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# Current geocological status of the specially protected natural area "Crane Homeland" (based on materials proposed by the Ministry of Ecology and Environment of the Moscow Region)

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**Abstract.** The article describes the current state of the geocosystem of the reserve "Crane Homeland". The authors take into consideration the consequences of improper drainage land-reclamation carried out in past decades in Apsarevskoe tract and Dubna water-swamp complex. Cutting down and uprooting the forest strip along the river Dubna in the vicinity of the Island village have led to the destruction of bird (*Cyanistes cyanus*) nests. In addition, the article points to poaching and spring fires occurred in a number of other places.

## 1. Introduction

Consideration of the territory of the reserve "Crane Homeland" and its study is due to its constant monitoring to save undisturbed geosystems and their components in the natural state, as well as the maintenance of ecological balance.

For the scientific study of the region in connection with changes in the study area due to the impact of drainage, violations of the natural complex by local farmers and visiting tourists, as well as residents of the private sector, it is necessary to conduct environmental monitoring of the territory of the reserve "Crane Homeland".

Land protected geocosystems include transitional and upland swamps, wetlands, small-leaved and spruce-small-leaved forests with oaks, hazelnut and broad-leaved ferns, gray-grass and birches moist. The areas surrounding the studied region have been also exposed within many decades to the impact of human activity and the considerable loading from the neighboring areas. As a result, there is a need for a comprehensive study of the degradation of protected area [1, 2].

## 2. Methods and materials

The assessment of the geosystem of the reserve "Crane Homeland" was carried out on the basis of the long-term studies of protected species of plants and animals. The studies included data on the key ornithological areas, forest genetic reserves and valuable soil objects. In addition, there were data of the Ministry of ecology and nature management of the Moscow region, data of the Union of bird protection of Russia and data of the Ministry of forestry included in the Red book of the Russian Federation.



### 3. Results and discussion

The purpose of this kind of research is the maintenance of preservation and restoration of natural systems, maintenance and preservation of habitats of rare species of plants and animals; monitoring of plant and animal species listed in the Red Book of Russia, as well as conducting research work of the specially protected natural area "Crane Homeland".

The species listed in the Red book of Russia and the book of the Moscow region include: *Cypripedium calceolus*, *Rubus chamaemorus*, *Goodyera répens*, *Empetrum nigrum*, *Dactylorhiza*, *Birch humifusa*, *Rubus arcticus*, *Nammarbya Marsh*, *Mjakotnica univalent* or *Stagachka*, *Shejhcerija palustris*. There are vulnerable species that need monitoring and observation: *mezereum* or *Daphne*, *Lycopodium complanatum*, *Platanthera bifolia*.

The Red book of Russia includes rare and vulnerable species of animals: *Ciconia nigra*, *Anser erythropus*, *Circus macrourus*, *Circaetus ferox*, *Aquila danga*, *Aquila pomarina*, *Aquila chrysaetus*, *Haliaeetus albicilla*, *Falco peregrinus*, *Lagopus*, *Numerius arquata*, *Lanius excubitor*, *Cyanists cyanus*.

The red book of the Moscow region presents the following species: *Ciconia ciconia*, *Grus grus*, *Anas Acuta*, *Anas strepera*, *Tringa totanus*, *Tringa stagnatilis*, *Philomachus pugnax*, *Gallinago media*, *Limosa*, *Xenus cinereus*, *Pernis apivorus*, *Milvus migrans*, *Circus cyaneus*, *Falco columbarius*, *Strix uralensis*, *Surnia ulula*, *Picus*, *Dendrocopos leucotos*, *Picoides tridactylus*, *Columba Oenas*, *Sylvia nisoria*, *Vipera berus*, *Natrix*, *Lacerta Agilis*, *Triturus cristatus*, *bufotes viridis*, *Colias palaeno*, *Coenonympha hero*, *coenonympha tullia*, *agriades optilete*, *Arichanna melanaria*, *Papilio machaon*.

Rare species include *Asio flammeus*, *Caprimulgus europaeus*, *Eurasian pygmy owl*, *Anthus pratensis*, *Falco*, *Turdus viscivorus* [1–5, 7].

