

Features of Functional Zoning of the Territory of the National Natural Park "Homilshanski Forests" For Preservation of Phytocenotic Rinhytnosis

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Abstract: One of the most important principles of effective use of nature reserves is functional zoning. The main task to be solved in the functional zoning of the territory is to study the features of the spatial distribution of natural complexes and anthropogenic load.

In the course of the research, the authors of the article proposed a promising scheme of functional zoning of NNP "Homilshanski Forests". When planning the functional zoning of the NNP territory and establishing the boundaries of functional zones, the priority criterion was the preservation of phytocenotic diversity of vegetation and especially the presence and distribution of typical and rare plant groups, which are listed in the Green Book of Ukraine. Analysis of the syntaxonomic composition of the vegetation of the NNP showed that in the vegetation of this area are rare phytocenoses included in the Green Book of Ukraine.

Keywords: National nature parks, functional zoning, recreation, nature management, protection and rational nature management.

1. INTRODUCTION

National nature parks are complex ecological systems consisting of complexes of various territories with differentiated modes of protection, use and restoration of nature.

The NNP is entrusted with the following main tasks: preservation of valuable natural and historical-cultural complexes and objects; creation of conditions for organized tourism, recreation and other types of recreational activities in natural conditions with observance of the regime of protection of protected natural complexes and objects; conducting scientific research of natural complexes and their changes in the conditions of recreational use, development of scientific recommendations on environmental protection and efficient use of natural resources; conducting ecological educational work.

Due to the rapid urbanization and development of industrial enterprises, there is a significant deterioration of the natural

environment (pollution of air, water, soil), which has a significant negative impact on the formation of modern national nature parks.

Imperfection of the internal structure, lack of rational architectural and planning organization, lack of measures for the arrangement of NNP have led not only to the deterioration of their condition, but also in some cases to the loss of unique natural landscapes.

Due to the decrease in the number of national parks in Ukraine in recent years, there is a need to develop research on these objects in the fields of urban planning, ecology, geography, zoology, botany - ie at the interdisciplinary level.

The territory of Homilshanskyi National Park is one of the most picturesque corners of the Left Bank of Ukraine. The territory of the natural park is located on the southern edge of the Left-Bank Forest-Steppe (subzone of the southern forest-steppe), where the forest-steppe is wedged into the steppe. The junction of two natural zones determines the richness and diversity of vegetation. By the time the Homilshanski Forests National Park was established, some phytocenoses had undergone significant changes, and the floristic and phytocenological structure of some plant communities had been disrupted, which had led to the impoverishment of the

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aboriginal flora. However, in general, the NNP still represents an area with well-preserved phytodiversity. Therefore, we can continue to talk about the uniqueness of this natural complex, which requires urgent measures to preserve.

2. METHODOLOGY

The first provision of land zoning is coordination and processing of a significant amount of cartographic materials. Given that the main type of data in geoinformation systems is spatially distributed information, based on the analysis of basic GIS modules, it can be concluded that GIS software is very specific and is not duplicated by traditional computer software. GIS software is a collection of more or less integrated software modules that provide the implementation of all basic GIS functions. The following functions are implemented on the basis of basic modules:

- 1) data entry and verification;
- 2) data storage and manipulation;
- 3) transformation of coordinate systems and transformation of cartographic projections;
- 4) analysis and modeling;
- 5) output and presentation of data;
- 6) interaction with the user.

When developing land zoning projects, it is necessary to use their quantitative and qualitative characteristics, cadastral zoning maps, general plans of soil assessment maps, and projects for the planning and construction of settlements, their historical-cultural, functional, sanitary-ecological, engineering-geological zoning, etc. A significant number of indicators, their spatial reference and a variety of sources of origin make the use of geoinformation technologies and geoinformation systems (GIS) natural. It is necessary to observe the spatial relationship of the functional zones of the territory, which is reflected on various cartographic sources, control the completeness and correctness of the information. The combination of all available graphic, semantic and other information in a single geo-informational space makes it possible to obtain a complete picture of the state of land use of the studied territory. The broad possibilities of modern geoinformation technologies for working with raster images make it possible to combine images of several cartographic materials, to determine the boundaries of territory planning elements. The geographic information software product ArcGIS was used to solve applied problems regarding land zoning.

During the implementation of land zoning outside the boundaries of settlements, materials of the land cadastral record containing information on the purpose of the land are used. Types and subtypes of land use outside the boundaries of settlements are determined using the project of the Classifier of Land Use Types, Purpose, Functional and Permitted Land Use.

