 years, human society has left remarkable environment footprints including those on the global climate. In the predictable future, human have to make adaptations to accommodate to the macro- and micro-climate changes that emerging globally and locally.

Besides the global vision, it's also essential for urban planning decision-maker to contextualize physical environment and climate changes mutually. The latter usually are due to local development rather than global changes, with the causality relatively easy to detect and measures necessary to take. Peculiar of loose fabric, the open spaces play important role as air shed and flow corridor, many of which are featured of such climatic amenity.

The microclimate especially airflow patterns inevitably be shaped by surrounding environments, which usually means agglomerated development and potentially affect the public life. Investigating such circumstance will provide knowledge for sustainable and reasonable urban design.

Based on modeling and simulation, this paper compares the instant winter and summer wind patterns of four predominant open spaces in Nanjing at 1930s, 1960s and 2000s. The results indicate that the airflow pattern complexity increased gradually, the outdoor comfortability degraded dramatically in some areas, the environment inequity may be deteriorated too. The researchers suggest to put climate issue firmly on the agenda of public policy, support the public involved in the evaluation and urban design code with technical and social assets, hence advance the social and ecologic sustainability of the open space and surroundings integrally.

### Key words:

open space; wind simulation; micro-climatic amenity; urban form; Nanjing

## Simulation of Airflow around Xi'an City Wall and Ventilation of Surrounding Residence Using CFD

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### Abstract

Xi'an City Wall was constructed in the 14<sup>th</sup> century Ming Dynasty. It is not only the most well-kept ancient China city wall to date, but the largest in scale among intact ancient military constructions in the world. With the fast urban expansion of the Xi'an city in recent years, however, the city wall has become the boundary between the inner and outer city and a part of the central city as well. With a height of 12 meters and a circumference of approximate 14,000 meters, the city wall could significantly disturb the airflow around them. Therefore, the low-rise high-density residence adjacent to the city wall could be largely influenced by their huge-volumeneighbour. The study of the airflow around the city wall is thus of great significance in terms of the relation between the urban wind environment and cultural heritage in Xi'an City. Airflow around Xi'an city wall is simulated using CFD technique in the aim of investigating the influence of the city wall upon the wind microclimate. Both 3d and 2d airflow simulations of wind flow are conducted and the results from the research scenarios are used for the analysis of air velocity and pressure distribution. Based on the overall research findings, recommendations for the future low-rise residential design in surrounding areas will be provided for a better urban wind microclimate.

### Key words:

Xi'an City Wall; airflow; CFD; urban microclimate; ventilation; residence

## Urbanization and Sustainable Development

Urbanization, global environment change and city sustainability



Home

### Oral

1. [A case study: Evaluation of the groundwater quality in shallow and deep aquifers](#)  
Battuya byambaa (Institute of Geography and Geocology, Mongolian Academy of Sciences, Mongolia)
2. [Climate Change Adaptation in Developing Countries of Southeast Asia: Challenge and Opportunity](#)  
Nurrohman Wijaya (Institute of Technology Bandung, Indonesia)
3. [Climate Change and Human Mobility: An Urban Intervention](#)  
Leonie Tuitjer (Durham University)
4. [Climate Change And Insurgency-Induced Migration And Its Implication For Sustainable Development: Case Of Lagos Megacity, Nigeria](#)  
TAI OYEKAN (National Population Commission, Lagos, Nigeria)
5. [Effects of urban impervious surfaces on land surface temperatures: Spatial scale dependence, temporal variations, and bioclimatic modulation](#)  
Qun Ma (Beijing Normal University, China), Jianguo Wu (Arizona State University, United States), Chunyang He (Beijing Normal University, China)
6. [Examining Urban Tree Health using High Resolution Worldview-2 Satellite Image in Hong Kong](#)  
Qiaosi Li(The Chinese University of Hong Kong, HongKong SAR, China)
7. [Growth of Industries and its future with reference to Land Acquisition in Peripheries of Large Metropolitan Cities of India](#)  
Pallabi Guha (Jawaharlal Nehru University, India), Veronica Gomes (Jawaharlal Nehru University, India)
8. [Research on the Development of New-type Urbanization in Chongqing from the Four-dimensional Perspective of PILE](#)  
lin zhang (Sun Yat sen University, China)
9. [The influence of population aggregation on urban air pollutants' concentration: Based on 159 prefecture-level cities in China](#)  
Xue Yang (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
10. [Urban Heritage Conservation and sustainable development: A Geographical Analysis of Udaipur City of Rajasthan, India](#)

Vyas P. R. Paliwal V.S. (Mohanlal Sukhadia University, Udaipur, Rajasthan, India)

11. [World Resource Geography: The Present Status, Deficiency and Opportunity of China's Resource Geography](#)

Qinli Lu (Nanjing University, China), Xianjing Huang (Nanjing University, China)

## Poster

1. [A Comparative Study on the New Urbanization in the Eastern Coastal Provinces of China](#)  
Xiaoyue Sun; Jianlan Ren (China, Shandong Normal University)
2. [Analysis on Industrial Water-saving Effect of Jining City Based on the Structure and the Efficiency Factor](#)  
Na Jin (China, Jiangsu Normal University)
3. [Coupling Relationship between Urbanization Efficiency and Economic Development Level in the Northern Slope of Tianshan Mountains](#)  
Tingting Zhang; Yuee Cao (China, Xinjiang University)
4. [Density, Distance, Division: Analyzing Industrial Pollution Emissions of Yangtze River Delta from the 3D Framework](#)  
Chen xiaofei (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences);  
Liu guilin (China, Department of Environmental Remote Sensing and Geoinformatics, University of Trier);  
Zhang Luo Cheng (China, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences)
5. [Evaluation on Spatio-temporal Development and Coupling Relationship between Ecological Civilization Construction and Urbanization in China](#)  
Guo-hua Bi; Qing-yuan Yang (China, School of Geographical Sciences, Southwest University)
6. [Examining the Long-Term Bidirectional Relationship Between Urbanisation and Energy Consumption, and CO<sub>2</sub> Emissions in China](#)  
Kunlun Chen (China, Hubei University)
7. [Hotspots and Knowledge Base of Sustainability Science Research](#)  
Su Fei; Ying Rongrong (China, Zhejiang Gongshang University)
8. [Land Reform of the Dongguan Village-based Development](#)  
Haoran Jin; Shenghe Liu (China, IGSNRR, CAS)
9. [On the New Driving Mechanism of Urbanization Process: a Case Study of Wuhan City](#)  
Yanping Wen (China, China University of Geosciences)

10. [Potential Exposure of Vulnerable Groups to Air Pollution in Major Spanish Cities: a GIS-based Method for Assessing Environmental Justice](#)  
ANTONIO MORENO-JIMENEZ (Spain, Universidad Autónoma de Madrid)
11. [Research and Assessment of City Competitive in Wanjiang Urban Belt Based on Principal Component Analysis](#)  
Mu Fengyun; Li ShuaiQi (China, Chongqing Jiaotong University)
12. [Research on Spatial and Temporal Pattern of Healthy Urbanization Based on Status-Driving analyzing frame in Henan Province](#)  
Jingyu Liu; Qiong Song (China, College of Environment and Planning, Henan University)
13. [Rethinking of China's Population Urbanization and Land Urbanization Allometric Growth Based on the Structure](#)  
Botao WANG; Chengxin WANG; Xiangyu WANG (China, College of Geography and Environment, Shandong Normal University)
14. [Spatio-temporal Differences and Optimization Simulation of Safety Warning on Carbon Emissions in China](#)  
Peijun Rong (China, Henan University)
15. [Temporal and Spatial Variation of the Precipitation in Huang-Huai-Hai Plain from 1963 to 2012](#)  
Yanan LI (China, Henan University)
16. [The Pattern and Trend of China's Urbanization on Two Sides of Hu Huanyong Population Line](#)  
Mingxing Chen; Yinghua Gong (China, Institute of Geographic Sciences and Natural Resources Research, CAS)
17. [The Resource Environmental Capacity Evaluation Of The Pearl Island](#)  
Jieyi Lu (China, School of Geographic Science)
18. [The Spatial and Temporal Variation of Haze and Its Relativity in the Beijing-Tianjin-Hebei Region](#)  
Xuyang Zhao (China, Shijiazhuang University)
19. [The Sustainability and Conflicts of Urban Development \(on Example of Kyiv and Some Cities of Ukraine\)](#)  
Leonid Rudenko; Sergyi Lisovskyi; Eugenia Maruniak (Ukraine, Institute of Geography of Ukraine NAS)
20. [Urban Green Space as an Urban Heat Island Mitigation: Case Study of Shenzhen, China](#)



Ka Wai Leung; Jing Qian; Shu Hong Peng (China, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences)

21. [Vegetation Cover Dynamics Associated with Rapid Urbanization in Metropolitan Areas of East China \(1998-2010\)](#)

Weifeng Li (China, University of Hong Kong); Jiansheng Wu (China, Peking University)

## **A case study: Evaluation of the groundwater quality in shallow and deep aquifers**

Battuya B

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### **Abstract**

The essential and vital component of natural life support system is groundwater. The groundwater resources are being utilized for drinking, irrigation and industrial purposes. There are increasing problems with deterioration of groundwater quality owing to geogenic and anthropogenic activities.

Groundwater, being fragile must be carefully managed to preserve its purity within standard limits, especially in Mongolia. Because the scarcity appears in the spring season is proved by the monitoring of the ground water level. Therefore, to assess the quality for human well-beings, the groundwater from the shallow aquifers and deep aquifers.

We have measured pH, total dissolved solids (TDS), fluoride, total iron and electrical conductivity (EC) content of groundwater samples, which collected from the shallow and deep aquifers in the Southwest side of Ulaanbaatar, Mongolia. Related to the urbanization affect the shallow aquifers water of the study area have poor water quality than those of the bore-wells from the deep aquifers of the Tuul river basin in the alluvial zone. The result reveals the groundwater of both aquifers is found to be slightly alkaline in nature with an average EC value of less than  $500\mu\text{S}/\text{cm}$ . For the dug-wells, the observed average TDS was 317 mg/L, but pollution level unsuitable for human health besides 586 mg/L for the deep aquifers. In general, the concentration of EC and TDS in the groundwater of the shallow and deep aquifers reveals the shorter groundwater-rock-contact time. The study involved evaluation of groundwater quality both in shallow and deep aquifers in May and September 2015.

### **Key words:**

Groundwater quality; deep aquifer; pollution; urbanization

## Climate Change Adaptation in Developing Countries of Southeast Asia: Challenge and Opportunity

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### Abstract

During the last few decades, climate change (CC) phenomenon has significantly become a global environmental issue. Its impacts can be more perceived in urban coastal areas, especially in developing countries of Southeast Asia (SEA). To minimize the impacts, national governments and local authorities have given attention to climate adaptation planning. This paper investigates the challenge and opportunity of climate change adaptation (CCA) at national level in Indonesia, Vietnam, and Thailand, and at local level in several selected coastal cities. Case study approach is conducted. The results reveal that at the national level, CCA becomes more concerned to all respective state governments. Although in the beginning of planning and implementation, mitigation is further getting attention rather than adaptation. In most cases, plans for adaptation have focused on coping with or minimizing the impacts of future CC. However, available long-term climate projections may not be detailed or reliable enough to support an action plan. At the local level, the common situation has given an indication that the impacts of CC have been occurred. The adaptation planning is varied in each coastal city depending on the level of vulnerability and adaptive capacity as well as the institutional and financial capacity. Adaptation strategies should consider approaches to development that increase resilience to climate risks. In this context, CC becomes a key factor in sustainable urban development planning. Mainstreaming adaptation into urban development planning is therefore a main concern.

### Key words:

case study; climate change adaptation; Southeast Asia; urban coastal area

## Climate Change and Human Mobility: An Urban Intervention

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### Abstract

This paper seeks to engage with the evolving literature on the “climate change and migration” (ccm) nexus, by re-orienting the polarized debate towards examining the spatial imaginations and subsequent political consequence informing it. While previous reviews of the literature have mostly focused on highlighting the divergent views of *conceptualising the link* between climate change and migration as either causal/deterministic or complex/messy; this review seeks to focus on how the literature is informed by a particular *spatial imagination with political consequences*. It is argued that the ccm debates predominantly discuss urban centres either as sights of vulnerability and origins of out-migration, or as unproblematic receiving sights for economic integration of climate migrants.

Given the problems of uncontrolled urbanisation in many Asian countries, uneven development within the urban terrain, tight funds and political wariness of integration policies for internal or international migrants, and a growing effort to implement urban climate change adaptation/mitigation strategies in the continent, this paper seeks to start re-thinking the significance of the urban sphere in developing, testing and contesting politics and practices that relate to ccm. By redirecting the debates towards urban terrains, the ccm literature is assessed along wider debates of climate change adaptation, urbanisation and more mundane questions of everyday mobilities that are already shaped by changing climatic conditions in Asian cities.

The review proposes an urban intervention that involves a shift from empirical to qualitative methods and ethnographic research and illustrates the points argued with data collected during a six month research period in Bangkok, Thailand.

### Key Words:

Urban studies; climate change; mobility

## Climate Change and Insurgency-Induced Migration and Its Implication

### For sustainable Development: Case of Lagos Megacity, Nigeria

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#### Abstract

The causes and effects of recent migration to Lagos megacity and its implication for sustainable development are the objects of this research. The country is diverse geographically, culturally and ethnically with her North-Eastern Region being ravaged since last 7 years by a group called "Boko Haram" demanding full implementation of Sharia Law in a secular nation, bounded at that part by Cameroon, Niger and Chad. The negative impact of climate change already being felt in the region as exemplified by the shrinking Lake Chad; coupled with the insurgency of Boko Haram generated IDPs and precipitated rural-urban migration especially towards the socio-economically more developed southern regions, notably Lagos megacity as destination. It confirms the Push and Pull theory of migration and also the division of its factors in Lee's laws. The major challenge of this study is unavailability of relevant secondary data. Within the context of the concept of origin and destination, the analysis of primary data derived from randomly selected respondents shows that the 'refugee migrants' were both internal and international migrants from the affected neighbouring countries; a newly emerging pattern of migration. Lagos is naturally an attractive destination for these refugee migrants despite the long distance – the pull factor. The implication of this is the increased pressure on the resources of the receiving city.

#### Keywords:

Migration; internal; international; climate change; insurgency; pull and push; sustainability

## Effects of urban impervious surfaces on land surface temperatures: Spatial scale dependence, temporal variations, and bioclimatic modulation

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### Abstract

Quantifying the relationship between urban impervious surfaces (UIS) and land surface temperatures (LST) is important for understanding and mitigating the environmental impacts of urban heat islands in human-dominated landscapes. Our main goal was to examine how the UIS-LST relationship changes with spatial scales, seasonal and diurnal variations, and bioclimatic context in mainland China. We took a hierarchical approach that explicitly considered three spatial scales: the ecoregion, urban cluster, and urban core. In general, UIS and LST were positively correlated in summer daytime/nighttime and winter nighttime, but negatively in winter daytime. The strength of correlation increased from broad to fine scales. For example, the mean  $R^2$  for winter nights was 3 times higher at the urban core scale than at the ecoregion scale. The relationship showed large seasonal and diurnal variations: generally stronger in summer than in winter and stronger in nighttime than in daytime. At the urban core scale, for instance, the mean  $R^2$  was 2.2 times higher in summer daytime than in winter daytime, and 3.1 times higher in winter nighttime than in winter daytime. Vegetation and climate modified the relationship during summer daytime on the ecoregion scale. Our study reveals several trends on the scale multiplicity, temporal variations, and context dependence of the UIS-LST relationship, which deserve further confirmation. Importantly, high mean  $R^2$  values with large variations on the local urban scale suggest that a great potential exists for mitigating urban heat island effects via urban landscape planning.

### Key words:

Urban impervious surfaces; Land surface temperatures; Urban heat islands; Urban landscape sustainability; China

## Examining Urban Tree Health using High Resolution Worldview-2 Satellite Image in Hong Kong

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### Abstract

Increasing cases of diseased tree fall in urban area causes serious casualties in Hong Kong. There are more than a hundred diseased trees which are listed under the category of old and valuable tree in Hong Kong. On one hand, they are old trees with historical and cultural value; however, on the other hand, they threaten public safety at all time. High spatial resolution satellite image can identify individual tree crowns and allows examination of tree health in dense urban area. This study utilized 8-band WorldView-2 image acquired in 2012 and 2014. Innovative vegetation indices (VI) were derived from the spectral data, which provides information about vegetation vigor of a common urban tree species, *Ficus microcarpa*. With reference to the government database, more than 20 crown samples were collected for both healthy and diseased trees. The diseased group was further divided according to density and the types of disease they suffered from including Brown Root Rot Infection (BRR), Dead branches, Bodies, Obvious wound, Dieback twigs, Cavity, Decay. Four VIs emphasising different aspects of vegetation characteristics and minimizing the external effects were computed. The vegetation spectra and 24 VIs were analysed for the diseased and healthy groups statistically. The result showed that canopy water content index yielded significant difference between dense and sparse diseased group. Broadband greenness index such as Enhanced vegetation index (EVI); narrowband greenness index involving pigment content and red edge slope index were able to distinguish the types of disease especially for BRR and when the trees suffered from serious cavity. Results from two years' image showed similar trend. It is suggested that satellite images with higher spatial resolution and with red-edge band have potential in examining individual tree health condition.

### Key Words:

WorldView-2; Spectrum Analysis; Vegetation Index; Individual Tree; Tree Health Examination

## **Growth of Industries and its future with reference to Land Acquisition in Peripheries of Large Metropolitan Cities of India**

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### **Abstract**

The process of urbanisation and urban expansion in India has been alacritous. Large cities are growing at a much faster rate in comparison to small towns although core areas have declined. They have developed large peripheries to sustain itself. These peripheries are dynamic in nature and hold a promising future for development. Government policies have played a big role in creation uneven distribution and creating further degeneration and overcrowding of the peripheries.

Policies in particular related to industries have caused their relocation from the city cores to the peripheries. Shifting of the industries in the peripheries has resulted in congestion, land degradation and increase in pollution. The resource mostly affected by such industrial expansion is land. Land around the Metropolitan cities is a scarce resource. Especially in an agriculture dominant country such as India, it is closely tied to livelihood and sentimental values. Policies to accommodate the industries have resulted in land acquisition from the farmers in peripheries. Land acquisition has resulted in destitution of farmers and prosperity for industries.

This paper would attempt to study the growth of industries, its nature of growth, with particular reference to the growth of informal sector over decades. With aid of statistics and mapping an effort would be made to assess the situation. Special emphasis would be on government policies and procedures for land acquisition. The impact of land acquisition in all the six major metropolitan cities for industrial purpose would be studied in order to aid in designing future policies.

### **Key words:**

Peri urbanisation; industrial growth; Land acquisition; livelihood

## Research on the Development of New-type Urbanization in Chongqing from the Four-dimensional Perspective of PILE

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### Abstract

New-type urbanization is an individual-oriented process, which intensifies to complete the transformation from “rural” to “urban” on the basis of various aspects such as industrial upgrading, changing land use patterns, and construction of residential environment, and eventually accomplish the aim of coordinative development and integration of urban-rural area, city-industry integration, saving and intensive using, ecological and livable residence and harmonic development. Chongqing is in a critical period of extensive development of new-type urbanization. Studying the development of new-type urbanization from a scientific point of view could promote the process and lay a good foundation for building a well-off society. Therefore, this paper analyzed the background condition of natural resources and the social-economic development strategy of Chongqing and then discussed the development of the new-type urbanization by applying the four-dimensional framework of PILE (Population, Industry development, Land use and Environment) and related econometric model. The results showed as follows:(1) During the period of 2011 to 2013, the composite scores of new-type urbanization developing level raised from 11.7719 to 97.1804 and developmental level experienced three stages: lower level-intermediate level-good level. (2)In the future, the coordination degree of the four elements: population, industry development, land use and environment, will experience a rising trend and gradually achieve the balanced sustainable development, in addition, the five functional areas will present a good trend of growth both in characteristic and differential development.(3)Starting from the actual situation of the five functional areas and combining the need of regional development, to build a different developmental mode of New-type urbanization that reflects the regional characteristics.

### Keywords:

new-type urbanization; four-dimensional framework of PILE; five functional areas; Chongqing

## The influence of population agglomeration on urban air pollutants' concentration:

### Based on 159 prefecture-level cities in China

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#### Abstract

Based on 159 cities in China, this paper studied the influence of population agglomeration on concentration of PM<sub>2.5</sub>, PM<sub>10</sub> and NO<sub>2</sub>. Specifically, population and population density were used to represent population agglomeration, and quadrant diagram method was used to show the relationship between air pollutants' concentration and population agglomeration. The results show that: (1) Only three cities are megacities, that is Beijing, Shanghai and Chongqing. On the other hand, mega-density cities are just four which are Zhengzhou, Shijiazhuang, Baoding, and Handan. It is noted that big population does not represent big population density, and there is no direct causal relationship between them. (2) Xingtai, Baoding and Shijiazhuang have the highest PM<sub>2.5</sub> concentrations and these places also have the highest PM<sub>10</sub> concentration. By contrast, the highest NO<sub>2</sub> concentration is mainly distributed in Hebei, Shandong, Henan, the Yangtze River Delta and part of Pearl River Delta cities. (3) PM<sub>2.5</sub> and PM<sub>10</sub> concentration are higher in most high population density cities, while these figures are lower in most low population density cities, which demonstrates that PM<sub>2.5</sub> and PM<sub>10</sub> concentration are more effected by population density, and the greater the population density is, the greater the concentrations are, and vice versa. (4) NO<sub>2</sub> concentration is higher in cities with high population and high population density, yet this figure is lower in cities with low population and low population density, which illustrates that NO<sub>2</sub> concentration is affected by population and population density at similar extent.

#### Key words:

population agglomeration; air pollutants' concentration; population density; urban municipal districts

## Urban Heritage Conservation and sustainable development: A Geographical Analysis of Udaipur City of Rajasthan, INDIA

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### Abstract

“Urban heritage one area that always considered as humane, socio- cultural and economic asset observed by various historic layering of values that have been produced by successive and existing cultures and an accumulation of traditions and experiences, recognized as such in their diversity. Paper focuses on basic policies, issues and challenges toward conservation of urban heritage in historic city Udaipur City of Rajasthan state of India. It is generally supposed that such historic urban centres are most abundant and diverse manifestations of our common cultural heritage, shaped by generations and constituting a key testimony to humankind’s endeavours and aspirations through time and space. Paper discusses the present status of urban heritage and projecting the future position. Further major components urban heritage studied and classified under two major categories, viz., tangible heritage which includes traditional buildings with architectural and historical significance and intangible heritage, comprising socio- cultural traditions. It is considered that emphasis needs to be put on the integration of heritage conservation, management and planning strategies into local development. For this purpose, field study conducted to understand the impact of urban developmental activities on heritage due to urban expansion. Paper also analysed interrelationships between dependant variable like heritage conservation and independent variables like urban growth, tourism development, socio-economic and cultural background of the society. Finally, landscape approach is suggested for heritage conservation towards urban sustainability.

### Key words:

Urban system; architectural values; heritage conservation; landscape approach; urban sustainability



## World Resource Geography: The Present Status, Deficiency and Opportunity of China's Resource Geography

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### Abstract

The globalization of resources is highly related to that of economy, while the rapid development of China has benefited a lot from the globalization in recent decades. China is urgent to get the supply of world resources, but the researches in this field are considerably weak. More efforts should be focus on geography of global resources and these measurements play an important role in sustainable development as well as the implementation of strategies. Currently, the researches about world resources cannot keep pace with the demand of them, as the main researches still focus on the analysis of the domestic fields. As for China's closed trading partners, the Eurasian continent and the areas of extending to Africa, it still lacks of specific systematic, target-oriented, in-depth studies, which are behind the pace of development of China's globalization and strategic needs; the similar situation exists in some important countries with global investment strategy. Considering the initiative of One Belt and One Road, it is critical for China to call for international cooperation and forming an international research team for global resources, as well as strengthening top-level strategic direction. Ongoing training for institutional and educational talents is one of the key factors to keep a competitive research team. It is also helpful to enhance the utilization and research of global resources for the further development by establishing a set of complete database for the whole world's resources gradually.

### Key words:

World resource geography; globalization; space; order dislocation

## A Comparative Study on the New Urbanization in the Eastern Coastal Provinces of China

Sun Xiaoyue, Ren Jianlan

### Abstract

With the continuous improvement of the level of industrialization, urbanization process significantly accelerated in China and process includes the tortuous development, the rapid development and the scientific development. But the traditional model of urbanization is mainly reflected the rapid growth of the urban population, disorderly expansion of urban space, consume a lot of resources and a significant deterioration of the urban environment, the dilated expand hindered the process of the urbanization development seriously in turn. Therefore, the “Eighteen Meeting” clearly stated that China would implement “New urbanization” in the future. The area where new urbanization process developed faster most concentrated in the eastern coastal areas in China, research in eastern coastal provinces and cities in the development of new urbanization process has great meaning to promote the new urbanization of other part in China. The according to previous research, in fully understand on the basis of new urbanization connotation, establish the new urbanization comprehensive evaluation index system with the “urbanization of the population, the level of economic and social life and environmental protection,” using the entropy method to determine the index weight, calculation of eastern coastal provinces new urbanization comprehensive score, the provinces of new towns of differences in degree of development. The results showed that influence factors and their effect are different, the comprehensive development process is also quite different provinces should take different measures according to their own conditions and level of development are the further development of its own new urbanization.

### Key words:

Southeast China; New Urbanization; the Entropy; Regional differences; Factors



## The analysis on industrial water-saving effect of jining city based on the structure and the efficiency factor

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### Abstract

Adopting the Laspeyres analysis method, the influence of structure and efficiency factors on industry water-saving are deeply analyzed in Jining from 2005 to 2013. The result indicates that structure and efficiency factors both played a positive role in industry water-saving of Jining from 2005 to 2008, at the same time, the contribution of efficiency factors is superior to structure factors in industry water-saving. From 2008 to 2011, the efficiency factors play a positive role for water-saving in industry, but the structure factors on the water-saving in industry present an inhibitory effect; The structure factors play a positive role for water-saving in industry from 2011 to 2013, which is superior to efficiency factors.

### Key words:

water-saving in industry; efficiency factors; structure factors; method of Laspeyres; Jining

## **Coupling relationship between urbanization efficiency and economic development level in the northern slope of Tianshan Mountains**

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### **Abstract**

The paper used the DEA model, analytic hierarchy process and a model for coupling degree to analyze urbanization efficiency, economic development level, and the coupling relationship between the two for the 12 cities on the northern slope of Tianshan Mountains from 2005 to 2014. As a result, theoretical exploration was conducted and a conceptual model was proposed. The results showed that: During the 10 years of evolution, the economic development level in the northern slope of the Tianshan Mountains has been in an upward trend; regional development reached a balanced stage, and the coupling relationship between urbanization efficiency and economic development level exhibited slow rise-sharp, the regional gap is large and persistent. Four cities are in better coordinated development, including Karamay, Shihezi, Urumqi and Kuytun. There is a dynamic coupling relationship between urbanization efficiency and economic development level. The main types of coupling relationship in the cities are low coupling type, medium level coupling type, the highest coupling type, which are concentrated in spatial pattern and show stability in distribution of the annual variation, higher coupling type closes to the highest coupling type. Those cities with higher economic development level are the first to be independent of the effect of urbanization efficiency. The root cause is the congenital endowment and coordination development imbalance situation of cities in urban agglomeration.

### **Keywords:**

urbanization efficiency; input and output; economic development level; coupling relationship; the northern slope of the Tianshan Mountains

## Density, Distance, Division: Analyzing Industrial Pollution Emissions of Yangtze River Delta from the 3D Framework

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### Abstract

The relationship between economic development and environmental pollution has been widely studied in the context of the EKC (Environmental Kuznets Curve). However, this study employs a 3D (Density, Distance, Division) analysis framework proposed by the World Bank to analyze the relationship between density, distance, division and industrial pollution emission. Economic density has a significant impact on the industrial pollution emission, the regression coefficients of 0.617, 1.880 and 1.402 for SO<sub>2</sub>, wastewater, and soot emission, respectively. Integrated transport distance plays a negative role to wastewater (−1.331) and soot emission (−0.511), but is not significantly correlated with SO<sub>2</sub> emission. No obvious relationship is reported between division and industrial pollution emission. Foreign direct investment (FDI) has a positive influence on industrial pollution emission. However, the manufacturing specialization indexes (MSI) has a negative effect on SO<sub>2</sub> and soot emission. FTV also has a negative effect on wastewater and soot emission.

### Key words:

industrial pollution emission; 3D framework; Yangtze River Delta

## Evaluation on Spatio-temporal Development and Coupling Relationship between ecological civilization construction and urbanization in China

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### Abstract

Assessment on spatio-temporal development and coupling relationship of ecological civilization construction and urbanization is helpful for China to promote the sustainable development of socio-economy. This paper, focusing on the coupling relationship between ecological civilization and urbanization, evaluated the spatio-temporal development and coupling relationship between ecological civilization construction and urbanization in China during 2008~2014, using the model of coupled coordination degree which based on the index system of ecological civilization construction and urbanization. The results show that: (1) From the data of coupling coordination degree we calculated, in provincial level administrative level, on the whole, 85.48 percent regions were in the running-in stage (the stage means the coupling coordinated development stage between ecological civilization construction and urbanization), 6.15 percent regions were in the antagonistic stage and the rest of 8.07 percent regions were in the coordination stage. (2) During 2008~2014, the coupling coordination development between ecological civilization construction and urbanization in China was in the running-in stage generally, and the level of ecological civilization construction still lag behind urbanization development. (3) The couple coordinated development process of ecological civilization construction and urbanization have existed volatility. To promote the coupling development between ecological civilization construction and urbanization, China should pay attention to improve the quality of ecological civilization construction.

### Keywords:

Ecological civilization construction; Urbanization; Coupling relationship; Coupling coordination degree; China

## Examining the Long-Term Bidirectional Relationship Between Urbanisation and Energy Consumption, and CO<sub>2</sub> Emissions in China

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### Abstract

Currently, Chinese new-type urbanisation is an important engine for steady, economic transformation and its development. Meanwhile, the key to Chinese new-type urbanisation is the transformation and development from the urbanisation of land to the urbanisation of people. Faced with this trend, governors of cities at different levels, who make policies regarding the sustainable development of towns, can be supplied with scientific, empirical analysis to fully understand the influence of the urbanisation of the population on changes in energy consumption and carbon dioxide (CO<sub>2</sub>) emissions. This paper studies the long-term relationship between the urban population, energy consumption and CO<sub>2</sub> emissions in China's provincial capital cities. We use the fully modified ordinary least squares (FMOLS) model to analyse samples of the time series of urban residents' primary energy consumption and the total amount of CO<sub>2</sub> of all Chinese provinces and municipalities directly under the central government from 1980 to 2011. The results show that, there is a long-term, positive, bidirectional relationship between the population urbanisation, energy consumption and CO<sub>2</sub> emissions in all provinces of China except Yunnan and Shanxi provinces. Based on this conclusion, this paper suggests that governors of cities at different levels should not only attach greater importance to the optimisation and upgrading of urban industrial structures, energy conservation and CO<sub>2</sub> emission reduction, but should also place more importance on the social aspects of a low-carbon lifestyle and focus on constructing a low-carbon urban life.

### Keywords:

population urbanisation; energy consumption; carbon emissions; FMOLS

## Hotspots and knowledge base of sustainability science research: based on data of sustainability science

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### Abstract

Sustainability is the theme of our time and also the grandest challenge to humanity. As a science that provides the theoretical foundation and practical guidance for sustainable development, sustainability science began to emerge in the beginning of the 21st century and became a hotspot research in global environment change research. Firstly, according to the web of science database from 2006 to 2015 which included the literatures of sustainability science, the paper analyzed the sustainability science's distribution status, in terms of subject, author, organization etc, by using statistics and visualization. The results show that the quality and influence of the sustainability science research is on a rising trend, mostly specializing in the subject of geography, ecology, environment, or other related topics. Five countries (i.e. Japan, United States, Germany, Australia, and Canada) and research institutions of Tokyo University, United Nations University, Arizona State University, Ibaraki University, Kyoto University, Osaka University, and Chinese Academy of Sciences show great research strengths of sustainability science. Secondly, applying the information visualization software CiteSpace, this paper drew the document co-citation network of sustainability science, and discussed the knowledge base and core authors. Scholars like Komiyama H, Lang D J, Miller T R, Talwar S, Clark W S, etc. and their representative works laid a solid foundation in the establishment of the theoretical elementary knowledge and other related researches. Finally, based on the keywords and burst phrases analysis of co-word and word frequency, this paper drew the evolution network of sustainability science research hotspots, and explored the frontier proposition research of climate change, management, sustainability, framework, adaptation, vulnerability, resilience and so on. Knowledge base of sustainability science research mainly includes the "discipline development", "interdisciplinary research", "planning mechanism", "disaster management", "information management", "island environment", "coastal vulnerability assessment", "land use", and "landscape".

### Key words:

sustainability science; research hotspot; knowledge base; visualization analysis

## Land reform of the Dongguan village-based development: Impact analysis and implications

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### Abstract

Expropriation of collectively owned farmland has long been blamed for depriving farmers of their rights and equitable sharing of potential benefits from subsequent profit-led developments. Expropriation has also led to serious social problems such as the “Three-No Farmers” (no land, no job and no social security). During the Third Session of the 18th Central Committee of the Communist Party of China held in November 2013, a deepened reform was undertaken to allow rural land to enter directly the land market under certain conditions. This paper explores the feasibility in implementing this new approach and examines its positive and negative impacts based on the Dongguan Model in Guangdong province. The paper has three main sections. Section 2 introduced the background of Chinese land policy system and related studies. Section 3 overviewed the Dongguan land development model, including its creation, characteristics and operating mechanism, and then examined the changes brought about by the new model including land use, income, population mobility and attitudes of the local population towards urbanization and newcomers. Section 4 summarized the potential economic, social and environmental impacts through impact analysis on the Dongguan model, and gave some discussions and policy implications. This paper supports the new model that collectively owned construction land should be allowed to enter market-based operations in conformity with land use planning and use control measures.

### Key words:

land reform; Dongguan model; village-based development; impact analysis; implications



## On the new driving mechanism of urbanization process: a case study of Wuhan City

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### Abstract

With the economic development of transportation and communication technology, industrial agglomeration in the city caused by the original polarization effect has not become only direction, the agglomeration and diffusion of the two direction are prevailing. The thesis discusses the reasons of the new trend, including the traffic jam and the rapid development of metro and express way, the rapid development of electronic commerce, and changes in consumption patterns and ect. The thesis will discuss the process of the urbanization, the reasons and spatial evolution, takes Wuhan city as an example.

### Key words:

driving mechanism; urbanization

## Potential exposure of vulnerable groups to air pollution in major Spanish cities: a GIS-based method for assessing environmental justice

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### Abstract

The concept of environmental justice (EJ) has recently gained currency, both as a factor for and a goal of city sustainability. Its measurement in practice implies focusing on a kind of man-environment interaction causing unequal burden distribution among sociodemographic groups, and setting a standard procedure to elucidate the amount of unfairness.

To measure inequalities more objectively and consistently it is proposed a method based on two complementary techniques: the goodness-of-fit type one-sample  $\chi^2$  test and the environmental justice balance or scale diagram, to test the null hypothesis ( $H_0$ ) that the proportional exposure of a given population group to unacceptable levels of atmospheric pollution (as stated by international regulations) is identical to that of the resident population as a whole (taken as baseline criterion). Some Spanish largest cities have been chosen as case-studies. Firstly, the spatial pattern of an air pollutant has been modelled, and secondly it has been related to the geographic distribution of some vulnerable population groups (children, elderly people and international immigrants) in the year 2010. This GIS-based methodology has provided insightful results uncovering which groups, and how much, suffer potential exposure to air pollution exceeding the maximum permitted levels disproportionately, which would imply a case of environmental injustice.

### Key words:

environmental justice; urban pollution; vulnerable groups; spatial interpolation; Spanish cities

## Research and Assessment of City Competitive in Wanjiang Urban Belt Based on Principal Component Analysis

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### Abstract

With the rapid development of economic globalization and the rise of Multi-national Corporation, the role of city in the national and regional economy has become increasingly prominent. As the first industrial transfer demonstration zone, Wanjiang urban belt is playing a decisive role in connecting economy and trade of east and west China, also in realizing the rise of central China and the Pan Yangtze River Delta. The comprehensive competitiveness evaluation index system is constructed in this paper. Economic, science and technology, infrastructure, government efficiency, opening-up policy are selected as indexes to evaluate a city's competitiveness. Statistical data related to the research is collected for quantitative evaluation of competitiveness on the basis of principal component analysis. He-fei, Wuhu, Ma'anshan, Tongling, Anqing, Chuzhou, Xuancheng, Chizhou, Lu'an is the ranking result of wanjiang urban belt. Competitiveness of each index is also analyzed in order to evaluate the competitiveness of each city accurately. Finally, proposal to enhance the comprehensive competitiveness of Wanjiang urban belt city is put forward.

### Key words:

city competitiveness; Wanjiang urban belt; principal component analysis

## Research on Spatial and Temporal Pattern of Healthy Urbanization Based on Status-Driving analyzing frame in Henan Province

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### Abstract

On the base of understanding to healthy urbanization, the Evaluation index system of healthy urbanization was established which included status index system and driving index system. Entropy weighted grey correlation model, Theil indexes and Coupling harmonious degree model were used to analyze the spatial and temporal pattern of Healthy Urbanization in Henan province. Results were shown as follow. From the perspective of time, at the angle of status side the level of healthy urbanization in Henan province from 2002 to 2014 was increasing continuously; the obvious influencing factor of healthy urbanization to sustain side became social development, economic development, and optimizing of resource and environment, et.al, but former factor was only social development. And at the angle of driving side, the supporting capacity of pulling and pushing was weak; and pushing sustain system side arrived at the stage of reluctant coordination in 2011, however pulling sustain system side steadily arrived at the stage of reluctant coordination in 2011, pushing sustain system side and pulling sustain system side all arrived at the stage of primary coordination in 2014. From the perspective of space, at the angle of status side the level of healthy urbanization for every city in Henan Province from 2002 to 2014, kept increasing and the regional difference among 18 provincially-administered cities became small. And at the angle of driving side the contribute from pulling sustain system to healthy urbanization was increasing contentiously and its regional difference became small; and the change of Comprehensive coordination index and Coupling coefficient which explaining the coupling coordination degree was contrary. And the contribute from pushing sustain system to healthy urbanization was increasing and its regional difference became small; and two index, Comprehensive coordination index and Coupling coefficient, to explaining the coupling coordination degree became small respectively. At 2002 and 2014, the important factors to affect healthy urbanization from driving angle side was different.

### Keywords:

healthyurbanization; status-driving analyzing frame; spatial and temporal pattern; Henan Province

## Rethinking of China's Population Urbanization and Land Urbanization Allometric Growth Based on the Structure

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### Abstract

Recalling the 20 years of China's rapid urbanization process, the contradiction between the shortage of land resources and the sharp increase in the demand for urbanization has been sharp. It has become the consensus of government and experts that the speed of land urbanization is faster than the population urbanization. But from the perspective of urban systems, it is only a surface phenomenon. From the perspective of regional structure, construction land and urban scale structure, and adopting the allometric growth model, this paper analyzes the internal relations between land urbanization and population urbanization allometric growth from 2001 to 2014. The results showed that land urbanization in the eastern and central regions of China is always faster than the population urbanization while the western region does not exist the problem from the perspective of regional structure; From the perspective of the construction land structure, administration and public services land, logistics and warehouse land, residential land do not exist the phenomenon. Although industrial land, green space and road and transportation land expand faster than urban population growth, it reflects the optimization and upgrading of urban functions; From the perspective of the urban scale structure, below 0.2 million, more than 5 million urban land intensive utilization level is higher; 0.2-0.5 million and 0.5-1 million urban land urbanization is faster than population urbanization phenomenon obviously. There are significant regional and structural differences between Chinese population urbanization and land urbanization, and the new urbanization policies should adjust the measures to local conditions in the future.