The total area of especially protected natural territories "Crane Homeland" is 11974.5 hectares, and it necessary to note the area of land included in the boundaries of the reserve without exemption from commercial use [1–8]. The considered reserve is located in the North-East of the Moscow region of the upper Volga lowland in the zone of distribution of flat and slightly wavy water-glacial, moraine-water-glacial and ancient alluvial-water-glacial slowly drained plains. The absolute heights of the natural-territorial complex vary from a minimum of 119 meters to 151.4 meters above the sea level [9–13]. Dubna bog massif is located on the right bank of the Dubna River, lying along its straightened bed. Within the considered area, the height differences are small absolute marks that vary from 126 m to 133 m.

The top layer of the pre-Quaternary Foundation of the area is the Dolomites of Perm, as well as upper Jurassic clay, siltstone and sand. There are the Dolomites of the Carboniferous in the West. On the study area there are flat water-glacial plains with swamps of all kinds, as well as the right Bank of the valley of the Dubna river with floodplain territory and floodplain terrace. The surfaces of flat areas are composed of sandy loam, water-glacial deposits and loam. Plains have slopes of 1-2°. Partially on smooth surfaces, slightly pronounced lower pits appeared.

On the Western part there are elongated hills ranging from 200-300 m to 1-2.5 km with a height of 2-3 m. The surface of the floodplain of the Dubna river formed at an altitude of about 2 meters above the riverbed, folded by alluvial sediment power loamy sand and sandy loam. The first floodplain terrace with an average height of about 5 meters is composed of ancient alluvial deposits. On the territory of the reserve, in places where waterlogged peat or humus poles are, there are old slopes with different lengths, a maximum of 5 km. They are deposited on water-glacial, ancient alluvial or alluvial deposits. They include the peat and the forming one opposed to phytogenic forms of bumps, tree trunks [9–14].

The common pool area has a slope in the Dubna River, the tributary of the Volga. On the plot there is a network of drainage canals, which are practically in parallel or perpendicularly positioned relative to each other. Melioration systems pass through a quarter of the area of the site. Their length is from 300-600 m to 3-6 km. Overgrown channels at their intersections in the north-west area represent rectangular fireproof quarries (20-30 m - length, 10-15 m - width). In this area there are old ponds (10-20 m wide) in the South-West section oxbow formed up to 60 meters [11, 12, 14].

Soils are represented by sod-podzolic on the sandy sediments. Such soils were formed on the hills.

These soils are formed at higher elevations. Drainage that slowed down in small depressions formed sod-podzol clay soil. In the hollows, on the bottom of the humus, there are gley soils under black alder - humic - gley soils. Peat oligotrophic and peat eutrophic soils are mainly located on bogs. At the same time, alluvial humus - gley soils are widespread on the river floodplain; in ancient riverbeds -alluvial peat - gley soils [2, 3, 7, 15, 16].

Apsarevskoe tract is a moraine-glacial plain with moraine hills that formed surrounded by water-glacial Plains and lowlands. It also includes a small portion of Hotcha River (upstream). Absolute marks vary from 119 m (in the North at the edge of the Hotcha River) to 151.4 m (at the highest point of the hill). The surface of the pre-Quaternary Foundation consists of clays and silt upper Jurassic. The plain is composed of cover loam on water-glacial sediments and moraine. The hills formed lower (height 5-10 m). Their slopes have a maximum steepness of 3-5°. At the sites, which folded seats and hollows, valleys have a drain in the reclamation of swamps [17].

The riverbed of the Hotcha river is straightened. The width of the river bed is 5.5 km, depth - 0.2 - 0.5 m. The bottom of the Hotcha river is sandy, it is found on the bottom of silt. The flow rate is 0.1 m/sec, sometimes it is simply absent. Water consumption in the upper reaches (in the East) 0.03 m<sup>3</sup>/sec. In the North, the section of the Hotcha River receives the water flow on the Kostinka River. The width of the left tributary is 1.5-7 m. The Site is transformed by drainage reclamation in the form of channels, which are located on 20% of the territory. The channels have a width of 2 to 8 m, sometimes up to 10 m. There are overgrown ponds of small depth. In the South a transitional swamp has formed, which is about 6 hectares. In the lowlands ponds of anthropogenic origin have formed, they have a rectangular shape with a length of 40-100 m, a width of 30 to 50 meters.

Soils are characterized as agrogenic-transformed. On high plains and hills agro-sod-podzolic soils have formed, which are confined to the loam. At the same time, depressions and lowlands are mostly found in sod-podzol clay. Wetlands are represented by peat oligotrophic peat soils and eutrophic. Sometimes in the area for hollows there are humic-gley soils or humus-gley soils. In the floodplain, the rivers are characterized by the light-humus and alluvial soil.