Methods of analysis and synthesis were used to study the subject and object of research, which helped to identify the main factors influencing the comprehensive solution of

issues of effective use of nature reserves and functional zoning of national nature parks.

An abstract-logical method was used to summarize the research results and draw conclusions.

3. RESULTS AND DISCUSSION

NNP "Homilshanski Forests" is located within Zadonetska, Velykohomilshanska, Nizhniobyskynska, Lymanska village councils of Zmiiv district and Verkhniobyskynska village council of Pervomaiskyi district (Fig. 1).

In geomorphological terms, the territory of the NNP is located within two major relief elements - the so-called Donetsk plateau, or elevated dissected plain on the lower-middle Miocene basis, and the Donetsk terrace plain. The boundary between them is the Seversky Donets River, which flows through the territory in an almost meridional direction, deviating slightly in the southern part to the east..

The climate of NNP, as well as any other territory, is formed as a result of interaction of three climate-forming factors: inflow of solar radiation, circulation of the atmosphere and character of an underlying surface.

The territory of the NNP is characterized by a significant diversity of soil cover. For the right bank of the Seversky Donets River, typical soils are gray, dark gray forest soils, and in some small areas - podzolic chernozems on forest-like loams. The steep slope of the right bank is strongly dissected by ravines and gullies, with mostly washed away soils (of varying degrees of erosion).

Riverside slopes are covered with woody, meadow-steppe and shrubby vegetation on podzolic eroded soils. In the deep ancient beams, the distribution of the pounds is greatly influenced by the exposure of the slopes. On the watershed adjacent to the southern slope of the Zaitsev Yar beam, gray and dark gray forest soils formed on forest-like loams. The northern slope of the beam is characterized by a washed-out forest layer and the formation of soils on the sands of the Poltava world, which lie under the forests. Sod-weakly podzolic and sod-medium-podzolic sandy and sandy soils under mixed deciduous forests were formed in this area. Part of the riparian watershed surfaces is occupied by podzolic chernozems and dark gray podzolic soils, to varying degrees eroded, formed on sandy loamy loams.

The territory of the NNP is located in the south of the Left Bank Forest-Steppe, on the border of forest-steppe and steppe zones and lies within the Euro-Siberian forest-steppe region, Eastern European province, Central Russian forest-steppe subprovince, Kharkiv district.

This is a unique forest massif, which presents different-age upland oak on the elevated right bank of the Siv River. Donets with ravines and beams, floodplain oak groves and meadows, forests and groves on the floodplain terrace of the left bank of the river. Forests are one of the best old oak groves on the Left Bank of Ukraine. Special relief of the indigenous right bank of the Seversky Donets River, formed by Rhys-Wurm erosion, became one of the refugiums for plants during the ice age. Therefore, this area is considered one of the relics in Ukraine and is characterized by significant floristic and coenotic diversity and a high



Fig. (1). Location of NNP "Homilshanski forests".

concentration of rare species, including relics of Pliocene flora.

Modern anthropogenic changes in the cenoses of the upland oak are caused by logging of sanitary care, grazing, significant recreational load along the right root bank of the Seversky Donets River. These factors cause a change in the floristic composition of forest groups, simplify their structure, worsen the restoration of the stand.

NNP fauna includes various zoogeographical groups of animals, mainly with wide ranges. It is within this forest that many forest mesophile animals find the southern limit of their distribution. Here the extinction of the Central European faunal element continues, many species of this group find the eastern limit of their distribution (Medvedev SI, 1957; Kryzhanov OL, 1979). Much poorer are the species of Mediterranean origin, which are located on the northern border of their range. It is in the oak forests of the Homilshanskiy forest massif that a number of relics of Atlantic, Tertiary and glacial origin have been discovered (Grams VM, 1995).

The boundary position of the territory has led to an extraordinary diversity of natural and territorial complexes. Here, over a short distance within two landscapes - forest-steppe watershed and steppe valley - five localities change: watershed, slope, floodplain, sand-pine. Each of the localities is divided into a large number of simple and complex tracts and hundreds of facies.

One of the most important principles of effective use of nature reserves is functional zoning. The main task to be solved in the functional zoning of the territory is to study the features of the spatial distribution of natural complexes and anthropogenic load.

In Ukraine, zoning is mandatory during the creation of a protected area and provided by law. Zoning is a very interesting issue, because each national nature park, whether a biosphere reserve or a regional landscape park is special both in nature and history. That is why different types of ecosystems require different conservation regimes.