### Key words:

Population Urbanization; Land Urbanization; Allometric Growth; Structure; China

## Spatio-temporal Differences and Optimization Simulation of Safety Warning on Carbon Emissions in China

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### Abstract

Carbon emissions security is an important part of ecological security. This paper used statistics which is from 1996 to 2012, took 30 provinces(except Tibet) of Chinese mainland for study units, analyzed energy consumption carbon emissions security spatial and temporal differences, which can provide some guidance on the regional carbon emissions reduction strategy and sustainable development. The early warning indicator system of energy consumption carbon emissions was built based on the pressure-response model, three levels: economic, social and environmental. The results showed that: from 1996 to 2012, energy consumption carbon emissions security alarm degree of the whole China had been worse and there was some spatial agglomeration phenomenon; most provinces faced more and more pressure while paid more and more attention to the responding measures; the sensitive indexes of Pressure system focused on the energy structure, industrial structure, economic development pressure and social development; sensitive indexes of response system focused on economic investment, technical improvement and increasing carbon sink; from the point of the simulation results, except the provinces of Zhejiang and Guizhou, the contribution of pressure system in other provinces to carbon emissions safety state change was bigger; each province should adjust measures to local conditions to cope with carbon security early warning.

### Keywords:

energy-related consumption carbon emissions; security warning; space-time differences; China

## Temporal and spatial variation of the precipitation in Huang-Huai-Hai plain from 1963 to 2012

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### Abstract

based on daily precipitation data for 85 national meteorological stations in the Huang-Huai-Hai plain during the period 1963-2012, this paper analyzed the variation of precipitation days and intensity, trends, periodicity and abrupt change. The results indicated that: (1) In recent 50 years, both the average rainfall days and intensity gradually decreased from southeast to northwest. The distribution characteristics of extreme rainfall index similar to annual precipitation index;(2) The annual variation trends of the average rainfall days showed an obvious decrease in contrast to the trend of precipitation intensity, that of the extreme rainfall index of the same level are consistent. The spatial of annual variation trends are quite different. The trend of the average rainfall days and intensity are consistent with the overall trend. The extreme rainfall index variation trend of some regions are in contrast to that of the overall trend;(3) Indicated from the precipitation periodicity, precipitation index showed obvious different periodic oscillation during the period, the number and strength of the precipitation index are different between different time scales, all the precipitation index had a same oscillation of 28a.(4) Indicated from the precipitation abrupt change, Precipitation index are all abruptly changed under the 0.05 significance level. The abrupt change of annual precipitation days and precipitation intensity are significantly decreased, while that of the extreme rainfall index are non-significant.

### Key words:

Temporal and spatial variation; Huang-Huai-Hai plain; Rainy days; Precipitation intensity

## The pattern and trend of China's urbanization on two sides of Hu Huanyong population line

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### Abstract:

In November, 2014, Chinese Premier Li Keqiang raised a problem about Hu Huanyong population line (hereinafter referred to as "Hu line"), when visiting the exhibition of sciences of human settlements in National Museum of China, which was called "Premier's Question" by the press. Hence, Hu line has become a highlight currently, and aroused great controversy and different views. Aiming at such dilemma of cognition, this paper gives a general review of the origins of Hu line, which was put forward by the famous population geographer Hu Huanyong in 1935, under the background of a debate on the surplus of domestic population. Based on population census data and GIS platform, the paper analyzes the change of population scale, proportion and density in both southeast and northwest sides of Hu line. The results indicate that the population urbanization and migration do not change the pattern of population distribution determined by Hu line. On such basis, the pattern that the population density of southeast part is large, while that of northwest part is relatively small will not radically change over a longer period, and the pattern that urban agglomeration is mainly located in southeast part as well. The long-term existence of Hu line depends on integrated physical geographical conditions, like climate. At the meantime, this paper argues that the core issue of the Premier's concern is solvable, by positive policy guidance and reasonable spatial organization. It is definitely promising for western China to realize a higher level of modernization and a better quality of urbanization, and central region as well.

### Keywords:

Hu Huanyong population line; The Premier's doubt; urbanization; pattern; trend

## The Resource Environmental Capacity Evaluation Of The Pearl Island

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### Abstract

With the accelerating of China's urbanization process, the urban agglomeration has become the most vitality and potential core-area among the pattern of China's economic development. It dominates the lifeblood of our country's economic development. At the same time, the regional urban agglomeration is an area where series of problems of resources and environment happened. As for this situation, the concept of "capacity of the resource environmental" is presented on the capacity of the resource and the capacity of the environment. It refers to the capacity that the environment can support the total population and the corresponding social economic among the area of different scale in a certain period of time. We applies the principal component analysis to evaluate the capacity of the resource environmental and the difference of nine cities in the pearl island. We selected eleven variables to be as the analysis indicators of the resource environment capacity, including population density, GDP, Unit GDP year-on-year and so on. We construct an evaluating index system and a principal component of integrated model. And the results of our study show that the internal resource environment capacity between nine cities in the pearl island is significantly different. The bigger of the city it is, the better resource environment capacity it has. Geographically, the cities which have the better resource environment capacity are located in the coastal areas. By contrast, the cities which have lower resource environment capacity are located in the inland area.

### Key words:

resources and environment; capacity; the pearl island

## The Spatial and Temporal Variation of Haze and Its Relativity in the Beijing-Tianjin-Hebei Region

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### Abstract

Beijing-Tianjin-Hebei Region is typical haze-prone area, haze temporal distribution of research in this area and its distributing characteristics are good for the prevention of significant haze. Research in November 2014. During this period the article this area in December 2013 showed that: ① Beijing, Tianjin and north-south distribution of haze during this period varies greatly, late fall to early winter  $PM_{2.5}$  concentration suddenly increased, the spatial extent of constantly expanding from southeast to northwest. Late winter to early spring  $PM_{2.5}$  concentration decreased rapidly shrinking space range from northwest to northeast. ② When the weather is cold high pressure control, no wind or the wind is relatively small, the most vulnerable to the formation of fog haze; ③ The second industrial energy consumption and  $PM_{2.5}$  concentrations closer relationship, especially industrial energy consumption. ④ Meteorological elements are gathering haze, transfer and diffusion of important influencing factors, and socio-economic factors that affect the fundamental reason for Beijing, Tianjin and haze-prone. Therefore, prevention of haze, should be based on weather conditions in different time periods, and to take appropriate preventive measures. The socio-economic factors as the fundamental starting point, the search for effective measures to control the haze.

### Key words:

Beijing-Tianjin-HebeiRegion; Haze; Temporal and spatial distribution;  $PM_{2.5}$

## The sustainability and conflicts of urban development (on example of Kyiv and some cities of Ukraine)

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### Abstract

Transition to sustainable (balanced) development was announced as the main task for humanity on the XXI century. Today more than half of world population lives in cities. So, sustainable development of cities is a key element for provision of global society's progress. However today, cities, with an impressive concentration of population and production within a small area, show incredible intensity in social and natural systems as well as significant number of development conflicts. Therefore, modern urban concepts are based on a search of acceptable balance of economic, social and environmental parameters for prospective urban development. The most developed countries have achieved visible success in straightening of the urban development sustainability indicators by improvement of planning system, utilization of new technologies, and infrastructural investment.

Unfortunately, Kyiv and other Ukrainian cities have performed badly in sustainability rankings. Authors investigated causes which contribute to the current low level of Kyiv and other major cities sustainability. The conflicts of urban environment in these cities were also analyzed. As a result recommendations to ensure sustainability and reduce conflicts in Ukrainian cities to lower level were developed.

### Key words:

sustainable (balanced) development; sustainability; urban conflicts; environment; Kyiv; Ukraine

## Urban green space as an urban heat island mitigation: case study of Shenzhen, China

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### Abstract

Urban heat island (UHI) is not uncommon to find in the highly urbanized area. There are many impact brought by the UHI to the cities, such as altering local micro climate, changing the urban habitat, affecting the energy consumption, causing negative impact of human health and etc. Urbanization is one of the vital factors in causing UHI. Since the 'Open Door Policy' of China in late 1980s. Shenzhen is the city have been experiencing a very fast urbanization rate. Therefore this study would use Shenzhen as a case study to investigate the UHI. The remotely sensed data from LandSat is adopted to analysis the UHI-prone area and the urban green spaces distribution. On the other hand, urban green space are located in the city to understand how it helps in mitigate the UHI in the study area. The ultimate aim of this study is to suggest the effective urban green space distribution in order to ease the effects of UHI for the study area. It is hoping that the experience can be share with other cities share similar situation.

### Key words:

Urban Heat Island; UHI; urban green space; Shenzhen

## **Vegetation Cover Dynamics Associated with Rapid Urbanization in Metropolitan Areas of East China (1998-2010)**

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### **Abstract**

It has recently gained increasing attention to promote sustainable urbanization in China due to the environmental consequences associated with the rapid urbanization in the past two decades. How vegetation cover, as an important indicator for environmental sustainability, was affected by different urbanization trajectories in China's major metropolitan areas is of great interest but rarely studied. In this paper, we used DMSP/OLS nighttime light time series images and SPOT-VGT satellite-derived Normalized Difference Vegetation Index (NDVI) to evaluate effects of urbanization on vegetation cover in the six major metropolitan areas (urban agglomerations) of East China over the last decade. We mapped urbanization dynamics at regional scales with nighttime light data and identified different urbanization trajectories based on the temporal signatures. The NDVI was then added to study the characteristics and change of vegetation cover in the areas with different urbanization trajectories. The study revealed that in general the vegetation cover decreased with an increase in level of urbanization. When compared to the average change rate of NDVI in the non-urban areas (which in fact showed an improvement trend in all six regions), the result indicated a negative average change in vegetation cover in all of the selected metropolitan areas. However, we should be aware that the trend was not merely a downward trend but was a U-shaped curve. In other words, the decrease rate accelerated at the early stage of urbanization and recovered in the later stage of urbanization, and the peak value appeared in different stages across different regions. We believe different patterns of NDVI changes were closely linked with these regions' policy-oriented differences in urbanization dynamics, which also highlighted the importance of implementing a sustainable regional growth policy.

### **Key words:**

urbanization; environmental sustainability; vegetation cover; DMSP/OLS; NDVI; Eastern China



# 33rd International Geographical Congress

21-25 August, Beijing, China

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## Urbanization and Sustainable Development

### Urban and regional planning



Home

### Oral

1. [An Analysis of Urban Residential Densification and Urban Expansion of the city: The Case of Shenyang, China](#)  
Dachuan Jiang (Institute for Social Policy, Housing, Environment and Real Estate (I SPHERE) School of Energy, Geoscience, Infrastructure and Society Herriot Watt University, Edinburgh, EH14 4AS, United Kingdom), Chris McWilliams (Institute for Social Policy, Housing, Environment and Real Estate (I SPHERE) School of Energy, Geoscience, Infrastructure and Society Herriot Watt University, Edinburgh, EH14 4AS, United Kingdom)
2. [Distinguishing the ‘Geographical City’ from the ‘Administrative City’: A Field Based Study of Bhubaneswar, Eastern India](#)  
Gourabamaya Pradhan (Jawaharlal Nehru University, New Delhi, India)
3. [Geographical basis of improvement of the population settlement system of Kazakhstan](#)  
Farida Akiyanova (Kazakhstan National Geographic Society, Kazakhstan), Kamshat Yegemberdiyeva (The Institute of Geography, Kazakhstan), Roza Temirbayeva (The Institute of Geography, Kazakhstan), Yuisya Lyy (The Institute of Geography, Kazakhstan)
4. [India’s Residential Rental Housing](#)  
Arjun Kumar (Jawaharlal Nehru University, India)
5. [Property Development and Capital Circulation in a Resource Boomtown, with Reference to Ordos City, China](#)  
Xing Su (University of Waterloo, Canada), Zhu Qian (University of Waterloo, Canada)
6. [Relationship between Spatial Renovation and Collective Memory of Inhabitants in Historical Districts: Situationists’ Mapping of Da Shi-Lar](#)  
Yizhou Zhao (Tsinghua University, China), Huaqing Huang (Tsinghua University, China)
7. [Third kind of settlement an approach to livable and sustainable communities](#)  
mahmoud jomehpour (Allameh Tabataba'i university, Iran)
8. [Urban and regional development policies and the Greater Mekong Sub-region in continental Southeast Asia](#)  
Masato Ikuta (Ritsumeikan University, Japan)

9. [Urban Growth and Its Spatial Manifestation: An Implication of E-Means of Communication and Transport Network in Indian Metropolitan Cities](#)

VERONICA GOMES (Jawaharlal Nehru University, India), Pallabi Guha (Jawaharlal Nehru University, India)

10. [Zoning planning based on spatiotemporal analysis](#)

Tsogtdulam Munaa (Department of Geography, National University of Mongolia, Mongolia),  
Bolorchuluun Chogsom (Department of Geography, National University of Mongolia, Mongolia)

## Poster

1. [A New Concept Model of Reginal System Under the View of Chinese Traditional Philosophy](#)

Peizhen Wang; Jiangang Xu (China, School of Architecture and Urban Planning, Nanjing University)

2. [Analysis of the Commercial Agglomeration and Economic Effects in Small Scale: a Case Study of Nanluoguxiang Commercial Street](#)

Qi Han; Yi Zhang; Can Yue (China, Beijing Normal University)

3. [Based on the New Urbanization Studies of Urbanization under the Background of Zhongyuan Urban Agglomeration](#)

Shuwei Yang (China, Shandong Normal University)

4. [Establishing the Rural Settlement Unit for Improving Spatial Development Dynamic in Poor Mountainous Area: A Case Study in Changyang Tujia Autonomous County, China](#)

Qiao Jie; Hong Liangping (China, School of Architecture & Urban Planning, Huazhong University of Science & Technology)

5. [Space Characteristics and Mechanism of Yangtze River Delta Urban Agglomeration Economy Network Structure under High-speed Rail](#)

Wang Zhao; Yang SHan (China, School of Geography Science, Nanjing Normal University)

6. [Spatial Planning Issues of Intensive Gravity and Influence Zone of the Capital Ulaanbaatar city](#)

Bazarkhand Tsegmid; Chinbat Badamdorj; Munkhnaran Sug (Mongolia, Department of Geography, School of Arts and Sciences, National University of Mongolia)

7. [Spatiotemporal Changes Analysis of Economic Relation Among Cities of Jiangxi Province](#)

Jin LUO; Caixia ZHANG; Xiaofang ZU (China, Jiangxi Normal University)

8. [Study on Cities' Differential Development Countermeasures Based on the Functional Structure Analysis: A Case Study of ShanDong Province](#)

Yi Miao (China, Shandong Normal University)

9. [Temporal and Spatial Evolution Characteristics Study of Urban and Rural Harmonious Development with ESDA-GIS Framework in the Qinling-Daba Mountains](#)  
Peng Cui; Xin Wu (China, College of Urban and Environmental Sciences, Northwest university)
10. [The Hierarchy and Logic of the Rural Planning in Ecological and Humanistic Thoughts: Based on the Investigation and Practice in Western Hubei Mountainous Area](#)  
Qiao Jie; Hong Liangping (China, School of Architecture & Urban Planning, Huazhong University of Science & Technology)
11. [The Perspective of Urban Block System Reformation in China](#)  
Chengxin WANG; Botao WANG (China, Shandong Normal University); Gefang WANG (China, Party School of the Shandong Provincial Committee)
12. [Urbanisation Pattern Study in Hubei Province Based on the Census of National Geographical Conditions](#)  
Ying Dong; Jing Luo; Lingling Tian (China, China Center Nomal University)
13. [Urbanization, Spatial Spillover Effects and Regional Differences of Urban-rural Income Gap in China: Based on Provincial Spatial Panel Data](#)  
Yingjie ZHANG (China, Linyi University); Juntao ZHANG (China, Dongbei University of Finance and Economics)

## **An Analysis of Urban Residential Densification and Urban Expansion of the city: The Case of Shenyang, China**

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### **Abstract**

Residential development in urban areas is a complicated process, and it has two main characteristics: substantial spatial; and temporal variation. Essentially, urban residential development has two main features: new housing construction within existing urban areas; and new housing construction on new residential land. The former one is defined as residential densification, and the latter one is defined as urban residential expansion. For over three decades now, China has experienced urbanization at a rapid speed due to large scale rural-to-urban migration of millions of people. Most Chinese cities are currently experiencing both residential densification and urban expansion simultaneously. Urban residential densities can explain and demonstrate the recent urban residential development, and changes of urban residential densities depend on several factors, such as the urban planning system, urban land supply and land acquisition, residential mobility, and government intervention. This study will focus on the urban residential development processes in the city of Shenyang, including an analysis of the key features and the processes which have influenced contemporary residential densities using GIS data and statistical method, plus semi-structured interviews for residential policy implementation.

### **Key words:**

Residential densification; urban expansion; residential density; GIS mapping

## Distinguishing the 'Geographical City' from the 'Administrative City': A Field Based Study of Bhubaneswar, Eastern India

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### Abstract

The increasing pace of urbanisation is resulting in rapid changes manifested through demographic, social and economic connotations not only within cities but also in their surrounding region. Together, the city and the dependent settlements surrounding it constitute a functional region. Past approaches to urbanisation and development studies focusing on urban and rural areas separately have failed to provide a clear understanding of a region. Therefore, in recent years, there has been increasing scholarly interest on the theme of rural urban interaction. The fact that people's activities in peri-urban areas are very much assimilated into the urban processes and vice-versa triggers the necessity of urban and regional planners to understand more clearly about the geographical city which extends much beyond the administrative city in a multidirectional manner. The tremendous increase both in terms of population and area has led to the more than doubling of the area earmarked to be developed by Bhubaneswar Development Authority (BDA) in 2011. In that backdrop, it is here attempted to distinguish the geographical city of Bhubaneswar by identifying the broader framework of rural – urban interaction in Bhubaneswar Development Plan Area (BDPA) as one functional region. Following a multi stage stratified random sampling technique, 473 households in selected 26 villages, were surveyed to gather data on transport connectivity, accessibility, commuting pattern, frequency and purpose of visits of rural inhabitants to the four urban centres in the study area. The interaction pattern varies considerably across three distance zones-inner, middle and outer.

### Key Words:

Rural urban interaction; geographical city; urban and regional planning

## Geographical basis of improvement of the population settlement system of Kazakhstan

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### Abstract

Development of population settlement systems is characterized by irregularity and depends on several factors: geopolitical, socio-economic, demographic and environmental. The current population settlement system of Kazakhstan generally was formed as a result of a long evolution. By the early twentieth century, Kazakhstan was still a country with a rural settlement. In Soviet times, there was the formation of the settlement system that met the requirements of the Union State. Given the gap between social and economic links due to the collapse of the USSR, also the problems of settlement aggravated, which had to be solved by Kazakhstan in the period of independent development. At that, in the system of settlement, the necessity of solving a number of problems, the main of which include reducing number and unsettling of rural settlements, has ripened. Problematic issues include the condition of many single-industry towns and small cities of Kazakhstan, problems of overpopulation of large cities and their suburban areas had also appeared, the population in them is not provided with places of work. Solution of this problem can be based on an integrated approach based on a "green economy", the regulation of settlement systems of architectural and planning tools, as well as implementation of the principle of unity of natural and natural-cultural landscape with technological system of cities by creating a natural and ecological framework. To develop geographical bases of formation population settlement system based on the principles of environmental comfort and safety of life of the population.

### Key words:

population settlement system of Kazakhstan; problems of settlement; geographical bases; green economy; the principles of environmental comfort

## India's Residential Rental Housing

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### Abstract

In 2011, more than one-tenth of the households in India lived in rented houses (27.4 million), of which almost four-fifth were in urban sector. Practically, renting a house may form a pragmatic and a deliberate choice to some households. The guiding reasons may range from choices of migration, mobility, and flexibility in managing household finances. It has the potential to improve productivity and promote entrepreneurship. Despite holding such value and developmental potential, rental housing market has been broadly neglected. In India, landlords have assumed an upper hand, and they exploit the poor and vulnerable tenants, especially poor migrants for whom rental housing offers an important option particularly in informal settlements, through exorbitantly high rents for crowded and sub-standard housing. It is unfortunate that governments, over the years, have done little to support the improvement of the existing rental markets or the expansion of the supply of rental houses, and neither have there been any development of loan programmes to encourage it. Indiscreet, successive rent control acts, which were primarily intended to protect tenants from eviction and unfair increases in market rent, have only ended up shrinking all future investment in rental housing and, in many cases, led to housing stock being withdrawn from the rental market, leading to the rise in Vacant houses in the market and hence aggravating the rental housing supply shortage. Ignoring rental housing in policy has simply deepened the inadequate quality of housing and basic services for urban poor tenants, making them more vulnerable. This paper analyses the situation of rental housing in India. Various facets like the existing market mechanisms, legislations, policies and emerging issues relating to it are discussed, apart from the analysis of the empirical evidences on - residential rental housing's magnitude, trends, nature and characteristics in aggregation, across consumption expenditure classes, and across states and size classes of towns/cities, besides trends in rent price and vacant houses – using data from the Census of India (houselisting and housing data) and National Sample Surveys (housing condition rounds). Empirical findings suggest that the share of the households living in rented houses out of the total number of households in India was substantially more in Union Territories (UTs), in developed and urbanized states, and also in larger towns/cities. Across economic categories, the share of households living in rented houses was found to be higher towards the top MPCE quintiles, especially in the urban sector. The government, through Pradhan



# 33rd International Geographical Congress

21-25 August, Beijing, China

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Mantri Awas Yojana, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), and (upcoming) The Model Tenancy Act, 2015, must work to ensure that there is sufficient rental and housing stock so as to meet the diverse needs of all the families in the country. Developing sustainable social rental housing is possibly the most effective and efficient way towards the formulation of a more inclusive and balanced housing policy.

**Key words:**

Housing

## Property Development and Capital Circulation in a Resource Boomtown, with Reference to Ordos City, China

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### Abstract

Ordos is a natural resource-abundant frontier city located in China's Inner Mongolia Autonomous Region, where its property market has experienced dramatic rise and fall during the past 15 years. Few existing studies have examined the flow of capital regarding the property development during a housing boom and bust cycle in a mid-sized Chinese city. Under the theoretical discourse of circuits-of-capital argument with regard to commodity production and built environment introduced by David Harvey, this study investigates the flows of capital among various agents with different interests and characteristics. Our findings suggest that, firstly, capital movement regarding property development is not solely conditioned by the relative profitability of the production sector, but rather significantly affected by the local government. Secondly, in Ordos City, the profitability of production sphere and the investment into built environment witnessed similar trajectories, rather than the contrary trends as Harvey's argument suggest in an advanced market economy. Thirdly, this study discovers that self-gathered funding raised by the general public in Ordos City plays a dominant role in fueling local property development, which brings new insights for the theoretical discourses of capital switching. Last but not least, this research reveals the existing policy deficiencies in the realm of urban investment and property development in Ordos City and makes policy implications.

### Key words:

capital circulation; property development; self-gathered funding; Ordos City

## Relationship between Spatial Renovation and Collective Memory of Inhabitants in Historical Districts: Situationists' Mapping of Da Shi-Lar

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### Abstract

With rapid urbanization, spatial planning and renewal in historical districts at its core has been an essential issue and research frontier. With new perspective and new method, this paper use situationists' mapping to analysis the relationship between contemporary spatial renovation and collective memory of inhabitants, which involves two aspects, the influence of spatial renovation on inhabitants' collective memory inheritance, and the inspiration from inhabitants' collective memory to spatial renovation strategies as well.

Precisely, based on collective memory theory and its objective elements, this paper illustrate the concordances and discrepancies between collective memory of inhabitants and objective elements of spatial renovation, by means of investigating, situationists' mapping and layer drawing on typical spaces. The results shows that situationists' mapping could lead a better understanding of the inter-relationship between different specific renewal spaces with collective memory, and same typical renovation space with collective memory of different inhabitants. Based on the results, reasonable thinking and strategies were put forwards, which would have significant and creative implications both for research and practice.

### Key words:

West Da shi-lar district; situationists' mapping; spatial renovation; collective memory

## Third kind of settlement an approach to livable and sustainable communities

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### Abstract

The main idea of this paper is that the present rural and urban settlements could not provide of good life and wellbeing for citizenships. It is necessary to seek for a new pattern of settlement that to behaving compatible with the needs and demands of modern society and also provide sustainable development term and reduce the imbalance in the current rural and urban settlement.

This article is based on the method of conceptual analysis of the theoretical and experimental with use from theoretical and statistical evidence and qualitative analysis of the current situation and idealistic realist favorable settlement of the situation in Iran. The theoretical basis in this research is empirical studies by researcher and 20 years experience in field of towns and villages. However, the social and ecological views have formed to the idea and sustainable development approach have effective role in idea construction. The rural and urban settlements issue analysis shows that transition from traditional to modern society led to that settlement patterns could not adapted it new live patterns and social and economical needs of peoples. The sequence of this trends have been rapid rural- urban migration and to appear of urban problems. The main finding of this study is to solve the rural and urban problems with alternative solutions. The alternative solution is third kind of settlement that named Rostak in here.

### Keywords:

rural and urban settlement; ecological communities; wellbeing; sustainable development

## Urban and regional development policies and the Greater Mekong Sub-region in continental Southeast Asia

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### Abstract

The regional economies in some nations are changing rapidly and complicatedly, with both industrialization and urbanization in continental Southeast Asia. The development projects of the Greater Mekong Sub-region (GMS) have been realized insofar as the country has believed that improvements in infrastructure, roads, power stations, and in other areas can effectively contribute to economic growth. China, a member country, has been contributing especially in the northern GMS. A number of foreign companies have invested directly in the regions, and some border areas are growing promptly due to the difference in labor and land cost. These nations, until today, could not firmly establish their own regional policies to reduce regional disparities that can be clearly distinguished from industrial policy. A socio-political stage is still ahead to realize regional policy due to the transition from a socialist to a capitalist system, achieving national unity, and creating new economic and industrial policies. Myanmar's new capital, Naypyidawz characterized by national unity and security, among other attributes. Suggestive regional policy, instead of the above-mentioned specific regional policies, is reflected in this move of locating a new capital. On the other hand, Thailand represents a complicated situation wherein the economic rivalry between the capital and the other local regions is deeply connected to the national political opposition. It is not an easy task that the central government can firmly establish coordinated and comprehensive regional policies including industrialization and job creation in the cities.

### Key words:

Greater Mekong Sub-region; border area; suggestive regional policy; specific regional policy; relational economic geography

## Urban Growth and Its Spatial Manifestation: An Implication of E-Means of Communication and Transport Network in Indian Metropolitan Cities

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### Abstract

Urbanisation in India has been very rapid, even extending beyond the municipal boundaries. India's definition of Urban has not been updated since 1951. Therefore it has become moribund as only 30% is urbanised while according to international measure it was estimated to be 52% urbanised. It gives an inaccurate picture of urban scenario, as it difficult to assess the process, trend and extent of urbanisation.

Mumbai, Delhi, Kolkata, Bangalore, Hyderabad and Chennai are the leading metropolitan cities which exhibit regional primacy. Globalisation, new international division of labour, and policies has changed the nature and structure of the urban agglomerations. Cities are now shrinking, while expansion is taking place along the fringes. New satellite towns have come up in *Peri Urban* areas as a result of the urban sprawl, to accommodate the migrants. Also the rampant usage of electronic communication has stoked the expansion of the urban units. With the nascency of the 'Information Revolution' the utilization of electronic means of communication is often recognized as one of the most important indicators of development of any society and country.

The paper firstly, attempts to measure the level of urbanisation among the six cities in a new light of globally comparable measure of Urban Agglomeration Index (population density, size and commuting distance) and compare them with the present census definition in order to identify the downward bias in urban statistics over two decades. Secondly, an assessment of spatial connectivity between the core cities and their hinterland in terms of transport network and electronic means of communication would be made, with particularly reference to Information Technology such as Internet etc. Therefore, building of networks which bridges the gap between core and peripheral areas of the agglomeration are to be analysed over a time period along with the analysis of the change in urban space.

### Key words:

Urban Agglomeration Index; E-Communication; Globalisation; Urban Fringes; Communication network

## Zoning planning based on spatiotemporal analysis

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### Abstract

Land use zoning is a regulation system of classifying land to control the development and use allowed in an area. Zoning regulates the types of activities that can be accommodated on a given piece of land, as well as the amount of space devoted to those activities, and the ways that buildings may be situated and shaped. Zoning describes the control by authority of the use of land, and of the buildings thereon.

The urban development sector in Mongolia has been greatly influenced by the rapid rate of urbanization in the country over the past 20 years.

During the former Soviet Union, Mongolia's economy and urban services were centrally planned and managed. By the early 2000s, Mongolia had established proper legal and institutional frameworks for the urban sector. At the time urban land described into 6 zones by Purevtseren's land use classification. In 2014 the new city land use zoning system introduced in Ulaanbaatar that includes 7 zones. But that cannot be directly copied this zoning category due to the socio-economic characteristics in the towns and small villages of countryside.

This research introducing new and more comprehensive functional zoning system based on spatio-temporal analysis in Zuunmod city. The zoning system will cover all land around Zuunmod city and includes 19 sub and 9 main zones: residential, commercial, industrial, open space, mixed use, engineering infrastructure, green zones, water body zone and special reservation use zone.

### Key words:

Urban planning; Functional zoning

## A New Concept Model of Regional System Under the View of Chinese Traditional Philosophy

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### Abstract

Since 1978, China's urban and rural landscape has been changed a lot by urbanization. But for rapid development and urban-rural dual structure, the gap and social justice issues between urban and rural are getting worse, and the characteristic of complexity and uncertain is presented in regional system, all of which become serious problems to the national economic development and social stability. The limitation of western traditional research method with reductionism is serious in solving China's urban development issues. A new view, which is consistent with system science, is supplied by Chinese traditional philosophy to learn the world not using western philosophy. For a reason that many conclusions of complexity research return to eastern thought and some ancient proposition of Chinese traditional philosophy, a new idea is proposed to recognition urban-rural relationship and regional system. Firstly, based on the Taoism, the five elements theory of negative and positive, the traditional recognition of urban-rural system, regional system is divided into natural environment system and artificial ecological system including ten subsystems, such as atmosphere, water, land, biology, mineral, society, economy, urban-rural, transportation, government and so on. Secondly, each subsystem's connotations, interrelation and evolution mechanism are explained with the concept of sustainable development and urban-rural integration. Lastly, theoretical foundation of regional system is summarized through the view of urban-rural planning and social governance

### Keywords:

Taoism; The Five Elements Theory of Negative and Positive; Regional System; Urban-rural Integration; Sustainable Development

## **Analysis of the commercial agglomeration and economic effects in small scale: a case study of Nanluoguxiang Commercial Street**

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### **Abstract**

In recent years, the development of business agglomeration in wide range tends to be obvious and accelerated. Likewise, there is a similar phenomenon of agglomeration in small Commercial Street. Will the effect of agglomeration be consistent with business agglomeration in wide range when we scale down to the shops as unit? In this paper, scale is narrowed to shop as unit when Nanluoguxiang Commercial Street is taken as an example. We draw a map that shows the distribution of shop type in Nanluoguxiang based on the field measurement data using ArcGIS software. And the shops' upgrading in Nanluoguxiang was investigated. As our survey shows, Nanluoguxiang Commercial Street is mainly dealing in the catering industry, clothing accessories and handicrafts at this stage, most of which are small shops. And the update speed is fast whereas the change of the shop's type is not significant. Preliminary questionnaire analysis shows that consumers have more demand for snacks. But as we see, the food retailers are too concentrated in Nanluoguxiang Commercial Street, which has exceeded consumers' demand. Accessories and crafts shops are more dispersed. It is difficult to reflect the cultural characteristics. As the comprehensive analysis indicated, the food retailers will be suited to be scattered, and commercial agglomeration is an ideal layout to clothing accessories and crafts shops.

### **Key words:**

Commercial agglomeration; Commercial Street; Nanluoguxiang; small scale

## Based on the new urbanization studies of urbanization under the background of zhongyuan urban agglomeration

Shuwei Yang

### Abstract

Level of urbanization is the measure of a country, region or even a city clusters of industrialization and modernization level of important symbol, also is the main trend of the development of social economy. Urban agglomeration will play an important role in economic and social development in our country, the central plains urban agglomeration as the important urban agglomeration in central China will become the main pulling plate of regional economic development strategy. Based on this, this article takes the new town into the background, and deeply discusses the present situation of zhongyuan urban agglomeration and urbanization and facing the contradictions and problems put forward the corresponding countermeasures, so as to offer reference to successfully implement the strategy of zhongyuan urban agglomeration in the urbanization.

### Keywords:

The new urbanization; urbanization; zhongyuan urban agglomeration

## **Establishing the Rural settlement Unit for Improving Spatial Development Dynamic in Poor Mountainous Area: A case study in ChangyangTujia Autonomous County, China**

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### **Abstract**

The organization of rural settlement space in China has been enduring long restriction from natural geography, grass-roots administration, cultural and social concept. The traditional organization model of rural settlement can't adapt to present aspirations for spatial development well when facing the continuous vitality release in rural China. The Aim of establishing rural settlement unit is to realize the symbiosis of 'Land-Human-Scene' in rural space according to local decision of settlement spatial structure. It will promote the rural spatial productivity sustainably in mountainous area based on constantly adapting to the characteristics of the rural social and economic development level, improving efficiency of public service facilities and lowering cost of grassroots social governance, strengthening the rural community consciousness of "rights+responsibility". This paper response to national policy "taking targeted measures in poverty alleviation" in China. It has three aims. The first is to propose the small watershed as basic unit of the organization framework of rural settlement by recognising Changyang Tujia Autonomous County rural settlement space. The second is to build evaluation index system and spatial gravity model for development of settlement space considering cultural tourism resources integration, ecological agriculture layout, infrastructure construction, public service facilities supporting as forces. The third is to establish settlement spacial system for promoting comprehensive space dynamic and realizing the bundling of rural settlement development and poverty eradication in Yantou stream watershed according to the theory and analysis results above.

### **Key words:**

mountainous rural areas; rural settlement space; spatial unit; poverty alleviation; Changyang Tujia Autonomous County; China

## Space characteristics and mechanism of Yangtze River delta urban agglomeration economy network structure under high-speed rail

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### Abstract

Based on location quotient index and gravity model, we build the economic network of Yangtze River delta urban agglomeration under different traffic conditions, then try to use the GIS technology and network analysis model to measure and compare the spatial pattern and variation characteristics of these networks. The aim is to explore how the high-speed rail influent the urban agglomeration economy network in regard to network connectivity ability, center node characteristics and core - edge structure, etc. The conclusions can be drawn as follows: (1) Urban agglomeration economic ties are joint efforts of inflow and outflow degree and distance between cities, high-speed rail network promote the connecting ability of economy network, shortening the average distance between nodes, but less effect on network density; The network centrality is decreasing, and it shows a multicenter trend. (2) High-speed rail polarize economic contact of city nodes with high foreign-service value. At the same time, weakens the intermediary role of 70% of the total number of cities in urban agglomeration economic network. Besides, connectivity differences between nodes have been expanded, and the network power of center cities have been reinforced; (3) According to cohesive subgroups analysis, high-speed rail strengthened the radiation ability of secondary core node, and make each subgroups getting closer. Development axis of "Nanjing - Hangzhou" and "区" -like network structure of whole economic network are more perfected, multiple hub-and-spoke nested economic network are forming. (4) "time- space compression" shows an imbalanced influence to cities with different service ability and location, we should improve the level of foreign economic service of those who get more inflow degree, strengthen the combination of high-speed network and the high-speed rail network of those cities who changed less in inflows and outflows degree.

### Key words:

high-speed rail; Foreign-service economy; Economic network; Yangtze River delta urban agglomeration

## **Spatial planning issues of intensive gravity and influence zone of the capital**

### **Ulaanbaatar city**

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#### **Abstract**

The capital city Ulaanbaatar, main place of over centralization, has been losing its definite spatial structure and organization and facing many problems such as ecological, social, economic, and transportation condition. Urban spatial structure, transportation networks are being improved and urban development process is taking places as for decision of above mentioned problems. So developments of satellite cities are suggested for urban decentralization policy. Many regional issues including expansion of urban intensive gravity and influence area, heightened role of urban regions and change in functions of towns within urban intensive gravity and influence zone are needed to be considered and reviewed as development plans for satellite cities, suburbs and edge cities are started to be implemented. Some solutions for development of Tuv region coherently with Ulaanbaatar city and other settlements nearby Ulaanbaatar city are considered in current Mongolian Regional Development Program and Development Programs of Tuv Region and Ulaanbaatar Region, however these are cannot being the basis for urban and land use planning as well as for rational spatial organization. Therefore, it is necessary to develop city-regional policy and planning which are based on development trend to develop the capital city as a region, considered functions of group settlement in urban intensive gravity and influence zone and estimated demands of central city substantively.

#### **Key words:**

urban intensive gravity and influence area; satellite cities; central city; urban region

## Spatiotemporal Changes Analysis of Economic Relation Among Cities of Jiangxi

### Province

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### Abstract

Taking Jiangxi Province as the study area, with applying the model of urban flow intensity and the method of GIS spatial analysis, this paper carries out the calculation on the urban external function capacity, urban flow intensity, urban flow tendency and some other indicators during 2003-2012 of 11 prefecture cities of Jiangxi Province, and also conducts comparison and analysis on the values in time and space. The results show that the external function capacity, urban flow intensity and urban flow tendency of the 11 prefecture cities are on the rise, but the growth rate varies. Nanchang plays a central role in the economic relation throughout the areas, with a strong concentration and radiation effect. The cities' overall economic strength and comprehensive service capability are inconsistent, and the overall economic strength of the other cities except Nanchang is all lower than the comprehensive service capability.

### Key words:

intensity of urban flow; spatiotemporal dynamic analysis

## **Study on cities' differential development countermeasures based on the functional structure analysis: A case study of ShanDong Province**

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Shandong Normal University

### **Abstract**

China is in the period of new urbanization construction and urban functional structure is constantly changing. Taking Shandong Province as a typical region, the urban functions were calculated by Scale-Location Quotient method, and the functional structure difference of every two cities was analyzed by the difference degree of functional structure. Analysis shows that the urban functional structure and some urban functions have clearly characteristics of spatial differentiation ; Eastern coastal cities show highly urban functional structure similarity while Jinan Metropolitan cities not. Based which put forward the optimization idea:deepening traffic and industrial development to promote regional development; the eastern coastal cities should work together to build a modern industrial system, focus on collaborative tourism and foreign trade functions; the metropolitan area of Ji'nan cities should strengthen the regional center city,Ji'nan, adjustment and optimization the regional functional structure complementary advantages is the main goal; the south Shandong cities should pay attention to grasp the opportunity, accord to new development ideas to make up the weakness of economic development.

### **Key words:**

functional structure; Spatial difference; countermeasures; ShanDong province

## Temporal and spatial evolution characteristics Study of Urban and Rural Harmonious Development with ESDA-GISFramework in the Qinling-Daba Mountains

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### Abstract

This paper uses the multi index comprehensive evaluation method to measure the level of urban and rural harmonious development in the Qinling-Daba Mountains, constructs evaluation index system of urban and rural harmonious development by the 18 basic indicators composed of five sub-systems. Using linear weighted sum methods integrates indicators, Using the network analysis method to determine the weight of each index, In order to get in the Qinling-Daba Mountains'counties of urban and rural harmonious development coordination index, and throughexploratory spatialdata analysis and GIS technology researches temporal and spatial evolution characteristics of urban and rural harmonious development in recent 10 years. The results show: urban and rural harmonious development in the Qinling-Daba Mountains levels in the space at the stage of the unbalanced development, presents the case to the ends of gathering, the high level counties with high levels of aggregation, the law from west to east in the space accumulation is low and land conditions of urban and rural development, industrial base , external transport have a high space coupling.

