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**Experience in the use of satellite imagery for monitoring
the land condition and land usage.**

THESIS

Remote sensing data are widely used in solving one of the key problems of land and property relations in the Russian Federation – the problem of monitoring the land condition and land usage.

The aim of monitoring the land usage is to supervise the use of land parcels in accordance with their intended purpose and permitted use.

The aim of monitoring the land condition is to identify the current state of negative processes and dynamics of negative processes.

For the vast territory of the Russian Federation, the use of earth remote sensing materials becomes particularly relevant, as it allows to develop the optimal, least expensive and most reliable methodology for identifying land parcels containing signs of violation of land legislation, as well as territories subject to the development and dynamics of negative processes.

For today, the implementation of monitoring of the land condition and land usage has been carried out for the subjects of the Russian Federation, which located in different natural areas and have different levels of economy. Works were performed for a number of municipalities of the following subjects: Republics Buryatia, Dagestan, Kalmykia, Karelia, Komi, Mari El, Sakha (Yakutia), Khakassia; Zabaikalsky, Kamchatka, Primorsky, Khabarovsk territories; Amur, Arkhangelsk, Bryansk, Vologda, Irkutsk, Leningrad, Magadan, Murmansk, Novgorod, Novosibirsk, Pskov, Sakhalin, Sverdlovsk, Smolensk regions; Yamalo-Nenets Autonomous district; Jewish Autonomous region.

A technical and methodological scheme of work was developed, as well as algorithms and standards for decoding signs of violations of land legislation and areas of negative processes. The method of decoding was developed taking into account the possibility of its application for other territories of the Russian Federation.

The main data sources for the implementation of monitoring of the land condition and land usage are:

1. Satellite imagery of 1.5 m/pixel spatial resolution from SPOT-6/7 spacecraft.
2. Relevant data of the Unified State Register of Real Estate, containing information about the boundaries of land parcels, their category, intended purpose and permitted use, as well as other publicly available information.
3. Cartographic materials obtained as a result of land management, in particular, the materials of the latest conducted soil surveys.
4. Results of field verification of signs of violation of the land legislation and negative processes. During field verification, the results of satellite image decoding were confirmed in more than 90% of cases.

As part of the monitoring of land usage on the basis of a joint analysis of the data sources, taking into account The Code Of Administrative Offences Of The Russian Federation, as well as The Town-Planning Code Of The Russian Federation the following types of signs of violations of land legislation were identified for land parcels:

1. The use of land not for its intended purpose in accordance with its belonging to a particular category of land and permitted use.

2. Neglect of the obligations to bring the land in a state suitable for use for its intended purpose.

3. Unauthorized occupation of the land parcel or its part, including use of land parcel by the person who does not have the rights to the specified land parcel provided by the Russian Federation.

4. Non-use of the land parcel intended for housing or other construction, gardening if the obligation on use of such land parcel within the established term is provided by the Federal law.

As part of the monitoring of land condition, the following types of negative processes leading to a decrease in the quality of land have been decoded:

1. Negative processes of natural and natural-anthropogenic origin: water erosion (linear and planar), wind erosion, desertification, waterlogging, flooding, landslide processes, abrasion processes, consequences of burning.

2. Violation of land quality: during ground construction, hydrotechnical construction, subsoil use, industrial forest management, agricultural development, geological exploration, storage and disposal of industrial waste, land pollution.

The results of this work will be useful for the formation of a technical and methodological basis for monitoring the land condition and land usage in the various regions of the Russian Federation, this will make it possible to develop a standard cartographic and analytical product based on remote sensing materials.

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