The first zoning of the park was proposed by the authors Rodichkin ID, Rodichkina OI, Grinchak IL and others

(1985), which is not consistent with modern requirements for functional zoning of national parks.

Functional zoning of the NNP territory is carried out in accordance with the Law of Ukraine "On the Nature Reserve Fund of Ukraine" on the basis of field surveys of the park, materials justifying its creation, approved "Regulations on the NNP" and other data. Natural, scientific, recreational, health, historical, cultural and other values of the territory, opportunities for restoration of ecosystems, etc. are taken into account.

The protected area has priority and determining value in functional zoning. The most effective method of functional zoning is to develop a scheme of location of zones by concentric circles, where the central circle is a protected area. If it is impossible to do so, other modifications of functional zoning are introduced - large-mosaic, cluster, palliative, etc.

When allocating the protected area, special attention should be paid to the preservation of indigenous and best preserved natural complexes, especially virgin and wetlands, and areas of plant and animal species of the Red Book of Ukraine, rare plant groups of the Green Book of Ukraine, plant and animal species and types of natural environments endangered in Europe and worldwide.

The protected area is created for the purpose of long-term preservation of ecosystems in the mode of the smallest interference in natural processes. Here can be identified areas for restoration work on lands with disturbed indigenous natural complexes, as well as measures to prevent changes in natural complexes of the zone due to anthropogenic impact - restoration of hydrological regime, preservation and restoration of historically established plant groups, plant and animal species. disappear, etc. The boundaries of the protected area are mostly drawn along the natural contours of ecosystems (river basins, their channels, watersheds, forest allotments, etc.), less often - along artificially created contours (neighborhood clearings, power lines, pipelines, old dirt roads, etc.). It should include, if possible, all particularly valuable natural complexes, especially those that before the organization of the NNP had the status of reserves, natural monuments (both national and local significance) and protected tracts.

The protected area is usually surrounded by a regulated recreation area, occasionally by a stationary recreation area, if it is represented by natural areas on the border with the protected area. The zone of regulated recreation should include only those natural territories that have recreational, ecological-educational, cultural-educational and scientific-cognitive significance. This zone is also created to prevent the negative impact of natural or anthropogenic factors on the ecosystems of the protected area, so it should be located around the protected area.

The economic zone is created, first of all, to meet the needs of NNP, as well as to ensure sustainable use of nature with the least possible impact on the surrounding natural ecosystems and processes. This area may surround stationary and regulated recreation areas, and its size may vary due to problems that arise. The economic zone also includes lands located in strict protection zones, water supply sources,

dangerous zones of gas pipelines, compressor and gas distribution stations, animal herds, power lines, oil, product pipelines, other land users, etc.

The stationary recreation zone borders on the regulated recreation zone and the economic zone. Within this zone there are objects of recreational infrastructure (hotels, campsites, commercial and cultural buildings, health facilities, sports grounds and fields, etc.). There may also be objects of historical and cultural heritage, settlements (their lands) and objects of construction (lands where construction is planned), which are planned for the future.

When developing the system of functional zoning of the territory of NNP "Homilshanski Forests", the whole set of criteria for individual zones proposed by Yu.R. Shelyah-Sosonko, P.M. Ustymenko (1988), as well as the peculiarities of the natural conditions of the region, the traditional use of the territory for recreational purposes, etc.

In particular, defining the boundaries of the protected area of the Homilshanski Forests National Park, the aim was to preserve typical and rare natural complexes and their ecosystems as standards of vegetation and landscapes with their gene pool and biodiversity.

For the functional zoning of the park is of paramount importance: first, the allocation of a protected area around which other areas are formed by concentric circles. To solve this problem, an analysis of landscape and botanical features of the park was proposed.

Landscape features. On the territory of the park there are three landscape areas: watershed, floodplain and sandy-pine, of which the watershed is classified as endangered areas in the Kharkiv region.

Divided land plots are of special value at the intersection of watersheds of the Siverskyi Donets river, the Olshanka and the Homilsha rivers in the central part of the park, where the highest point of the park is located - 203.8 m. This place occupies a key position in the relief of the park in terms of maintaining the dynamic balance of ecological systems of the park (Shelyah-Sosonko Yu.R., 1991).