### Key words:

urban and rural harmonious development,temporal and spatial evolution characteristics, exploratory spatialdata analysis (ESDA) , the Qinling-Daba Mountains

## **The Hierarchy and Logic of the Rural Planning in Ecologicaland Humanistic Thoughts: Basedon the Investigation and Practice in Western Hubei Mountainous Area, China**

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### **Abstract**

The rural area is the important carrier of ecological civilization construction in China.Dealing with the harmonious relationship between ecologyandhuman in the rural living environment construction is the inherent requirements of rural planning and also essential aims of ecological civilization construction.This paperfirstly propose that rural planning should contain three important aspectsin the context of ecology concept and humanistic thoughts,they are the livelihood planning of the villagers, rural settlement planning and rural community development planning, and secondly build the working humanistic logic of rural planning: base on"ecology of geography andhuman living";build triplecollaboration platform in"county-town-village" for rural plnning; make sure that adapting to grassroots development demands and respecting the local villagers requirement is the core values; follow squire and technical guidance;abidethe planning strategy of "low technology + highparticipation + raisewisdom from all relative.It aims to promote the comprehensive system efficiency of human settlement environment construction.

### **Key words:**

ecological civilization; humanistic; human settlement environment; rural planning; China

## The Perspective of Urban Block System Reformation in China

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### Abstract

Recently, *The CPC Central Committee and State Council on further strengthening the management of urban planning and construction several opinions* was promulgated. It pointed that "new residential neighborhoods should popularize the block system, and in principle, it doesn't allow to build closed residential community", "the residential quarters and units should open gradually", which caused the whole society discuss widely. This paper expounds the realistic significance of the urban block system reform, such as ease urban traffic congestion, intensive use of urban land, building a harmonious society and proposes the difficulties such as the conflicts between new policy and the real right law, the incongruity between the policy-making and public opinions, the asynchronism between policy and compensation expense. It seriously affects the block system implementation. To this end, this paper puts forward the paths to promote the urban block system reform implementation successfully, for example, initiative propaganda, setting an example by the government, the planned scientific advance, the sufficient compensation, the implementation of adjust measures to local conditions and to reform step by step.

### Key words:

Urban; Block system; Reform; China

## Urbanisation Pattern Study in Hubei Province Based on the Census of National Geographical Conditions

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### Abstract

Based on the first Census of National Geographical Condition, an indicator system, in constitution of Centrality, Traffic Accessibility and Spatial Connecting, was built to probe the urbanization pattern in Hubei Province in the prospect of prefecture level and county level by using Analytic Hierarchy Process method, Cost Matrix and Gravity Model on the platform of ArcGIS and YAAHP.

The results shows that there exists an obvious urbanization pattern of “One Main Two Vice” in Hubei. To be specific, Wuhan, joined with Ezhou, taking the central place of all the cities in the province while Xiangyang, together with Yichang, occupied the two sub-centers. Meanwhile, the centralities of the 103 counties in Hubei present high in east and low in west.

In terms of traffic, Wuhan, Xiaogan, Xiangyang and Yichang, as the node cities, score highly on Traffic Accessibility and locate in the half hour traffic circle of the central cities. 29% of the counties can arrive the central cities in 1 hour.

It also shows that Certain concentric circles has formed in Wuhan metropolitan area, with Wuhan as the centroid, Xiaogan, Ezhou, Huangshi, Xiantao as the core circle, Huanggang, Tianmen, Qianjiang and Xianning as the close circle, Suizhou as the radiation circle. Xiangyang has a prominent connection with Shiyan while Yichang shows a close but not prominent connection with Jingmen and Jingzhou. Both Enshi and Shennongjia shows a weak connection with Wuhan, Xiangyang and Yichang.

### Keywords:

Centrality; Traffic Accessibility; Spatial Connecting

## Urbanization, Spatial Spillover Effects and Regional Differences of Urban-rural Income Gap in China: Based on Provincial Spatial Panel Data

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### Abstract

The backwardness of urbanization and expansion of urban-rural income gap are two major challenges for China at present. The Third Plenary Session of the CPC's Eighteenth Central Committee adopted a major strategic decision to take the road of new urbanization which is aimed at balancing urban and rural development, narrowing the gap of urban-rural areas and promoting social harmony and stability. Previous theoretical and empirical studies show that the impact of urbanization on urban-rural income gap has two sides: narrowing or widening urban-rural income gap. Based on provincial spatial balanced panel data of China from 2001 to 2013, using exploratory spatial data analysis (ESDA) and spatial panel data model, the paper empirically studies the effect of urbanization on urban-rural income gap in four economic region of China(the eastern, midland, western and northeast ) by controlling some key factors of affecting urban-rural income gap. Thereby, this paper puts forward to some suggestions aiming at narrowing the urban-rural gap between four economic regions of China and promoting the coordinated development of regional economy.

### Key words:

urbanization; urban-rural income gap; spatial spillover effect; regional difference

## Urbanization and Sustainable Development

### Land use and urban environments



Home

### Oral

1. [Applying WUDAPT to Local Climate Zone classification in Urban Heat Island study: a case of Beijing](#)  
Mengdi Zhang (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China), Zengxiang Zhang (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China), Qingke Wen (Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, China)
2. [Climate Migration and Built Environment: An Urban Resettlement Perspective](#)  
Muhammad Abdur Rahaman (ADAMS, Bangladesh)
3. [Does Urban Greenery Reduce the Cost of Cooling Homes?](#)  
Monjit Borthakur (OKD Institute of Social Change and Development, India)
4. [Environmental Effects of Land Use Change in Rapid Urbanization: The Case of Hangzhou, China](#)  
Zhonghua Huang (Zhejiang University of Technology, China)
5. [Estimated reduction of resident exposure to respirable particulate matter and health risk in Beijing if source control measures during the “2015 military parade” were sustained](#)  
Yangyang Xie (Tsinghua University, China), Shunhua Bai (Beijing Normal University, China), Qinzi Luo (Tsinghua University, China), Bin Zhao (Tsinghua University, China), Jing'ai Wang (Beijing Normal University, China)
6. [Forecasting the influence of policy oriented scenarios onto urban modelling at the country scale. Some preliminary results from Italy](#)  
Federico Martellozzo (University of Rome La Sapienza, Italy), Federico Amato (University of Basilicata, School of Engineering, Italy), Beniamino Murgante (University of Basilicata, School of Engineering, Italy), Antonella Rondinone (Italian Chamber of Deputies, Italy)
7. [Green space and urban form: a historico-geographical approach](#)  
YITING ZHANG (University Of Birmingham, United Kingdom)
8. [Spatial Distribution of Supermarkets in Kano Metropolis, Nigeria](#)  
Abdulkadir Dambazau Muhammad (Kano University of Science and Technology, Wudil, Nigeria), Suwaiba Mustapha Ado (Kano University of Science and Technology, Wudil, Nigeria), Ado Mukhtar Bichi (Kano University of Science and Technology, Wudil, Nigeria)
9. [Toward green use of industrial land in China: a non – radial Malmquist index approach](#)

Xie Hualin (Co-innovation center for institutional construction for Jiangxi eco-civilization, Jiangxi University of Finance and Economics, China)

10. [Urban Expansion and Its Impact on Agricultural Land: A Case Study of Rajpura Tehsil, Patiala, Punjab, India](#)

Preetinder Kaur (Department of Geography, Panjab University Chandigarh, India)

11. [Use of an inside buffer method to extract the extent of urban areas from DMSP/OLS night-time light data in North China](#)

Minghong Tan (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

12. [Using CLUE-S model to determine Urban Growth Boundary in Shenyang, China](#)

Huang Daquan (Beijing Normal University, China)

## Poster

1. [Evaluation of Urban Land Intensive Use with Emerging Fine-scale Data: a Case Study of Jiangsu Province](#)

Wenxin Wang; Xiaobin Jin; Xuhong Yang (China, School of Geographic and Oceanographic Sciences, Nanjing University)

2. [Identifying Conservation Priorities in a Rapidly Urbanizing Landscape: a Habitat Network Perspective](#)

Bin Xun (China, College of Urban and Environmental Sciences, Northwest University)

3. [Research on Spatial and Temporal Evolution of Landscape Pattern of Urban Village Under Urban Expansion: A Case Study of Nanchang City](#)

Fuqiang Liao; Shu Xiaobo; Sufang Xiao (China, School of Geography and Environment, Jiangxi Normal University)

4. [Risk Assessment of Land Use Competition in the Fringe of the Valley City: A case Study of Lanzhou](#)

Yongnan Wang; Peiji Shi; Chunfang Liu (China, College of Geography and Environment Science of Northwest Normal University)

5. [Study on Spatial-temporal Change of Water Environment in Suzhou and its Relationship with Land Use Type](#)

Yang Jie; Xu Youpeng; Yang Liu (China, School of Geographic and Oceanographic Sciences, Nanjing University)

6. [The Effect of Green Open Space on Sense of Belonging](#)

Yuemei Zhu; Qing Zhu; Xuze Ji (China, Beijing Normal University)



7. [The Relationship Research of Spatial and Seasonal Distribution of Atmospheric Particulates and Urban Heat Island \(UHI\) Intensity with Landsat Images in Xi'an, China](#)

Xinming Zhu; Dajiang Yan; Wenting Mao (China, Northwest University)

## Applying WUDAPT to Local Climate Zone classification in Urban Heat Island study: a case of Beijing

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### Abstract

Traditional urban heat island (UHI) analysis based on land use and land cover types and simplistic separate urban and rural climate field site. Local Climate Zone (LCZ) system comprehensively classifies natural and city landscapes into 17 categories for UHI study. This article followed the workflow provided by World Urban Database and Access Portal Tools (WUDAPT) to identify LCZs in Beijing. For thermal differentiation analysis of LCZs, the previous studies obtained temperature data from fixed stations and automobile traverses. This research use land surface temperature retrieval from ETM+ data for UHI analysis, in order to experiment its effectiveness in LCZ study. The result demonstrates that 1) LCZ system can perform purposeful in UHI analysis by recognizing landscapes accurately and enhance the importance of 3D data. 2) Numerous spatial analyses can be done based on LCZ method as it analysis land surface temperature in several homogeneous zones rather than pixels. 3) To some extent, temperature retrieval from remote sensing data can replace those from automobile traverses in LCZ research.

### Key words:

Local Climate Zone; land cover; urban climate; WUDAPT; surface temperature retrieval

## Climate Migration and Built Environment: An Urban Resettlement Perspective

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### Abstract

This study examines the complexity of climate displacement, rural-urban migration and built social and physical environmental domains in informal settlements at urban areas of Bangladesh with particular attention to internally displaced people by climatic impacts. Being the most vulnerable country, urban areas of Bangladesh have already been experiencing increasing climate induced problems like drainage congestion, water logging, property damage, fresh water unavailability, groundwater depletion and tidal inundation (coastal urban areas). The study was conducted in three major cities (Dhaka, Chittagong, and Khulna) and three district towns (Cox's bazar, Noakhali, Satkhira). Over 80% of the climate-displaced people are living in the congested informal settlements in urban who are pushed by climate-induced extremities like sea level rise, tidal surge, salinity intrusion, cyclone, water logging in coastal belt; flood, river erosion, water logging in floodplains and drought, agricultural drought in northwest Bangladesh which make them climate refugees, extreme poor and hunger. They have limited access to technical and social services, alternative livelihoods and entail various socio-physical environmental dimensions. Current study investigates how climate-migrants occupied urban informal settlements affect the built environmental systems and their adaption strategies to urban built environment at individual household levels. Adopting an exploratory case study and focus group discussion approach, the study reveals that in informal settlement areas, urban built environmental systems are disrupted in multidimensional ways and lack of understanding on adaptive capacity, climate migrants are living in the more vulnerable environment than origin. To overcome this worsening situation, climate resilient urban policy response and optimized adaptive capacity of cities must be recognized for climate-displaced people at household and community level adaptive practices.

### Keywords:

Climate displacement; urban migration; vulnerability; informal settlements; built environment

## Does Urban Greenery Reduce the Cost of Cooling Homes?

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### Abstract

The study investigates the effect of urban land use change to land surface temperature and how urban greenery have moderating impact in reducing the cost of cooling in residential units of Guwahati Metropolitan Area. During the last decade, Guwahati has undergone phenomenal urban change with high population growth and major changes to land cover. The complex urban fabric with high rise multistoried, roads and pavements increase the urban surface temperature due to their high heat storage capacity. The complex urban fabric also reduces the horizontal air flow in residential buildings. The study reveals that the city has a prominent urban heat island effect. The result of the panel data model shows that the densely populated urban areas with less than 10% greenery are on an average 1°C warmer than the areas with 50% greenery. Due to this additional heat, the daily increase in electricity demand for the city is estimated as 5.4 Mw with 1°C increase in surface temperature. Considering one unit cost of electricity, the study estimates that the urbanites residing in the downtown areas of the city are paying an additional amount of Rs. 846,000 per month to cool their residential units. The study offers conclusive evidence of the significant economic gains deducible from urban greenery. The results clearly show that the annual welfare gain to the city from urban greenery is significant in terms of reduced electricity consumption.

### Key words:

Urban Heat Island; electricity; greenery

## Environmental Effects of Land Use Change in Rapid Urbanization: The Case of Hangzhou, China

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### Abstract

Land use changes sharply in rapid urbanization, yet its environmental effects are often ignored in land use decision and policy making. Using the case of Hangzhou, China, We analyze the environmental effects of land use changes including ecosystem service value, carbon emission and landscape pattern, based on the Landsat TM images from 1995, 2000, 2005, 2010 and 2014. We found significant environmental effects of land use changes in rapid urbanization. The ecosystem service value in Hangzhou decreased from 3.24 billion Yuan in 1995 to 2.40 billion Yuan in 2014, and the ratio of ecosystem service value to GDP reduce from 5.86% to 0.56%. The net carbon emissions increased from 4.26 million tons in 1995 to 15.10 million tons in 2014, mainly due to a huge increase of built-up land carbon emissions and a decrease of forest land carbon sink. The ecosystem service value was unevenly distributed spatially and low ecosystem service value spread from the central to the peripheral area. The pattern of land use changes showed decreased fragmentation, increased connectivity and decreased diversification. We use scenario analysis to show that economic growth and environmental protection could be coordinated by bringing environmental effects into land use decisions.

### Key words:

land use change; environmental effect; ecosystem service value; carbon emissions; Hangzhou

## **Estimated reduction of resident exposure to respirable particulate matter and health risk in Beijing if source control measures during the “2015 military parade” were sustained**

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### **Abstract**

Metropolitans in developing countries are experiencing over-urbanization and industrialization which leads to severe air-pollution issues. There are lot studies about PM<sub>2.5</sub> in Beijing, but the limitations are that these studies did not present the picture of PM<sub>2.5</sub> distribution and chemical composition meanwhile; the difference between indoor air and ambient air are usually ignored. Most people spend more than 80% of their time indoors, considering indoor particle pollution and chemical composition exposure is important for understanding the impact of particle pollution on human health. Therefore, this article presents the simulated concentration of PM<sub>2.5</sub> distribution based on Land-Use Regression model with recent data from 35 monitoring stations in Beijing... With the chemical analysis of the samplers during the “2015 military parade” the chemical compositions distribution can be also simulated. Furthermore, we employ the Monte Carlo method to modify the difference between indoor and outdoor environment. Finally, we explore human exposure and assess potential health effects in the situation that source control measures during the “2015 military parade” were sustained. Results illustrates that traffic and plant contribute the most of PM<sub>2.5</sub> articles. Add also, certain source control measures reduce the exposure in a considerable quantity.

### **Key words:**

PM<sub>2.5</sub> Distribution; Land-Use Regression; Exposure; Health Effects; indoor air

## Forecasting the influence of policy oriented scenarios onto urban modelling at the country scale. Some preliminary results from Italy

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### Abstract

The uncontrolled spread of the built up environment into the surrounding rural and natural land, and the consequent increasing urbanites' demand for natural resources are among the most important causes of the dramatic consequences of global environmental change in many parts of the world. This study investigates soil consumption due to urbanization in the last decades in Italy, which has undergone relevant urban expansion, although not coupled by a comparable population growth, thus suggesting that such degree of urban expansion may be unjustified. Besides it aims also at presenting different forecasts for soil consumption, loss of agricultural potential, and increase in energy demand for the coming future. The methodological framework features past trend data analysis coupled with modelled projections; the data used is a fusion of archived thematic maps, classified satellite imagery, census data, and forecast data from cellular automata model (SLEUTH). The authors analysed urban and population growth through the evolution of spatial explicit data over time according to 3 scenarios: business as usual, "booming expansion", "fostering conservation". The results of this study provide realistic figures of future land cover change in Italy, estimates which regions are likely more prone to urbanization and where urban growth will likely feature a sprawled pattern. Furthermore, it discusses what are the potential risks related to the projected soil and energy demand and how these may be avoided. In conclusion, it aims at providing policy makers with useful tool and information to support and favour resilient and sustainable development.

### Key words:

Land-use change; urbanization; Italy; land-use change modelling

## Green space and urban form: a historico-geographical approach

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### Abstract

There is a significant gap, in respect of both research and practice, between urban morphology and urban ecology. Studies of urban ecology have hitherto been largely ahistorical and almost entirely acultural. In contrast, key concerns of urban morphologists have been how urban physical expressions of culture have changed over time. This is notably the case with research that has adopted a Conzenian or Muratorian approach. Such approaches have stimulated research on the characteristics and planning of the form of cities that has been largely divorced from concerns about ecosystem services. Employing a case study in Birmingham, UK, this paper examines the connection between urban morphological research on the fringe-belt concept, as developed by M. R. G. Conzen and others, and the character and distribution within cities of major areas of green space. The principal focus is on how green spaces within those fringe belts that are embedded within cities (for example, parks, recreation grounds, allotment gardens, golf courses, and land attached to educational and medical institutions) have changed over time, especially during the past 100 years. The contribution to both understanding the historico-geographical and sustainable development of urban form and in linking urban morphology and ecosystem services is emphasized.

### Key words:

fringe belt; urban morphology; historical geography; sustainable development and planning; spatial analysis and mapping

## Spatial Distribution of Supermarkets in Kano Metropolis, Nigeria

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### Abstract

The study focused on the spatial distribution of supermarkets and factors influencing their utilization in metropolitan Kano, North Western Nigeria. Primary data was obtained from field observation and Questionnaire survey. The field exercise involved the collection of coordinates of all modern supermarkets in the study area using a hand held Garmin GPS 76 Model. Also a total of 252 instruments were distributed to the users of the various supermarkets using a systematic sampling technique. The coordinates of the supermarkets collected were analysed by digitizing the map of the study area using the ILWIS software. Multiple regression analysis was used to determine respondents who to patronize the supermarkets in instead of the traditional markets. Result of the analysis shows an uneven distribution of supermarkets in the metropolis while the multiple regression analysis results reveal an R-square value of 0.83% (F. Sig = 0.006 P <1%) which was significant at 1% confidence level. The study recommends the location of more supermarkets in other areas poorly served to reduce the problem of access faced by users.

### Key words:

Supermarkets; distributions; spatial; Kano metropolis; patronage

## Toward green use of industrial land in China: a non-radial Malmquist index approach

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### Abstract

Industrial production activities are the main contributors to the environmental pollution in China. Industrial land is not only an important input to industrial production, but bears most industrial pollutants. Therefore, a detailed analysis of industrial land use incorporating bad output caused by industrial production is necessary to make reasonable policies aiming at promoting sustainable use of industrial land. This paper aims at analyzing the status of total-factor green use efficiency of industrial land (TGUEIL) by employing a non-radial global directional distance function (NGDDF). We propose a non-radial Malmquist industrial land performance index (NMILPI) to measure the dynamic changes of the TGUEIL, and then try to find the main source of the growth of TGUEIL by decomposing the NMILPI into an efficiency change (EC) index, and a technological change (TC) index. The empirical results show that the TGUEIL in China enjoys rising trend during 2003–2012. The eastern region performs much better than the central and western regions, and the regional gaps of TGUEIL are narrowing. The growth of TGUEIL is mainly driven by technological progress, and provinces in the eastern region perform better than those in the central and western regions in the innovation of environmental friendly industrial production technology. The results of influencing factors analysis show that introducing more environmental protection policies, expanding the scale of industrial economy, increasing industrial R&D investment, decreasing the energy intensity and reducing the use of coal in the process of industrial production, and properly solving the problem of labor surplus in the industrial sectors would be helpful to improve the TGUEIL.

### Keywords:

green use; industrial land; Malmquist productivity index; China



## Urban Expansion and Its Impact on Agricultural Land: A Case Study of Rajpura Tehsil, Patiala, Punjab, India

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### Abstract

Urban expansion takes into account two processes, internal reorganization and outward expansion of urban areas. This expansion appears to exert direct impact on agricultural land around the urban areas leading to the shrinkage of agricultural land. Through this paper the attempt has been made to evaluate the extent, composition of urban expansion and its influence on agricultural land using unpublished revenue records data from 2001 to 2011 in Rajpura Tehsil district Patiala(Punjab). Three urban areas namely Rajpura (Municipal Council), Ghanaur (Nagar Panchyat) and Nilpur (Census town) have been selected to carry out the research at micro level. Analysis suggests that area under non-agricultural uses has expanded from 11.2 percent (2001) to 13.5 percent (2011) in the tehsil. The loss of agricultural land has taken place basically under commercial uses (31.5 percent) along the National Highway in the tehsil. It followed by Industrial uses (31.1 percent) in north-western part and residential uses (25.4 percent) in central part of tehsil. At the town level built up land has constantly increased in all the three towns respectively by 1 percent in Rajpura, 3 percent in Ghanaur and 15 percent in Nilpur during 2001-2011. The latter has experienced highest urban expansion and consequent loss of agricultural land as it got transformed into a Census town (2011), due to doubling of its population. This change from agricultural to non-agricultural uses clearly point towards need of making policies for saving good agricultural land and for increasing agricultural production by using state of art technology in agriculture.

### Key words:

Urban Expansion; Agricultural Land; Non- agricultural Uses; Punjab

## Use of an inside buffer method to extract the extent of urban areas from DMSP/OLS night-time light data in North China

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### Abstract

Defense Meteorological Satellite Program (DMSP)/Operational Linescan System (OLS) night-time imagery provides a valuable data source for mapping urban areas. However, the spatial extents of large cities are often over-estimated because of the effect of over-glow from night-time light if a fixed thresholding technique is used. In the work reported here, an inside buffer method was developed to solve this issue. The method is based on the fact that the area over-estimated is proportional to the extent of the lit area if a fixed threshold is used to extract urban areas in a region/county. Using this method, the extents of urban areas in North China were extracted and validated by interpretations from Landsat Thematic Mapper images. The results showed that the lit areas had a significant linear relationship with the urban areas for 120 representative cities in North China in 2000, with an  $R^2$  value of over 0.95. This demonstrates that the inside buffer method can be used to extract urban areas accurately. The validation results showed that the inside buffer model developed in 2000 can also be directly used to extract the extent of urban areas using more recent night-time light imagery. This is of great value for the timely updating of urban area databases in large regions or countries.

### Keywords:

DMSP/OLS data; inside buffer model; northern China; over-glow effects; urban areas



## Using CLUE-S model to determine Urban Growth Boundary in Shenyang,China

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### Abstract

In the past several years, China has experienced the urbanization process that offered unprecedented challenges to cultivated land protection as well as urban and rural coordinative development. As an important policy to guide urban development, Urban Growth boundary(UGB) has been implemented in many countries. However, In China, current research on scientific UGB determine method has still been in the exploration. In this passage we have designed an UGB model applied to Shenyang, one of the highest urbanization city in northwest China. Here we show that coupling a Markov chain on CLUE-S model simulate the urban growth process well. We use stepwise logistic regression analysis to find the main factors of influencing urban growth. We find that access to road, population and policy influence city development significantly. Furthermore, we design three types of UGB based on different development concept. Our results demonstrate how Shenyang are likely to be in 2020, offering a rational planning for future development. We anticipate our research to be a referential UGB model applied in China and offer proposal for the growth of Shenyang.

### Key words:

urbanization; urban growth boundary; Shenyang

## Evaluation of urban land intensive use with emerging fine-scale data: a case study of Jiangsu Province

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### Abstract

Facing the large amount of population, limited farmland resources and the rapid development of urbanization, China must take effective measures to strength the intensive use of land resources. Currently, urban land intensive use has been one of the hot topics of study on LUCC in urban areas, and a few studies have been conducted from different aspects and different spatial scales. Based on the traditional evaluation method i.e., focusing on social and economic development and confining in an administrative boundary, characteristics of the urban infrastructure, urban population concentration, urban functions vitality were explored by emerging fine-scale data including urban transport networks, Points of Interest (POIs) in urban areas, cellular signaling data, Weibo data and other Location-based services (LBS) data to establish a technical framework for urban intensive land use evaluation. Jiangsu Province in China was taken as a case study and a result at a resolution of 1km\*1km was achieved. It indicated: (1) the integrated urban vitality evaluation broadensthe connotation of the intensive in urban land use. Emerging fine-scale data provide effective support for conducting urban land intensive use evaluation; (2) there are significant differences among major cities (city groups) on urban land intensive use. The utilization level, the economic development level and city size are positively correlated; (3) there are also some obvious differences within a city area especially in urban functions and vitality between the new developed city area and the old town.

### Keywords:

land intensive use; urban area; fine-scale data; Jiangsu

## Identifying conservation priorities in a rapidly urbanizing landscape: a habitat network perspective

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### Abstract

Biodiversity conservation is challenging in urbanizing landscapes where there is recurring habitat degradation and limited space for subsequent restoration. Conservation efforts based on natural reserves can not necessarily maintain certain ecological processes that take place across whole habitat network. There is a need to conserve or restore critical habitats outside protected areas for maintaining the functional connectivity of networks. In this study, we developed a connectivity modelling approach associated with varying conservation scenarios to identifying habitat conservation priorities in a rapidly urbanizing area of Shenzhen, China. We incorporated unprotected habitat patches into the reserve network via four scenarios and prioritized the contributions of those patches to the overall network connectivity. We also investigated the responses of species with different dispersal abilities to habitat changes under each conservation scenario, respectively. The results showed that habitat patches around protected areas could create large connectivity gains and should be prioritized for conservation. Connectivity benefits from different scenarios were closely linked with species' dispersal abilities. Key patches that could enhance connectivity substantially were also identified as conservation priorities. The species-specific and site-specific conservation schemes we provided are useful to making informed decisions in urban planning and management.

### Keywords:

ecological conservation; urban planning; biological habitat; network connectivity; graph theory; conservation scenario

## Research on Spatial and Temporal Evolution of Landscape Pattern of Urban Village Under Urban Expansion: A Case Study of Nanchang City

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### Abstract

Intensive utilization of land is an important means of maximum benefits and allocation of land resource. It is a great significance for building the resource-conserving and environment-friendly society. During the the process of construction and development of rural construction land in, lacking of system planning, low utilization of land, imbalance in the structure of land, and hollowing out, caused great waste of rural land.

According to the connotation of intensive utilization of land, widely absorbing the domestic and foreign research results, this paper based on the land compensation law theory, the land scarcity theory and the land location theory, used quantitative and qualitative analysis, combining the theoretical research and empirical research method, studied 13 villages of rural construction land in the coordination degree of population and construction land in Zuofang County in Jinxi and 7 typical villages of intensive utilization from macroscopic and microscopic scales. By measuring the theoretical capacity and practical capacity of the 7 typical villages, it can help us explore the stock capacity of rural construction land and the ways of mining.

In the macro scale, it mainly aimed at the fitting degree of the rate of resident population changing and rural construction land changing, and then, separating the 13 villages into different types.

In the micro scale, it mainly aimed at the intensive utilization evaluation analysis of the 7 typical villages which is choose from different types of the 13 villages. First, divide the rural construction land into different land types. And then, evaluate them by a set of index system which is a composition of land using structure, land using intensity and the social economic benefits.

The land potential capacity is divided into two aspects. One is theoretical potential capacity which is calculated by the area of construction land per people. Another is practical potential capacity which is calculated by totaling up the leisure land and the idle houses.

According to the result, the 13 villages is low coordination degree in population and construction land. And the land intensive level of the 7 typical villages is extensive. Since the structure of construction land is single and the land using is extensive, it existed a large amount of potential capacity. In order to form an intensive style of land use, we need to change traditional development conception, design scientific program, speed up



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the transformation and upgrading of rural to urban, tear down the idle houses, expand the public infrastructure, optimizing the land layout, provide a more convenient and comfortable living environment for farmers.

**Key words:**

Rural construction; Intensive utilization evaluation; Zuofang County

## **Risk assessment of land use competition in the fringe of the valley city: A case study of Lanzhou**

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### **Abstract**

Due to the limitation of terrain, the construction land is scarce in the valley city. The relationship between stakeholders is particularly complex in the urban fringe. The contradiction of land use competition is prominent. This paper chooses Lanzhou - a typical Valley City, as the research area. Based on GIS multi-criteria analysis (GIS-MCDA), Questionnaire Survey and Interview, Delphi method, combined with the city development, ecological protection and stakeholders will, the risk evaluation index system of land use competition was established and the land use competition risk was evaluated in urban fringe of Lanzhou City. The results show that: there is a small area of high risk land use competition in Lanzhou, which was mainly distributed in the valley basin inside of the undeveloped areas in the city edge. The relatively high risk areas are widely distributed, which was mainly distributed in the central city east, west and the north low-slope hilly land region. The centre city eastern land use competition was in the highest risk, which is inconsistent with the strategy of development the Heping-Dingyuan group as the eastern city of Lanzhou.

### **Key words:**

land use competition risk; GIS-based multi-criteria analysis; urban fringe; Lanzhou

## Study on Spatial-temporal Change of Water environment in Suzhou and its

### Relationship with Land Use

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#### Abstract

Taking Suzhou with the rapidest economical development for example, using entropy model, selecting 5 indexes including dissolved oxygen (DO), ammonia nitrogen ( $\text{NH}_3\text{-N}$ ), permanganate index ( $\text{COD}_{\text{Mn}}$ ), total phosphorus (TP), total nitrogen (TN), the temporal and spatial variation of the water quality in research area from 2002 to 2014 were analyzed, and the relationship between water quality indexes and social-economical indexes and land use type in 2002 and 2014 was discussed and analyzed separately. The results showed that: (1) The water quality in Suzhou was general bad but become slightly better in recent years. (2) From the perspective of spatial variation, water quality of central urbanization area which was influenced by intense human activity was poorer, and that in surrounding areas was relatively good. (3) The results of related analysis showed that the influence of different economic social indexes and land use type to water quality indexes was not identical. For  $\text{NH}_3\text{-N}$ , TN, TP and  $\text{COD}_{\text{Mn}}$ , the positive influence of industry and agriculture pollution was larger. For the impact of land use type on water quality indicators, there was a strong correlation between the proportion of urban land along riparian and those indicators. But the influence decreased from 2002-2014. Meanwhile, the affect of riparian land use on river water quality was larger in wet season compared to dry season.

#### Key words:

Water Environment Change; Entropy assessment; Urbanization; Suzhou

## The Effect of Green Open Space on Sense of Belonging

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### Abstract

Previous studies have overwhelmingly focused on the effects of residents' individual condition, dwelling time and social relations on sense of belonging. Little attention has been paid to the relationship between green open space and sense of belonging. Using the 2014 data of three communities from Beijing, this study pioneers the application of SEM to examine green open space correlates of sense of belonging. Results from structural equation modeling and path analysis suggest that the green open space have 16% of interpretive force to sense of belonging, and the residential satisfaction of green open space would positively affect sense of belonging. The sense of belonging would indirect impacted by convenience, importance and quantity of green open space.

### Key words:

greenopen space; sense of belonging; structural equation model; hierarchical regression; shape index

## The Relationship Research of Spatial and Seasonal Distribution of Atmospheric Particulates and Urban Heat Island (UHI) Intensity with Landsat Images in Xi'an, China

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### Abstract

In the movement of speedy urbanization, the problem of atmospheric particulates pollution has drawn great attention in some large cities. In the past five years, some studies have demonstrated Difference Vegetation Index (DVI), NDVI, MNDWI have impacts on the concentration distribution of atmospheric particulates and Urban Heat Island (UHI). However, the relationship between distribution of atmospheric particulates and UHI intensity has not been clearly explained in basin topography region. Therefore, this paper combines the methods of thermal infrared images retrieval and mathematical statistics, with four different seasons Landsat images for Xi'an, China in 2013 and 2014, using multiple index data including UHI intensity index, DVI, NDVI and MNDWI to quantitatively study the relationship between spatial-temporal distribution of atmospheric particulates and UHI intensity. By regression analysis, in the study area, the results demonstrate that DVI has a strong correlation on UHI intensity for two images in summer half year, and the correlation coefficient is all greater than 0.7. When UHI intensity is less than -0.1, DVI has a positive effect on UHI intensity. But, when UHI intensity is above -0.1, DVI tends to be exponentially negative correlated with UHI intensity. In addition, in the four Xi'an images, due to the influence of vegetation and water, the spatial distribution of the smaller DVI values and the larger UHI intensity values is located in fallow land and urban district usually, which conforms to the natural law.

### Key words:

atmospheric particulates; UHI intensity; DVI; NDVI; MNDWI; Xi'an

## Urbanization and Sustainable Development

### Demographic change and migration



Home

### Oral

1. [Employment-oriented Urban-ward Migration and Migrants in Urban Labour Market in Post-reform India](#)

Debarshi Guin (Centre for the Study of Regional Development, Jawaharlal Nehru University, India)

2. [Floating characteristics and formation mechanism of rural-urban migrants in China based on the urban house purchasing](#)

Wenheng Wu (Northwest University, China), Jingsa Zhang (Northwest University, China), Kaiying Xu (Northwest University, China), Yinghao Qu (Northwest University, China), Hongying Zhu (Northwest University, China)

3. [Return Migration, Non-agricultural Employment and Urbanization Plan: An Empirical Study Based on Chinese General Social Survey 2010](#)

Yin Jiangbin (Shaanxi Normal University, China)

4. [The Gond Tribe in Transition - Negotiating Boundaries and the Politics of Intrusion in India](#)

Shreya Saha (Jawaharlal Nehru University, India)

### Poster

1. [Digital Simulation of Population Density in China Based on Nighttime Light Data](#)

Minghong Tan; Xiubin Li; Shiji Li (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)

2. [Disparities of Urbanization in Maharashtra State of India](#)

Parag Khadke (India, Swami Ramanand Teerth Marathwada University, Nanded, Maharashtra)

3. [Immigration and Its impact on Demographic Scenario and Socioeconomic Condition among Tribal in Tripura](#)

Debbarma Solomon (India, International Institute for Population Studies (IIPS), Mumbai)

4. [Spatial Distribution of Migrants Returning from Metropolis Based on the Fluid Dynamics Theory: Taking Guangzhou as an Example](#)

Yueyue Zhang (China, Guangdong Key Laboratory for Urbanization and Geo-simulation)

5. [Study on Residential Segregation of Migrants and The Influencing Factors in Period of Transition: A Case Study on Wuxi](#)

Jiao Chen; Fengbao Liu (China, Nanjing University)

## Employment-oriented Urban-ward Migration and Migrants in Urban Labour Market in Post-reform India

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### Abstract

Since the liberalization of Indian economy in 1991, a lot of changes have occurred in both urban and rural labour markets which have some direct influence on the employment related urban-ward migration, its composition and labour market outcomes of the urban migrants which the current study aims to explore.

The study is based on 49<sup>th</sup>, 55<sup>th</sup> and 64<sup>th</sup> round National Sample Survey data on migration. Stepwise regression, multinomial logistic regression and Herfindahl's index of concentration have been employed to analyze the data.

Findings show that, push factors are more powerful than the pull factors to control the growth of employment related urban-ward migration. Among the employment-oriented migrants, majority have migrated 'in search of employment' and 'in search of better employment'.

Labour market outcomes of the urban migrants before and after migration reveal marked decline in the rate of unemployment and significant improvement in work participation rate and the nature of employment. However, it is also found that chances of being employed is much higher among the illiterate and less educated migrants as compared to highly educated migrants. But they are more likely to be employed as casual labourers while better employment (regular salaried workers) is more or less exclusive to the better educated urban migrants only. Thus, it is clear that liberalization led new-economy does not bring any hope to the millions of less educated urban migrants and they are continued to be absorbed in informal sectors (or as casual workers in formal sectors).

### Key words:

employment-oriented migration; urban labour market; urban migrants; employment, liberalization



## **Floating characteristics and formation mechanism of rural-urban migrants in China based on the urban house purchasing**

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### **Abstract**

At present, more and more rural-urban migrants purchase urban housing in China, and the National New-type Urbanization Plan released by the central government also encourage rural-urban migrants to gradually become the permanent residents by possessing urban housing. To study on the floating characteristics of purchasing urban housing for a permanent home and to deeply understand the direction and difference of rural-urban migrants might help to know about public migration intention from the demand side. Further, relevant policies of urbanization and citizenation can be better formulated from the supply side and the effective supply may be implemented. In this study, 1327 valid information from China's 24 provinces and autonomous regions such as Jiangsu, Henan, Shaanxi and so on was collected through random questionnaire survey of farmers, migrant workers, undergraduate students, graduate students and their family members. Basic situation of rural-urban migrants and their family members of purchasing urban housing were filled out by participants' memories or telephone inquiries according to the questionnaire. Floating characteristics of rural-urban migrants for purchasing urban housing was summarized by data analysis. Furthermore, causes and formation mechanism of differences between floating directions were probed into from the perspective of individual or the family by Spearman bivariate correlation analysis and multiple classification Logistic regression analysis methods. The results show that firstly, few rural-urban migrants purchase urban housing in China during the 1980s~1990s, whereas migrants of purchasing urban housing are gradually growing and tend to be younger since 2000. What's more, migrants of higher education level purchase housing in the cities of larger scale or higher grade in general. Secondly, cities within the province or autonomous region, especially, county-level cities are the main destination of rural-urban migrants purchasing urban housing, and the attraction of town is weak as a whole, so it is particularly important for promoting the new-type urbanization and citizenization process to strengthen the construction of county-level cities. It can be seen from the data that the original location of migrants affects the floating orientation of purchasing urban housing, namely, rural households of ordinary township move to the county-level cities and towns nearby, but the households near

big cities specially provincial cities prefer to purchase their housing in those higher-level cities. Thirdly, cities and towns of different levels in the eastern provinces of China have relatively high proportion of purchasing housing, and towns have the highest percentage of rural-urban migrants for purchasing urban housing among the eastern, central and western regions. Those indicate there the relatively developed regional economy and the urbanization pattern of coordinated development between large, medium and small cities and small towns; Rural-urban migrants dispersedly purchase their housing in cities at or above the county level in the central provinces, where the county-level cities and cities of other provinces at prefecture level and above have the largest proportion of purchasing housing among the three regions. There the rural-urban migrants is decentralized; In the western provinces, migrants who purchase their urban housing in the cities of prefecture level and above account for more than half, and the proportion of migrants flowing to towns by purchasing housing is the lowest among the three regions. Those reflect that there it still is underdeveloped and unbalanced inside. Finally, it should say that the interaction between the urban and rural demand, the interference of other cities and the distance from the city influence spatial distribution of migrants with purchasing urban housing. Moreover, the desired economic income and the attraction of the city should be the underlying causes that migrants purchase the urban housing where they work. People prefer to choose the housing in the county-level cities and towns of their hometown or the higher levels of cities nearby if they do not have the stable work in the cities. We also found through the quantitative analysis that the floating differentiation between migrants for purchasing urban housing is significantly correlated with the personal or family factors such as education degree, fixed a job or not, whether work in the city of purchasing the housing, work time in the current city, the age of buyers, and so on. In a word, the macro-level social environment and policy implications, the middle level all media in the urban and rural system, and the micro-level subjective behavior of individual or family members comprehensively drive the spatial differentiation of rural-urban migrants.