The reserve of the first has two large arrays of forest. On the Eastern part of the forest there are small-leaved forests with floodplain black-alder trees. On the Western part there are swampy pine forests, on transitional and upland swamps – with pine and birch. There are also spruce, pine, small-leaved and mixed forests.

The Western part of the forest has a greater variety of trees. In the forest waters of the West spruce, pine, birch, aspen, black alder, linden and maple grow. In the southern part of the forests as part of the stand there is spruce, pine, birch, aspen and oak. Sometimes arrays of spruce undergrowth, even oak and undergrowth can be found.

The lower tiers are poor, there are even dead-blood parts of the cover. From the sparse grass-shrub, a tier can be found: cranberries (*Vaccinium vitis-idaea*), blueberries (*Vaccinium myrtillus*), Lúzula, *Solidago virgaurea*, *Rúbus saxátilis*, *Gymnocárpium dryópteris*, *Stellária holóstea*, *Lysimáchia*, *Dáphne mezéreum*.

To the North of the site there are well developed small-leaved forests: alder, birch, willow nettle, meadow-nettle with weed. In the undergrowth there is black currant. The grass tier is represented by: *Epilóbium*, *Aegopódium podagrária*, geranium. Around the marsh land and pine-birch forests, stripes with *Lycopódium annotínium* grow.

On the Eastern part of the reserve, black and birch (nettle) forests grow. In their undergrowth there is: black currant, cherry and raspberry. The following herb layer is marked: *Urtica dióica*, *filipéndula*, *lycopus europaeus*, *Chamaenérion angustifolium*, *Impátien Nóli-tángere*, *Deschampsia cespitosa*, *Geránium robertiánium*, *Stáchys palústris*, *dryópteris carthusiána* Dry *Dryópteris filix-mas*, *cómarum palústre*, *Athýrium filix-fémina*, *Ranunculus repens*, *Thelypteris palústris*, *glechoma hederacea*, *thyselinum palustre*, *Fallópia convólulus*. On the second section there are separate island forest lands, previously cultivated fields. At present, on the farmland in most of the abandoned meadows and former fields, there are small-leaved species with growing pines. In the depressions, the willows from wetland

areas grew. On the Western part and in the center of the site there are swampy areas, pines and birches. Spruce declines, the circle has overgrown with alder forests.

The undergrowth is dominated by: *Urtica dióica* and *Aegopódium podagrária*. One can meet untamed *Filipéndula ulmária*, *Equisétum sylváticum*, rivále *Géum*, celandine, *Lysimáchia*, *Páris*. Moss grows on the fallen trees. Copious amounts of: bilberry, blueberry, cloudberry, cranberry can be found, including *Empetrum nigrum*, *Lycopódium*. In the Eastern part of the site on the outskirts of the small-leaved forest there is a gray alder with a birch and aspen with a thick teenager cherry and alder gray. In the grass tier there are wide *Júncus effúsus*, *Ranunculus repens*, *Páris*, *Deschampsia cespitosa*, *Géum rivále*. In the North-West the melioration overgrown swamp with a forest of birch is drained.

The areas of the reserve are included in the specially protected natural areas of the Moscow region. Many birds, including rare and protected birds, as well as those listed in the Red book of Russia, nest on its territory, as well as during the flight. The areas of the preserve: Dubna array and Apsarevskoe tract, are important in maintaining populations of rare bird species, rare and protected species of animals. For example, the first site is the habitat of at least 102 species of terrestrial vertebrates (4 species of amphibians, reptiles, 80 species of birds and 14 species of mammals). They belong to the meadow-edge, wetland and forest species of the Moscow region. Within the Dubna wetland there are three main zoocomplex: zoopharmacy mixed forests, zoopharmacy pine forests, pine - sphagnum mires and peat, zoopharmacy open wetland habitats and agricultural lands.