Botanical features. Particularly valuable are the areas in the central upland part of the park, which have little effect on anthropogenic impact. Here grow roots with a complex structure, stands, in which there are areas of overgrown oak plantations aged 120-160 years, and these forests are marked by the greatest syntaxonomic diversity in the park, such areas are to be preserved in a preserved state in the first place.

In order to ensure the protection, reproduction and recreational use of natural complexes and facilities of NNP "Homilshanski Forests", its territory is divided into the following functional zones: protected area; regulated recreation area; stationary recreation area; economic zone (Fig. 2). A protection zone is created around the territory of the NNP in the manner prescribed by law.

The total area of the protection zone is about 6,700 hectares.

Within the protection zone there are several areas that complete the formation of the park area within the watersheds around the park, which will ensure the migration

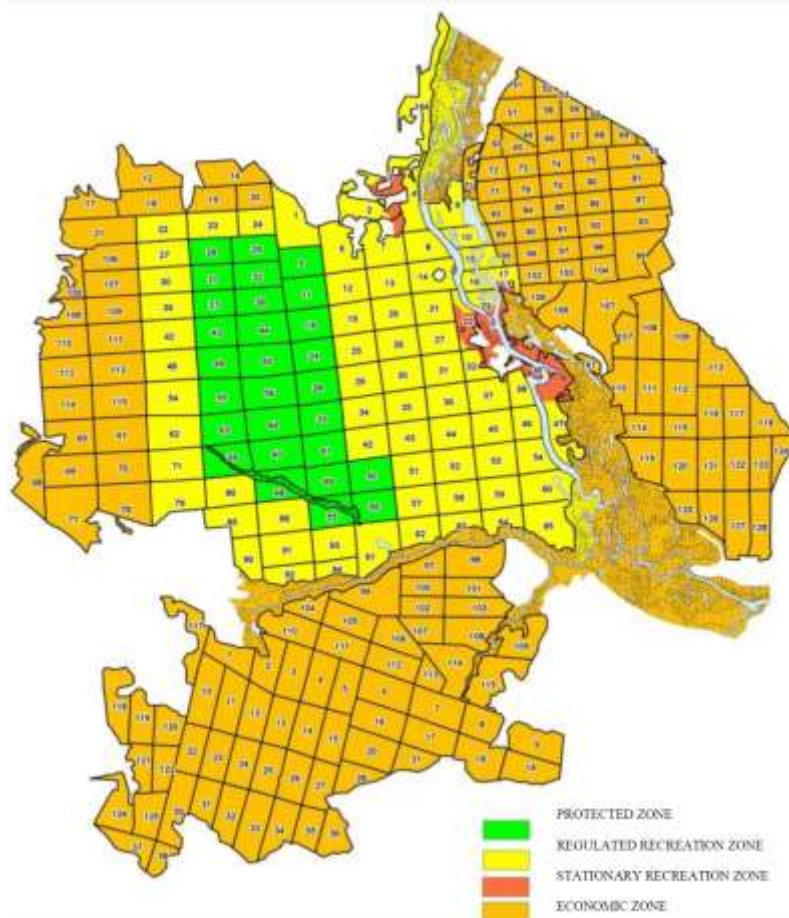


Fig. (2). Perspective scheme of functional zoning. NNP "Homilshanski forests".

of substances with surface runoff, the direction of migration that depends on the direction of slopes and features of watersheds and watersheds (Fig. 3).

To ensure the necessary protection of natural complexes and NNP facilities, to prevent the negative impact of economic activities in the adjacent territories, the construction of industrial and other facilities, the development of economic activities that may lead to negative impacts is not allowed. Environmental protection measures are carried out on the basis of ecological expertise, which is carried out in the manner prescribed by the legislation of Ukraine.

Sozological characteristics of the functional zones of the park. The vegetation of the Homilshanski Forests National Park is dominated by forest syntaxons, which testifies to the high scientific value of this territory. The presence and significant distribution of indigenous forests give it special sociological significance. These groups were formed in optimal conditions for these cenoses and develop for a long time almost without human influence. Indigenous forests have a complex stand structure. In the first tier next to the common oak grow common ash (*Fraxinus excelsior* L.), rarely maple (*Acer platanoides* L.) and heart-shaped linden (*Tilia cordata* Mill.), In the lowlands, where high soil

moisture, aspen appears tremula L.). The undergrowth is dominated by common hazel (*Corylus avellana* L.). Typical immoral species predominate in the herbage: hairy sedge (*Carex pilosa* Scop.), Lanceolate aster (*Stellaria holostea* L.), common primrose (*Aegopodium podagraria* L.), fragrant butterbur (*Galium odoratum* (L.) Scop.), Etc.