**Keywords:**

urban house purchasing; rural-urban migrants; floating characteristics; urbanization

## **Return Migration, Non-agricultural Employment and Urbanization Plan: An Empirical Study Based on Chinese General Social Survey 2010**

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### **Abstract**

Return migration has becoming a significant phenomenon of migration process, and will influence the prospective of economic development and urbanization in emigrating regions profoundly. Because of the particularities of the experience in employment and residence, return migrants have been proposed more likely to employ non-farm work and settle in cities. Based on nationally-representative data from the Chinese General Social Survey (CGSS) carried out in 2010, we build one single-indicator path analysis model with Mplus 7.0 software to examine the mechanism between return migration, non-agricultural occupation and urbanization plan. Our purpose is to find whether migration experiences influence the urbanization behavior of return migrants, and to explore the inner mechanism of return migration influencing urbanization plan, especially for the impacts of employment choice. Empirical result indicates that migration experience has a significant positive impact on aspiration of settling towns, and the direct impact shows bigger than indirect impact by non-farm employment. The age at return, years of migration, and workplace during migration have significant influences on urbanization behavior of return migrant. Finally, we provide some related policy suggestions to local governments.

### **Keywords:**

return migration; non-agricultural employment; urbanization aspiration; mechanism



## The Gond Tribe in Transition- Negotiating Boundaries and the Politics of Intrusion in India

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### Abstract

An unusual demographic change has been noticed in the pattern of distribution of Gond tribes in India post Independence. It has been found that the Gond tribes had a compact core in 1961 while in 1981 the core is seen to be fragmented. However, by 2001 the Gonds have tended to cluster more closely and project a compact core and compact periphery once again and are widespread across more districts. This kind of reshuffling of the Gond population could be primarily attributed to their very location itself in the mineral rich Central Indian plateau that attracts the exploitative character of powerful authority be it State or global capital. The State in its attempt to promote 'national development' has almost turned a blind eye to the socio-cultural dismantling of tribal societies that the policies are bringing about. At a micro level, it is found that Bastar, the largest Gond inhabited district is also experiencing a change in its demographic profile with large scale intrusion of non tribal population owing to the resource worth of the region and this change is accompanied by a gradual transition in the work activities of the home population. Thus, the present paper intends to bring to light the territorial reconfiguration of the Gonds using the core- periphery model and for micro level changes simple population growth rate and occupational shift proves the reality.

### Keywords:

Core; periphery; national development; eminent domain; public purpose

## Digitalsimulation of population density in China based on nighttime light data

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### Abstract

Migration has become one of central concerns in China, which influences climatic changes, ecological construction, water and land resources use, and economic development. The data of population investigation and census are provided at the form of points, while spatial distribution of population is important and necessary for various scientific research. This study simulated population densities of China with a resolution of 1 km×1 km in 2000 and 2010, using the population data from the fifth and the sixth censuses in China and night-time light imagery provided by The Defense Meteorological Satellite Program (DMSP) and Operational Linescan System (OLS). The results showed that there were some significant features in spatial distribution of population in the 2010s. First, the regions with a population density between 500 and 1500 persons/km<sup>2</sup> were “disappearing”, which werelocated in main grain productive areas in China. Second, the regions with a high population density increased significantly. For instance, the regions with a population density over1500 persons/km<sup>2</sup> increase by 76% in the 2010s. Third, the regions with a low population density also increased quickly. These features exert great impacts on land use, ecological construction.

### Keywords:

nighttime light data; census; population density; China

## Disparities of Urbanization in Maharashtra State of India

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### Abstract

Towns and cities have taken shape as centre of administrative and cultural significance through the centuries. As we can observe that the population in urban area is increasing too rapidly. Mostly people are moving to urban from rural area to have a more comfortable life, higher salary and better educational environment. At the moment, India is among the countries of low level of urbanization. Number of population residing in urban areas has increased from 2.58 crores in 1901 to 37.71 crores in 2011. India is the most populous countries in the world. Our country covers only 2.4 per cent of the land area of the world, whereas it is the home of more than 16.87 per cent of the world's population. Since the new economic policies were adopted in the country, Maharashtra has seen fast urban growth. Maharashtra has the highest level of urbanization in India at 45.23 per cent compared to 29.5 per cent as the all India average. Census data were used to study the nature and pattern of urbanization in India with special reference to the state of Maharashtra. Urbanization depends on the socio-economic system of the society and the rate of its development. Maharashtra state urban population growth is considered for the period 1901 to 2011. It has increased from 3217202 persons in 1901 to 50818259 persons in 2011. The highest urban population growth in the all census was 1961 i. e. 62.42 per cent, and Lowest urban population growth in the census 1911 i.e. 0.99 per cent.

### Key words:

Trend of Urbanization; Growth of population; Development; Transformation

## Immigration and Its impact on Demographic Scenario and Socioeconomic Condition among Tribal in Tripura

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### Abstract

Tripura was a glorious princely state ruled by 184 kings before it merged with Indian union on 15th October 1949, after which there was a serious social, political and demographic ramification with the great influx of Bangladeshi immigrant from 1947 to 1971. Attempt will be made to study the consequences of this event.

The Present study will analyse the changes in the demographic and socio-economic scenario of the tribal and non-tribal population from Census of India 1941-2001 and National Sample Survey (NSSO) 52nd, 64th and 71st round using univariate and bivariate analysis.

The result shows that the tribal who are once majority are now sharing only 31% of the total population, further the language composition shows that only 26% speaks tribal dialect while about 67% speaks Bengali and 7% other (Census 2001). The wealth quintile from NSSO data shows that non-tribal are better than tribal people; as the majority of the tribal people are still poor or middle category. Tripura has been ruled by the ruling party "Communist party of India" since 1993. On the other hand In-spite of being a tribal state; there was only one chief minister from these tribes so far.

As a result of these change, there happen to be many communal clashes and emergence of insurgency group, which disturb the communal harmony of the state. So there is a need to explore the status of this tribe, in order to through light to the policy maker for implementing the better policy for this tribes.

### Keyword:

Migration; Demographic change; Tribal; Immigration

## **Spatial distribution of migrants returning from metropolis based on the fluid dynamics theory: taking Guangzhou as an example**

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### **Abstract**

With more and more migrants returning from metropolis, the urbanization in future will more likely take place in medium cities, small cities and towns. Moreover, urban planning in those areas will be different from it in metropolis, and will be influenced remarkably by the scale and the direction of the migrants flow. Thus, the spatial distribution of migrants returning from metropolis should be paid more attention. This paper takes Guangzhou as an example. Based on the fluid dynamics theory, a model will firstly be constructed to analyze the spatial movement of migrants. Secondly, the spatial distribution of returning migrants will be concluded by inputting influence factors of migration obtained through questionnaires and data from National Health and Family Planning Commission of the People's Republic of China into the model. Finally, the result of it will be mapped by GIS accurately and vividly, and corresponding advice could be suggested to the planning in these areas, such as the layout of the infrastructure and the way of improving attraction of satellite towns.

### **Key words:**

spatial distribution; migrants returning from metropolis; fluid dynamics theory

## Study on Residential Segregation of Migrants and The Influencing Factors in Period of Transition: A Case Study on Wuxi

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### Abstract

Since reform and opening-up, the migrants who come to city from countryside usually concentrate in certain areas in city, forming a special agglomeration space, which produces impacts to the general urban space of the city. With the concentration of migrants, the problems of the social spatial fragmentation, the privatization of public space and social tagging of community residents become more conspicuous. The social space heterogeneity is unceasing deepening. Meanwhile, the social relations and order of the community have been severely disturbed and destroyed. Taking Wuxi city as an example, this paper analyzes the concentration characteristics of the living space of migrants, and the differentiation features of the urban residential space of the city by referring to related study methodologies in China and abroad. Moreover, the paper also explores the inference of the social space elements via methodologies of fitting and comparison, with the aim to explore the pattern, extent as well as mechanism of migrant residential segregation in transitional China.

### Key words:

migrants; residential space; spatial agglomeration; spatial segregation

## Urbanization and Sustainable Development

### Risk and vulnerability analysis and urban safety



Home

#### Oral

1. [Demography of Disasters – The Role of Demography in Planning for and Mitigating Impacts from Disasters in Developed Nations](#)  
David Karacsonyi (Geographical Institute, Hungarian Academy of Sciences, Hungary); Andrew Taylor (The Northern Institute, Charles Darwin University, Australia)
2. [Disaster Management in Future Indian Smart Cities: Issues and Challenges](#)  
Janki Jiwan (Shaheed Bhagat Singh College, University of Delhi, New Delhi, India)
3. [Ecological Risk Assessment of Landslide Disasters in Southwest Mountainous Area: A Case Study in Dali Bai Autonomous Prefecture](#)  
Yueyue Du; Jian Peng; Shiquan Zhao; Zhichao Hu; Yanglin Wang (Peking University, China)
4. [Livelihood and Vulnerability in the Peri-Urban Interface. A Case from Developing India.](#)  
Nasrin Banu (Department of Geography, Aligarh Muslim University, Aligarh,, India)
5. [Probabilistic Risk Analysis Application on Evaluating Ocean Surge Related Disasters' Impacts: A Case Study at Hainan Island China](#)  
Peihong Jia; Miao Wang; Shu Gao; Yong Yin; Ling Li; Zhi Gu (Nanjing University, China)
6. [Spatial Analysis of the Relationship between Urban Development and Tsunami Disaster Risk in Cold and Heavy Snow Area -A Case of Tomakomai City, Japan](#)  
Takeshi KAWAMURA (Graduate Student of Hokkaido University, Japan); Yuichi HASHIMOTO (Hokkaido University, Japan)

#### Poster

1. [A Visualized Simulation Study on the Rainstorm Water Logging Risks in Nangan District of Changchun from Multi-Scenarios Perspective](#)  
Peng Chen; Jiquan Zhang; Yingyue Sun (China, Jilin Normal University)
2. [Assessing Heat-related Health risk at Pixel Level – A Case Study of Zhejiang Province, China](#)  
Kejia Hu; Xuchao Yang (China, Zhejiang University); Jieming Zhong (China, Zhejiang Provincial Center for Disease Control and Prevention)
3. [Assessment of Vulnerability to HIV/AIDS in Mizoram, India: A Study of Groups-at-Risk](#)  
Debendra Kumar; Khupmuanlal Zou (India, North Eastern Hill Region)



4. [Study of Urban Vulnerability Evaluation in Northwest China Based on TOPSIS Model](#)

Hailing LI; Bei-bei MA; JIANG Jun (China, Shaanxi Normal University)

## Demography of Disasters – The Role of Demography in Planning for and Mitigating Impacts from Disasters in Developed Nations

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### Abstract

Both slow onset disasters (like the loss of polar ice from climate change) and rapid onset disasters (such as cyclones and man-made or industrial disasters) have the capacity to fundamentally change the profile of populations at local and regional levels. Impacts vary according to the type, rapidity and magnitude of the disaster, but also according to the pre-existing population profile and its relationships to the economy. It is well known that sub-sections of populations, like elderly, homeless and Indigenous populations, may be more vulnerable than others to the effects of disasters.

Demographic impacts from disasters might range from a magnification of demographic trends observed in the past to a complete bifurcation in the form of de-population or a collapse in the viability or sustainability of communities. In all cases, the key to understand impacts is to have research based knowledge about the number and compositions of those who might be or who are immediately affected. Tools and techniques for assessing population impacts are a first step for responding to immediate needs and for understanding longer term impacts and appropriate responses. Policy responses should be informed by knowledge of pre-existing demographic conditions and how different populations react under situations of disaster onset.

In the on-going book-project entitled “The Demography of Disasters” we compile case studies which provide cross-national cases of population responses to disasters in order to provide practical and theoretical insights for understanding the role of demography in planning for and mitigating impacts from disasters in developed nations.

### Key words:

demography; disasters; resettlement; vulnerability

## Disaster Management in Future Indian Smart Cities: Issues and Challenges

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### Abstract

In India, proposed smart cities are vulnerable to variety of natural hazards (floods, hurricanes, earthquakes and volcano eruptions) and man-induced emergencies (technological or industrial accidents, usually involving the production, use or transportation of hazardous material, and occur where these materials are produced, used or transported). These recurrent disasters have potential to disrupt components of smart cities viz., Smart Health, Smart IT & Communications, Smart Transportation, Smart Environment, Smart Energy, Smart Governance, Smart Environment and Smart Buildings. This paper looks into the vulnerability of these components to mainly two disasters namely earthquake and flood with focus on two proposed smart cities viz., New Delhi and Chennai (Earthquake vulnerability in New Delhi and Flood Vulnerability in Chennai). This paper also studies various models, issues and challenges for making disaster resilient components of smart cities so as to enable decent living for their residents, a clean and sustainable environment and adopt smart solutions to meet their ends.

### Key words:

Smart City; Disaster Management; ICT; Issues and Challenges

## Ecological Risk Assessment of Landslide Disasters in Southwest Mountainous Area: A Case Study in Dali Bai Autonomous Prefecture

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### Abstract

Facing the background of land creation project strategy, huge development potential for gentle hillside, high frequency of geological disasters and fragile ecological environment in southwest of China, the ecological risk assessment on geological disasters is particularly important to the sustainable development of regional social economy and ecological environment. The existing assessments working on geological disasters are likely to focus on the risk of economic loss instead of the risk of regional ecosystems. Besides, the process of how risk receptor exposure and then response to the stressors has been paid less attention. Choosing Dali Bai Autonomous Prefecture as an example, the study assesses ecological risk of landslide geological disasters considering risk stressors, risk receptors, exposure and response process, and ecological end points. To be specific, this research firstly uses the information method to evaluate the hazard of landslide disasters. Secondly, ecological vulnerability is evaluated based on landscape pattern metrics. Thirdly, the potential ecological damage of the study area is obtained according to ecosystem service assessment. Finally, this paper comprehensively evaluates the ecological risk of landslide geographical disasters, and distinguishes the partitions of risk precaution and governance. The results showed that, (1) 10 aspects including geography, geology and human activity factors such as elevation less than 1800 m, slope within 15-25 °, NDVI less than 0.31 are the best information combination for inducing landslide geographical disasters in Dali Prefecture. As to the hazard of landslide geological disasters, the whole Dali prefecture is generally in middle and high risk level of landslide and debris flow disasters. And the risk of northwest is lower than that of southeast; (2) the areas with high ecological vulnerability mainly concentrated in the south of Hong River watershed, southeast of Jinsha River watershed and the central of Lancang River watershed. Watersheds with low ecological damage occupy relatively poor water conservation service and food supply service. Watersheds with middle ecological damage have obvious advantage in providing net primary production and soil conservation service. Watersheds with high ecological damage would have relatively strong food supply and water conservation service. (3) the ecological risk of landslide geographical disasters shows a circling structure in which the lower risk level is distributed on the periphery, and the higher risk always occurs in the middle of the study area. What more, the area and number of watersheds in different risk level decreases gradually. 367 small watersheds contain 8 kinds of structures of ecological risk and 4 partitions of risk prevention and governance strategies. The results will do great help to the decision making of ecological risk prevention and macro ecological management in Dali Prefecture on the background of gentle hillside construction.

### Key words:

Ecological risk of landslide disasters; Geological hazard; Ecological vulnerability; Ecological potential damage; Risk prevention and governance; Dali Bai Autonomous Prefecture

## Livelihood and Vulnerability in the Peri-Urban Interface. A Case from Developing India.

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### Abstract

The present study is an attempt to depict the picture of livelihoods and its vulnerability in the transforming Peri-Urban Interface of Aligarh city which is located in the shadow of the national capital, Delhi. The study assumes that process of peri-urbanization adds complexity to household livelihood security. To measure this stress, the study adopts the Sustainable Livelihood Approach of DFID. It also evaluates the coping strategies adopted by the households to cope with urban stress.

The study is based on both primary and secondary sources of data. The primary data was collected through stratified sampling where on the basis of distance the PUI has been divided into three zones. From the city boundary up to 5 km is termed as immediate PUI, 5-10 km is intermediate and 10 -15 km is distant PUI. After the zonation, 44 villages were sampled and 757 households were surveyed.

Indices of Asset, Exposure and Sensitivity have been made for preparing Livelihood Vulnerability Index. On the basis of LVI's score the PUvillages have been categorized into three stages which include accumulating, adapting and surviving stage. Better status is in accumulating stage which has the ability of absorbing urban stress. But interestingly none of the immediate PUI is found in this stage. The second stage of livelihood ladder is adapting stage in which livelihood situation is improving. The third stage of livelihood ladder is surviving stage in which life is a constant battle and higher number of the villages in immediate PUI falls under this stage.

### Key words:

sustainable livelihood; peri-urban interface; coping strategy; exposure; asset; sensitivity and livelihood ladder

## Probabilistic Risk Analysis Application on Evaluating Ocean Surge Related Disasters' Impacts: A Case Study at Hainan Island China

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### Abstract

Ocean storm surge is a serious marine disaster occurred with rapid and strong destructive force to cause many disasters that seriously threaten coastal area and cause huge property and life losses. Hainan Island is being developed to be International Tourism Island and the research area is admitted to be a pilot zone by China National and Hainan Provincial Government, meanwhile, it is one of the provinces affected by tropical cyclones in a higher frequency and causes serious damage to the environment, people's life and economic properties. Nanjing University has finished some research works and collected abundant surveying and research data in Hainan Island. Ocean storm surges in history, Geo-Ocean, social and economic etc. data, combined DEM data, remote sensing data, other social and economic data are overlaid in ARCGIS10.1, plus QASER model to integrated analyse with 2D/3D styles to assess multi-risk of storm surge disasters. More sustainable and resilient urban planning to all disasters is emphasised to require urban planner to have a thorough understanding on the potential impact of natural disasters and then make a resilient urban planning to resist multi-risk assessments in this area as prediction to direct the infrastructure construction rationally by science data and policy, to provide an important theoretical basis for risk zoning and assessment of disaster losses, and to support scientific decision-making for the preparation of evacuation routes, the design of disaster prevention project, and the guidance of the coastal economic layout taken into account in long-term urban/land use planning.

### Key words:

Ocean storm surge disaster; Multi-risk assessment; integrated analysis; city resilience; QASER model

## Spatial Analysis of the Relationship between Urban Development and Tsunami

### Disaster Risk in Cold and Heavy Snow Area

#### -A Case of Tomakomai City, Japan-

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#### Abstract

This study aimed to clarify the tsunami disaster risk of port city in cold and heavy snow area. The study area is Tomakomai City in northern part of Japan. Tomakomai City is a coastal port city. The port of Tomakomai is a particular international hub port. For the purpose of this study, we analyzed the change in building location and population in the evacuation difficult zones using a geographical information system(GIS). We used the city planning basic survey data and the tsunami simulation data in this analyzed. As a result, manufacturing facilities and the daytime population increased around the port. On the other hand, in the western part of the city, houses increased in the 1990s. The result of this analysis showed that the location of manufacturing facilities around the port and suburbanization of houses increased tsunami disaster risks. In the evacuation difficult zones, setting of evacuation facilities reduces tsunami disaster risks. However, because of the drop of the walking speed by the snow, the people who cannot arrive at the evacuation facilities increase. This study showed that factors of the increase of tsunami disaster risks differ from region to region, and the risk changes by a season. Thus, it is important that development of the disaster prevention plan depending on locality and seasonality.

#### Key words:

geographical information system(GIS); city planning basic survey data; simulation data of tsunami disaster; spatial analysis of building location; coastal port city; evacuation facilities; evacuation behavior

## A Visualized Simulation Study on the Rainstorm Water Logging Risks in Nanguan District of Changchun from Multi-Scenarios Perspective

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### Abstract

Frequent urban rainstorm water logging is severely threatening the lives of urban residents and safety of property. The simulation of urban rainstorm water logging risks will provide evidences for the forecast and early warning of the disaster. In this paper, Nanguan District of Changchun was selected as study area for urban rainstorm water logging. From the multi-scenarios perspective, this paper proposed a multi-scenarios simulation framework of urban rainstorm water logging risks. For this purpose, it synthetically built a numerical model of urban rainstorm water logging risks taking one-dimensional and two-dimensional unsteady flow as the governing equation and irregular grids as the frame. The results are as followings: ① the study area has 12 water logging points with the maximum accumulated water depth of 0.69m, after a 30-year rainstorm in intensity of 60mm/h; ② 15 water logging points with the maximum accumulated water depth of 1.035m after a 50-year rainstorm in intensity of 89.5mm/h; and ③ 22 water logging points with the maximum accumulated water depth is 1.58m, after a hundred-year rainstorm in intensity of 103.2 mm/h. These results can be referenced by urban water logging emergency management authorities for the forecast and early warning of disaster.

### Key words:

Rainstorm Water Logging; Multiple Scenarios Simulation; Nanguan District; Visualized simulation

## Assessing Heat-Related Health Risk at Pixel Level – A Case Study of Zhejiang Province, China

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### Abstract

Extreme heat events will become more intense, more frequent, and longer durative with a continuous climate change in the foreseeable future, leading to an increased human health risk of diseases and excess deaths. (Extreme climate events are expected to further intensify in the near future, last longer and occur more frequently in particularly coast regions such as the Monsoon Asia, having significant implications to human health.) In hazard risk assessments, there is always a spatio-temporal mismatch between hazard data and exposure data, due to the fact that demographic data is generally updated every couple years and not available at sub-census unit level, which hinders the ability to diagnose human risks. In this study, an exposure model based on multi-sensor remote sensing data was applied in population distribution estimation on a per-pixel basis. Urban heat island effect was taken into account in hazard (heat stress) measurement. The heat health risk was spatially explicit assessed and mapped at a 250m×250m grid across Zhejiang Province, China. The assessed risk and the heat-related deaths during the same period have a good spatial correlation at county level ( $R^2=0.66$ ). The analysis of heat-related deaths indicated higher deaths, a higher spatial death density, but a lower mortality in urban areas compared with non-urban areas.

### Key words:

extreme heat; human health

## Assessment of Vulnerability to HIV/AIDS in Mizoram, India: A Study of Groups-at-Risk

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### Abstract

Based on interviews conducted among four high risk groups in Mizoram- a state in India perceived to be highly vulnerable to HIV/AIDS owing largely to its location and space relation with countries and states already experiencing a spurt in HIV positive cases., vulnerability to HIV/AIDS has been probed in this paper including a sample of those who have already contracted the disease. The latter includes a sample of those who are HIV Positive and the former consists of the commercial sex workers (CSW), the intravenous drug users (IDUs) and the truck drivers. The reason for including HIV positive group in the study was felt necessary as it provides a direction to HIV/AIDS vulnerability among the groups at risk. Information extracted from them helped build an understanding of the extent of vulnerability to HIV/AIDS. It is important to see as to how they got infected and the conditions that made them contract the virus. A schedule was designed for thirty respondents (HIV positive persons) with their prior consent and with the help of concerned NGOs. Besides the HIV Positive, the study includes a sample of the commercial sex workers, intravenous drug users and the truck drivers- the three most important groups who, by the very nature of their profession can easily be considered as highly at risk. As many as 30 respondents from each of these groups were interviewed on several facets of their personal and professional works in order to assess the extent of their vulnerability to the dreaded disease.

### Key words:

Vulnerability; Risk; AIDS

## Study of Urban Vulnerability Evaluation in Northwest China Based on TOPSIS Model

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### Abstract

As the underdeveloped area in China, Northwest region's development in eco-environment and society and economy are crucial for China. However, both the basic infrastructure and sustainable development of this territory are flawed. Making a research on the urban vulnerability and its dynamic evolution are of great significance to promote the territory sustainable development. This paper aims to evaluate the urban vulnerability and its change trend in capacity Northwest (Xi'an, Lanzhou, Xining, Yinchuan, Urumqi) from 2000 to 2014 by using the TOPSIS method. The assessment can be divided into four parts, they are resources, eco-environmental systems, economics, and social development. Results show that the urban vulnerability in five cities is relatively high vulnerability, and high vulnerability. The overall urban vulnerability change high vulnerability to relatively high vulnerability from 2000 to 2014, but resource vulnerability is abnormal, which can be indicated by the moderate vulnerability change into the relatively high vulnerability. Resources and eco-environment can be the factors affecting the changes.

### Key words:

the urban vulnerability; capacity northwest; TOPSIS method; change trend

## Urbanization and Sustainable Development

### Urban Transport Geography: Transitions to Sustainable Mobility



#### Oral

1. [Enhancing Passenger Safety and Security in Ghana: Appraising Public Transport Operators' Recent Interventions](#)  
Enoch Frederick Sam (University of Education, Winneba, Ghana); Albert Abane (University of Cape Coast, Ghana)
2. [Spatial Imprint of Road Transport and Its Impact on Spatial and Sustainable Urban Form: A Study of Lucknow Metropolis, U.P., Lucknow, India](#)  
Kashif Imdad (PPN PG College, CSJM University, Kanpur, India)
3. [The Influence of Household Structure on the Travel Behavior of Young Couples in China](#)  
Zhenzhen WANG; Ying He (Department of Geography and Resource Management, The Chinese University of Hong Kong, China)
4. [Understanding the Relationship between the Development Degree of Public Transport and Economic Development of Cities in China](#)  
Fengjun Jin; Jingjuan Jiao (Key Laboratory of Regional Sustainable Development Modeling, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)

#### Poster

1. [Spatial Dependency of Bus-line distribution Based on bipartite network: A Case Study of Beijing City](#)  
Duan Dezhong; Liu Chengliang; Gui Qinchang (China, East China Normal University)
2. [Spatiotemporal Evolution of Land Subsidence around Subway, Determined by Time-series InSAR and the Entropy Method](#)  
Chen Wenfeng; Gong Hui-li; Chen Bei-bei (China, Capital Normal University)

## Enhancing Passenger Safety and Security in Ghana: Appraising Public Transport Operators' Recent Interventions

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### Abstract

Descriptive cross sectional study in nature, the paper examined passenger safety and security interventions of public transport (PT) operators in Ghana. Data were drawn from in-depth interviews with six (6) major inter-urban PT operators as well as questionnaires administered to 273 inter-urban PT passengers. Field data were presented and analysed using both narratives and descriptive statistics.

A number of recent safety and security interventions adopted by the surveyed operators were appraised. For the operators, these have resulted in reduction in road accidents and highway robbery attacks involving their buses and invariably their passengers. On the part of passengers, interventions geared towards addressing reckless driving and police escort on buses were commendable.

The study emphasised the need for periodic review of the regulatory framework establishing public transport undertaking by the Metropolitan, Municipal and District Assemblies (MMDAs) to reflect changing safety and security circumstances.

### Key words:

public transport operators; passenger safety; passenger security; safety and security interventions

## **Spatial Imprint of Road Transport and Its Impact on Spatial and Sustainable Urban Form: A Study of Lucknow Metropolis, U.P., Lucknow, India**

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### **Abstract**

Urban form refers to the spatial imprint of an urban transport system as well as the adjacent physical infrastructures. The evolution of road transportation has influences and determined the direction of change in urban form and spatial arrangement of the cities. The most important change in the urban form is the evolution of new cluster because of a change in urban activity and its mobility from old cluster. With continue transformation of cities and change in urban activity a complex urban structure continues to develop. Because each city has its own unique form of geography, transportation, history, social and economic characteristics, it develops a unique set of urban form and spatial structure. Present study intends to study spatial imprint of road transport and its impact on spatial and sustainable urban form. For this purpose road traffic data has been collected along all major highways and crossings. Various other associated parameters of road traffic have also been collected to determine different parameters of selected segments of roads and nodes. The result indicates positive relation between of road transport imprints on spatial and sustainable urban form of Lucknow metropolis.

### **Key words:**

Sustainable transport; Spatial imprint; Urban form; spatial structure and metropolis

## The Influence of Household Structure on the Travel Behavior of Young Couples in China

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### Abstract

Existing studies have documented that individual's travel behaviour is affected by intra-household interactions about the allocation of household tasks and out-of-home activities among family members. China's unique household structure, extended household with co-residence of senior parents, is supposed to significantly affect intra-household interactions and therefore influence individual's travel behaviour. Based on the data of 2013 Huzhou Residents Travel Survey, this study will attempt to explore how China's unique household structure affects young couples' travel behaviour, including travel frequency and duration for various purposes. Descriptive analysis method will be adopted at first to compare the difference in travel behaviour of young parents with different household structures, and then multivariate regression models will be established to further investigate how travel behaviour of young parents is affected by household structure. The finding of this study may have potential implications for urban transportation policy in China.

### Key words:

household structure; travel behaviour; young couples; China

## Understanding the Relationship between the Development Degree of Public Transport and Economic Development of Cities in China

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### Abstract

Influenced by the rapid development of economy, the levels of mobility have increased substantially in China, which leads to many traffic (congestions), environmental and other problems in some megacities and very large cities (e.g. Beijing and Shanghai). To solve these problems, the strategy of developing public transport is proposed by many governments. However, the studies about the development degree of public transport and its relation with economic development in China are rare. Therefore, this paper will firstly analyze the evolution of public transport (including subway, light rail and bus) in China. Secondly, this paper will use the factor analysis to evaluate the development degree of public transport and economic development in the city level and explore their spatial patterns. Thirdly, this paper will explore the relation between the development degree of public transport and economic development in China and classify the study objects into several categories. Lastly, this paper will try to give some suggestions to the development of public transport in China.

### Key words:

public transport; development degree; economic development; China

## Spatial Dependency of Bus-line Distribution Based on Bipartite Network: A Case Study of Beijing City

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### Abstract

Based on the idea of binary network, this paper discussed the local and global spatial dependency of Beijing bus-line distribution by the space correlation matrix construction of bus-line and city road, and the introduction of dependency measures from 1-mode network. We found that in terms of local dependence, the layout of bus-line is highly dependent on a few city trunk roads and express roads from downtown to suburb, so its spatial dependence pattern forms a corridor diffusion pattern of core-periphery which takes the downtown of Beijing as the core, and takes the suburban rapid corridors for the channel. In terms of global dependence, the distribution structure of bus-line was imbalance, which seemed more fragile and greatly influenced by the city road traffic conditions. The downtown area taking the Forth Ring as the boundary was the core space of bus-line dependence. In terms of space division, the layout of Beijing bus-line presented good correspondence to the city districts, Chaoyang District, Haidian District and Within Third Ring Area were the three most density area of bus-line distribution.

### Key words:

bus-line; city road; spatial dependency; bipartite network; Beijing City

## Spatiotemporal Evolution of Land Subsidence around Subway, Determined by Time-Series Insar and the Entropy Method

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### Abstract

Land subsidence caused by over-mined groundwater and engineering construction has become a serious problem in urban Beijing, China. As the main urban infrastructure, the underground railway network has burgeoned with the expansion of Beijing City. However, the influence of subway construction and operation on regional subsidence has received minimal attention. In this study, the land subsidence information around Beijing Subway Line 6 was determined by the PSI (Permanent Scatters Interferometry) method. Synthetic Aperture Radar data we used were the Radarsat-2 satellite with a resolution of 25 meters. Based on the land subsidence information, we generated 39 ring buffers between Huangqu and Changying Station. The expectation ( $E_x$ ) and entropy ( $E_n$ ) of the deformation rate in each buffer were then calculated. In land subsidence, the  $E_x$  and  $E_n$  respectively reflect the overall level of regional land subsidence and the temporal degrees of non-uniformity of the regional land subsidence. in time and space. By comparing the changes of  $E_x$  and  $E_n$ , we estimated the spatial influence range of the subway on land subsidence. The influenced area mainly lied in the area between 60 m and 80 m from the subway line in the north and south, respectively. After calculating the time series  $E_x$  and  $E_n$  of deformation rate of PS (Permanent Scatter) points in the affected area again, we revealed the the evolution of land settlement before and after the subway operation. The land subsidence was most altered during the subway construction stage. During operation, the deformation rates along the subway slightly increased in the first two years, then tended to stabilize.

### Key words:

Subway; Land subsidence; Entropy; PSInSAR; GIS

## Urbanization and Sustainable Development

### Land System Dynamics and Regional Sustainable Development



#### Oral

1. [Assessment of Sustainable Development Level on China National Sustainable Communities — A Case Study of Rizhao City](#)  
Min Liu (Capital Normal University, China)
2. [Change in Ecosystem Service Values and Related Factors in Zhoushan Island](#)  
Wenting Cao; Rui Li; Ninghua Chen; Jianyu Chen (School of Earth Sciences, Zhejiang University, China)
3. [Framing Global Cropland Dynamics during 2000-2010](#)  
Wenbin Wu; Qiong Hu; Miao Lu; Di Chen (Institute of Agricultural Resources and Regional Planning, Chinese Academy of Agricultural Sciences, China)
4. [HANPP Dynamics Due to Land Use Change in China](#)  
Jian Peng; Tian Zhang; Yanxu Liu; Yanglin Wang (Peking University, China)
5. [Level of Food Security in the Districts of Kerala and Bihar: A Comparative Analysis](#)  
Shuchi Tiwari; Vijay Baraik; Mahendra Nathawat (Indira Gandhi National Open University (Ignou), new delhi, India)
6. [Mapping and Ranking Global Mortality Risk and Affected Population Risk by Multiple Natural Hazards](#)  
Peijun Shi; Yang Xu; Xu Wei; Wang Jing'ai (State Key Laboratory of Earth Surface Processes and Resource Ecology, China)
7. [Quantifying Spatiotemporal Dynamics of Ecosystem Services across Landscapes: Four Mega-Sandy Lands, China](#)  
Yuanyuan Zhao (Beijing Forestry University, China)
8. [Simulating Land System Dynamics at Local Scale with the Clumondo Model: A Case Study in Hohhot in Inner Mongolia, China](#)  
Zhifeng Liu (Beijing Normal University, China)
9. [Socio-Economic Transformation in Urban Rural Interface Area in North India : A Geographical Analysis](#)  
NIZAMUDDIN khan (Aligarh Muslim University, Aligarh, India)
10. [Spatiotemporal Pattern of Urban Land Use and Contributions on Regulating Urban Climate](#)

Wenhui Kuang (Chinese Academy of Sciences, China)

11. [Spatio-Temporal Variations of Ecological Conditions and Its Relationship with Urbanization Efficiency in the Yangtze River Delta, China](#)  
Min Liu; Fang Yang; Qiannan She; Xia Peng; Ning Wei; Weining Xiang (Shanghai Key Lab for Urban Ecological Processes and Eco restoration, School of Ecological and Environmental Sciences, East China Normal University, Shanghai, 200241, P. R. China, China)
12. [The Impacts of Land Use Change on Flood Peak Discharge in Urban Areas: A Spatial View Point](#)  
Shiqiang Du (Shanghai Normal University, China); Peijun Shi (Beijing Normal University, China); Anton Van Rompaey (KU Leuven, Belgium); Jiahong Wen (Shanghai Normal University, China)
13. [The Rapid Expansion of China's Industrial Land in the Rural Areas and the Environmental Costs](#)  
Chi Zhang; Wenhui Kuang; Ailin Liu (Xinjiang Institute of Ecology and Geogrpahy, Chinese Acadmey of Sciences, China),
14. [The Study of Sustainable Urban Development: Case study of Yasouj, Iran](#)  
Mehdi Momeni (Department of Geography & Urban Planning, Faculty of Humanities, Najafabad Branch, Islamic Azad University, Najafabad, Isfahan, Iran)
15. [Understanding Chinese Urban Expansion with Natural Cities](#)  
Ying Long (Tsinghua University, China)
16. [Urban Expansion and Its Impact in China: A Perspective from Nighttime Light Data](#)  
Chunyang He; Min Xu; Liu Zhifeng (State Key Laboratory of Earth Surface Processes and Resource Ecology (ESPRE), Beijing Normal University, Beijing, 100875, P.R. China, China)
17. [Urbanization and Its Implications in Building Energy Use](#)  
Yuyu Zhou (Iowa State University, United States)

## Poster

1. [Dynamic Appraisal of Land Ecological Security for SiChuan Province Based on Matter-element Model](#)  
Huang Hai (China, ChongQing Jiaotong University)
2. [Effects of Urban Expansion on Carbon Emission: A Case Study in Shizuishan, China](#)  
Rongfang Lv; Jianming Zhang (China, The College of Earth and Environmental Sciences, Lanzhou University)
3. [Environmental Sustainability Assessment Based on DMSP/OLS Nighttime Light Data: A Case Study of the Bohai Rim](#)  
Yang Yang (China, Ocean University of China); Wang Chen (China, Ocean University of China)

4. [How will Urban Expand in the Drylands in Northern China? Scenario Simulation Based on SLEUTH](#)  
Jingwei Li (China, Center for Human-Environment System Sustainability (CHESS), State Key Laboratory of Earth Surface Processes and Resource Ecology (ESPRE), Beijing Normal University)
5. [Patterns and processes of dust storms on the Mongolia Plateau in recent 15 years: A multi-scale analysis](#)  
Huanbi Yue (China, Beijing Normal University)
6. [The Contribution of the Technopoles in Regional Sustainable Development: Moroccan Case.](#)  
Imad EL HADAD (Morocco, University Of Hassan II)
7. [The Influence Analysis And Radiation Effect Research Of The Center City In Hainan Province](#)  
Yan Li (China, Hainan Normal University)

## Assessment of Sustainable Development Level on China National Sustainable Communities— A Case Study of Rizhao City

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### Abstract

Under the direction of sustainable development theory, China National Sustainable Communities (CNSCs) is an important experimental and demonstrations base to explore the coordinating development mode of economic, social, resource and environment. Taking Rizhao for example, considering the characteristic of CNSCs, from four aspects of economic, social, resource and environment, and choosing the assessment index system, adopting Principal Component Analysis method, this paper analyses by synthesis the sustainable development level. The results show that the sustainable development level of Rizhao improves significantly in recent years, but the difference is very prominence contrasting with the same prefecture-level cities. In the end, this paper puts forward some countermeasure promoting sustainable development of CNSCs about Rizhao, which will contribute to the sustainable development of CNSCs about Rizhao and other same type cities.

### Key words:

China National Sustainable Communities; sustainable development level; Principal Component Analysis;

Rizhao

## Change in Ecosystem Service Values and Related Factors in Zhoushan Island

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### Abstract

Many islands in developing countries are undergoing intensive development. Ecosystem service values (ESVs) there may change considerably. The ESV changes in Zhoushan Island during 1995-2011 were quantified by land use proxy based approach. Furthermore, a geographically weighted regression (GWR) model is used to explore the relationships between changes in ESV and related influential factors. We employed the Defense Meteorological Satellite Program/Operational Linescan System (DMSP/OLS) nighttime lights and topography as two influential factors.

The results showed that with the booming island development, the land use in Zhoushan Island changed dramatically in the past decades, 37% tidal flat and 12% farmland were transformed into construction land. As a result, its total ESV decreased from 811.6 RMB Yuan/yr in 1995 to 759.8 million RMB Yuan/yr in 2011, reducing annually at a rate of -0.4%. The ESV changes exhibited significant positive autocorrelation, changing greatly along the coast, but less in the central mountains. Furthermore, the decline of ESVs occurred mostly in the south-facing blocks along the coast. The topography played a considerably crucial role in the location and degree of EVS changes. The Changes in DMSP/OLS nighttime lights were spatially negative correlated with ESV Changes. This is conducive to quickly identify and map the spatial heterogeneity of ESV Changes. It is urgent to formulate an environmental function zoning of the island, to protect a certain land sections with higher ecosystem value coefficient from construction, to draw a red line for the protection of tidal flat and farmland.