The zoof ormations of mixed forests include species such as: *Erinaceus europaeus*, *Sciurus*, *Castor*, *Lepus timidus*, *Lepus europaeus*, *Sus scrofa*, *Cervus elaphus*, *Capreólus capreólus*, *Vulpes*, *Canis lupus*, *Lynx lynx*, *Ursus arctos*, *Meles meles*, *Ciconia nigra*, *Accipiter gentilis*, *Iyurus tetrrix*, *Glaucidium passerinum*, *Surnia ulula*, *Caprimulgus europaeus*, *cuculidae*, *Picus canus*, *Dendrocopos leucotos*, *Dendrocopos major*, *Picoides tridactylus*, *Anthus trivialis*, *oriolus oriolus*, *garrulus glandarius*, *troglodytes troglodytes*, *Phylloscopus collybita*, *fringilla coél*, *carduelis spinus*, *Erithacus rubecula*, *Sitta europaea*, *Parus major*, *Cyanistes caeruleus*, *Turdus pilaris*, *Turdus philomelos*, *Turdus iliacus*, *Turdus merula*, *Aegithalos caudatus*, *Muscicapa striata*, *Zootoca vivipara*, *Lacerta agilis*, *Bufo bufo*, *Bufotes viridis*, *Rana temporaria*.

To zoopharmacy pine forests, pine-sphagnum bogs and peatery include: *Numenius arquata*, *Xenus cinereus*, *Tetrao urogallus*, *Falco columbarius*, *Dryocopus*, *Turdus viscivorus*, *Poecile montanus*, *Certhia familiaris*, *Periparus ater*, *Cyanistes cyanus*, *Regulus regulus*, *Rana arvalis*. There are rare species of butterflies: *Colias palaeno*, *Coenonympha hero*, *Coenonympha tullia*, *Agriades optilete*, *Carsia sororiata*. On semi-aquatic territories the following can be highlighted: *Ciconia Ciconia*, *Anas acuta*, *Anas strepera*, *Limosa Limosa*, *Gallinago media*, *Tringa totanus*, *Tringa stagnatilis*, *Milvus migrans*, *Circus cyaneus* and *Circus pygargus*, *Sylvia nisoria*. There are birds listed in the Red book of the Moscow region such as: *Circus macrourus*, *Aquila*, *Aquila chrysaetos*, *Circaetus gallicus*, *Haliaeetus albicilla*, *Falco peregrinus*, *Haematopus ostralegus*, *Lanius excubitor*. On the territory there are: *Asio flammeus*, *Falco*, *Perdix perdix*, *Tringa glareola*.

Among the migratory there are: *Anser albifrons*, *Anser erythropus*, *Philomachus pugnax*, Golden rye, Curlew. Their number sometimes reaches 1500-3000 individuals.

In another area there are about 81 species of vertebrates. There are two kinds of amphibians, one kind of reptile, 60 species of birds and 15 species of mammals. Perch and pike inhabit the rivers. The faunistic complex of terrestrial animals of the Apsarevskoe tract mainly consists of species of meadow-glade, a lesser role is played by forest and wetland. In the seasonal period, thousands of flocks of the grey crane (*Grus grus*), *Anser fabalis* and *Anser albifrons* can accumulate. They fatten up before a long flight.

In mixed forests there are: common hedgehogs (*Erinaceus europaeus*), protein (*Sciurus*), beaver (*Castor fiber*), *Lepus timidus* and *Lepus europaeus*, *Sus scrofa*, *Cervus elaphus*, *Capreólus capreólus*, *Vulpes vulpes*, *Accipiter gentilis*, *Lyrurus*, *Columba palumbus*, *Columba oenas*, *Cuculidae*, *Picus canus*, *Dendrocopos leucotos*, *Dendrocopos major*, *Anthus trivialis*, *oriolus oriolus*, *Corvus Corax*, *garrulus glandarius*, *troglodytes troglodytes*, *Phylloscopus Trochilus*, *fringilla coélebs*, *carduelis spinus*,

Erithacus rubecula, Sitta europaea, Parus major, cyanists Caerule, Turdus pilaris, Turdus philomelos, Turdus iliacus Linnaeus, Turdus merula, Aegithalos caudatus, Muscicapa striata, Zootoca vivipara, lynx (Lynx Lynx), wolf (Canis lupus), badger (Meles Meles), brown bear (Ursus arctos).

#### 4. Conclusion

On the described territory of the reserve "Crane Homeland" there is now extremely negative pressure exerted by humans. Their actions are the logging, felling and stubbing of forests (strip of at least 50 meters) on a plot near the Dubna river. Essentially, this is the destruction of nesting white blue Tits (Cyanistes cyanus). In spring and autumn, the burning of grass and debris leads to frequent fires.

In summer, during the July anticyclone there is spontaneous combustion of dried peat bogs, which are the areas of high fire hazard. Drained marshes, in general, are the result of improper drainage reclamation in the twentieth century. As a result, geocosystems suffer, where a huge number of birds and animals live among the vegetation cover of the unique natural complexes of the reserve "Crane Homeland" [18].

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