To determine the age structure of the native stands of the oak forest within the proposed functional zones of the park, the following age categories of these stands have been established: Category I - age of stands 100-120 years; II category - age of stands 121-140 years; Category III - age of stands 141-150 years; IV category - the age of stands over 150 years (Table 1).

The range of age categories proves that most of the most valuable stands are concentrated within the protected area. These are category IV forests (over 150 years old), almost half of their area is located in a protected area. Category III forests (age 141-150 years) occupy an area of 194.7 hectares in the protected area or 12.8% of the total area under the native forests of this zone. 32.4% of category II stands (age 121-140 years) and more than 38% of category I forests (age 100-120 years) grow in the protected area.

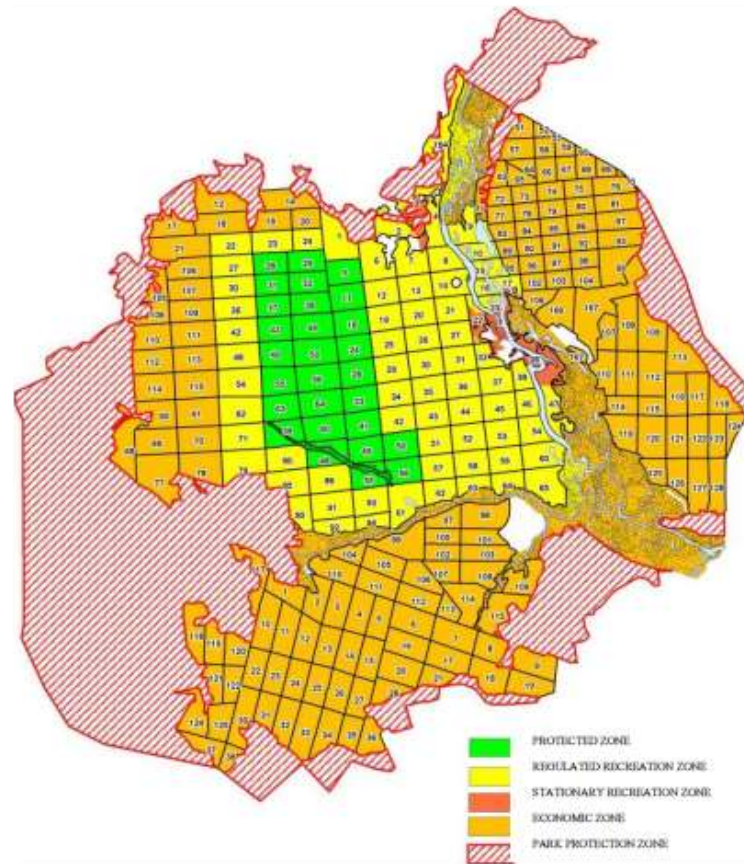


Fig. (3). The scheme of the protection zone of NNP "Homilshanski forests".

Table 1. Age Categories of Indigenous Stands of Oak Forest in the Vegetation of Functional Zones of NNP "Homilshanski Forests".

Functional zones	Age Categories of Indigenous Stands									
	I – 100-120 y.		II – 121-140 y.		III – 141-150 y.		IV – more than 150 y.		Total	
	Area		Area		Area		Area		Area	
	ha	%	ha	%	ha	%	ha	%	ha	%
Protected	485,3	31,90	261,6	17,19	194,7	12,8	27,3	1,79	968,9	63,7
Regulated recreation	604,4	46,08	615,2	46,90	20,3	1,54	71,6	5,45	1311,5	61,38
Stationary recreation	89,0	40,19							89,0	40,19
Economic	94	28,06	192,1	57,36	48,8	14,57			334,9	20,95
Total	1272,7	56,95	807,3	28,11	212,4	10,07	98,9	4,85	2704,3	49,37