### Key words

Ecosystem service; DMSP/OLS nighttime lights; GWR; Zhoushan Island; Topography; Sustainability

## Framing Global Cropland Dynamics during 2000-2010

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### Abstract

Croplands cover 1.53 billion hectares (about 12% of Earth's terrestrial surface), with great implications for global food production, food security and the environment. There has been much research to investigate the spatio-temporal changes of croplands at local scale or in specific small regions, few study was performed at the global level. This presentation aims to introduce the latest research on detecting and monitoring the dynamics of global croplands during 2000-2010. The China's 30 meter resolution land cover dataset (GlobeLand30) was used and multiple indicators including total areas of change, conversion-in/out areas, cultivation index, multiple cropping index and other landscape index at different levels were calculated to depict the quantitative and spatial characteristics of changes in global cropland over the past decade. The preliminary results show that global cropland increases by 7.83 million mu during 2000-2010, which is mainly due to the reclamation of grassland and deforestation. South America and Africa have the largest changing rate in terms of cropland area. Those countries such as India, Argentina, Eastern European, USA and Northern China have relatively high cultivation index, which are the important regions for producing global grains. Moreover, countries near the equator (e.g., Philippines and Nigeria) or surrounded by ocean (e.g., Malaysia and Bahamas) are found to have high multiple cropping index largely due to the abundant heat and water resources. The regions with high cultivation index but low multiple cropping index may have some potential to increase global food production by increasing the cropping intensity. These results may provide some helpful information to better understand the agriculture development and the multi-dimensional interactions of the coupled human and natural systems.

### Key words:

Globeland30; global cropland; dynamics; cropping intensity

## HANPP Dynamics Due to Land Use Change in China

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### Abstract

Increasing human activities will enlarge human demanding for biophysical resources, including land use and biomass, which also influence the biological productivity of land, altering material and energy flows in the biosphere. In recent years, with the sharpening contradiction between human activities and ecological system, it becomes a common challenge to quantify the intensity of human-induced changes on ecological system. The human appropriation of net primary production (HANPP) is an integrated socio-ecological indicator quantifying the human domination of the productivity and harvest in biosphere, indicating regional ecological sustainability.

Meanwhile, land use and land cover change (LUCC) is one of the most important factors in global environmental change, as an key issue in geography. From the perspective of human activities, LUCC is the most typical way of terrestrial ecosystem transformation. Quite amount of biophysical resources was dominated during the human transformation, which is a key composition of the HANPP and is defined as the biomass losses caused by the LUCC ( $\Delta\text{NPPlucc}$ ). The other part of the HANPP is the harvest of biomass (NPP<sub>h</sub>), which combined as the grain harvest from cultivated land, the wood harvest and the animal products. It is obvious that LUCC could directly influence the  $\Delta\text{NPPlucc}$  and thereby alter HANPP, and the intensity of cultivated land development also has a direct relationship with the grain harvest. Therefore, the regional HANPP would dynamically alter due to the land use change.

As a hotspot in the domains of human-induced environmental change, research on HANPP has received much attentions in recent years. However, most of the studies focus on the concrete accounting of the HANPP at the global scale, the research at China is quite rare especially lack of the one focus on provincial scale. More attentions should be especially paid on the relationship between HANPP and the regional land use/cover change. In this study, we quantified the HANPP in China's 31 provinces during 1982 to 2010 based on remote sensing data, meteorological data as well as China Statistical Yearbook in forestry and animal husbandry. We mainly analyzed the spatial and temporal distribution pattern of HANPP as well as discussed how the HANPP alters along with the long term land use change among different provinces.

### Key words:

HANPP; Land use change; Spatial-temporal dynamics; China

## Level of Food Security in the Districts of Kerala and Bihar: A Comparative Analysis

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### Abstract

Zero hunger is one of the 17 Sustainable Development Goals adopted by the United Nations in September 2015, which aims to end hunger, achieve food security and improved nutrition and promote sustainable agriculture by 2030. The issue of the level of food security and its assessment has become increasingly important for the framing of hunger reduction strategies. The concept of food security encompasses the three components- availability of food, accessibility of food and absorption of food. It is the combination of the varying levels of these components, which results in varying levels of food security in different regions. Two States of India-Kerala and Bihar rank highest and lowest respectively in terms of accessibility of food based on certain indicators, which determine the economic and physical accessibility of food.

In this study, a detailed district level comparative analysis of the level of food security in the two States is done for the reference year 2011 to explore the inter-district patterns and characteristics within the States of highest and lowest levels of accessibility of food. It identifies the gap areas in the fulfillment of the nutritional needs of the population. Composite Indices are calculated using selected indicators, which represent the three pillars/components of food security- Availability, Accessibility and Absorption. The study is based on secondary data using simple statistical techniques.

### Key words:

Food Security; Availability; Accessibility; Absorption; Nutrition and Composite Indices

## Mapping and Ranking Global Mortality Risk and Affected Population Risk by Multiple Natural Hazards

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### Abstract

Substantially reduce the mortality and affected people due to natural hazards by 2030 are two of the most important targets of supporting the assessment of global progress in achieving the outcome and goal of *Sendai Framework for Disaster Risk Reduction 2015-2030*. This paper firstly systematically reviewed the methods and indicators to assess the impacts on human society by multiple natural hazards. Then based on the assessment result of expected annual multi-hazard intensity ( $Mh$ ) at grid unit ( $0.5^\circ \times 0.5^\circ$ ) of eleven hazards in the *World Atlas of Natural Disaster Risk*, including earthquake, volcano, landside, flood, storm surge, tropical cyclone, sand-dust storm, drought, heat wave, cold wave and wildfire, a vulnerability model among  $Mh$ , the coping capacity indicator (GDP Per Capital) with mortality rate or affected population rate is developed to estimate the mortality and affected population per 100,000 during 2005-2015 and 2020-2030. Finally, the global mortality risk and affected population risk are mapped at grid unit and ranked at national unit. The result shows that: countries and regions with high multi-hazard intensity have significantly high mortality risk and affected population risk if the development of coping capacity cannot match the growth of population, such as India, Bangladesh, Philippines and Pakistan; countries and regions with high multi-hazard intensity and high growth rate of population but with low socioeconomic status, also have high mortality risk and affected population risk, such as Bangladesh, Philippines and Vietnam. Hence, to achieve the target in *Sendai Framework*, it is necessary to enhance the disaster coping capacity, especially for the developing countries with high multi-hazard intensity, large population and less developed economic. The proposed method to quantitatively calculate the mortality and affected population in this paper can provide scientific and technical support of the assessment of global and national/regional progress in achieving the outcome and goal of the *Sendai Framework*.

### Key words:

Multi-hazard, Mortality risk, Affected population risk, Global scale, Sendai Framework for Disaster Risk Reduction 2015-2030

## Quantifying Spatiotemporal Dynamics of Ecosystem Services across Landscapes: Four Mega-Sandy Lands, China

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### Abstract

The four mega-sandy lands (Hulunbeir, Horqin, Otindag, and Mu Us) are reported to be the most seriously desertified regions in China. Ecosystem services in these regions are of great value for improving human well-being. The main objectives of this study were to quantify the spatiotemporal dynamics of ecosystem services across the sandy landscapes and explore the possible driving forces during 2000-2014. We estimated multiple ecosystem services including food and meat production, soil conservation, and carbon sequestration, using model simulation and statistical methods. Then the relationships between ecosystem services and possible driving factors were investigated. We found that ecosystem services generally showed a significant increasing trend in all sandy lands during the past 15 years. Changes in all ecosystem services were positively correlated with those in vegetation cover. Wind speed was significantly correlated with the soil conserved from wind erosion. However, the correlation strength varied among the four sandy lands, and ecosystem services and their dynamics exhibited large spatial heterogeneity across the study region. Vegetation cover and wind speed interactively determine ecosystem functions and thus ecosystem services in these drylands. Vegetation coverage was a major determinant for the variations and spatial patterns of provisioning services. Both vegetation and wind speed played important roles in regulating soil erosion. To improve ecosystem services in drylands such as sandy lands, we need to adopt measures focusing on the major drivers and landscape heterogeneity.

### Key words:

Ecosystem services; Sandy land; Vegetation change; Soil conservation; Carbon sequestration; Food and meat production

## Simulating Land System Dynamics at Local Scale with the CLUMondo Model: A Case Study in Hohhot in Inner Mongolia, China

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### Abstract

Understanding land system dynamics is essential for assessing their effects on environments and improving regional sustainability. Recently, the CLUMondo model, which can simulate changes in both land cover type and land use intensity, provides an innovative approach for understanding land system dynamics. However, the CLUMondo model has not been applied at local scale. The objective of this study was to simulate land system dynamics in Hohhot, the capital of Inner Mongolia in China, from 2013 to 2030 based on the CLUMondo model. The land system maps in 2000 and 2013 were respectively used to calibrate and validate the model, and three scenarios for land system change from 2013 to 2030 were developed based on the trend of historical land system change, the regional planning, and the biodiversity conservation target. We found that the land system in 2013 was well captured by the CLUMondo model with an overall accuracy of 76.96% and a quantity disagreement of 1.62%. From 2013 to 2030, the intensity of cropland was projected to increase in Hohhot under all the three scenarios. Additionally, the forest was projected to increase to a large extent under the scenario of planning, whereas the natural grassland was projected to increase obviously under the scenario of biodiversity conservation. Our results evidenced that the CLUMondo model is an effective land system model at the local scale. In addition, we suggested that the increases of natural grassland, forest, and intensity of cropland are needed to achieve socioeconomic development and environmental conservation in Hohhot simultaneously.

### Key words:

Land system dynamics; The CLUMondo model; Simulation; Hohhot

## **Change in Socio-economic Behavior in Urban Rural Interface Area in North India: A Geographical Analysis**

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### **Abstract**

The urban rural interface area is dynamic in nature, moving in response to horizontal expansion or urban sprawl. It is passing through transitional stage of modification slowly under mutual exchange of socio economic interaction. Rurality of area is threatened and urban influence is imposed and consequently remarkable transformation is observed. The study is based on primary and secondary sources of data. Dynamics of urban rural interface region is also identified by GIS and remote sensing technique. Four villages were selected for detailed survey in the interface area of Aligarh city. Study revealed that the interface area witnessed change in house type, food habits, and means of livelihoods as well as socio cultural transformation to a considerable level. Environmental challenges are also emerging on account of socio-economic transformation in the study area.

### **Key words:**

Urban Rural interface; Rurality; Livelihood; Transformation



## Spatiotemporal Pattern of Urban Land Use and Contributions on Regulating Urban Climate

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### Abstract

The relationship between urban land components and thermal characteristic has been studied for long years including examining the impact of urbanization on urban thermal environment. Previous studies pointed out that impervious surface have positive effects on urban heat island while water and vegetation have negative effects. This paper took Beijing as a case study to illustrate urban land component change and its impacts on land surface temperature. The Landsat TM from 1984 to 2014 in autumn were downloaded through the USGS online portal and consistently calibrated to surface reflectance and brightness temperature (BT). The land surface temperature was derived using the single channel algorithm because it required only the parameters of water vapor and land surface emissivity and had a reported error close to 1 K. The urban components were extracted through the unmixing technology and multi-index. A comparison of different components in urban areas showed different patterns of urban components have different impacts on thermal environment. Next, temporal thermal signatures were created to characterize and quantify the impact of urban component changes. Decomposition analysis showed that the conversion of urban components' pattern and areas generated the largest difference in LST and the largest trend difference.

### Key words:

spatiotemporal pattern; regular thermal environment; urban components

## Spatio-Temporal Variations of Ecological Conditions and Its Relationship with Urbanization Efficiency in the Yangtze River Delta, China

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### Abstract

The Yangtze River Delta (YRD), including Shanghai City, Jiangsu and Zhejiang Provinces, is the largest metropolitan region in China and the sixth largest in the world. In the past three decades, the region has experienced an unprecedented process of rapid and massive urbanization which dramatically altered the landscape and detrimentally affected the ecological environments in the region. In this paper, we analyzed the spatio-temporal variations of ecological conditions (EcoC) and the urbanization efficiency (UrbE) in the Yangtze River Delta during 1990-2010, the fastest-ever period of urbanization development. Moreover, with the 25 cities in YRD as the basic elements, a coupling analysis was also illustrated to examine the relationship between EcoC and UrbE. The result showed that: (1) The averaged classification of EcoC in the YRD was “moderately high”, which exhibited slow upward trend during the study period. (2) The EcoC in SHYRDUA demonstrated obvious spatial variations between south and north, with Shanghai--Suzhou-Wuxi-Changzhou-Nanjing as a demarcation belt. The EcoC of the south area in Zhangjiang province were generally better than that of the north of Jiangsu province. (3) There were negative correlations between ecological conditions and urbanization level in 25 cities of SHYRDUA. The coupling degree between EcoC and UrbE was relatively high and showed an inverted U-shape curve, with the coordinated degree increasing first, reaching the peak and then decreasing. It is hoped that the information provided in our study could serve the purposes of raising public awareness, informing urban and regional sustainability planning across different levels, and facilitating governmental decision-making.

### Key words:

Ecological conditions; Urbanization efficiency; Yangtze River Delta; Coupling analysis

## The Impacts of Land Use Change on Flood Peak Discharge in Urban Areas: A Spatial View Point

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### Abstract

To date, limited attention has been paid to the role of impervious surface (IS) location in influencing flood processes. However, this topic is of tremendous significance for developing guidelines for urban planning and flood management. This study uses the Hydrologic Engineering Center's Hydrologic Modeling System (HEC-HMS) to investigate the impact of land-use change on flood processes, and proposes a new index to quantify the impact of IS location on basin peak discharge. The results indicate that rapid urban expansion in the Longhua Basin, China, has increased peak discharge and flood volume by 140% and 162% over the past 30 years, respectively. The new index, named the Impervious Surface Impact Index (ISII), describes the spatially varying effects of IS increase in individual sub-basins on a basin's peak discharge. For the Longhua Basin, the index varies from 0.43 in downstream sub-basins to 5.91 in upstream sub-basins. An increase in upstream IS increases peak discharge nearly 14 times more than the same increase in downstream IS. Accordingly, the location of newly created IS can influence flood processes significantly. These findings can help to find suitable locations for urban development while mitigating the impact of land development on flood risks.

### Key words:

Peak flow; flood risk; impervious surface; low impact development; flood mitigation

## The Rapid Expansion of China's Industrial Land in the Rural Areas and the Environmental Costs

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### Abstract

China's industrial growth accompanied huge environmental costs. In response to the environmental awareness among city residents, the government relocated factories from urban areas to rural areas. Our study indicates that the area of rural industrial lands (RIL) was  $30.0 \times 10^3$  km<sup>2</sup> in 2010 in China. The expansion rate of RIL in the 2000s ( $0.2 \times 10^3$  km<sup>2</sup>/yr) was about 7 times that in the 1990s ( $1.6 \times 10^3$  km<sup>2</sup>/yr), about 70% of the expansion in the 2000s took place after 2005. The rural mining (RM) area has increased from  $4.9 \times 10^3$  km<sup>2</sup> in 2000 to  $7.2 \times 10^3$  km<sup>2</sup> in 2010. As the results, the RIL area under high risk of landslide has increased 172% from 1990 to 2010. About 80% of the increase took place after 2005. The RM area under high risk of landslide has increased 45% in the 2000s. The number of settlements within 1 km distance from the RIL and RM and the nature conservation areas within 4 km distance from the RIL and RM increased dramatically from 2000 to 2010. The crop production and the net primary productivity of the China's ecosystems lost due to the expansion of RIL and RM. We also found significant correlations between soil and water pollutions and the closeness from the RM in China.

### Key words:

China's industrialization; pollution; mining land; rural industrial land

## The Study of Sustainable Urban Development: Case study of Yasouj, Iran

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### Abstract

The existence of inequalities and different dimensions of it significantly demonstrate underdevelopment; the distribution of development index in different levels should be revised in order to remove such deficiencies. In order to solve the problems which stem from regional imbalances, the first step is to study and classify the regions from the point of view their enjoyment in different fields. Based on this fact, some of the development indexes including therapeutic- hygienic indexes, cultural, economic, civil indexes in urban districts and infrastructure indexes in Yasouj were examined and studied. The methodology of the research is of analytic-descriptive one and the results of it can be applied in other studies. The required data have been collected using the statistic resources related to general census of population and housing, statistic calendar of Iran statistic center and other related organizations. The data collected are related to 2012. Data were analyzed using the interpretative approaches, fuzzy multi-indexes analysis, fuzzy hierarchical analysis and SWOT model. The findings of the research shows that according to the studies of selected indexes in the whole city, the development of Yasouj is not close to national indexes and there is a significant difference between these two, therefore the unsustainability of urban development is evident. Being far from the political, economic, social and other important centers of country and also being mountainous can be among the reasons of underdevelopment of the city which caused some of the social, economic and social indexes show unsustainability at the time of study.

### Key words:

sustainable urban development; composed development indexes; SWOT model; Yasouj

## Understanding Chinese Urban Expansion with Natural Cities

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### Abstract

During the last several decades, China has experienced a rapid urban expansion, which has attracted extensive research from multiple dimensions. The existing studies rely heavily on official statistical data and remote sensing images which are labor-cost, time and finance consuming for a country as large as China. Moreover, their accuracy has been often criticized. Recent efforts made by fractal analyses provide possible alternatives to scrutinize the corresponding “natural urban area” to the change of urban context. To introduce a simplified method on detecting and evaluating the emergent urban expansion throughout China, we refer to Bin Jiang’s natural city (NC) methodology understanding China’s urban expansion in the light of open data based on the empirically observed heavy-tail distribution. We redefine cities with four types of open data and capture corresponding expansion on four dimensions. For evaluating the magnitude and pattern of urbanization and expansion, we also measure the urban size and relative maturity on the four dimensions. It turns out the urban expansion areas during 2009 and 2014 were associated with fast and extensive morphological development with expansion rate up to 70%; and the functional development (31.6%) fell behind. Considering the relative maturity which is the ratio of the density of expansion to the area in 2009, the proposed methods produce higher outputs (95.9% by road junctions and 91.8% by POIs) than the conventional methods (47.6% by road junctions and 28.6% by POIs). The bottom-up NC method contributes to our comprehensive understanding on China’s urban expansion.

### Key words:

urban expansion; road junction; points of interest (POIs); social network; China; natural city

## Urban Expansion and Its Impact in China: A Perspective from Nighttime Light Data

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### Abstract

Effective and timely quantifying the spatiotemporal pattern of urban expansion and examining its impact is important for the sustainable development in China. However, the dynamics of the most recent urban expansions in China since 2012 have not yet been adequately explained due to a lack of current information. In this presentation, we want to quantify spatiotemporal patterns of urban expansion and assess its impact in China between 1992 and 2015 with the support of time-series nighttime light data. First, we extracted information on urban expansion in China between 1992 and 2015 by integrating nighttime light data, vegetation index data, and land surface temperature data. Then we analyzed the spatiotemporal patterns of urban expansion at the national and regional scales, as well as at that of urban agglomerations. Finally, we conducted the impacts of urban expansion on cropland. We found that China experienced a rapid and large-scale process of urban expansion between 1992 and 2015, with urban land increasing from  $1.22 \times 10^4 \text{ km}^2$  to  $7.29 \times 10^4 \text{ km}^2$ , increasing in size nearly fivefold and with an average annual growth rate of 8.10%, almost 2.5 times as rapid as the global average. We also found that urban land in China expanded mainly by occupying  $3.31 \times 10^4 \text{ km}^2$  of cropland, which comprised 54.67% of the total area of expanded urban land. We suggest that effective future management with respect to edge expansion of urban land is needed to protect cropland in China.

### Key words:

Urban expansion; impact; China; nighttime light data

## Urbanization and Its Implications in Building Energy Use

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### Abstract

Urbanization profoundly influences our physical and social world, for example, altering carbon cycling and climate. Understanding the consequences of urbanization for better scientific insights and effective decision-making unarguably requires accurate information on urban extent and its spatial distributions. We developed a novel method to map urban extents from the night-time lights remote sensing data and built a consistent 20-year global urban map series to evaluate the time-reactive nature of global urbanization. Supported by urban maps derived from nightlights remote sensing data and socio-economic drivers, we developed an integrated modeling framework to project future urban expansion by integrating a top-down macro-scale statistical model with a bottom-up urban growth model. With the models calibrated and validated using the historical data, we simulated urban growth at the grid level (1-km) over the next two decades under a number of socio-economic scenarios. Finally, we explored the implications of urbanization in building energy use in the context of climate change.

### Key words:

Remote sensing; night-time lights; global urbanization; building energy use

## Dynamic Appraisal of Land Ecological Security for SiChuan Province Based on Matter-element Model

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### Abstract

Improper Land use has led to a series of ecological problems such as soil and water loss, land desertification and land pollution since the past century. Land ecological security has attracted much interest as a key factor for land sustainability issues. This research aims at how to establish the appraisal index and adopt scientific method for the objective appraisal of land ecological security, together with the countermeasures. Based on analysis of the land use and ecological environment situation of SiChuan Province, the paper adopted the conceptual model of “Driving forces–Pressure–State–Influence–Response” (DPSIR) to set up the land ecological appraisal index system. The matter-element model was put use to the appraisal of land ecological security of SiChuan Province. Research results showed the land ecological kept improving from 2006 to 2013. But it is not optimistic yet because it is still graded “Sensitive”. The countermeasures were given for maintaining land ecological security and land sustainability for SiChuan Province. The conclusion is drawn that DPSIR model and matter-element model are scientific and feasible for the appraisal of land ecological security.

### Key words:

Land Ecological Security; Driving forces – Pressure – State – Influence – Response Model; Matter-element model; Countermeasures; SiChuan Province

## Effects of Urban Expansion on Carbon Emission--A Case Study in Shizuishan, China

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### Abstract

Exploring the socioeconomic drivers of urban expansion and the effects of urban expansion on environment is vital for land use management. The unique features of the energy dependent city of Shizuishan make it a valuable case study to examine the effects of urban expansion on carbon emission at the city level. Using RS, GIS, spatial model and statistical model, we analyzed the dynamics of carbon emission by socio-economic activities and landscape change in the past 26 years and predicted carbon emission in the future 20 years. In the study, we used a new model by integrating Modified-SLEUTH model, InVEST model and regression model. First, we analyzed the socio-economic drivers of urban expansion. Then, we made a modification of SLEUTH model to make urban expansion adapting to different economic development by integrating the results of socio-economic drivers exploring. Next, we calculated carbon emission from 4 parts: industrial production, transportation, human respiration and temporary carbon storage change through InVEST model. The coupling model combines the advantages of these three models and can analysis the impacts of urban expansion on regional carbon emission in the past period and future period. In the urbanization process, carbon emission by socio-economic activities and landscape change would keep increasing, and in the energy dependent city carbon emission by fossil combustion occupy the absolutely dominate role in the whole carbon recycle. Therefore, we should improve utility efficiency of fossil and consider urban expansion speed seriously to realize the win-win of economic development and greenhouse effect mitigation.

### Key words:

InVEST model ; Modified-SLEUTH model; dynamics of carbon emission

## Environmental Sustainability Assessment Based on DMSP/OLS Nighttime Light

### Data: A Case Study of the Bohai Rim

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#### Abstract

In recent years, the environmental sustainability assessment is becoming more and more important. The existing environmental sustainability indexes (ESI) are mainly created based on the statistical data. These studies are lack of enough spatial information and comparability. Therefore, a new environmental sustainability assessment method based on the nighttime light data and the ecosystem services value was proposed by using the remote sensing and GIS Technology. Then the method was applied in a representative study area, the Bohai Rim of China from 2000 to 2010. The results showed that the ESI of most regions was at low to medium level, and the most of the high level of ESI was concentrated in the northeast and northwest of the Bohai Rim. Furthermore, the ESI of 62.98% of the total area in the Bohai Rim was decreased from 2000 to 2010 and the coastal area experienced a significantly environmental degradation process. These findings could play an important role in regional environmental protection and optimization.

#### Key words:

Environmental sustainability; DMSP/OLS; ecosystem services; Bohai Rim

## How Will Urban Expand in the Drylands in Northern China? Scenario Simulation Based on SLEUTH

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### Abstract

Understanding the dynamics of urbanization in the drylands in northern China (DNC), where are characterized by water scarcity, infertile soil, and rapid population growth, is crucial for China's sustainable development. Urban expansion in the DNC has rapidly transformed the landscape in the past decades, resulting in a series of ecological and environmental problems. However, few studies have systematically simulated how the future urban would expand in the DNC under multiple economic and social scenarios. The goal of this study was to simulate the future urban expansion in the DNC for the next 30 years using SLEUTH model through setting socio-economic scenarios (SSP1, SSP2, SSP3, SSP4, SSP5) according to the Shared Socio-economic Pathways, based on the analysis of the historical urban dynamic in the DNC from 1992 to 2015 by the nighttime lights data. Our results showed that urban land increased from  $4.10 \times 10^3$  km<sup>2</sup> in 1992 to  $2.10 \times 10^4$  km<sup>2</sup> in 2015, with an average annual growth rate of 7.34%, which was 2.29 times as quick as the global average. During the next 30 years, urban land in the DNC will expand around metropolitan areas and the conflict between urban and cultivated land will become more severe. Understanding the historical urban dynamic and future expansion projection will enable decision makers to analyse and direct the future urbanization to realize sustainable development in the DNC. Effective policies should be implemented to achieve higher utilization efficiency of urban land with the optimization of urban growth modes and the mitigation of cropland loss.

### Key words:

drylands in northern China; urban expansion; scenario simulation; SLEUTH

## Patterns and Processes of Dust Storms on the Mongolia Plateau in Recent 15 Years: A Multi-Scale Analysis

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### Abstract

The Mongolia Plateau is one of the major dust sources in Asia. Understanding the patterns and processes of dust storms on the Mongolia Plateau are important for desertification controlling. However, relevant research was still poorly in recent years because of difficulties in accurate monitoring of dust storms. Moderate Resolution Imaging Spectroradiometer (MODIS) data provide good alternatives for dust storm detection. The main objective of this study was to analysis the patterns and processes of dust storms over the Mongolia Plateau in recent 15 years using MODIS-based dust index. We firstly proposed an improved Brightness temperature Adjusted Dust Index (BADI) by integrating three MODIS thermal infrared bands of band20 (3.66-3.84 $\mu\text{m}$ ), band31 (10.78-11.28 $\mu\text{m}$ ) and band32 (11.77-12.27 $\mu\text{m}$ ). Then, BADI was applied to monitor dust storms over the Mongolia Plateau during 2000-2012. Our results showed that the annual mean dust density over the Mongolia Plateau is 20.32 $\text{ug}/\text{m}^3$ , and the annual dust density decreased with a rate of 0.30 $\text{ug}/\text{m}^3$  during 2000-2012. The annual mean dust density of Mongolia and Inner Mongolia are 14.69 and 25.43 $\text{ug}/\text{m}^3$ , respectively. The significant dust decrease area of the Mongolia Plateau was about 62523.8  $\text{km}^2$ , which is mainly located in Inner Mongolia. Meanwhile, the significant dust increase area was about 16365.9  $\text{km}^2$ , which was mainly located in the Mongolia. Dust density on the Mongolia Plateau showed a general decrease trend, and Inner Mongolia have a higher dust storms hazard than Mongolia. We need to pay more attention to high dust density region and dust density significant increasing region.

### Key words:

Dust storm; MODIS; BADI; Mongolia Plateau; Patterns and processes; Multi scales

## The Contribution of the “Technopoles” in Regional Sustainable Development: Moroccan Case.

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### Abstract

In response to the centrifugal process of remodelling that operates the globalization of economies in everyday life, a sort of territorial anchoring is felt in terms of discovery, revenge or simply rediscovered near concepts, participatory management, local development initiatives, SPL, clusters, territorial competitiveness, territorial marketing ... This renewed interest underlies two major restructuring seating both on innovation and intelligence: the first is that large companies are not the only guide to the act produce and innovate. Globalization requires a degree of flexibility which SMEs can respond better than large firms (flexibility synonymous with globalization). Hence the need to strengthen the presence of SMEs / SMIs internationally as a guarantee of competitiveness, innovation and flexibility-Flexicurity. As a requirement for Morocco especially since its productive fabric is 93% of SMEs / SMIs. The second, in perfect symbiosis with the first based on the networking of intelligent territories (J. Bouinot-2003). This process creates interconnectivity between SPL and clusters harbouring clusters of flexible entities pooling the risks and costs of strategic operations. As illustration recall here the statement of Ch. Laplaud<sup>1</sup> saying which opened the Moroccan and Brazilian markets his group is export based on innovation and knowledge sharing. He argues that the creation of trust between SME networks open to business and market is a prerequisite for the knowledge economy.

### Key words:

Regional Sustainable Development; Technopoles; Land System Dynamics

## The Influence Analysis and Radiation Effect Research of the Center City in Hainan Province

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### Abstract

This paper is mainly based on the background of the construction of new of urbanization, through the application of gravity model and the breaking point formula, pay more attention to the influence and the radiation of the four center city in Hainan province. The results of the study show that, the influence and radiation of Haikou largely influences the northern area , and the influence and radiation of Sanya in the south of Hainan is larger, Dan Zhou plays an larger important role in the neighboring cities in the south of Hainan. Qionghai have a big influence and radiation on the neighboring cities in the east of Hainan. The influence and radiation of center city is mainly contributed to the level of economic development, geographical location, topography, traffic and cultural diversity.

### Key words:

Center city; The role of radiation; Influence; Hainan Province

## Urbanization and Sustainable Development

### Urbanization and Its Impacts on Ecosystem Services



#### Oral

1. [A Scale-dependent Analysis of the Socio-biophysical Factors Driving Urban Landscape Changes: A Comparison of Two American Metropolises](#)  
Ting Liu (Northeastern Illinois University, United States); Xiaojun Yang (Florida State University, United States)
2. [Changing Social Values of Ecosystem Services during Urbanization: The Case of Changyang Township, Beijing](#)  
Zhifang Wang; Yujing Ma; Ankang Cao (Peking University, China)
3. [Economic Landscape Large Planted Area in Menglian County Study on Change of Ecosystem Service Value](#)  
Zexian Gu; Xiaoqing Zhao; Wei Tang (yunnan university, China)
4. [Effects of Urbanization on Ecosystem Service Values in an Oasis City - A Case Study in Zhangye City, China](#)  
Huali Tong, Peiji Shi; Jiafang LI; Guofeng ZHU; Xuebin ZHANG; Yongnan WANG; Yuanfeng LIU (College of Geography and Environmental Science, Northwest Normal University, Lanzhou 730070, China, China)
5. [Identification of Urban Expansion Pattern in Bangkok Metropolitan Region through the Time Series of Remote Sensing Data](#)  
Chudech Losiri; Masahiko Nagai (Asian Institute of Technology, Thailand)
6. [Land Use and Water Quality at the Margin of the Metropolitan Region of Porto Alegre, RS-Brazil: the Case Study for the Barragem Mãe d`Água](#)  
Nina Simone Vilaverde Moura; Luís Alberto Basso (Universidade Federal do Rio Grande do Sul, Brazil)
7. [Mapping and Interpreting Vegetation Patterns in Urban Areas: Research Status and Challenges](#)  
Xiaojun Yang; Dee Shi (Florida State University, United States); Ting Liu (Northeastern Illinois University, United States)
8. [Plant Species Composition and Bioculture of Greenspace in Urban Campus and Parks of Kunming City, Southwestern China](#)  
Liangzao Wu; Zhaolu Wu; Huiling Shi; Lei Yuan (Institute of Ecology and Geobotany, Yunnan University, China)

9. [The Effects of Green Landscape on Urban Thermo-Environment: A Case Study in Beijing](#)  
Liding Chen; Zhifeng WU (Research center for eco environmental sciences, Chinese Academy of Sciences, China)
10. [The Flowering Phenological Response of Early Spring Herb to the Urbanization Process in Beijing](#)  
Qing Chang; Xiao Liu; Jing Wang (China Agricultural University, China)
11. [The Major Issues for Management of Urban Green Spaces in Nepal \(Case Study of Pokhara City, Nepal\)](#)  
Jyoti Bhandari; Dhruva Bijaya G.C (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Nepal)
12. [Understanding the Spatial Configuration of Trees on Urban Heat Mitigation: A Comparative Study](#)  
Weiqi Zhou; Jia Wang (Research Center for Eco Environmental Sciences, Chinese Academy of Sciences, China)
13. [Urban Growth, Landscape Changes, and Coastal Vulnerability in Southwest Florida](#)  
Fang Zhang; Xiaojun Yang (Florida State University, United States)
14. [Urbanization Spatial Process and Its Environmental-Ecological Effects in the Pearl River Delta, China: Perspective from Remote Sensing](#)  
Wu Zhifeng; Guo Guanhua; Chen Yinbiao; Jianzhou Gong (School of Geographical Sciences, Guangzhou University, Guangzhou, 510006, P. R. China, China)

## Poster

1. [Assessment and Mapping of Urban Ecosystem Services in Bulgaria](#)  
Bilyana Borisova; Stoyan Nedkov (Bulgaria, Sofia University St.Kliment Ohridski); Miglena Zhiyanski (Bulgaria, Forest Research Institute – BAS)
2. [Assessment of Ecosystem Service Importance in Yan-Long-Tu Region](#)  
Xue Gong; Mingyu Li (China, Yanbian University)
3. [Ecosystem Services Assessment in the Rapidly Urbanizing Zhangye oasis, Northwest China](#)  
Youjia Liang (China, Wuhan University of Technology); Lijun Liu (China, Gansu Meteorological Bureau)
4. [Impact of the Spatial Pattern of Regional Urbanization on Landscape Pattern and Ecosystem Services: a Case Study of Xi'an Metropolitan](#)  
Zhou Zhongxue (China, Shaanxi Normal University)
5. [Impact of Rapid Urbanization on Water Resources in the context of Climate Change Using Remote Sensing and GIS : A Policy Perspective](#)

Kamal Narain Joshi (India, Institute of Development Studies)

6. [Spatiotemporal Variation of Urban Vegetation and Its Response to Rapid Urbanization in Shenzhen City](#)

Zhi Wang (China, China University of Geosciences)

7. [Status of Urban Slums Dwellers in Varanasi City: An Analysis](#)

Brijendra Nath Singh; Sinha Brij Raj Kumar (India, Department of Geography, Banaras Hindu University, Varanasi, U.P., India-221005)

8. [The Urban Land Ecological Suitability Evaluation of Yan-Long-Tu Region](#)

Xiaona Zhao; Mingyu Li (China, Yanbian University)

## **A Scale-dependent Analysis of the Socio-biophysical Factors Driving Urban Landscape Changes: A Comparison of Two American Metropolises**

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### **Abstract**

Understanding the socio-biophysical drivers of urban landscape changes is critical to land use decision-making for sustainable environmental management. This study presents a scale-dependent analysis of the underlying socio-biophysical drivers of urban landscape dynamics in two large American metropolises: Atlanta, Georgia and Chicago, Illinois. The two metropolises contrast each other not only in their geographic locations but also in the underlying urban development processes. In this paper, we firstly identify a set of major driving factors of urban land change in each metropolis. Specific focuses will be given to the factors at three dimensions: socio-economic, biophysical, and proximate causes of urban landscape changes. Then, we derive the proxy variables for the various drivers using GIS and spatial analysis. The spatial data integration techniques used in this process will be discussed. Lastly, statistical analysis is performed to evaluate the various driving factors of urban landscape changes across different spatial scales. A comparison study highlights both the common processes and unique dynamics underlying urban landscape changes in the two American metropolises.

### **Key words:**

urban landscape; driving factors; spatial scales; statistical analysis; comparative urbanism

## Changing Social Values of Ecosystem Services during Urbanization: The Case of Changyang Township, Beijing

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### Abstract

Despite of the fact that ecosystems are capable to provide multifaceted values for human well-being, social values in general is often underscored in research paradigm. The evolutionary mechanism of ecosystem social services during urbanization and its roles in decision-making is not clear. This research selects Changyang township, Fangshan district, Beijing as the study area. Based on the related definition and classification of social values of ecosystem services, through field survey and remote sensing image to obtain research data, this study explores spatial distribution and dynamic change of ecosystem social services and social - ecological hotspots in the process of Changyang town urbanization from the aspects of time and space. Local perception with spatial mapping is incorporated into the research as a supplement of expert knowledge to strengthen planning decision-making. The findings demonstrate that there are clear spatial differences in the distribution of ecosystem social values. And social values of Changyang town in general have experienced decreasing and then increasing trend in the process urbanization. Areas with low urbanization rates (rural villages) have more concentrated but less influential ecosystem social values. When demolition for urbanization starts, local ecosystem social services begin to decrease and be more dispersed. Following further urbanization with new buildings and parks, ecosystem social services in urbanized areas tend to be more concentrated with larger service areas. Many factors contribute to the differences spatially and timely. Based on the analysis, urban management strategies are then proposed accordingly.

### Key words:

Social value of ecosystem services; Urbanization; Cognitive mapping; Social - ecological system

## Economic Landscape Large Planted Area in Menglian County Study on Change of Ecosystem Service Value

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### Abstract

From the point of spatio-temporal changes of ecological system type, function and value, in Menglian County, land using/cover data was based on three Landsat images which were interpreted as basic information sources by using RS and GIS technology and then revising ecosystem service value per unit area in Menglian County. This paper has researched on the changes of ecosystem service value of economic garden for large area planting as well as evaluated ecosystem service value scientifically in Menglian County combined with the sensitivity analysis. The Results showed that: (1) In Menglian County, from 2000 to 2015, land use pattern manifested as the transformation from large areas of dry land, forest land and shrub to the economic landscape, the economic landscape is increased by 24478.96hm<sup>2</sup>; (2) Changes of ecosystem service value is closely related to economic landscape development in Menglian County. The situation of ecosystem service value shows the changing trend from improvement to severity in 2000-2015. ESV is increased by 96.39×10<sup>6</sup> Yuan from 2000 to 2005, But in the year of 2005 to 2015, ESV is reduced by 120.24×10<sup>6</sup> Yuan; (3) From the aspect of space distribution, ecosystem service value in Menglian County is relatively high in central area and relatively not high in western and eastern area. The temporal and spatial variation of ecosystem service value in Menglian County is affected by natural and human factors. The key to the development of economic landscape is rational land use according to the practical situation, which can create economic value and also keep its ecological value.

### Key words:

Large area of artificial landscape introduction; Ecosystem service value; Temporal and spatial variation

## Effects of Urbanization on Ecosystem Service Values in an Oasis City - A Case Study in Zhangye City, China

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### Abstract

Arid areas accounted for about 30% of the global land. Oasis city is a major city mode in this area. A dramatic urbanization process might severely impact the ecosystem service functions in an oasis city, affecting the quality of life for the residents. Taking Zhangye, an oasis city in China as a case study, this paper evaluates its urbanization level and analyzes the relationship between the level of urbanization and ecosystem service values during the period of 1995-2013, using Xie's ecosystem unit service value table. The results show that Zhangye's level of urbanization has progressed gradually during the study period while ecosystem service values increased. Moreover, the relationship between the level of urbanization and ecosystem service values over time exhibits an irregular "U" shape. From 1995 to 1998, Zhangye's ecosystem service value slowly rose with the growing urbanization level, while it kept no change from 1998 to 2006 and during 2006-2013 there was a remarkable rose.

### Key words:

Oasis city; Urbanization; Ecosystem services value; Influence mechanism

## Identification of Urban Expansion Pattern in Bangkok Metropolitan Region through the Time Series of Remote Sensing Data

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### Abstract

Urban expansion has different patterns which affect to a land development and police planning. Increasing in the number of population puts the force to expand the built-up areas in the Bangkok Metropolitan Region (BMR) predominantly in vicinity of Bangkok, which causes several problems in terms of physical and social aspects. Therefore, understanding the pattern of the urban expansion is a key challenge to allocate enough infrastructures and respond the land demand for inhabited people in this area. The classification of the pattern of urban expansion analyzed from Landsat5-TM images in 1988, 1993, 1998, 2003, 2008, 2011, and 2014 respectively. The urban area, built-up construction, was mainly extracted by supervised classification. The result could be found that the origin on the urban area of the BMR was established in the eastern of the Chao Phaya River with a clustered or radial settlement. Each province of the BMR extended the urban area itself from the center of the city and also connected together via the main roads as a linear settlement. Finally, a dispersed settlement could be discovered in the areas which are far away from the road network like an urban sprawl.

### Key words:

urban expansion; remote sensing; Landsat; Bangkok Metropolitan Region

## Land Use and Water Quality at the Margin of the Metropolitan Region of Porto

### Alegre, RS-Brazil: the Case Study for the Barragem Mãe d'Água

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#### Abstract

This study comprises an analysis of the process involving the development of the vegetation cover and land use, as well as the consequences on the quality of surface water within the catchment of the dam system Barragem Mãe d'Água. This system belongs to the larger Arroio Dilúvio watershed, set within the Metropolitan Region of Porto Alegre, Rio Grande do Sul, Brazil. To this objective it was necessary: to characterize the physical elements and its anthropic related change; to analyze the urbanization impacts on the quality of the surface water; to characterize the environment conditions during the occupation process and field survey to check information and to collect water samples. It was determined that the basic land forms of this area are made up of hills, slopes and plains, and that the urban occupation, began on the slopes and, more recently, related to significant modifications to the original morphology, was extended to the plains and steeper sides of the hills, resulting in the intensification of the erosive and depositional processes. The quality of surface water is considered low for most uses based of the Brazilian environmental laws, due the discharge of non-treated water to the inflowing streams of the catchment. Such processes, involving the development of vegetation cover and land use, express the socioeconomic relations of the territory, revealing of the appropriate of nature by society, significantly altering the environmental quality of the area especially of the water resources.

#### Key words:

land use evolution; quality water; urban geomorphology

## Mapping and Interpreting Vegetation Patterns in Urban Areas: Research Status and Challenges

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### Abstract

Vegetation is an essential component in urban ecosystems because it not only can affect environmental conditions and energy fluxes but also provides humans and other life with all kinds of ecological services. Mapping the spatial distribution of vegetation types and understanding the socio-ecological processes determining the observed patterns are critical for urban planning and resources management. The purpose of this paper is to review the research status and challenges in the areas of mapping and interpreting vegetation patterns in the urban environment. First, we will review the status of urban vegetation inventorying with focus on various remote sensing methods for large-scale mapping applications. Some strategies that can be used to deal with the spatial and spectral heterogeneity in urban areas will be discussed. Then, we will review several conceptual frameworks that can be used to understand the observed vegetation patterns in urban areas, which are drawn from such disciplines as geography, ecology, and sociology. Third, we will present a case study for mapping and interpreting vegetation patterns in a large metropolitan area in North America through the combined use of remote sensing, GIS, and spatial statistical analysis. Lastly, we will identify several areas that need further work concerning theories, methods, and technologies in urban ecological research.

### Key words:

Vegetation types; urban areas; spatial patterns; remote sensing; interdisciplinary perspectives

## Plant Species Composition and Bioculture of Greenspace in Urban Campus and

### Parks of Kunming City, Southwestern China

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#### Abstract

Plant species composition in urban greenspace reflects the natural environment, human management and cultural connotation of the city. But many studies do not discuss the cultural connotation of urban plants. The plant species composition and bioculture were studied based on the field data.

A total of 143 families, 448 genera and 716 species of vascular plants was recorded, of which, 649 species were in the campus and 374 species in the parks, indicating the higher species diversity in the campus. In terms of growth form, the herbs, trees, shrubs and vines respectively accorded for 46.51%, 27.79%, 22.49% and 3.21%. The proportion of trees in the parks (33.69%) was higher than that in the campus (28.35%). In terms of species origin, the proportion of alien plants in the total species, campus species and park species were 39.25%, 38.52% and 41.44% respectively. More tropical plants introduced caused annually a large number of plant frost damage and management input.

The plant composition in the urban greenspace embedded the distinct traditional morality and real aesthetic. Most plants played the roles of afforestation and beautification, reflecting the season changes of colorful flowers and leaves. More local bioculture was showed in the aged greenspaces, compared the dull afforestation and visual sense in the new ones. The key taxa of plant system evolution, state or local protection plants and local endemic species were highlighted in the plant configuration of campus green, promoting the culture service functions for teaching and scientific research.

#### Key words:

urban greenspace; plant composition; cultural service functions; bioculture; campus and park

## The Effects of Green Landscape on Urban Thermo-Environment: A Case Study in

### Beijing

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#### Abstract

With the rise of global human population moving to the urban areas, the demand of improving human living environment is becoming increased. Rapid urban expansion may lead to extensive replacement of natural surfaces by artificial alternatives and massive anthropogenic heat emission that may result in urban heat island and thermal environmental deterioration. Increasing more green landscape seems to be a vital and useful measure in ameliorating urban thermal environment and meeting human needs on ecosystem services. However, how is the effect of green landscape on urban macroclimate and thermo-environment is still in dispute. In this study, a residential quarter with high-rise building in Beijing was chosen to study the effects of green landscape and their configuration on thermo-environment. Land surface temperature of each landscape type was compared based on on-site measurement and air temperature above each landscape type was compared by using ENVI-met model. Green landscape may contribute much to lower LST of itself other than surrounding areas, and the air temperature under the tree or shade is much lower than it at open space. This means that green landscape may affect air temperature and microclimate in situ and little contribution to thermal environmental amelioration in surrounding areas.

#### Key words:

Urban heat island; green landscape; land surface temperature (LST); air temperature; microclimate; ENVI-met model; thermo-environment

## The Flowering Phenological Response of Early Spring Herb to the Urbanization

### Process in Beijing

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#### Abstract

The response of vegetation phenology to the urbanization is a hotpot in the research field of global changes and urban ecological effects. Through observing the flowering times of 7 kinds of early spring herbs and temperature changes from May to June in 2012-2013 in the northwest urbanization gradient in Beijing, this paper founded that the closer to the urban center, the higher of temperature and the earlier of vegetation phenology of early spring herb, while the average flowering duration and speed did not change with the urbanization gradient distinctly. Additionally, the average flowering time change of 7 kinds of early spring herbs was most sensitive to the accumulated temperature change of 5°C. The perennial early spring herb was more sensitive to the urbanization gradient than the annual early spring herb. It is suggested that the cumulative effects of land use/cover changes and urban heat island in the urbanization process on the physiology and phenology of vegetation deserve more attention and thus to reveal the response of plant phenology to the urbanization and climate changes.

#### Key words:

Urbanization gradient process; Early spring herb; Flowering phenology; Response; Urban heat island

## The Major Issues for Management of Urban Green Spaces in Nepal

### (Case Study of Pokhara City, Nepal)

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#### Abstract

This study aimed to identify the major issues for management of urban green spaces in Nepal. It also assessed the level of awareness and perception of people towards urban forestry. Direct observation Semi-structured interview and open discussion with key-informants and secondary data through literature review were used to assess urban tree activities. The obtained data were analyzed both quantitatively and qualitatively using SPSS and Microsoft Excel. There are number of NGO and INGO institutions working in the field of urban forestry. These institutions are not fully devoted towards urban forestry but only contributing part for it. The major urban tree species are Schima-Castanopsis, Pinus, Alnus, Nigalo and Bamboo The study also showed that the major obstacles in the development urban green spaces are there due to less participation of local people in urban forestry management since all the people were not known about the importance and benefits of urban forestry. There are not adequate action and activities such as Park development; roadside plantations tree hazard prevention, nursery establishment, city beautification and raising awareness to the local people from government and other institution. As result of unplanned urbanization, green spaces are shrinking and pollution issues are rising in the cities of Nepal. Municipal authorities should realize that a sustainable management of urban forestry without the participation of local beneficiaries is not viable and that this should be encouraged at all stages of activity starting with planning, implementation and management to care and maintenance.

#### Key words:

urban forestry; major issues; perception; awareness

## Understanding the Spatial Configuration of Trees on Urban Heat Mitigation: A Comparative Study

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### Abstract

Urban greenspace has significant cooling effects on urban heat mitigation. It is widely recognized that increasing percent coverage of greenspace can greatly reduce temperatures in urban environments. However, recent studies investigating the effects of spatial configuration of greenspace show significant, but inconsistent results. To investigate the causes of this inconsistency, we conducted a comparison study at Baltimore, MD and Sacramento, CA, USA, two cities with very different climatic conditions, using different statistical approaches and analytical units with varied sizes. Trees were mapped from 1m spatial resolution imagery, and land surface temperatures(LST) were estimated based on TM thermal band. We found: (1) The effects of spatial configuration of trees on LST varied greatly in terms of magnitude, significance, and even sign, between the two cities. (2) When using different statistical approaches, the relationships between LST and configuration metrics could dramatically change. Our results underscored the necessity of controlling the effects of percent cover of trees, when quantifying the effects of spatial configuration of trees on LST. (3) Spatial autocorrelation could influence the relationships between landscape metrics and LST, particularly when the unit of analysis is relatively small. (4) With the increase of the size of analytical unit, the relationships between spatial pattern metrics and LST became stronger. This study can enhance our understanding on the effects of spatial configuration of greenspace on UHI. It also provides important insights on how to mitigate the impact of urbanization on UHI through urban design and vegetation management.

### Key words:

Urban forest; Spatial configuration; Urban heat mitigation; Urban Ecology



## Urban Growth, Landscape Changes, and Coastal Vulnerability in Southwest Florida

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### Abstract

Anthropogenic impact on the environment has become much stronger than ever before due to the rapid growth of world population over the past several decades. Urban growth associated with the quick concentration of population has become a key driver of environmental changes worldwide. Such phenomena causes more concerns in coastal areas where humans have settled for a very long period of time because of the high biodiversity and accessibility. How to sustain a coastal city has become an urgent topic. This study aims to develop a geospatial approach to explore the relationship between urban growth and coastal vulnerability in Southwest Florida. Urban ecology together with remote sensing and GIS advances the methodological approach for landscape transition studies through analyzing the spatial patterns and temporal sequencing. In this study, the land cover change will be analyzed through a time series of Landsat images. Landscape fragmentation will be examined because of its implication in biodiversity degradation. Last, the coastal vulnerability resulted from the landscape change will be discussed. This study will lead to a better understanding of urbanization's impacts on the coastal environment, and the projected vulnerability will be highly relevant to sustainable coastal planning and management.

### Key words:

Coastal vulnerability; landscape change; urban growth; spatial and temporal analysis

## Urbanization Spatial Process and Its Environmental-Ecological Effects in the Pearl River Delta, China: Perspective from Remote Sensing

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### Abstract

The Pearl River Delta area have experienced rapid economic growth and urbanization over the past three decades, accompanied with the accelerated built-up land expansion. At different scales (e.g. Pearl River Delta, Coastal Area of the Pearl River Estuary, Guangzhou-Foshan metropolitan area, the urban fringe, and villages in city, etc.), the environment-ecological effects brought by rapid urbanization are explored through analyzing the urban spatial information and its evolution. Remote sensing, combined with geographical analysis and integrated earth observation techniques are adopted in this research. The results show that the urban space in the Pearl River Delta has undergone a rapid expansion in the recent 30 years. Specifically, nearly 65 % of agricultural land in the Bay Area of the Pearl River Estuary have been converted to built-up land. The ecosystem service of the Pearl River Delta has received heavy threat from a urban sprawl. The strengthening urban heat island(UHI) , impervious surfaces growth, disappearance of surface waterbody and soil sealing are the main performances of ecological stress on human settlements during the dramatic urbanization process.

### Key words:

Urbanization spatial process; Ecosystem service; Urban thermal environment; Impervious surfaces; Soil sealing; Pearl River Delta area

## Assessment and Mapping of Urban Ecosystem Services in Bulgaria

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### Abstract

Urban landscapes are geospatial elements, characterized by extreme deviations from the natural structure of the respective geosystem. Thereby, their ecological processes possess distinctive functions and dynamics. The main factor which determines their development is the higher concentration of population and its derivative balance of socio-economic assets and liabilities, under conditions of ever increasing demands for a more favorable living environment. This fact is a serious challenges in territorial planning and geospatial management: to improve the wellbeing of the population, the characteristics of urban landscapes should allow extraction of maximum benefits from the in-situ ecosystem services.

The study aims at creating an ecosystem based geo-information system about the state and the ecosystem services provided by the urban ecosystems in Bulgaria situated outside the NATURA 2000 zones. It includes development and implementation of a system of indicators for assessment and mapping of urban ecosystems. Emphasis is given to the evaluation of the heterogeneity of urban landscapes (soil sealing, urban development structure, local climate, etc.), which determines the state of green infrastructure and the overall potential of urban systems to produce ecosystem services. The assessment tool includes the following stages: typologization of urban ecosystems derived from the MAES (2013), assessment and mapping of the ecosystems state (using 10 mandatory and 27 recommended indicators), and assessment and mapping of 18 groups of ecosystem services.

The results are oriented towards a better understanding of the ecosystem services’ concept and its implementation in sectoral policies and territorial development.

### Key words:

Urban ecosystems; Ecosystem services; Ecosystem state; Ecosystem services assessment; Ecosystem services mapping; Bulgaria

## Assessment of Ecosystem Service Importance in Yan-Long-Tu Region

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### Abstract

This paper used analytic hierarchy process and comprehensive index method to evaluate the regional ecosystem service function of Yan-Long-Tu region. It was Analysis of the importance of water resources conservation, carbon fixation and oxygen release, biodiversity protection, regulating micro-climate, agricultural products supply and landscape visual retention of Yan-Long-Tu region and showed its spatial distribution. It was analysis the comprehensive evaluation of regional ecosystem services. The results showed that the most important areas of ecosystem service were 72.03% of the total area of Yan-Long-Tu region. More important areas and important areas were 13.57%, 10.69% of the total area, respectively. Generally important areas were only 3.21%. It provided scientific basis for the scientific management of regional ecosystem and ecological function zoning. And it played an important role in the maintenance of regional ecological security of Yan-Long-Tu region.

### Key words:

ecosystem; service function; importance evaluation; Yan-Long-Tu region

## Ecosystem Services Assessment in the Rapidly Urbanizing Zhangye Oasis, Northwest China

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### Abstract

Although advances in conceptual frameworks and different decision making tools, the integrated assessment of ecosystem services in data scarce oases remains limited. In this study, we presents a methodology for quantifying spatio-temporal change in multiple ecosystems services and biodiversity as an impact of land use change mainly using the InVEST model. The integrated modelling methodology was used to simulate carbon storage and sequestration, sediment retention, water yield and biodiversity for the rapidly urbanizing Zhangye oasis of northwest China based on land use of 2000, 2009, land management scenarios of moderate protection (S1) and strict protection (S2). Specifically, the ecosystem services indicators and biodiversity based on the oasis condition were used to analyze land use change impacts on the spatio-temporal change of ecosystem services at the pixel and oasis scale. The limitations and uncertainties of the study in the oasis were also discussed. The integrated modelling of ecosystem services illustrates a methodology that can be employed by local land managers in exploring multiple land management scenarios and their implications for multiple ecosystem services and biodiversity change. The application of ecosystem services assessment in this study showed it could support decision making and ecological conservation in other similar regions of northwest China.

### Key words:

Ecosystem services; Land management scenarios; GIS; Integrated modelling; Artificial oasis

## Impact of Rapid Urbanization on Water Resources in The Context of Climate Change Using Remote Sensing and Gis: A Policy Perspectiv

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### Abstract

Increasing pressure of population and industrialization has threatened the quality and quantity of water resources in and around urban areas. Protecting surface water resources like lakes, rivers, streams, and ponds etc in the vicinity of urban area has become a very difficult task for urban planner and administrators. The haphazard growth of colonies, slum squatters and unplanned land use has not only broken down the natural flow of hydrological net work but also deteriorate the quality of water that directly affects health of people. The present paper investigates that how the urbanization and industrialization has changed urban land use of Jaipur urban Agglomerate which ultimately affected the surface water bodies and reduced the recharge area of ground water. The changing rainfall pattern due to possible climate change has exaggerated the situation. The study has been carried out with the help of Indian remote sensing satellite data and GIS techniques.

It was found that increasing pressure of population and un-systematic anthropogenic activities have made negative impact on water resources. Recharge of ground water has stopped due to increased pavement area for urban development like infrastructure development, industrial development and other urban development activities. On the other hand Average annual number of rainy days has been reduced from 35 to 28 days in last 34 years. \*17 years out of 34 years (1985 - 2014) have received less than average (650 mm) rainfall. Average number of days having High temperature has increased.

### Key words:

Urbanization; Water Resource; Climate Change; Remote Sensing; GIS

## Impact of the Spatial Pattern of Regional Urbanization on Landscape Pattern and Ecosystem Services: A Case Study of Xi'an Metropolitan

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### Abstract

The impact on landscape pattern and ecosystem services is strongly varying with transformation of the spatial pattern of regional urbanization from single central-city to multiple central-cities. These are rarely researched. In paper the spatial patterns of regional urbanization and its characteristics were analyzed by employing the degree of centralization and Moran's I in Xi'an metropolitan. Also the influence and mechanism of regional urbanization on landscape pattern and ecosystem services were explored under the spatial patterns of single central-city and multiple central-cities. These conclusions were reached: (1) the level of comprehensive urbanization in Xi'an metropolitan is increased by 40%, and the spatial pattern of regional urbanization are transforming from a single central-city stage to multiple central-cities stage from 1988 to 2013. (2) Regional urbanization has resulted in fragmentation of landscape and decreasing of ecosystem services. The expansion of urbanized area, the stretch and networking of transportation infrastructures and the transformation from traditional agriculture to modern urban agriculture are observably driving the fragmentation of landscape and the decreasing of ecosystem services in multiple central-cities stage, in which these influences are stronger than in single central-city stage. (3) Under regional urbanization pattern of multiple central-cities the stronger negative influences were occurred in the region of urban-rural transition zone and near transportation infrastructures. The results indicate that the fragmentation of natural or semi-natural landscape and the decrease of ecosystem services will be alleviated by maintaining or replanting enough large area of forest, grassland or orchard, by developing fruit sector and horticultural crops and by constructing ecological corridors near roadside and riverside.

### Key words:

Regional urbanization; spatial pattern; landscape; ecosystem services; Xi'an metropolitan

## Spatiotemporal Variation of Urban Vegetation and Its Response to Rapid Urbanization in Shenzhen City

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### Abstract

The characteristics of urban vegetation, such as vegetation type, area, coverage, and spatial pattern, can reflect regional climate conditions, soil and water resources, human activities, and so on. Urban vegetation provides ecological service functions such as microclimate regulation, environmental purification, provision of leisure and recreational spaces, and other functions. We selected Shenzhen City, a typical rapidly urbanizing city in China, as our study area. Analyses of variation tendency, and spatial evolution, and response to urbanization of urban vegetation were based on remote-sensing images collected between 1980 and 2014, which were subjected to a linear regression model. Urbanization was found to have a significant effect on vegetation in Shenzhen City. Vegetation cover first decreased and then increased during rapid urbanization; the effects of urbanization on vegetation were negative at first, but become positive as urban development progressed. The spatial distribution of vegetation was principally dominated by vegetation coverage, which was largely distributed in higher-altitude areas. Over the course of urbanization in the last 35 years, the area under natural vegetation has decreased significantly; the area under woodland has decreased and was largely restricted to mountainous areas; cultivated land first increased and then decreased; and landscape fragmentation increased with urbanization. The ecosystem services of urban centre are mainly provided by urban parks and other artificial green spaces.

### Key words:

vegetation characteristics; urban; urbanization; Shenzhen City

## Status of Urban Slums Dwellers in Varanasi City: An Analysis

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### Abstract

Slums are the part of urban environment and they are identified by the presence of features of living conditions that are undesirable like overcrowding, lack of sanitation and hygiene, inadequacy of drinking water and poor construction etc. The objective of this study is to represents the socio-economic status of slums dwellers in five slum locations of Varanasi city. This paper also investigates the problems of slum dwellers in the study area. The analysis and interpretation of this paper is based on the primary data sources collected from personal field survey. Different statistical and cartographic techniques are used to represents the actual status of urban slum dwellers. Living standard and environmental conditions of the slums areas is very bad. There is need to develop good social amenities facility in this slum areas. The result of this study represents the social and economic conditions of the slum dwellers are very poor. They are facing various types of problems. Finally this paper produces the appropriate suggestion for reducing the problems related to slums dwellers in Varanasi city.

### Key words:

Slums; Urban Environment; Overcrowding; Sanitation; Hygiene; Social Amenities



## The Urban Land Ecological Suitability Evaluation of Yan-Long-Tu Region

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### Abstract

The resistance evaluation system of this paper included 12 factors which were from the natural geography, social economy and ecological limit three aspects. This urban land ecological suitability evaluation of Yan-Long-Tu region primarily used GIS spatial analysis method which was based on the resistance model and minimum cumulative resistance model. The results showed that: the urban land ecological suitability of Yan-Long-Tu region can be divided into the key construction area (538.55km<sup>2</sup>), the optimized construction area (743.53km<sup>2</sup>), the restricted construction area (1887.46km<sup>2</sup>) and the forbidden zone (1919.16km<sup>2</sup>). This paper made the space distribution of all different levels clear and put forward some suggestions correspondingly in order to provide the theory, technology, decision-making and other support for the urban land ecological planning and management of Yan-Long-Tu region.

### Key words:

land ; ecological suitability; minimum cumulative resistance model; Yan-Long-Tu region

## Urbanization and Sustainable Development

### Sustainable Development of Urban Agglomeration and Eco-Environment Effects of Urbanization



Home

#### Oral

1. [Analyze on Spatiotemporal Evolution Characteristics of Resources-environment-economy Efficiency in Urban Agglomeration in China Based on Mixed Direction Distance Function](#)  
Xueqin LIN(Capital Normal University, China)
2. [Convergence of carbon dioxide emissions in the Yangtze River Delta, China](#)  
Jianbao Li; Xianjin Huang (Nanjing University, China)
3. [Decarbonizing China's Cities Urban Agglomerations](#)  
Shaojian Wang (Sun Yat-sen Universtiy, China); Chuanglin Fang (Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, China)
4. [Delineate and Extend China's Functional Urban Areas with Geographical Open Data](#)  
Kang Wu (Capital Unibersity of Economics and Business, China)
5. [Dynamic Econometric Analysis of the Relationship between Urbanization and Desertification Reversal Trend:A Case of Yanchi County in Ningxia](#)  
Ya WANG (Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, China); Lihua ZHOU (Institute of Science and Development, Chinese Academy of Sciences, China)
6. [Ecological and Landscape Dimension of the Suburbanization of the Warsaw Urban-Rural Region](#)  
Bozena Degorska (Institute Geography and Spatial Organization, Polish Academy of Sciences, Polish)
7. [Ecological and Livable Agglomeration](#)  
XiaoFeng Dong; Yanyan Li (BeiJing Jiaotong University, China); Xingguang Liu (Lanzhou University, China)
8. [Ecological Vulnerability Recognition and Sustainable Development Strategy of Mainland China's 'Economic Polarized Areas'](#)  
Xuejun Duan; Lei Ye; Lei Wang; Hui Zou (Nanjing Institute of Geography & Limnology, The Chinese Academy of Sciences, China)
9. [Environmental Monitoring and of Soil Heavy Metals Pollution in Ulaanbaatar Area](#)  
Otgonbayar Erdenetsogt; Navchaa Tugjamba; Myagmarsuren Dash (University of the Humanities, Mongolia)

10. [Estimating the Impact of Urbanization on Air Quality in China Using Spatial Regression Models](#)  
Chuanglin Fang; Haimeng Liu; Guangdong Li; Dongqi Sun (Institute of Geographic Sciences and Natural Resources Research, China)
11. [Evaluation of Resource-Environmental Carrying Capacity and Sustainable Development Strategy of the Yangtze River Economic Belt, China](#)  
Hui Zou; Xuejun Duan (Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, China)
12. [Fulvic Acid Mediates Chromium \(Cr\) Tolerance in Wheat \(\*Triticum aestivum\* L.\) Through Lowering of Cr Uptake and Improved Antioxidant Defense System](#)  
Mujahid Farid; Shafaqat Ali (Department of Environmental Sciences and Engineering, Government College University Faisalabad, Pakistan, Pakistan)
13. [Hotspots of Relationships between Urbanization and Eco-Environment in Different Spatial Scales](#)  
Haitao Ma (Institute of Geographical Sciences and Natural Resources Research, CAS, China)
14. [Huai Hai City Ecological Civilization Degree Evaluation and Spatial Analysis](#)  
Yang Chen (Jiangsu Normal University, China)
15. [Impact of Floating Population Spatial Distribution on Polycentric Spatial Structure in Guangzhou-Foshan Metropolitan Area, 2000-2010](#)  
Xinjian Li; Miaozi Zhao; Liming Tang (South China University of Technology, China)
16. [India and ASEAN Trade Relations: A Spatiotemporal Analysis](#)  
Purva Yadav (Jawaharlal Nehru University, India)
17. [Scientific Selection and Grading Cultivation of China's Urban Agglomeration to Adapt to New Normal in China](#)  
Chuanglin Fang; Siao Sun (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
18. [Spatial and Temporal Span of Multi-scale——The Comparison of Spatial Evolution Simulation Based on Urban Agglomeration and Single City](#)  
Jinchuan Huang; Haoxi Lin (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
19. [Spatial-Temporal Characteristics and Determinants of PM<sub>2.5</sub> In China: A City-Level Perspective Analysis](#)  
Zhenbo Wang; Chuanglin Fang; Guang Xu (Institute of Geographic Sciences and Natural Resources

Research, Chinese Academy of Sciences, China)

20. [Spatial-temporal Characteristics of Eco-efficiency of the Pearl River Delta Urban Agglomeration](#)  
Chenyi Shi; Chunshan Zhou (School of Geography and Planning, Sun Yat sen University, China)
21. [Summary of the Correlation Study of Urbanization and Ecological Environment](#)  
Xiaohua Yu (Institute of Geographic Sciences & Natural Resources Research, China)
22. [The Airport Economy Development of ZAEZ's Innovation on the Regional Development Pattern](#)  
Zhang Zhancang; Chen Ping; Peng Junjie (The Henan Academy of Social Sciences, Zhengzhou, 450002, P. R. China)
23. [The Correlation and Dual Structure of City Tourism Resources, Tourists, Star Hotels and Revenues in Guangxi](#)  
Yi ling LU; Gen nian SUN (Shaanxi Normal University, China)
24. [The Evaluation of Territorial Utilization Quality in China: From the Aspect of Production-Living-Ecological Space](#)  
Li Qiuying (Shandong Academy of Social Sciences, China)
25. [The Identification and Development Pattern of Urban Agglomeration in China](#)  
Weiping Zeng; Peijuan Zhu (Hunan Normal University, China)
26. [The Level of Employment Security and Its Spatial Pattern in China's Urbanization Process](#)  
Chuanglin Fang; Kui Luo (Institute of Geographic Sciences and Natural Resources Research, CAS, China)
27. [The Relationship between Water Use and Urbanization](#)  
Siao Sun; Chuanglin Fang (Institute of Geographic Sciences and Natural Resources, China)
28. [Understanding the Dynamics of Shanghai's Urban Public Safety](#)  
Danlin Yu (Montclair State University, United States); Chuanglin Fang (Institute of Geographical Sciences and Natural Resource Research, CAS, China)
29. [Urbanization and Eco-Environment in Yangtze River Delta: Improved EKC and Coupling Analysis](#)  
Yabo Zhao (Beijing Normal University, China); Shaojian Wang (Sun Yat-sen University, China)
30. [Xinjiang Urban System Level and Development Countermeasures](#)  
Simayi Zibibula; Feng Gang; Zhao Xuepeng; Lu Youbin (Xinjiang University, China)

## Poster

1. [Changing and Differentiated Urban Landscape in China: Spatiotemporal Patterns and Driving Forces](#)  
Guangdong Li; Chuanglin Fang; Shaojian Wang (China, IGSNRR, CAS)

2. [Coupling Relationships and Constraining Effects Between Urban Agglomeration Development Quality and Water Resources Utilization](#)  
Bao Chao; Chen Xiaojie (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)
3. [Decoupling Analysis between Population Growth and Constructed Land Expansion in Fast-emerging City](#)  
Zhang Meihong; Liang Yanqing (China, Hebei Normal University)
4. [Evolution Characteristics and Driving Factors of Urban functional land in Zhangye City, Northwest, China](#)  
Liang Feng; Li Qianguo; Shi Peiji (China, College of Geography and Environment Science, Northwest Normal University)
5. [Feature Identification of Wuhan Urban Agglomeration Spatial Pattern Evolution and Construction of Optimization Model](#)  
Mengjie ZHANG; Chong PENG (China, Architecture and Urban Planning Department, Huazhong University of Science and Technology)
6. [Research on County Development Potential in the Jing-Jin-Ji Region Based on Modified Potential Model](#)  
Jinli Zhao (China, Beijing Normal University)
7. [Spatial Differences and Driving Forces of Land Urbanization in China](#)  
Yang Wang (China, Guangzhou Institute of Geography); Xueqin Lin (China, College of Resources Environment and Tourism, Capital Normal University)
8. [Strategies for Coordinated Development of Jingjinji Region Based on limited Water Resources —A Case Study of Baiyangdian Area](#)  
Xiyu Liu; Sijia Cheng; Sitong Huang (China, Tsinghua University)
9. [System Simulation of the Rational Scale of Jing-Jin-Ji Urban Agglomeration Constrained by Water Resources](#)  
Bao Chao; He Dongmei (China, Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences)
10. [The Analysis of Spatial Distribution of PM2.5 in Pearl River Delta Urban Agglomeration](#)  
Jie Liu (China, Institute of Geographic Science and Natural Resources Research, UCAS)
11. [The Changing Landscape and Characterization of Air Pollution Index in Urban Areas of the Yangtze](#)

## River Delta

Tan Chen (China, Nanjing University)

12. [The Differentiation of Agglomeration Degree and Pattern of Spatial Polarization in the Ha-da Giant Urban Belt](#)

Tian Junfeng (China, School of geographical Sciences, Northeast Normal University)

13. [The Driving Effect Decomposition and Space-time Difference of Industrial Carbon Emissions in Xuzhou Metropolitan Area](#)

He Yuan (China, Jiangsu Normal University)

14. [The Relationship between Economic Growth and Constructed Land Expansion of Shijiazhuang](#)  
JI Shuying; LIANG Yanqing; HUANG Zhiying (China, Hebei Normal University)

15. [The Scope Definition and Prediction Research of Ha-chang Urban Agglomeration Under the Revised of Daily-communication-area](#)

Tian Junfeng (China, China Northeast Normal University); Wang Shijun; Wang Binyan (China, School of geographical Sciences, Northeast Normal University)

16. [Theoretical Analysis on Interactive Coupled Effects Between Urbanization and eco-environment in Mega-urban Agglomerations](#)

Chuanglin Fang (China, Institute of Geographic Sciences and Natural Resources Research, CAS);  
Chenghu Zhou; Chaolin Gu (China, School of Architecture, Tsinghua University)

## Analyze on Spatiotemporal Evolution Characteristics of Resources-environment-economy Efficiency in Urban Agglomeration in China Based on Mixed Direction Distance Function

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### Abstract

With the continuous improvement of the market mechanism in China, regional market is gradually formed, and the social and economic relations between cities have become more and more closely. Urban agglomeration has become an important regional spatial organization form to promote the development of economy and urbanization in China, and also is the most significant and frequent area of human and land interaction. Based on hybrid directional distance function, this paper estimates resources-environment-economy efficiency of 20 urban agglomerations in China from 2005 to 2013, analyzes their spatiotemporal evolution characteristics, and finally explores the relationship between them. The main conclusions are as follows: (1) the resources, environment and economy efficiency of urban agglomeration in China are generally low, the growth of economy efficiency is the fastest, the second is environment efficiency, and finally the resource efficiency; (2) the resources-environment-economy efficiency gradually reduce from the east coast to the western interior. Within the urban agglomeration, the distribution of the efficiency is dominated by low values; (3) three efficiencies has the long-term coordinated development relationship. With the improvement of economic efficiency, resource efficiency increase synchronously, while environmental efficiency increase little.

### Key words:

resources-environment-economy efficiency; spatiotemporal evolution characteristics; mixed direction distance function; urban agglomeration; China

## Convergence of Carbon Dioxide Emissions in the Yangtze River Delta, China

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### Abstract

As China's industrialization and urbanization have grown rapidly in recent years, China has become the world's largest CO<sub>2</sub> emitter in 2006. The Chinese government has attached great importance to the issue of carbon emission and set the target of decreasing carbon intensity to 60-65% of 2005 levels by 2030. The investigation of convergence for carbon intensity is contributed to decomposition of the target for decreasing carbon intensity. Yangtze River Delta Region is one of the key regions of carbon emissions in China, with the higher urbanization level and larger carbon emissions, thus we employed prefecture-level panel data between 2000 and 2010 to investigate whether the  $\sigma$ -convergence, stochastic convergence and  $\beta$ -convergence exist in the carbon intensity across prefecture-level cities in the Yangtze River Delta Region. Spatial econometric models were utilized to investigate  $\beta$ -convergence of carbon intensity. The results indicate that carbon intensity shows divergence during the period 2002-2004 and  $\sigma$ -convergence over other periods. Carbon intensity exhibits stochastic convergence, indicating that the shocks to carbon intensity of every prefecture-level city to the average level are only transitory. Carbon intensity exists spatial spillover effect and  $\beta$ -convergence, which means that the prefecture-level cities with higher carbon intensity tend to reduce rapidly in carbon intensity, when other conditions keep unchanged, we should consider the present situation of carbon intensity, spatial factors, social and economic factors, such as per capita gross domestic product, population density and industrial structure, when we conduct the allocation plan for carbon intensity reduction.

### Key words:

convergence; carbon intensity; spatial econometric models; Yangtze River Delta

## Decarbonizing China's Cities Urban Agglomerations

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### Abstract

China's urban agglomerations contribute 64.0% to China's greenhouse gas emissions and thus play a vital role in determining the future of climate change. There is little information available about city-level energy consumption and carbon emissions, thus we employ spatiotemporal modeling using DMSP/OLS nighttime light imagery. Our findings show that such agglomerations have in fact experienced a remarkable decline in CO<sub>2</sub> emission intensity—from 0.62t/thousand Yuan to 0.26t/thousand Yuan between 1995 and 2010, which constitutes an average annual decline of 5.6%. Despite still very high CO<sub>2</sub> intensities in western China, a convergence of CO<sub>2</sub> intensities across the country has occurred over the last few decades. Using panel regression modeling we show the main driving forces behind this decline in CO<sub>2</sub> emission intensities—specifically economic growth and associated technical change, population density, and foreign direct investment. Factors that have been hampering an even further decline where the ongoing industrialization of China's economy and increasing investment in infrastructure and the housing stock.

### Key words:

carbon intensity; spatiotemporal modeling; urban agglomerations; panel regression modeling

## **Delineate and Extend China's Functional Urban Areas with Geographical Open Data**

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### **Abstract**

Functional Urban Area (FUAs) refers to the functional economic units, consisting of highly densely populated municipalities (urban cores) as well as any adjacent municipalities with high degree of economic integration with the urban cores, measured by social economic activity flows. In China for a long period of time, there is a gap between the urban administrative region and urban functional region, which caused a number of confusions in terms of the "cities" and "city-regions". Due to the inconsistency of different urban statistics ranges, researchers often feel uncertainty about how to define an accurate city boundary and how to collect a data for urban studies. This paper aimed to introduce how to delineate a functional urban areas (FUAs) in a Chinese context by using available geographical open data. Three different scale FUAs: Metropolitan Areas(MAs), Metropolitan Coordinating Region (MCRs) and Megalopolis were delimited and extended at the township level for the first time. The results show China has been initially shaping 151 different size MAs which cover a total population of more than 376 million, 27 MCRs and 5 Megalopolis.

### **Key words:**

Functional urban area; metropolitan area; megalopolis; spatial structure

## Dynamic Econometric Analysis of the Relationship between Urbanization and Desertification Reversal Trend: A Case of Yanchi County in Ningxia

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### Abstract

Urbanization subsystem and ecological subsystem is a pair of function formula that mutually mapping at the stage and regional scale. There were complex relationship between them in different regions and different phases. This paper explores the interactive process and quantitative mechanism of urbanization to desertification reversal trend during 2003-2013 in Yanchi, a typical area of desertification reversed, Ningxia, China. The paper measures the comprehensive level and its dimension of urbanization and desertification reversal with entropy method, examines causal relationships between sub-indexes with ADF stationary test and Granger causality test, analyzes the dynamic process during 2003-2013 with impulse response and variance decomposition of VAR model. Results showed that: (1) Yanchi County's urbanization level had been gradually increasing since 2003, meanwhile the desertification reversal trend remained at more 0.3 level. (2) The comprehensive index of Urbanization did not directly effect the desertification reversal trend, but its component indicators impacted desertification reversal trend, pressure, status and response. (3) The explanatory power of urbanization to desertification reversal was gradually improving. Population migration, economic growth, social progress and urbanization development impacted on desertification reversal trend-pressure-state-response were maintained at the level of 78%, 58%, 13% and 9%. As an effective way to improve the ecological environment of inland arid area, Yanchi County should regard the population urbanization and society urbanization as the key breakthrough to enhance the urbanization's positive effect to ecological environment.

### Key words:

Urbanization; Desertification reversal trend; Granger causality test; VAR model; Yanchi County

## Ecological and Landscape Dimension of the Suburbanization of the Warsaw Urban-Rural Region

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### Abstract

Studies of the spatial suburbanization process in terms of ecological and landscape aspects require a broader reference to the geographical space and particularly to the environment. They introduce new research subject fields combining geography, natural science, urban planning and socio-economic science. Extension of the substantial scope of studies of the ecological and landscape aspects in terms of systemic and functional approach, is one of the most value added from discipline development point of view, that is, the geography in the context of spatial analysis. Study involved Warsaw urban-rural region in central Poland, due to the very intense process of urban sprawl and its consequences for the environment and spatial planning. It was indicated, that there are some problem areas in terms of spatial processes, that decrease the ecological and landscape value. Moreover, the stability and the spatial cohesion of the natural system were assessed from the functional and landscape point of view. Recognition of the spontaneous urbanization process and its consequences to the environment and the landscape enabled the identification of preventive measures against the negative outcome of the suburbanization, and setting of the directions and forecasts for the functioning and stability of the ecological and landscape structures, with special stress put on the ecological corridors and green belts which on the one hand relate to the Warsaw Metropolitan Area, but on the other, have also universal character, referring to the best practices of spatial planning in selected European countries.

### Key words:

suburbanization; urban-rural region; environment; spatial planning

## Ecological and Livable Agglomeration

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### Abstract

As the main approach of urbanisation on urban densely populated areas, sustainable development on urban agglomeration is significant. The key point of approach is to take the path of ecological and liveable development, which sets the habitable environment and economic prosperity as a goal, and follows the principle of ecological urban and rural planning, construction and management. Firstly, we has analysed the domestic and international research-practice progress of the livable and ecological urban agglomerations, and chose both international and domestic best practices, for example the Great London and Randstad urban agglomeration as international cases and Pearl river delta urban agglomeration, Changsha-Zhuzhou-Xiangtan urban agglomeration and Lanzhou-XiNing urban agglomeration etc. as domestic cases. Then, we has analysed the advanced experiences on the liveable and ecological development of London urban agglomeration and Lanzhou-Xining urban agglomeration. The overall characterises are summarised as follows: to respect the demand of ecological environment, make a rational distribution of urban system structure, develop diversified green economy (including tourism) based multi-centre urban function system, connect cities via expressway and rail transit, and pay attention to the natural landscape pattern and ecological environment protection. Finally, we has discussed the ecological development approach of BeiJing-TianJin-HeBei urban agglomeration, that is, constructing functional system and spatial distribution of world city on the economic and social function, taking the knowledge industry and high-end business information service based ecology economy approach, building ecological protection system on the basis of ecological function zoning, developing ecological infrastructure such as low-carbon transport, sponge city, green energy, balancing development of basic education, health care, housing and social security system between urban and rural areas. Ecological and liveable urban agglomeration mode is the inevitable way of transition and new development on Chinese urban densely populated areas.