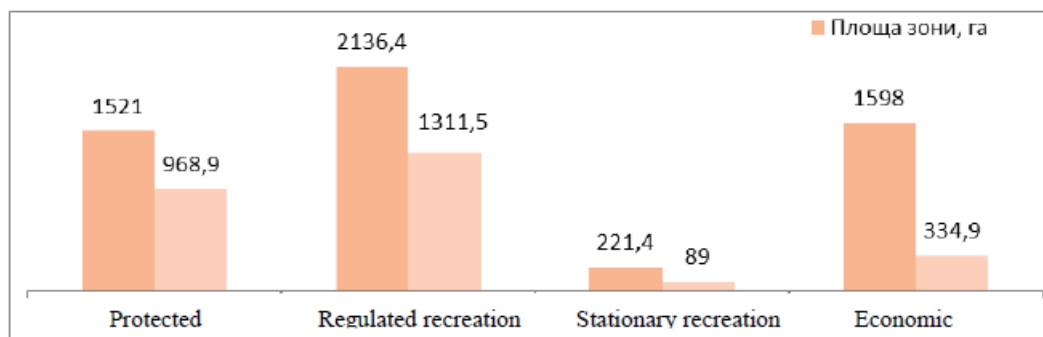


Fig. (4). The ratio of the area of indigenous forests within the functional zones of NNP "Homilshanski forests".

The data in Table 1 and the histogram (Fig. 4) show that within the zones of protected, regulated and stationary recreation and economic about half of the area (49.37%) is covered with native stands. On the territory of the projected protected zone, the native stands grow by 968.9 ha, which is 63.7% of the total area of this zone. And in the territories of the projected zones of regulated and stationary recreation the native stands cover 61.38% and 40.19% of their total area, respectively.

When planning the functional zoning of the NNP territory and establishing the boundaries of functional zones, one of the important criteria is the preservation of phytocoenotic diversity of vegetation and especially the presence and distribution of typical and rare plant groups listed in the Green Book of Ukraine. Analysis of the syntaxonomic composition of the vegetation of the NNP showed that the following rare phytocenoses included in the Green Book of Ukraine are widespread in the vegetation cover of this territory:

- 30. Syntaxon: a group of associations of oak forests from common Tatar maple - *Querceta (roboris) acerosa (tatarici)*;
- 32. Syntax: a group of associations of oak forests from common hazel oak - *Querceta (roboris) corylosa* (Typical groups);
- 37. Syntaxon: associations of linden-oak and maple-linden-oak coniferous forest - (*Tilieta (cordatae)* - *Quercetum (roboris) aegopodiosum*, *Acereto (platanoidis)* - (*Tilieta (cordatae)* - *Quercetum (roboris) volosiotosum* and *cordatae)* - *Quercetum (roboris) caricosum (pilosae)*, *Acereto (platanoidis)* - *Tilieta (cordatae)* - *Quercetum (roboris) caricosum (pilosae)*);
- 39. Syntax: associations of mixed oak forests from common yeast oak - *Mixeto-Quercetum (roboris) alliosum (ursini)*.

Park protection zone. The designed boundaries of the park do not coincide with the natural boundaries, ie with the boundaries of the catchments that exist around the park, so the designed area of the park can not provide maximum opportunities for self-regulation of natural complexes included in the park.

The purpose of creating a protection zone is to promote independent self-regulation of the state of natural complexes and objects both around the park and in the park itself as a whole and to prevent the negative impact of economic activities in the areas adjacent to the park.

The territory of the park is surrounded on all sides by agricultural lands, mostly plowed, under agricultural crops, with pastures and hayfields on the slopes of the beams.

4. CONCLUSION

The land zoning project is impossible without the use of modern geo information technologies. GIS provide opportunities for creating the necessary cartographic support in the implementation of the land zoning process. When implementing land zoning, it is necessary to take into account: the analysis of the legislative, regulatory and technical and in-

formation base, in compliance with the requirements of regulatory and regulatory and technical acts that regulate the implementation of effective state management, use and protection of land. Therefore, the development and comprehensive implementation of geoinformation technologies in land and environment monitoring in general is a driving force in the implementation of environmental protection policy, and will contribute to the development of scientifically based management decisions, the creation of safe conditions for human life, forecasting and prevention of environmental crises.

Functional zoning of NNP "Homilshanski Forests" is an important prerequisite for its further development, conservation of biodiversity and rational use of nature. Given the current state of forests and the nature and level of recreational use of NNP ecosystems, the zoning of its territory should be aimed at optimizing management, and in the future the leading direction will gradually become recreational. The advantage of the proposed scheme is the significant differences in the ratio of areas of functional areas in accordance with international requirements, and their boundaries are consistent with the boundaries of the natural territorial complexes, which allows them to be fully protected and rationally used.

The data obtained during the research will be used in the future to assess the state and dynamics of bioproductivity in the functional areas of the park's forests, which will be a significant contribution to both the conservation of the region's unique biodiversity and solving environmental problems.

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