### Key words:

Ecological; livable; Agglomeration

## Ecological Vulnerability Recognition and Sustainable Development Strategy of Mainland China's 'Economic Polarized Areas'

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### Abstract

This paper explores an empirical analysis of ecological vulnerability and sustainability in the development of Mainland China's space-economy by operationalizing the concept of 'economic polarized areas (EPAs)'. The concept of 'economic polarized area' presents an effective tool to study the spatial agglomeration of the key components of Mainland China's regional development under the conditions of economic globalization, and to recognize spatial pattern of Mainland China's ecology and sustainability, and relationships between development and ecology. The paper focus on reorganization of ecological vulnerability in 16 EPAs by analysis of soil erosion, desertification, rocky desertification, ecosystem types, key ecological function areas, water resources and land resources. The results show that (1)most EPAs locate in less vulnerable areas which are relatively suitable for reasonable economic development and polarization, (2)ecological vulnerability of Chengdu-Chongqing, Beijing-Tianjin-Hebei Metropolitan Area, Guanzhong Tianshui Economic Zone, Central Plains Area, Wuhan City Circle and Guangxi Beibu Gulf Economic Zone is severe relatively, and (3)the more severe ecological vulnerability of EPA situates, the lower development level EPA reveals. Subsequently the paper puts forward several sustainable development suggestions for Mainland China's EPAs.

### Key words:

economic polarized areas; mega-regions; ecological vulnerability; sustainable development; China

## Environmental Monitoring and of Soil Heavy Metals Pollution in Ulaanbaatar Area

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### Abstract

Last two decades, urban extension and population growth has been increased dramatically in Ulaanbaatar, the capital city of Ulaanbaatar. Due to uncontrolled and poor managed urban planning, environmental issues has been arising seriously in the city. A total of 22 soil samples from 6 locations were collected from Ulaanbaatar city, in 2012-2015 period.

The purpose of this survey is to investigate the current status of soil morphology and heavy metals (Cu, Fe, Pb, and Mo), in Ulaanbaatar. Soil samples were collected from different parts of the city and measurements made in the laboratory of the University of the Humanities. Laboratory results were analyzed by statistical methods. However, metal pollution was not a serious problem in the city and there was no significant evidence of infiltration of metal solutions into subsoil (at a depth of 30 cm) in the past, some exceeding of heavy metals at the alert level were identified in the sensitive and residential areas. Pb, Mo, Fe Cu contents in most samples were higher than normal. Correlation of different elements in soil samples were calculated by the non-parametric Spearman rank method.

### Key words:

Soil pollution, heavy metals, urban soil, environmental monitoring

## Estimating the Impact of Urbanization on Air Quality in China Using Spatial Regression Models

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### Abstract

Urban air pollution is one of the most visible environmental problems to have accompanied China's rapid urbanization. Based on emission inventory data from 2014, gathered from 289 cities, we use Global and Local Moran's I to measure the spatial autocorrelation of Air Quality Index (AQI) values at the city level, and employed Ordinary Least Squares (OLS), Spatial Lag Model (SAR), and Geographically Weighted Regression (GWR) to quantitatively estimate the comprehensive impact and spatial variations of China's urbanization process on air quality. The results show that a significant spatial dependence and heterogeneity existed in AQI values. Regression models revealed urbanization has played an important negative role in determining air quality in Chinese cities. The population, urbanization rate, automobile density, and the proportion of secondary industry were all found to have had a significant influence over air quality. Per capita Gross Domestic Product (GDP) and the scale of urban land use, however, failed the significance test at 10% level. The GWR model performed better than global models and the results of GWR modeling show that the relationship between urbanization and air quality was not constant in space. Further, the local parameter estimates suggest significant spatial variation in the impacts of various urbanization factors on air quality.

### Key words:

Air Quality Index; air pollution; PM2.5; urbanization; spatial regression models

## Evaluation of Resource-Environmental Carrying Capacity and Sustainable Development Strategy of the Yangtze River Economic Belt, China

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### Abstract

The Yangtze River Economic Belt (YREB) has been undertaken multiple missions of urbanization, economic drive and environmental protection when it became national stagey in 2014. Based on the Pressure-State-Response (PSR) model, build resource-environmental carrying capacity (RECC) evaluation method and indicator system. Results show that: (1)cities in the middle and lower reaches of the Yangtze River reveal better in pressure system and response system, however cities upstream show better in state system. Urban agglomeration in the middle reach of Yangtze River and Chengdu-Chongqing urban agglomeration are more coordinated in pressure, state and response systems. (2)Regions with better RECC distribute in the Yangtze River Delta, the Wuhan Metropolitan Area, south-eastern Jiangxi Province, north-western Hubei Province, western Sichuan Province, etc. Cities downstream the Yangtze River reveal better than upstream and cities northern the Yangtze River show better than southern.(3)High pressure of resource consumption and environmental pollution and inadequate human feedback response are major constraints of cities with poor RECC, which can be attributed largely to technology and management constraints. Shortage of water resources per capita and pollution load are main constraints of cities with better RECC. Finally, from aspects of urbanization and economic activities layout guidance, resources utilization improvement, pollution defence and regional competition and basin management, puts forward sustainable development strategies for the YREB.

### Key words:

resource-environment carrying capacity; sustainable development; PSR model; the Yangtze River Economic Belt

## **Fulvic Acid Mediates Chromium (Cr) Tolerance in Wheat (*Triticum aestivum* L.) Through Lowering of Cr Uptake and Improved Antioxidant Defense System**

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### **Abstract**

Proliferation of population triggers the scarcity of food worldwide. The intensive agricultural practices reduced the fertility of soil and introduced a number of organic and inorganic pollutants in soil and water biota. Among different inorganic pollutants chromium (Cr) stress is one of the most adverse environmental factors that affect plant growth and cause food chain contamination. Fulvic acid (FA) is known to enhance the growth and production of crops, but the studies are scarce regarding the application of FA on metal tolerance in plants. The effects of FA application on alleviating Cr phytotoxicity in wheat plants were investigated in a pot experiment conducted in sand- and soil-grown plants. Three Cr (0, 0.25, and 0.50 mM) treatments in the form of  $K_2Cr_2O_7$  were applied in both soils with or without foliar application of  $1.5 \text{ mg L}^{-1}$  FA. Plants were harvested after 4 months of treatments, and data regarding growth characteristics, biomass, photosynthetic pigments, and antioxidant enzymes were recorded. FA application increased plant biomass, photosynthetic pigments, and antioxidant enzymes while it decreased Cr uptake and accumulation in plants as compared with Cr treatments alone. We conclude that FA application contributes to decreased Cr concentrations in wheat grains and could be used as an amendment when aiming for decreased metal concentration in plants.

### **Key words:**

Antioxidant enzymes; Biomass; Chromium; Growth; Photosynthetic; Phytotoxicity

## Hotspots of Relationships between Urbanization and Eco-Environment in Different Spatial Scales

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### Abstract

Urbanization and eco-environment are two major topics existing in human society currently. The relationship between Urbanization and eco-environment has been widely considered. However, existing studies rarely noticed differences in different spatial scales, ignoring comparison and discussion about the characteristics of this relationships in different spatial scales. Based on a review of a large number related research, this paper proposes the geographical features, political background, research focus, problems and the future direction of interest of different spatial scales on the relationship. Human development should be considered in global scale, and considering how the improvement of urbanization affect the change of eco-environment. When talking about the relationship in a country, the socio-economic development phase should be considered. How administrative division affect the relationship is worth study, because inter-provincial regions have no regulatory agencies. Each province has a different natural basis, so relationship research should be based on their characteristics. The interaction with the surrounding area should fully take into account in prefecture-level city. Research on urbanization and eco-environment in different spatial scales can't be confused. We need to design targeted research framework and issues, so as to effectively serve human development of various regions.

### Key words:

Urbanization and Eco-Environment; spatial scales; hotspots; differences

## Huai Hai City Ecological Civilization Degree Evaluation and Spatial Analysis

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### Abstract

Ecological civilization is the human social development after the primitive civilization, agricultural civilization and industrial civilization of a new type of social civilization. Ecological civilization refers to the human in the process of the development and utilization of natural, from safeguarding the interests of the whole society, economy and natural environment, the respect nature, protect nature, committed to the modernization of ecological environment construction, improve the quality of ecological environment, make the modern economic and social development based on the ecological system of virtuous cycle, in order to effectively solve the demand of the human activities and natural ecological environment system, the contradiction between supply and realize the common development of man and nature. The first of the 17th national congress of the "construction of ecological civilization" into political report, and the construction of ecological civilization as one of the new requirements to achieve the comprehensive construction well-off society goal. Party's description in the eighteenth big and well-off society goal, will be promoted to the ecological civilization construction and economic construction, social construction, cultural construction, political construction of parallel strategic height. And the evaluation of ecological civilization is the premise and basis for the construction of ecological civilization, based on constructing evaluation index system of city ecological civilization, on the basis of using the factor analysis method, ecological civilization degree is evaluated on the huaihai urban agglomeration and spatial analysis.

### Key words:

ecological civilization degree evaluation; spatial analysis

## Impact of Floating Population Spatial Distribution on Polycentric Spatial Structure in Guangzhou-Foshan Metropolitan Area, 2000-2010

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### Abstract

Migration plays an important part in the sustainable development of urban agglomerations. However, there are few studies about the relationship between floating population and polycentric spatial structure from the perspective of metropolitan area. In this paper, we use one case study, Guangzhou-Foshan Metropolitan Area, to explore the floating population spatial distribution and polycentric spatial structure with an aim to understand their relationship and its influence mechanism. With the census and enterprise data from 2000 to 2010 for Guangzhou and Foshan, we investigate the spatial distribution of floating population by spatial analysis, Moran  $I$  and location quotient, meanwhile measuring polycentric spatial structure of population and employment by polycentric population density models and rank-size distribution models. According to the basis above, we use descriptive statistical to preliminarily analyse the impact of floating population spatial distribution on polycentric spatial structure. To further explain the influence mechanism of floating population spatial distribution to polycentric spatial structure, we create a regression equation, carry out a residual analysis and describe the migration flows in figure. The results illustrate that: 1) the floating population from inner cycle has been growing and spilling over, concentrated sub-centres in peripheral areas. 2) the floating population is the main reason of sub-centres formation and its redistribution has a greater impact on the evolution of the sub-centres. 3) origin constitution of floating population has been more widely, which strengthened the polycentric spatial structure. We believe the research will have implications for population management and urban agglomerations plan.

### Key words:

Floating population; urban agglomeration; spatial distribution; polycentric spatial structure; census data; enterprise data; Guangzhou-Foshan Metropolitan Area

## India and ASEAN Trade Relations: A Spatiotemporal Analysis

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### Abstract

Asia's aim of single market would depend on the existence of a flexible and efficient logistics and transportation system. At present the market is fragmented and is often a hindrance to free flow of goods and services, and technical barriers in the market lead to expensive mobility within Asia. To create an efficient single market in Asia, it is necessary to overcome infrastructure gaps. Undoubtedly, distance is a key determinant of a region's trade prospects and in the absence of an adequate connectivity, vast opportunities created by the dynamic growth poles of Asia may diminish at their international borders. Connectivity is important as it encourages trade, and brings regions closer and integrates economy with the world. In India, Delhi-Mumbai Industrial corridor (DMIC) is conceived to develop as the global manufacturing and trading hub supported by world class infrastructure and enabling policy. Developing the Chennai-Bangalore-Mumbai Industrial Corridor and integrating it with DMIC, would provide significant boost to the industrial and economic growth not only for these regions but also for the country. Efficient connectivity between manufacturing cores along the Chennai-Bangalore-Mumbai region, on the one side, and the East Asian countries, on the other, would give considerable boost to the trade potential between India and ASEAN. In the recent years, ASEAN has become one of India's largest trading partners. Hence, an attempt is made through this paper to compare volume of trade and commodity composition (in particular manufacturing goods) of export and import between India and ASEAN countries from 1990s onwards.

### Key words:

International trade, industrial corridor, India, ASEAN, manufactures

## Scientific Selection and Grading Cultivation of China's Urban Agglomeration to Adapt to New Normal in China

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### Abstract

The urban agglomeration is a city group that highly integrated and regional Co-coordinating, which has experienced with four extension process from the city—metropolitan area—metropolitan circle—urban agglomeration—the metropolis. Urban agglomeration is the main land of One Belt And One Road(OBAOR) and where the world economy focus will transfer to, the main part of the new urbanization, and the core areas that the most dynamic and with the highest potential in the economic development pattern today and the future. But a series of "city disease" should be solved, such as "arbitrary range, strive for grandiose projects, spoil things by excessive enthusiasm, out of thin air, and knock together" et al. These problems embodied in: the strategic position of urban agglomeration has been exaggerated overvalued, appeared "only group theory" in the new urbanization; spatial scopes of urban agglomeration expand excessively, and violate the basic purpose of urban agglomerations for state construction; Urban agglomeration scopes depend too much on subjective will, and break away from the basic stand of urban agglomerations; the choice of cultivation of urban agglomeration make endless concessions to local interests and affects the nation's overall strategic security structure; urban agglomerations become sensitive area and the "problem" area that ecological environment problems centralized in, such as fog and haze. To solve these problems, we suggested that selecting urban agglomeration should be in accordance with the scientific standard and objective law and cultivating urban agglomeration step by step, and the understanding urban agglomeration development objective standards and laws of nature; distinguish the essential difference between urban agglomeration and city cluster, avoiding confused them in government documents and academic research; cultivate and construct China's urban agglomeration in large, medium and small gradient scientifically, and construct five big national-Level urban agglomeration, nine medium Regional-Level urban agglomeration and six small Local-Level urban agglomeration; make urban agglomeration planning adapt to the resource environmental bearing capacity; innovate public finance system and public fiscal reserves mechanism of urban agglomeration; play the main role of market mechanism in urban agglomeration development to construct market-leading urban agglomerations, and guide urban agglomeration comply with the new normal of economic development to realize healthy and stable development.

### Key words:

Urban agglomeration; Scientific Selection; Urban agglomeration disease; Grading cultivation; Countermeasures and Suggestions

## **Spatial and Temporal Span of Multi-scale——The Comparison of Spatial Evolution Simulation Based on Urban Agglomeration and Single City**

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### **Abstract**

Under the background of rapid urbanization around the world and worsening conditions of over population, resource scarcity and environmental degradation, cities, as well as urban agglomeration, experience the growing contradiction between human and land being the main carrier of urbanization. Changzhou and Beijing-Tianjin-Hebei Urban Agglomeration, respectively as the typical city in the Yangtze River Delta and one of the three most important urban agglomerations in China, they both profoundly embody the characteristics of urbanization process in China. Moreover, with the continuous strengthening of policies like collaborative development, the spatial evolution of Changzhou and Beijing-Tianjin-Hebei Urban Agglomeration will continue and further present new features. It's of great importance to dive deep into the micro mechanism of urbanization and spatial dynamic. Meanwhile, conducting spatial evolution simulation according to multiple scenarios has very strong realistic guiding significance, which places more emphasis on answering "What if" rather than pursuing the so-called precision prediction. As the basic methodology, city model regards city as a plane and focus more on the internal change within the city while the regional model emphasizes the interaction between cities and regard cities as points. Therefore, after introducing the simulation theory and method with spatial-temporal dynamic characteristics, we establish spatial evolution simulation of multiple scenarios model for Beijing-Tianjin-Hebei Urban Agglomeration and Changzhou, aiming at exploring the similarities and uniqueness of urban model and regional model. To be more specific, on the basis of Cellular Automata (CA), we integrate the neighborhood concept of CA with multiple restrictive factors such as traffic routes, socio-economic indexes and ecological patterns on the basis of clustering analysis of geographical space partition and iterative algorithm, which jointly builds up the synthesized algorithm for spatial evolution simulation model. Then, we apply the model to simulate the expansion of urban built-up area of multiple scenarios for Beijing-Tianjin-Hebei Urban Agglomeration and Changzhou, attempting to provide decision-making support for the adjustment of the current urban development direction and for the next round of town planning. Finally, we discuss the spatial and temporal span of multi-scale.

### **Key words:**

Beijing-Tianjin-Hebei Urban Agglomeration; Changzhou; Spatial Evolution Simulation; Scenario Analysis

## Spatial-Temporal Characteristics and Determinants of PM<sub>2.5</sub> In China: A City-Level Perspective Analysis

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### Abstract

Haze pollution has become a severe environmental problem in the daily lives of people in China. PM<sub>2.5</sub> makes a significant contribution to poor air quality. This paper, based on observed data from 945 newly located monitoring sites in 2014 and industrial working population data obtained from International Standard Industrial Classification (ISIC), reveals the spatio-temporal variations of PM<sub>2.5</sub> concentrations in China and the correlations among different industries. We tested the spatial autocorrelation of PM<sub>2.5</sub> concentrations in the cities of China with the spatial autocorrelation model. A correlation coefficient to examine the correlativity of PM<sub>2.5</sub> concentrations and 23 characteristic variables for 190 cities in China in 2014, from which the most important ones were chosen, and then a regression model was built to further reveal the social and economic factors affecting PM<sub>2.5</sub> concentrations. Results: (1) Hu Line and Yangtze River were the divide between high and low values of China; (2) The pm<sub>2.5</sub> concentrations shows great seasonal variation; (3) PM<sub>2.5</sub> concentrations had a distinct characteristic of spatial agglomeration; (4) PM<sub>2.5</sub> concentrations have a close relationship with Urban population size, per capita GDP, urbanization rate, building industry, health and social security, social welfare industry, and public management and social organization industry in China.

### Key words:

PM<sub>2.5</sub>; China; spatial-temporal characteristics; determinants; monitoring data

## Spatial-temporal Characteristics of Eco-efficiency of the Pearl River Delta Urban Agglomeration

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### Abstract

Eco-efficiency indicates the development level of circular economy. Based on super-efficiency DEA model, this paper measured the eco-efficiency of the Pearl River Delta Urban Agglomeration from 2005 to 2014. With malmquist index and ESDA, it analysed the spatial-temporal characteristics of eco-efficiency. The results show that: in terms of temporal changes, the eco-efficiency of the Pearl River Delta Urban Agglomeration has taken a fluctuating increase, rising by 7.3%. Shenzhen's eco-efficiency is especially high, which locates at the production frontier together with Foshan, Guangzhou and Zhongshan. In terms of spatial changes, there are clear regional differences, with the East Coast as a whole being more than the West, but having more serious polarization. Also the spatial distribution of eco-efficiency demonstrates a trend of focusing on the regional center. The traditional extensive economic growth mode restricts the improvement of regional eco-efficiency. To realize sustainable development, the transformation of economic growth mode and technological promotion are needed.

### Key words:

Pearl River Delta; Urban Agglomeration; Eco-efficiency; Spatial-temporal Characteristics



## Summary of the Correlation Study of Urbanization and Ecological Environment

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### Abstract

Urbanization is not only the inevitable trend of economic and social development, but also is the impetus to promote the further development of economy and society. But such rapid extensive mode of urbanization has caused tremendous pressure to the urban eco-environment, which has become a stress factor in our society and urban development. During the rapid urbanization, the correlation of urbanization and eco-environment is paid attention from urban geography. This article summarized the study on the correlation of urbanization and urban eco-environment conducted by researchers at home and abroad and put forward the views from four aspects.

### Key words:

Urbanization; Ecological Environment; Summary

## The Airport Economy Development of ZAEZ's Innovation on the Regional Development Pattern

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### Abstract

As the growth pole of regional economic development, the pathway that airport economy leads the development of regional economy includes: changing the regional elements endowment in the micro scale, coupling with the regional industries in the medium scale, accelerating the tax revenue increase and employment growth in the macro scale. As a representative of Chinese airport economy, Zhengzhou Airport Economic Zone (short for ZAEZ) has played a significant leading and demonstrating role in the following fields: deepening the system reforms in an all-round way, promoting the "synchronization of five modernizations", building "one carrier and four systems", constructing "Four Henan", advancing the structural reform of supply-side and integrating the resources of Henan airport. The article concludes: the structural reform of supply-side needs to be accelerated to integrate into the international frontiers of airport economy. Airport economy is promising under the "One Belt, One Road" initiative. The ZAEA development has promoted the innovation of regional development pattern and showed the tendency of new "four modernizations" of the future regional development. The airport economy has developed rapidly based on the international aviation transportation system, which may change the traditional development pattern that the regional development center located in the coastal areas usually since the Industrial Revolution, and open up a new era that the regional development center will return to the inland regions.

### Key words:

Airport Economy; the Structural Reform of Supply-side; Zhengzhou Airport Economic Zone; Regional Development Pattern; Inland Era

## The Correlation and Dual Structure of City Tourism Resources, Tourists, Star Hotels and Revenues in Guangxi

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### Abstract

The correlation between resources attraction, tourists visiting, star hotels reception and tourism revenues is the basic characteristic of the coupling relationship in tourism system elements. This paper taking Guangxi Zhuang Autonomous Region as the example, discuss the correlation between four elements on the basis of total scale classification. It is found that resources attraction and the reception of tourists show a clear dual structure. Inbound tourists mainly concentrated in Guilin, which has three 5A scenic spots; while domestic tourists are attracted by all kinds of scenic spot. In addition, there is a significant difference in the scale of tourists. Star hotels mainly receive domestic tourists in the era of mass tourism. There is a linear relationship between star hotels and domestic tourists, while inbound tourists and star hotels form three groups. Tourists and tourism revenues are positively correlated, in which domestic tourism is still expanding in linear. The dual structure of tourism industry in Guangxi leads to the inbound and domestic tourism orientation obviously among cities.

### Key words:

resources attraction; tourists; star hotels; tourism revenues; correlation

## The Evaluation of Territorial Utilization Quality in China: From the Aspect of Production-Living-Ecological Space

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### Abstract

At present, with the rapid development of the urbanization process in China, some conflicts such as the larger gap between urban and rural area, the imbalance development in different regions, the wasting resources and damaging environment severely and other problems are accompanied. From the concept of production-living-ecological function, this paper has built the production territorial utilization quality index (*PTQI*), living territorial utilization quality index (*LTQI*), ecological territorial utilization quality index (*ETQI*) with a total of 12 subtype indices and several elements of the comprehensive quality of territorial utilization (*TQI*). On the basis of the data in 2012 in provincial unit, comprehensive evaluation method is used to calculate China's territorial utilization quality and type characteristics. The results has showed that the *TQI* is relatively low and it has showed differentiated in spacial distribution. *PTQI* and *LTQI* in the east are higher than that in the middle, and that in the middle are higher than that in the west. *ETQI* is higher in in the northeast areas and the southeast coastal areas. This paper can give suggestion to the development of production space with intensive and efficient use, the living space with livable and the ecological space with green mountains and clear water.

### Key words:

territorial utilization quality; production-living-ecological space; evaluation

## The Identification and Development Pattern of Urban Agglomeration in China

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### Abstract

Accurate identification of urban agglomeration is the premise and foundation for the effective development of urban agglomeration planning, the full release of urban agglomeration to lead the potential of economic and social development in the region. At present, regardless of the levels of government and academia, temporarily have not yet formed a unified urban agglomeration identification standard, resulting in the understanding of China's urban population and development degree of divergent. In view of the previous research methods have different degrees of limitations. In this paper, the macro partition method recognition of urban agglomeration, and combined with the index method for the identification of urban agglomeration development pattern analysis, to urban agglomeration identification method and theory research to provide some reference for accurate planning of urban agglomeration development to provide valuable reference. Research shows that: Currently, China have 18 urban agglomeration, including five national urban agglomeration, six regional level of the urban agglomeration and seven regional level urban agglomeration, their developmental pattern showing a degree of development level, regional differentiation and along the main traffic economic axial belt distribution characteristics. The result of this research method has strong objectivity and high accuracy, which is consistent with the mainstream of the country. It has a certain value of popularization and use for reference.

### Key words:

Urban Agglomeration; Macro partition; Index method; Development pattern; China

## The Level of Employment Security and Its Spatial Pattern in China's Urbanization

### Process

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### Abstract

In order to promote a new-type urbanization of people oriented, the level of employment security and its spatial pattern should be carefully studied in China's urbanization process. Based on the interaction mechanism between industrialization and urbanization, this paper analyzed the relationship between urbanization and the level of employment security, and the level of employment security and its spatial pattern of provincial and prefecture level has been discussed based on two types of evaluation index system of the level of employment security, respectively. The main conclusions are as follows. (1) It's found that an obvious U shape curve relationship is existed between the urbanization process and the level of employment security, and the inflection point of the curve roughly appeared in the early stages of rapid urbanization. (2) The overall level of employment security is relatively low in provincial level, Beijing has the best performance, while Guizhou is the worst. From the spatial distribution, the coastal and border provinces show a better level of employment security than other provinces, while the southwestern provinces have the worst performance. (3) The overall level of employment security is also relatively low in prefecture level, Xiamen has the best performance, while Shuangyashan is the worst. From the spatial distribution, eastern coastal areas and some western region with lower level of urbanization have the best level of employment security, while the central and northeastern regions are the worst. Thus, A variety of measures need to be applied to enhance the level of employment security in order to promote the sustained and healthy development of new urbanization in the future.

### Key words:

urbanization; employment; security level; spatial pattern; U-shaped curve

## The Relationship between Water Use and Urbanization

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### Abstract

Predictions of national water use is important for water management and planning as well as for making national water resources related development strategies. A few literature studies have addressed water use as a function of economic factors (e.g., GDP). Results were inconsistent, depending on used data and methodology. This study examines the relationship between national water use and urbanization levels. Annual water use data from FAO (<http://www.fao.org/>) and urbanization level data (urban population percentage) from the World Bank (<http://data.worldbank.org/>) are used. Data from 31 countries with over 5 data points (two neighbouring data points are usually with a temporal gap of 5 years) are available. The linear and quadratic regression relations are applied to cross-sectional data and panel data of water uses and urbanization levels. The relationships are not significant so that it is difficult to draw any conclusion from cross sectional and panel data analysis using the regression method. The Mann-Kendall trend analysis method is applied to data series of each country to study the evolution pattern. Data series of one country may present increasing, decreasing or first increasing then decreasing trend, probably representing one part of the Environmental Kuznets curve, i.e., an inverted U curve. But the water use of some countries presents randomness. Different water use curves are characterized for different countries due to different water resources endowments and varied urban and technique development stages. This also explains why regression analysis has difficulty to provide valuable information in water use when pooling data of all countries together.

### Key words:

Water use; urbanization; regression; Mann-Kendall trend analysis; cross-sectional data; panel data;

Environmental Kuznets curve

## Understanding the Dynamics of Shanghai's Urban Public Safety

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### Abstract

Due to rapid urbanization during the past decades in China, cities in China are facing increasing challenges from a variety of aspects. Among them, urban public safety concerns including urban crime, urban livability and urban disasters that would potentially impact upon urban development and prosperity start to attract governmental, academic as well as public attention. Applying a system dynamics modeling scheme, this research investigates and attempts to predict the urban public safety dynamics of Shanghai, the largest and most developed city in China, with a set of collected indicators that describes aspects of Shanghai's infrastructure and development, population, crime, livability and disaster during the past decade (2001 – 2009). The feedback loops are constructed based on intensive, exploratory data mining through regular statistical analyses and grey system modeling techniques. The analytical results suggest Shanghai's public safety is increasing during the past decade due to high level of urban socioeconomic development, which provides a foundation (or asset and investment) for urban public safety. In the meantime, factors that 'expend' such asset and investment (crimes and relevant events and disasters) increased at a relatively lower level. Dynamic prediction on Shanghai's public safety, however, indicates that the city could still enjoy its continuous improvement of public safety providing the city continues to develop like in the past decade, which might not be the case in the long run. A few scenarios are presented by altering a few critical variables to demonstrate potential public safety dynamics of Shanghai in the next 15 years.

### Key words:

Urban public safety; System dynamics; Grey system simulation; Prediction; Shanghai

## Urbanization and Eco-Environment in Yangtze River Delta: Improved EKC and Coupling Analysis

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### Abstract

The Yangtze River Delta (YRD), one of China's most urbanized areas, plays a significant role in China's economic development. However, its rapid urbanization has resulted in many eco-environment issues. Thus, a better understanding of the relationship between urbanization and eco-environment (U&E) would contribute to the coordinate development between them. This study established a comprehensive index system of U&E and further empirically investigates the relationship between U&E in YRD. The improved environmental Kuznets curve (EKC) model and dynamic coordination coupling degree (CCD) model were used in this study and the period 1980-2013 was considered. The main conclusions were as follows: (1) Economic urbanization and eco-environment endowment accounted for the highest weight of urbanization system and eco-environmental system respectively, thus being the key factors for U&E system. (2) Further analysis found the existence of differentiated inverted-U curves between U&E across cities, thus the improved EKC hypothesis is confirmed. From the viewpoint of the empirical curves, we found that when the inflection point appears, economically developed area has a higher urbanization level while less developed area has a higher eco-environment pressure. Before the inflection point, a striking positive correlation was observed between the eco-environment pressure and urbanization level, while a negative correlation after the inflection point. (3) There was a dynamic coordination coupling relationship between U&E, which conforms to the "S" curve. The coordination coupling process has stepped into the break-in development stage from low-grade symbiosis stage gradually, but the pattern of coordination always belonging to eco-environment lagged. What's more, the dynamic CCD showed a difference in spatial distribution, and presented the pattern of "higher in the around, lower in middle" during the study period. The improved EKC and coupling analysis may help Chinese decision makers to formulate sustainable measures to balance urbanization development and eco-environment protection.

### Key words:

Urbanization; Eco-environment

## Xinjiang Urban System Level and Development Countermeasures

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### Abstract

In this paper, using the theory of "city center", combined with the actual situation of Xinjiang, screening of 14 indicators, rule of these indicators can be divided into four layers: the city size, urban economy, urban quality of life and urban ecological environment, using the index analysis of the size of the cities contribute value to other cities in Xinjiang, through the city center of theoretical calculation, the results show that: only in Urumqi, Xinjiang Uygur autonomous region in the central city's first regional central city of Karamay and Korla, and regional secondary center cities and regional central cities, the more the view from the space distribution, regional central cities around Urumqi urban agglomeration, and regional secondary center cities and regional central cities are mostly around the edge of Xinjiang; Then it is pointed out that urban system development in Xinjiang and accordingly puts forward the future for a period of time the mode of city development in Xinjiang.

### Key words:

Xinjiang; city system; level; development countermeasures

## Changing and Differentiated Urban Landscape in China: Spatio-Temporal Patterns and Driving Forces

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### Abstract

Urban landscape spatio-temporal change patterns and their driving mechanisms in China are poorly understood at the national level. Here we used remote sensing data, landscape metrics and a spatial econometric model to characterize the spatiotemporal patterns of urban landscape change and investigate its driving forces in China between 1990 and 2005. The results showed that the urban landscape pattern has experienced drastic changes over the past fifteen years. Total urban area has expanded approximately 1.61 times, with a 2.98% annual urban-growth rate. Compared to previous single-city studies, although urban areas are expanding rapidly, the overall fragmentation of the urban landscape is decreasing and is more irregular and complex at the national level. We also found a stair-stepping, urban-landscape changing pattern among eastern, central and western counties. In addition, administrative level, urban size and hierarchy have effects on the urban landscape pattern. We also found that a combination of landscape metrics can be used to supplement our understanding of the pattern of urbanization. The changes in these metrics are correlated with geographical indicators, socioeconomic factors, infrastructure variable, administrative level factor, policy factor and historical factor. Our results indicate that the top priority should be strengthening the management of urban planning. A compact and congregate urban landscape may be a good choice of pattern for urban development in China.

### Key words:

Urban Landscape; self-organization map; Spatio-Temporal Patterns; Driving Forces

## Coupling Relationships and Constraining Effects between Urban Agglomeration Development Quality and Water Resources Utilization

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### Abstract

During China's rapid urbanization, traditional urbanization development pattern with high resources consumption, high pollution emissions and low economic efficiency has been greatly criticized. China's urbanization has been turning to new-type urbanization which focuses on urbanization development quality. Urban agglomeration is an important organization form of urbanization. It is also the main spatial pattern for China to promote new-type urbanization. On the other hand, as an important kind of natural resources and one of the key eco-environmental elements, water plays an important role on the sustainable development of China's urbanization, particularly for urban agglomerations in arid area of Northwest China. The imbalance between water supply and demand has greatly constrained the promotion of urban agglomeration development quality. Therefore, Lanzhou-Xining Urban Agglomeration was taken as a case, and the following issues were discussed: (1) a comprehensive evaluation index system was constructed for the economic development quality, social development quality, resources and environment development quality, and then the development quality of Lanzhou-Xining Urban Agglomeration was evaluated. Its evolution law was analyzed. (2) Based on a coupling and coordinating degree model and a grey correlation degree model, key elements of the development quality of Lanzhou-Xining Urban Agglomeration were identified. (3) Based on a cubic function model and the Granger Causality Test, the coupling relationship between the development quality and water resources utilization of Lanzhou-Xining Urban Agglomeration was analyzed. (4) Water resources constraint intensity on the development quality of Lanzhou-Xining Urban Agglomeration was measured. (5) The modes and countermeasures were put forward to improve the development quality of Lanzhou-Xining Urban Agglomeration under the restriction of water resources.

### Key words:

urbanization development quality; water resources constraint; evaluation index system; Granger Causality Test; Lanzhou-Xining Urban Agglomeration

## Decoupling Analysis between Population Growth and Constructed Land Expansion in Fast-emerging City

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### Abstract

Understanding and grasping the population growth and coordination of the construction land expansion and regional differences is of great significance to making overall district development and accomplishing fast and efficient urban development. Take Shijiazhuang as example, it was analyzed based on the characteristics of population growth and the construction land expansion from 2003 to 2011 by the decoupling theory. The results indicated that: ① the relationship of population and construction land in Shijiazhuang reflects the phenomenon of expanded junction, land use types tends to be extensive trend; ② the relationship of population and construction land in Shijiazhuang and in Luancheng reflect the phenomenon of expansion negative decoupling, population growth and the construction land expansion are more reasonable; most of the counties and cities are not unreasonable. The quantitative research of population growth and the construction land expansion are of great significance to improving the efficiency of construction land and controlling the total construction land, have certain theoretical and practical significance for sustainable development and strategy formulation.

### Key words:

Fast-emerging City; population growth; the construction land expansion; decoupling state; Shijiazhuang

## Evolution Characteristics and Driving Factors of Urban functional land in Zhangye City

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### Abstract

The transition of urban functional land is the spatial reflection of urban functional agglomeration and diffusion, which can profoundly reveals the internal characteristics of horizontal expansion of urban space. This paper takes Zhangye City's planning scope as a study case and based on remote sensing image and social and economic data. The GIS's spatial analysis methods is adapted to analysis spatial evolution characteristics and driving forces of three functional land: residential land, industrial and storage land and public facilities land in Zhangye City since 1981, and aiming at providing guidance for reasonable division of urban internal function space. The study shows that: (1) the urban residential land and public facilities land have been gradually increasing, have been farming a trend which spreads from cohesion to scattered outside. They spread around the old city. But industry and storage land has been increased first and decreased after, forming a mixed to concentrative trend. On the whole, it concentrated in northeastern industrial park. (2)Zhangye City's urban functions evolution is the result under the direct force of population and economic growth, traction of the traffic organization, together with guidance of policy and planning. (3) In order to meet the supply-side structural reformation in city space development under the new normal background, Zhangye City needs to form a spatial structure type: one cores with four zones to enhance the comprehensive function of urban system.

### Key words:

Urban Expansion; Urban Functional Land; Temporal and spatial Characteristics; Driving Force; Spatial Structure; Oasis Cities; Zhangye

## Feature Identification of Wuhan Urban Agglomeration Spatial Pattern Evolution and Construction of Optimization Model

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### Abstract

Based on the night light data, urban area, population scale and GDP of Wuhan urban agglomeration from 2009 to 2013, use city order - scale law, spatial self-correlation analysis and weighted standard deviation ellipse to conduct systematic analysis on the evolutionary features and development features of spatial pattern, form pattern and organization pattern in Wuhan urban agglomeration. The research results prove that: The system level of Wuhan urban agglomeration is obvious, forming the pattern of "agglomerating in one center and competitive balance in multiple points" and presenting the development tendency of "stronger in the west and weaker in the east". Ezhou, Huangshi and Wuhan gradually aggregate to urban core group. At the same time, the contract between the low-level cities and urbans is gradually strengthened, forming several secondary regional space, while the agglomeration tendency is not obvious enough. Between 2009 and 2013, Wuhan urban agglomeration expanded gradually from northwest to southeast and presented the dynamic evolution features of "along the river, the road and the side". In the future, the spatial development center of Wuhan urban agglomeration will become the main urban area of Wuhan and the spreading circle expansion will be kept within layering period. According to the recognition of spatial pattern features, problems and tendency in Wuhan urban agglomeration and based on central geological theory and multi-center network theory, construct a "network and circle" spatial pattern optimization model, present "network + circle" model system (including the interaction mechanism of spatial elements and each element) and present the evolutionary organization model according to the different development stages of urban agglomeration.

### Key words:

Wuhan urban agglomeration; night light data; spatial pattern

## Research on County Development Potential in the Jing-Jin-Ji Region Based on Modified Potential Model

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### Abstract

The evaluation of regional development potential can play an important role in understanding future regional development patterns and promoting coordinated development, but accepted evaluation methods have both advantages and constraints. In this paper, we explore the evolution of spatio-temporal patterns of county regional development potential and analyze the restricting factors by combining a proposed potential model with a synthetic quantified assessment method to address some shortcomings in existing methods. The Jing-Jin-Ji region, which is representative of unbalanced regional development in China, is the selected study area. Key findings include: 1) the modified proposed potential model is more effective at measuring regional development potential than previous methods; 2) a growing Matthew effect in county development in the Jing-Jin-Ji region is indicated by a steady increase in global Moran's I and in the variation coefficient during the period from 2000 to 2013; 3) features of the local spatial agglomeration of most counties remain relatively stable and display some clear rules, that is, most of the counties with higher potential are concentrated in the Jing-Jin-Tang region and tend to extend to eastern neighbouring areas, while counties with lower potential are widespread in Hebei Province; 4) three types of restraint are present in areas that are mainly concentrated where there is low potential, and there is significant overlap between them. Finally, suggestions for exploiting and promoting the development potential of low potential areas are proposed on the basis of the results.

### Key words:

county development potential; modified potential model; pattern evolution; constraint factor

## Spatial Differences and Driving Forces of Land Urbanization in China

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### Abstract

This paper establishes the conceptual framework and calculation method for the quantity and rate of land urbanization process. The study evaluates the spatial differentiation pattern of absolute and relative process of land urbanization in 658 cities in China from 2000 to 2010. The spatial distribution of cities with rapid land urbanization process is discussed and the contribution rate and its spatial heterogeneity of major land use types are explored through application of GIS. Based on this, the major drivers and their variation among cities of different sizes have been analyzed. The main conclusions are as follows: (1) Land urbanization in China shows a clear spatial difference. The greater the city scale, the faster its land urbanization; (2) Over the last 10 years, the average quantity of land urbanization in the 656 cities was 3.82 km<sup>2</sup>, the quantity of land urbanization is differentiated by administrative grade. The rate of land urbanization reveals a pattern of differentiation between coastal and other cities; (3) In the past 10 years, the two primary land use types associated with land urbanization in China are residential and industrial, with a combined contribution rate of 52.49%. The greater the scale of the city, the more significant the driving effect of industrial land. (4) Overall, urban population agglomeration, industrial growth and investment are the three drivers of land urbanization in China, but different scales cities have the different drivers.

### Key words:

land urbanization; urban construction land; urban area; the driving force for land urbanization; China

## Strategies for Coordinated Development of Jingjinji Region Based on Limited Water Resources —A Case Study of Baiyangdian Area

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### Abstract

With urbanization in Beijing, Tianjin and Hebei region, water scarcity has been one of the main factors restraining the development. Building green, livable and civilized capital ecological space increasingly becomes an important goal to achieve. This article analyzes current situation of water resource together with its relationship with urban construction, and then sums up the patterns and the main problems. What's more, taking Baiyangdian area for an example, we make advices as well as verification by GIS simulation and also spatial strategic planning under the concept of the harmony between ecology and regional development. We learn from and expand the concept of "Yuan" culture in ancient China, making Baiyangdian area a national livable place.

### Key words:

Jingjinji Region; Water Distribution; Interaction mechanism; GIS simulation; spatial strategic planning

## System Simulation of the Rational Scale of Jing-Jin-Ji Urban Agglomeration Constrained by Water Resources

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### Abstract

Urban agglomeration is an important spatial organization form of socio-economic development in China. It is also the major form of China's new-type urbanization. As one of the world-class urban agglomerations in China, Jing-Jin-Ji Urban Agglomeration is an important spatial carrier of the coordinated development strategy among Beijing, Tianjin and Hebei Region. Along with the promotion of its national and international strategic position, the urban scale (i.e. population, gross domestic product and constructive land) is becoming larger and larger. However, Jing-Jin-Ji Urban Agglomeration is located in North China, where water resources are greatly scarce. Water resources have become the key stress to the development of Jing-Jin-Ji Urban Agglomeration. Therefore, we carried out the following research: (1) we analyzed the coupling relationship among water resources utilization, population growth, socio-economic development and eco- environmental evolution in Jing-Jin-Ji Urban Agglomeration, and revealed the interaction mechanism between socio-economic system and water resources system; (2) Taking system dynamics model as the main model, and water resources supply threshold model, population growth threshold model, economic development threshold model, urban land expansion threshold model as the auxiliary models, we constructed a system simulation model on the rational scale of Jing-Jin-Ji Urban Agglomeration constrained by water resources; (3) Based on multiple scenario setting and key variables controlling, we simulated the rational population scale, economic scale, constructive land scale and urbanization level which are compatible with the water resources carrying capacity in Jing-Jin-Ji Urban Agglomeration in 2016-2030; (4) we finally put forward the coordinated development mode of Jing-Jin-Ji Urban Agglomeration constrained by water resources, aiming to provide a scientific policy-making foundation for the sustainable development of Jing-Jin-Ji Urban Agglomeration.

### Key words:

urbanization; threshold of urban scale; system simulation; water resources carrying capacity; Jing-Jin-Ji Urban Agglomeration

## The Analysis of Spatial Distribution of PM<sub>2.5</sub> in Pearl River Delta Urban

### Agglomeration

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#### Abstract

In recent years, severe weather headed by the haze swept China, which attaches great importance to bring pollution under control and protect the environment. As the main contents of the haze, the research of the characteristics and spatial distribution of PM<sub>2.5</sub> has important significance to the management of the haze. This paper use ArcGIS, study the spatial distribution of the annual mean and the four quarter of PM<sub>2.5</sub> in the Pearl River Delta Urban Agglomeration in 2014, calculate the contribution degree of four pollutant source and the purification capacity of PM<sub>2.5</sub> in different city, and analysis the cause of the spatial distribution of PM<sub>2.5</sub> in the Pearl River Delta Urban Agglomeration. The results show that the spatial distribution of PM<sub>2.5</sub> in the Pearl River Delta Urban Agglomeration shows obvious ladder distribution pattern of high in the northwest and low in southeast, the industrial structure is the biggest factors affecting the city's total PM<sub>2.5</sub> emissions. Affected by the wind and other natural conditions, high concentration centers of the spatial distribution moved from Zhaoqing to Guangzhou, then to the Jiangmen. Shenzhen has the strongest purification capacity of PM<sub>2.5</sub>, and the purification ability of PM<sub>2.5</sub> in Zhaoqing city is seriously insufficient. Therefore, in addition to strengthen the purification capacity of PM<sub>2.5</sub> by taking reasonable measures, it's very helpful to strengthen the whole Pearl River Delta region PM<sub>2.5</sub> emission control.

#### Key words:

PM<sub>2.5</sub>; Spatial Distribution; Industrial Structure; Purification Capacity

## The Changing Landscape and Characterization of Air Pollution Index in Urban Areas of the Yangtze River Delta

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### Abstract

The hallmark of development in the Yangtze River Delta has been sprawling urbanization. However, air pollution is a significant problem in these urban areas. In this paper, we investigated the urban spatial structure and analyzed the air pollution index (API) in four cities (Shanghai, Nanjing, Hangzhou, and Ningbo) in East China at latest ten years. We try to empirically examine the relationship between sprawling urban patterns and air quality in urban areas of the Yangtze River Delta. According to the monitoring data, the API in the four cities was down slightly. Clear interannual, seasonal, and monthly variations of API were analyzed, which indicated air quality was poorest in winter but improved in summer and air quality level varied in different weather conditions. Quantitative correlation analysis showed that there is a high coefficient among the largest green vegetation landscape patch area index, green patch of vegetation landscape fragmentation, urban landscape patch fragmentation and API. Some other indexes like landscape diversity, fractal dimension and fragmentation index have a weak correlation with API. The study also showed that landscape diversity is sensitive to the change of pollution concentration when the concentration of pollutants in the air reaches a certain value.

### Key words:

landscape patterns; air pollution index (API); urbanization; Yangtze River Delta

## The Differentiation of Agglomeration Degree and Pattern of Spatial Polarization in the Ha-da Giant Urban Belt

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### Abstract

On the basis of defining the concept of the space polarization, apply the evenness index, the Gini coefficient, Cui Wang index to analysis the urban agglomeration degree of differentiation characteristics and spatial pattern of polarization, the conclusions are as follows: (1) From 1990 to 2012, time and space differentiation of the element agglomeration degree in the big giant urban belt is obvious, and the "Core - periphery" structure lead by the central city is gradually appearing, At the same time, its internal can be divided into two secondary area based on element agglomeration degree differences: Ha-Chang area and the central and southern of Liaoning area ;(2) There are significant spatial polarization for element agglomeration in the giant urban belt. The "four cities" dominated the space polarization of the city belt, and the degree of space polarization in the central and southern of Liaoning area is stronger than the Ha-Chang area;(3) The internal force is the main factor for the space polarization of the city belt, while urban development investment intensity ,the inner attractive of the city and the level of economic development also have significant influence on the urban space polarization. Besides, the influence factors of the two sub-regions are different: The influence factors of Ha-Chang area is the urban investment intensity and the level of economic development. While the endogenous force is the main factor that influence the space polarization of the central and southern of Liaoning area. Beside, the location conditions also have obvious influence on the urban internal spatial polarization differentiation.

### Key words:

The Ha-da giant urban belt; The space polarization; Concentration degree; Polarization index; Geographical detector

## The Driving Effect Decomposition and Space-Time Difference of Carbon Emissions in Xuzhou Metropolitan Area

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### Abstract

Adopting complete decomposition analysis method, taking the Xuzhou metropolitan area as the research unit, the spatial and temporal characteristics of carbon emissions and its driving effect are analyzed in growing metropolitan circle from 2000 to 2014. Based on the analysis, it can be found that it has positive correlation between carbon emissions and industrial growth, and industrial carbon intensity tends to decrease, presenting a cleft pattern that high in north-south and low in the middle; Resource and labor intensive industries are the highest industry in the carbon intensity, presenting a downward trend, but tech-intensive industry is the lowest industry in the carbon intensity; Scale effect for industrial carbon emissions showed the positive driving effect, but structure effect and technological effect for industrial carbon emissions presented an inhibitory effect; Scale effect presented a pattern from unidirectional incline with Jining as the core to middle high and east-west low. The spatial distribution of structure effect presented a pattern decreasing from south to north instead of declining from Xuzhou to peripheral in the past, at the same time, the effect of technology presented evolved from the pattern with middle high and low on both sides into high in east and low in west. Research suggests that cities should reduce carbon emissions by optimizing industry structure and improving energy utilization.

### Key words:

industrial carbon emissions; complete decomposition analysis method; the driving effect; space-time difference; Xuzhou metropolitan area

## The Relationship between Water Use and Urbanization

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### Abstract

Predictions of national water use is important for water management and planning as well as for making national water resources related development strategies. A few literature studies have addressed water use as a function of economic factors (e.g., GDP). Results were inconsistent, depending on used data and methodology. This study examines the relationship between national water use and urbanization levels. Annual water use data from FAO (<http://www.fao.org/>) and urbanization level data (urban population percentage) from the World Bank (<http://data.worldbank.org/>) are used. Data from 31 countries with over 5 data points (two neighbouring data points are usually with a temporal gap of 5 years) are available. The linear and quadratic regression relations are applied to cross-sectional data and panel data of water uses and urbanization levels. The relationships are not significant so that it is difficult to draw any conclusion from cross sectional and panel data analysis using the regression method. The Mann-Kendall trend analysis method is applied to data series of each country to study the evolution pattern. Data series of one country may present increasing, decreasing or first increasing then decreasing trend, probably representing one part of the Environmental Kuznets curve, i.e., an inverted U curve. But the water use of some countries presents randomness. Different water use curves are characterized for different countries due to different water resources endowments and varied urban and technique development stages. This also explains why regression analysis has difficulty to provide valuable information in water use when pooling data of all countries together.

### Key words:

Water use; urbanization; regression; Mann-Kendall trend analysis; cross-sectional data; panel data; Environmental Kuznets curve

## The Scope Definition and Prediction Research of Ha-chang Urban Agglomeration under the Revised of Daily-communication-area

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### Abstract

To guide the construction of Ha-chang urban agglomeration, realize the reasonable and healthy development of urban agglomeration, based on the daily-communication-area, under the help of the GIS, considering the natural and ecological condition, national and regional development policy, the barrier of administrative boundaries in this region, defined the spatial scope of Ha-chang urban agglomeration with the combination of qualitative and quantitative methods. The study found that the spatial scope of Ha-chang urban agglomeration is dynamic. It will be changed by the change of modes of transportation and the optimization of transportation system. The current and recent range mainly include nine cities: Harbin, Daqing, Suihua, Changchun, Jilin, Songyuan, Siping, Liaoyuan....The forward range on the basis of existing would expand to east and west ,and it would include Mudanjiang, Yanbian Korean autonomous prefecture and so on ,summing to 13 cities (state). Finally it would form a wide-area urban agglomeration, which covers the north-central of the northeast region.

### Key words:

daily-communication-area; transportation network; scope; Ha-chang urban agglomeration

## Theoretical Analysis on Interactive Coupled Effects between Urbanization and Eco-Environment in Mega-Urban Agglomerations

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### Abstract

Mega-urban agglomerations in China play a vital role in both national economic development strategies and national new-type urbanization, and undertake important historical responsibility with the world economic center transfer to China. However, they suffer a series of increasingly serious eco-environmental problems in the process of development. Thus, studies on the interactive coupled effects between urbanization and eco-environment in mega-urban agglomerations are the frontier areas and high priority tasks in the earth system science for the future ten years. This paper analyses the basic theory frame of the interactive coupled effects between urbanization and eco-environment in mega-urban agglomerations systematically. On theoretical aspect, based the nonlinear relationship and coupling characteristics of the natural and human elements in mega-urban agglomerations system, we could estimate the interactive coercing intensity, nearcoupling and telecoupling mechanism of the inside and outside mega-urban agglomerations system after scientific identifying the key elements, then form the basic interactive coupling theory. Moreover, we could build a spatiotemporal coupling dynamic model, which integrated with multi-elements, multi-scales, multi-scenarios, multi-modules and multi-agents. The model will be used to develop the intelligent decision support system for urban agglomeration sustainable development. On methodology aspect, the mega-urban agglomeration is regarded as an open complex giant system. We should establish the standardized shared database for exploring the interactive coupled effects between urbanization and eco-environment, then using new technology for analyzing big data and the integration methods incorporating of multi-elements, multi-scales, multi-targets, multi-agents, multi-scenarios and multi-modules, we can build a methodology framework to analyze the complex interaction coupling between urbanization and eco-environment. The technical route is that analyze spatiotemporal evolution characteristics, identify the key elements, interpret coupling relationship, reveal the mechanism of coercing effect, find the general rules, filtrate the control variables, solve the critical thresholds, conduct regulation experiments, simulate different scenarios, propose an optimized schemes, and achieve national goals. Further, we could put forward the overall optimization scheme. In general, this research could provide theoretical guidance and method support for the transformation and sustainable development in mega-urban agglomerations.

### Key words:

mega-urban agglomerations; urbanization; eco-environment; interactive coupled effects; theoretical framework; methodology

# PLENARY LECTURE

IGU COMMISSIONS

FORUMS, SYMPOSIUMS & SPECIAL SESSIONS

JOINT COMMISSIONS

KEY TOPICS

PLENARY LECTURES



## Schedule of Plenary Lectures



Home

*August 22<sup>nd</sup> Plenary Hall A+B, 4th Floor*

Mark Stafford Smith (Australia)

[Geographical Sciences and Future Earth: Research for Solutions, from Local to Global Scales](#)

Bojie Fu (China)

[Understanding China's Geography: Linking Science and Society](#)

Woo-ik Yu (South Korea)

[Back to the Future: Reasoning the Territorial Way of Life](#)

*August 23<sup>rd</sup> Plenary Hall B, 4th Floor*

Denise Pumain (France)

[Urban Dynamics and Geo-diversity: From Theory to Modeling](#)

Mark W. Rosenberg (Canada)

[A 21<sup>st</sup> Century Agenda to Shape "Our Harmonious Worlds" Through Research on the Geographies of Health and Care](#)

*August 24<sup>th</sup> Plenary Hall B, 4th Floor*

Dahe Qin (China)

[Climate Change and Its Impact](#)

Michael Meadows (South Africa)

[Geography and Future Earth: Perspectives from Africa](#)

*August 25<sup>th</sup> Plenary Hall B, 4th Floor*

Benno Werlen (Germany)

[Global Understanding for Global Sustainability](#)

Virginie Mamadouh (Netherlands) & Takashi Yamazaki (Japan)

[From Inter-state to Multiscalar Political Geographies](#)



**Professor Mark Stafford Smith** is based in Canberra, Australia, and looks after coordinating Adaptation Research across CSIRO; he oversees a highly interdisciplinary program of research on many aspects of adapting to climate change, as well as regularly interacting with national and international policy issues. He has over 30 years experience in drylands systems ecology, management and policy, including senior roles such as CEO of the Desert Knowledge Cooperative Research Centre in Alice Springs. His significant international roles include being past vice-chair of the International Geosphere–Biosphere Programme’s Scientific Committee. In 2012 he was co-chair of the Planet Under Pressure: New Knowledge Towards Solutions conference on global environmental change in the lead up to Rio+20. In 2013 he was appointed Chair of the inaugural Science Committee for Future Earth,

which aims to help coordinate research towards global sustainability worldwide.



**Professor Bojie Fu** is a professor of physical geography and landscape ecology at the State key Lab. of Urban and Regional Ecology, Research Centre for Eco–Environmental Sciences, Chinese Academy of Sciences. He is President of the Geographical Society of China, Director–General of Department of Earth Sciences, National Natural Science Foundation of China. He is member of Chinese Academy of Sciences, Fellow of the Academy of Sciences for Developing World (TWAS) and Corresponding Fellow of the Royal Society Edinburgh UK. His research areas are land use and land cover change, landscape pattern and ecological processes, ecosystem services and management. He service as the Vice President of International Association for Ecology (INTECOL) and Vice Chairman of International Long–term Ecological Research Network (ILTER). He has published more than

400 scientific papers and 10 books, including *Science and Nature Geoscience*. His prizes include China National Natural Science Prize and Award of Distinguished Service from the International Association of Landscape Ecology.



**Professor Woo–ik Yu** was born in 1950 at Sangju, Korea. He studied geography at the SNU (Seoul National University) and got his B.A. and M.A. degree. After completing military service as an instructor at the Korea Military Academy, he then studied further geography, sociology, and history at the University of Kiel (Germany) and received his Ph.D. degree in philosophy (1980).

Woo–ik Yu taught social geography and regional policy at the Seoul National University for 30 years (1980–2009). As dean of academic affairs, he led university reform to level up the SNU to a world class research university. He was also a visiting professor at Berkeley, Paris–Sorbonne and Nankai University. After organizing the 29th International Geographical Congress in 2000 Seoul, he was elected to the Vice President and Secretary General of the IGU (International

Geographical Union), where he served for two terms (2004–2010)

During President Lee Myung–Bak’s government (2008–2013), Woo–ik Yu left the SNU to serve as the first Chief of Staff to the President, Korean Ambassador to the People’s Republic of China, and the Minister of Unification. While serving as Minister, he created the ‘Unification Jar’, a monetary campaign in preparation for the unification of Korea.

Now he has returned to Seoul National University as a Professor Emeritus and as a Distinguished Professor at the Korea Military Academy. He also serves as the chair of directors of ‘The Uninitiative’, a non–governmental organization for Korean initiative for unification, the Chairman for ‘the President Lee Myung–Bak Foundation’, and the economic advisor for Guizhou–sheng (China).

As an academic, Woo–ik Yu wrote many academic papers and books on geography and unification policies including “The Land Policy for the Unified Korea” and “Meaning of Places” (Vol. 1, 2).



**Professor Denise Pumain** trained in geography at Ecole Normale Supérieure, she was lecturer at University Paris I from 1970, researcher at the National Institute of Demography (1981–86), Professor at University Paris 13 (1986–89) then at University Paris I Pantheon–Sorbonne, member of the Institut Universitaire de France. Former Chair of the Commission on Urban Development and Urban Life of the IGU (1992–2000), founder of the research laboratory P.A.R.I.S. (1984), Director of the UMR Géographie–cités (CNRS 1992–2000), the European Research Group S4 (Spatial Simulation for Social Sciences, 2006–2013), Cybergeog, European Journal of Geography (founded 1996), Principal Investigator of the ERC advanced grant GeoDiverCity, <http://geodivercity.parisgeo.cnrs.fr/blog/> (2011–2016).

Her main scientific contribution is about building an evolutionary theory of urban systems and transferring concepts and models from self–organising complex systems towards social sciences. She was chief executive of education and research for the Académie de Grenoble (2000–2001) and first scientific coordinator for social sciences at the French Agency for research assessment (2007–2008). Doctor honoris causa at University of Lausanne and Liege, silver medal of the CNRS and Vautrin Lud International prize in Geography in 2010. Corresponding member of the Austrian Academy of Sciences since 2009 and corresponding fellow of the British Academy since 2012. Officer in French Order “Legion d’honneur” and “Ordre du mérite”.



**Professor Mark W. Rosenberg** is a Professor of Geography and cross–appointed as a Professor in the Department of Public Health Sciences at Queen’s University in Kingston, Ontario, Canada. He is also the Canada Research Chair in Development Studies. Professor Rosenberg received his undergraduate training at the University of Toronto and his graduate training at the London School of Economics and Political Science (LSE). Among the many honors, he has received, most recently, Professor Rosenberg received a Queen Elizabeth Diamond Jubilee Medal for his research on Canada’s aging population, contributions to gerontology and service to older Aboriginal and non–Aboriginal populations in 2012. He is an Honorary Professor in the Chinese Academy of Sciences – Institute of Geographic Sciences and Natural Resources Research. His research covers a wide range of

topics including health and the environment, access to health care and social services, and studies of vulnerable populations, especially older populations and Aboriginal Peoples. Publications from his research can be found in the leading journals of geography, gerontology, social science and medicine. Funding for his research mainly comes from the Canadian Institutes of Health Research and the Social Sciences and Humanities Research Council of Canada.



**Professor Dahe Qin**, a distinguished geographer, and an academican of both the Chinese Academy of Sciences (CAS) and the Third World Academy of Sciences (TWAS). He also serves as a member of the Standing Committee of the CPPCC, Deputy Director of Population, Resources and Environment Committee of CPPCC, and vice chairman of China Association for Science and Technology. He served as Administrator of the China Meteorological Administration. Academican Qin was involved in the leadership of the preparation of the Third, Fourth and Fifth Assessment Reports of IPCC, and also the assessment of Chinese climate environment, making significant contributions to deepening the understanding of climate change science. He actively promotes the cryospheric science concept to build a theoretical framework of cryospheric science. He is the founder of the State Key Laboratory on Cryospheric Science. He led the preparation of the “Strategic Research on Development of Chinese meteorological Service”, a monumental

document that proposed a new concept of “public–, security–, and resources–oriented meteorology”, and took the lead in sharing scientific data. He has published more than 400 scientific papers/works. Among the numerous awards and accolades are the 2007 Nobel Peace Prize to recognize his involvement in the leadership of IPCC; the 53rd International Meteorological Organization Prize; the 2013 Volvo Environment Prize and the Second Prize of (China) National Natural Science Award.



**Professor Mike Meadows** was born in Liverpool, United Kingdom but has lived in South Africa for more than 30 years and has been Head of the Department of Environmental and Geographical Science at the University of Cape Town since 2001. He holds an undergraduate degree from the University of Sussex and a PhD from the University of Cambridge. Meadows has authored or co-authored more than 150 peer-reviewed research articles and edited several special editions of international journals. Major works include the recent co-edited *Southern African Geomorphology* (Sun, 2012) and *Geomorphology and Society* (Springer, 2016). His research interests are in the area of physical geography, more specifically concerning Quaternary environmental change and the geomorphological and biogeographical impacts of natural and human-induced climate change. In his reconstructions of past southern African environments, Meadows has engaged with a range of proxies, including pollen, diatoms, biomarkers, stable isotope geochemistry and sedimentology, using evidence from lakes, wetlands and, more unusually, accumulations of faecal and urine material deposited by *Hyrax capensis*, a small colonial mammal that lives in the arid mountains of southern Africa. This proxy in particular has facilitated the detailed reconstruction of late Quaternary environmental and climate change in localities about which very little was previously known. Professor Meadows has been Secretary-General and Treasurer of the International Geographical Union since 2010 and is a Fellow of the Royal Geographical Society, of the Royal Society of South Africa and of the Society of South African Geographers.



**Professor Benno Werlen** studied geography, sociology, cultural anthropology and economy at the Université de Fribourg (Switzerland). He holds a PhD of the Faculty of Philosophy (University of Fribourg) and a Habilitation of the Faculty of Natural Sciences (University of Zurich). He has held the Chair for Social Geography at the Friedrich-Schiller-University, Jena since 1997. He has taught at the universities of Fribourg, Kiel (Germany), Zurich, ETH Zurich, Cambridge (GB), Salzburg, Geneva and Nijmegen. Werlen is the Executive Director of the IGU-Initiative for an International Year on Global Understanding; Chair of the International Geographical Union (IGU)-Commission 'Cultural Approach in Geography'; a Panel Member of the 'European Research Council' (ERC/Brussels) for Society and Environment and 'Agence National de Recherche' (ANR/Paris) for

the Social Sciences and the Humanities. Werlen is counted as one of the 'Key Thinkers of Space and Place' (Sage Publisher) and is one of the most cited social geographers. He has published 14 books and more than 200 papers in scientific journals and books, has given over 200 keynote presentations at universities across five continents in the fields of geography, sociology, economics, political sciences, philosophy, history, cultural anthropology, linguistics, and organized more than 50 scientific conferences and conferences sessions on all continents, except Oceania.



**Professor Virginie Mamadouh** is Associate Professor of Political and Cultural Geography at the department of Geography, Planning and International Development at the University of Amsterdam (UvA), The Netherlands. She has been the secretary of the Steering Committee of the IGU Commission on Political Geography since 2014 and the co-chair since 2014. She is one of the editors of the academic journal *Geopolitics* and *The Arab World Geographer*.

Her research interests pertain to Political and cultural geography; Geopolitics and globalisation; Supranationalism and (multilevel) governance in the European Union; National political cultures; Geopolitics of multilingualism; multilingual cities; (Transnational) migration and territorial identities; Transnationalism and "new media"; Urban social movements and Electoral geography.



**Professor Takashi Yamazaki** is a professor of Geography at Osaka City University, Japan. He received his Ph.D in political geography from University of Colorado at Boulder in USA. His current research interest concerns the (de) militarization of Okinawa and critical geopolitics of Japanese foreign policy. He has been a Steering Committee member of the IGU Commission on Political Geography since 2004 and acted as a co-chair since 2014. He was also a co-chair of the Research Committee 15 on Political and Cultural Geography of the International Political Science Association from 2007 to 2012. Within Japan, he established and chaired the Political Geography Research Group of the Human Geographical Society of Japan from 2011 to 2015 and acted as a vice-chair of the Commission Committee for the IGU Kyoto Regional Conference in 2013. His publications include "Space,

Place, and Politics: Towards a Geography of Politics" (Nakanishiya, 2013 in Japanese), 'The US militarization of a 'host' civilian society: the case of post-war Okinawa, Japan' in S. Kirsch and C. Flint eds. "Reconstructing Conflict: Integrating War and Post-War Geographies" (Ashgate, 2011), and 'The re-institutionalization of island identities: the "textbook fight" in the Yaeyama Islands, Japan' in D. Kaplan and G. Herb eds. "Scaling Identities" (Rowman & Littlefield, forthcoming).



## A 21st Century Agenda to Shape “Our Harmonious Worlds” through Research on the Geographies of Health and Care

Mark W. Rosenberg (Canada)

### Abstract

“Shaping our harmonious worlds” is predicated on human and physical geographers working together alongside our colleagues in other parts of the humanities, and the social, natural and health sciences to improve health and care in a socially just way. To achieve the goal of improving health and care in a socially just way requires a 21<sup>st</sup> century research agenda for geographers that begins with how we understand social justice. We also need to understand demographic, environmental and urban change as processes that will frame health and care issues throughout the 21<sup>st</sup> century in very different ways than in the past. With particular attention to geographic scale, and out of our understanding of social justice, and demographic, environmental and urban change, some key health and care issues and challenges will be identified that might contribute to a 21<sup>st</sup> century agenda to shape our harmonious worlds through research on the geographies of health and care.

## Back to the Future: Reasoning the Territorial Way of Life

Yu, Woo-ik (South Korea)  
Seoul National University

### Abstract

This is a story of a geographer about his life, thoughts, and work. In his plenary address, Yu Woo-ik will tell the participants about his unique experiences in and outsidings of geography. The emphasis will be laid on the usefulness of geographical ways of thinking and its potential to contribute to solving actual problems and to formulating policies for the future.

Yu Woo-ik is a Korean geographer who belongs to the generation that was born and grew up during the time of war and poverty and then worked hard to make the 'miracle', the rapid industrialization and democratization of the country. Keeping in mind his family motto, '*study and requite the nation*' (學而報國), the geography student found the reason of his study in devoting to '*the unification*' of the country, and it became the theme of his life-long pursuits. Consequently, it was natural that his academic interest covered a wide area of geography and its adjoining disciplines including regional policy. After studying geography, history and sociology in 1970s' in Germany, another divided nation at that time, Dr. Yu went back to Korea and taught geography for 30 years at the SNU (Seoul National University).

Yu Woo-ik used to be the IGU Secretary General (2006-2010). He worked as a geography professor and Dean of Academic Affairs at the SNU until he was called to serve the Korean government. From 2008 to 2013 he worked as the Chief of Staff for the President, the Korean Ambassador to China, and lastly the Minister of Unification of Korea. Presently, he is back in academia as an honorary professor and is teaching geography and international relations at the SNU and the KMA (Korea Military Academy).

Though having served in these various positions, he remained a geographer in that he tried to think geographically, that is to say to think primarily about '*the life of the people*' with consideration of the relationships between: a) man and nature; b) time and space; c) matters, phenomena and places. He also tried to think d) holistically or convergent; and e) policy-oriented as well as practically.

In this context, he would like to remind his colleague geographers of the classical academic concept, '*reasoning the territorial way of life*' (地理).

At the dawn of the 21st century, Yu Woo-ik proposed a theme related to this task to the international geographical society, and consequently to the world. The theme he proposed was "*Living with Diversity*", a key concept for the way of life in the coming new era. It was the main theme of the 29th IGC in Seoul 2000 of



which he was the organizer. He emphasized three virtues of the concept: a) contributing to the stability; b) enhancing development potential; and c) expanding the capacity for creative activities.

Now 16 years later from then, he stands again on the platform of the IGC as a plenary speaker. He is pleased at the main theme of Beijing Congress "*Shaping Our Harmonious Worlds*", for he find the concept evolving continuously since Seoul 2000 via Glasgow, Tunis, Cologne and lastly to Beijing. In his neighborhood old Asian City, the speaker will go in depth about '*diversity in harmony*' in socio-cultural world just as it is in the biosphere.

Yu Woo-ik believes it is time for geographers with their geographical way of thinking to contribute positively to the creation of new civilization, and hopes especially the young geographers from various cultural realms to be encouraged.

## Climate Change and Its Impact

Dahe QIN (China)

### Abstract

Since October 2013, the Intergovernmental Panel on Climate Change (IPCC) had released the Fifth Assessment Report (AR5) including three Working Group Reports and Synthesis Report. New observations have further proved that the warming of the global climate system is unequivocal. Each of the last three successive decades before 2012 has been successively warmer at global mean surface temperature than any preceding decade since 1850. 1983-2012 was likely the warmest 30-year period of the last 1400 years. The ocean has warmed over the period of 1971 to 2010, the rate of global mean sea level rise has accelerated, anthropogenic global ocean carbon stocks were likely to have increased and caused acidification of the ocean surface water. Since 1971, the glaciers and the Greenland and Antarctic ice sheets have been losing mass, the extent of the Northern Hemisphere snow cover has decreased. Human influence has been detected in the warming of the atmosphere and the ocean, changes in the water cycle, reductions in snow and ice, global mean sea level rise, and changes in climate extremes.

The largest contribution to the increase in the anthropogenic radiative forcing was by the increase in the atmospheric concentration of CO<sub>2</sub> since 1750. It led to more than half of global warming since the 1950s (with 95% confidence). It is predicted that the global mean surface temperature will continue to rise for the end of this century, the frequency of extreme events such as heat waves and heavy precipitation will increase, sea level will continue to rise and cryosphere will continue to warm. If the increase in temperature is higher than 2°C than before industrialization, the mean annual economic losses worldwide will reach 0.2% to 2.0% of income, and cause large-scale irreversible effects, including death, disease, food insecurity, inland flooding and water logging, and rural drinking water and irrigation difficulties that affect human security. If taking prompt actions, however, it is still possible to limit the increase in temperature within 2°C. To curb the gradually out-of-control global warming and achieve the goal of sustainable development of the human society, global efforts to reduce emissions are needed.

## From Inter-State to Multiscalar Political Geographies

Virginie Mamadouh (Netherlands) & Takashi Yamazaki (Japan)

### Abstract

Since the early 1980s political geography has become one of the most prolific subdisciplines of human geography, but it is still largely dominated by geographers working in North America and Europe. The Commission on Political Geography of the IGU was established in 1984 as the study group on the World Political Map, this name was chosen then because the notion of political geography was contested in some parts of the world. Some of the issues addressed by political geographers remain sensitive in many countries and political regimes do not always allow much room for academics to do political geography. All the same, the wide range of issues pertaining to the geographies of power relations is highly relevant everywhere and often necessary for the study of other social phenomena, be it climate change or gender relations.

The lecture will present a broad review of the state of the art stressing how political geography evolved for the past thirty years from a state centric subdiscipline, focusing on state territory, borders and international relations, into a multifaceted field of multiscalar political processes, with examples from Europe and East Asia. In addition the lecture will stress the need to foster opportunities to engage in a dialogue between political geographers from different parts of the world and with other geographers, using as example the Joint meeting Earth, Society, Islands, and the Political in the Changing World (held in June 2016 in Taipei) and the International Conference on Geography of Peace (scheduled in April 2017 in La Paz).

## Geographical sciences and Future Earth: Research for Solutions, From Local to Global Scales

Mark Stafford Smith (Australia)

### Abstract

The world is facing a growing series of environmental challenges which are impacting human well-being at an accelerating rate. In the face of this, nations of the world last year signed off at least 3 major agreements that set sustainable development goals for the planet – I disaster management, climate change and the sustainable development goals; a major responsibility for research is now to deliver the understanding to enable these goals to be met, and to do so in ways that are more nimble in the face of the increasing rates of change.

Future Earth is a global platform for international research collaboration on global environmental change and sustainable development that aims to fulfil the commitment of the research community at Rio+20 to play its part in contributing to this more nimble global innovation system. It draws on the existing work of over 20 major global projects (<http://futureearth.org/projects>) which I will outline, and is now focused on eight major societal challenges (<http://futureearth.org/our-vision>), for which both fundamental and applied research across many disciplines is critical. The geographical sciences, with their overarching lens on spatial relationships and scale, have a major role to play in addressing these challenges.

Future Earth has a solutions orientation, emphasises principles of co-design, and is addressing the challenges of integrating across scales in ways that are particularly important in the Asian region, and again notably relevant to geographical agendas. The Future Earth platform has frankly taken a while to construct, but this presentation will outline how it is now active, and the ways in which the geographical research community can engage with it. The major vehicles for this engagement are our Open Network (<http://futureearth.org/future-earth-open-network>) and a growing suite of Knowledge-Action Networks (<http://futureearth.org/knowledge-action-networks>).

## Geography and Future Earth: Perspectives from Africa

Michael E Meadows (South Africa)

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### Abstract

The environmental, cultural, social and economic diversity of the African continent is significantly underestimated and generalisations concerning these aspects are at best oversimplifications. Nevertheless, there are some prominent trends emerging in regard to its population and development, not least the fact that it is an increasingly urbanised continent. Across large parts of the continent, both rural and urban populations, however, face major physical environmental challenges including climate change and sea level rise that are exacerbated by issues around governance, civil strife and have contributed to, for example, land degradation, food insecurity and migration. Geography straddles the social and natural sciences and, as such occupies a virtually unique position as a discipline to explore (and help resolve) the set of ‘wicked’ problems that characterise the increasingly challenging relationship between people and their environments in Africa. Such challenges are, of course, recognised at the highest global level through the adoption of the United Nations Sustainable Development Goals. The International Council for Science (ICSU) and the International Social Sciences Council (ISSC) have jointly launched, along with several other key partners, the ‘Future Earth’ initiative, central to which is the concept of a dynamic but sustainable earth system that will enable future human development. In this paper, I reflect on the eight key Future Earth challenges confronting the planet and consider the role that Geographers can play in understanding the diverse interdisciplinary issues that these entail in the African context. A geographical perspective and the ‘joined-up’ thinking that it engenders, is perhaps one approach that can help develop a more robust understanding of the range of environment and development problems in Africa. While it is true that geographers cannot easily enforce wiser political decision-making, it is the case that a more nuanced and comprehensive understanding of how to address the complex array of challenges is at least a step in the right direction. Many of the International Geographical Union (IGU) Commissions conduct research that interfaces well with Future Earth and, coupled with activities associated with the IGU’s International Year of Global Understanding (IYGU), offer excellent opportunities for engagement that has particular relevance to Africa.

## Global Understanding for Global Sustainability

Benno Werlen (Germany)

### Abstract

Global thinking and global action demand global understanding. The IGU Initiative for an International Year of Global Understanding (IYGU), proclaimed by the international councils for the Natural, Social and Human Sciences, aims to bridge the gap in awareness and knowledge between local acts and global effects through research, education, and information.

The IYGU recognizes that global social and climate changes require a global level of understanding. It provides information on culturally differentiated sustainable actions to reach global sustainability. And most of all: it develops a blueprint for a new geographical view of a radically changing world.

Every day we all experience how globalization has brought and is bringing far-flung places and people into ever-closer contact. New kinds of supra-national communities are emerging at an accelerating pace. At the same time, these trends do not efface the local. Globalization is also associated with a marked re-affirmation of cities and regions as distinctive forums of human action. All human actions remain in one way or the other regionally and locally contextualized.

The IYGU addresses the ways in which we inhabit an increasingly globalized world. Everyday geography-making is essential for the constitution of geographical realities. Our world faces social, cultural, and economic change, as well as a changing climate. Human actions play a key role in creating such worldwide challenges. However, human actions also provide solutions. If individuals know what their day-to-day routines mean for the planet, they can take appropriate action to help overcome global challenges.

The IYGU wants sustainable change that starts from the bottom and thus focuses on essential daily activities such as eating, drinking, housing, working, travelling, and communicating. Why do we make the choices that we do? Which societies make more globally sustainable choices? Natural and social scientists will jointly provide answers.

Ultimately, the IYGU encourages everyone to make daily decisions in the light of global challenges.

The presentations highlight the IYGU's action program and its network, the latest significant achievements, and how one can become an active part of the first international year initiated by the International Geographical Union and proclaimed by the international councils of the natural, social, and human sciences.



## Understanding China's Geography: Linking Science and Society

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### Abstract

China has a long history of over 2000 years known geographical observations. After the founding of The People's Republic of China, geography in China has been significantly advancing. I will give an overview of China's geography from various respects including academic organization, education, research, and international cooperation with the geographical research in China as the core theme. Four sub-themes on this core will be briefly reviewed including the spatial differentiation and regionalizations of the China's geographical environment, infrastructure and data acquisition for China's geographical research, theoretical development and societal applications in China's geographical research, and new progress on regional integrative geographical research in China, with typical cases in point.

China is a large country with diverse environmental conditions and significant geographical differentiations both naturally and socioeconomically. Since the 1950s, modern geographical research in China started from Comprehensive Geographical environment and natural resources surveys and geographical regionalizations inspired by the urgent requirement from the socioeconomic development. After the 1990s, the regionalization research advanced towards more integrative with considerations of ecological and environmental issues and social and economic sustainable. Many of these researches have been feed into regional and national development and environment policy making processes.

As key infrastructure for advancing geography in China, ground based monitoring networks and earth observation networks have been established, which facilitated process based geographical research and pattern-process integrations across spatiotemporal scales. The contributions of Chinese geographers to advancing social relevant geographical science will be exemplified with key examples such as understanding the human-land relations, regional and global environmental change and urbanization and sustainable development. Indeed, China's geography has achieved great progress since the 1950s and also contributed much to the scientific understanding of the geographical environment and the development needs across scales. Much still to be done by Chinese geographers on new contributions to the science and societal needs of geography both in China and globally.

## Urban Dynamics and Geo-Diversity: From Theory to Modeling

Denise PUMAIN (France)

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### Abstract

The evolution of cities is a major issue because it affects the majority of the world population. It is in cities that solutions must be invented to solve the problems of sustainable development in terms of quality of life, of resource management, of intelligent integration of technological and cultural innovation and of social cohesion, at the local and the global scales. The diversity of cities is such that it might seem difficult to develop a scientific knowledge about them for sustaining policies. However, cities have long been interdependent and organized into systems of cities, they co-evolve through the multiple relationships which connect them into networks for the exchange of materials, investments, people or information. These interdependencies drive and constrain the evolution of each city in the system, according to a complex set of dynamics which exhibit patterns regular enough to help understanding and even predicting certain trends.

For anticipating urban future, geographers have since long developed a theoretical framework relying on the observation, not only of the few megacities global stars but of thousands of cities and towns taken in a variety of world regions. These empirical observations were scrutinized through analytic methods inspired from the dynamics of complex systems and data and processes are now integrated into computer simulation models which are able to reconstruct the stylized facts and trends observed. The theory and the results of these modeling experiments emphasize the importance of interactions between the cities in the evolution of their size and the effects of the spatial diffusion of large innovations waves, which tend to reinforce the hierarchical unevenness and explain the reversal of trajectories in the specialized cities. The path-dependent role of the precocity and sustainability of settlement systems is confirmed as well as the bifurcations associated with colonization in having created at world scale a diversity of systems of cities which has been maintained for decades in terms of hierarchical inequality and the primacy of their metropolises. Adapted urban policies might partly counteract such self-organized trends. In any case, the urban geodiversity has to be taken into account in order to continue the major function of cities and towns which still are altogether remarkably efficient socio-spatial adaptors on the long run in the human history.