Transport network development of the Yamal municipal district on a landscape and ecological basis

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Abstract. The sustainability of the Northern territories is characterized by a number of features expressed by the climatic and economic conditions that have determined the coexistence of two diametrically opposite types of nature management: traditional nature management and subsoil use. It determines directions in the field of rational organization of the use of land (natural) resources, which requires an integrated landscape and ecological approach. The key element of this process is the accumulation of current views, principles, and methods of several areas of activity that provide planning for the development of the territories. This refers to land management and territorial planning.

1. Introduction

The organization of the rational use and protection of land resources and the environment of the Northern Territories is considered a priority in the development of the Yamal municipal district in the conditions of industrial development of its territory [1-3, 6, 11].

According to the theoretical principles of classical land management, the rational organization of lands ensures their full, correct and effective use, while preserving the prevailing traditional nature management and feed base for the main area of activity - reindeer husbandry [7, 10, 13].

In accordance with the territorial planning of the development of municipal districts, its spatial and territorial organization is of particular importance [12].

Based on the concept of sustainable development of territories, the prevailing Russian experience in land management and environmental management, a comprehensive analysis of the condition and use of land resources of the Yamal municipal region is required [1, 2].

In this regard, the aim of the study is to develop the provisions of spatial and territorial organization of the Yamal municipal district in the rational use of its natural (land) resources based on the results of a comprehensive analysis of their condition and use.

2. Methods

The research methodology includes the following objectives:

1. Study of the theoretical foundations of land management and territorial planning in the field of planning and organization of land use.

2. Establishing the significance of the land management approach and territorial planning for the formation of sustainable development of the municipal district based on the rational organization of the use of its land resources.
3. Analysis of the conditions that form the use of land resources of the Yamal municipal district and affect their condition.

4. Implementation of the analysis of traditional nature management and the ecological state of the land resources of the municipal district.

5. Development of the purpose and content of the spatial and territorial organization of the Yamal municipal district.

The following scientific methods were used in the development of key provisions: abstract-logical, structural-logical, induction and deduction, and modeling.

Today, practice shows that in the scheme of territorial planning of the Yamal municipal district of the Yamal-Nenets Autonomous Area, the placement of zones of various types of engineering (industrial) development is carried out at the expense of significant areas of forest land, which on the one hand leads to a reduction in this category of land, and on the other hand to damage of the natural resource potential. It refers to the placement of oil and gas facilities that cause the degradation processes far beyond the construction sites. Despite this, the territorial planning materials (in terms of justifying design decisions) do not provide a proper analysis of the actual land use planned for engineering development, as well as an analysis of possible environmental risks and their impact on the integrated development of the territory, which confirms the relevance of this study.

3. Results and discussion

Issues of rational planning and organization of land use are considered in the scientific works of such scientists as A. A. Varlamov, V. V. Vershinin, S. N. Volkov, S. A. Galchenko, E. B. Dopiro, T. A. Yemelyanova, N. I. Kresnikov, S. A. Lipsky, P. F. Loiko, A. S. Mindrin, A. A. Murasheva, Yu. M. Rogatnev, V. A. Likhachev, Z. F. Kochergina and others.

In our opinion, urban planning documentation and land management projects alone are not enough to regulate land use in the municipal area, since each of these areas has specific goals, objectives, design objects, and a complex of works [11]. Therefore, to streamline and organize the rational use and protection of land in the municipal district, to make it possible to have a unified land policy on the territory of the Yamal municipal area, it is necessary to adhere primarily to the principles of environmental and land management and, on this basis, make adjustments to the structure and content of the territorial planning scheme [3, 4, 9].

In the study of the parameters of the spatial and territorial model of the municipal district, in assessing the condition and use of land resources of the Yamal municipal district, a landscape-ecological approach was used, according to which it was established that the spatial-territorial model is characterized primarily by a natural ecological framework formed by a specific type of Arctic, coastal, marine climate, which is characterized by a low amplitude of temperature changes, colder and shorter summers, mild winters compared to the continental climate of tundra areas that are far from the sea [5, 6, 12].

The natural ecological framework differs from ecological-economic frameworks, in which, along with natural elements, artificially created ones are formed, such as: green protection zones, protection zones of oil and gas fields, territories of tribal communities, areas of especially valuable highly productive reindeer pastures, areas of special reserve pastures for the purpose of determination of the possible functions of the natural-territorial complex of the region regarding the sustainability of its development [5, 6, 7, 8, 11].

When analyzing the natural-ecological framework of the Yamal municipal district, the following requirements were taken into account:

1. The best possible ratio of structural elements of the framework.
2. The principles of placement and interaction of its structural elements.
3. The parameters of the equilibrium state of the framework elements.
4. Ranking of the degree of ecological balance of the territory of a municipal district that can withstand negative physical, geographical and anthropogenic factors characteristic of the territory under study [3, 6, 11].
The structure of the natural and ecological framework of the district includes the following functional elements: cores, nodes and corridors. The nodes of the frame are natural complexes of tundra, forest-covered territories, within which, due to their size and a certain level of biodiversity, natural processes
occur that stabilize the ecological situation in larger territories, as well as water bodies (lakes), their coastal strips and swamps. The hydrographic network and coastal strips act as corridors, and it is possible to include environmentally friendly ecotones [3, 6, 7, 11].

The calculation of the coefficient of ecological sustainability of the district territory was performed according to the methodology adopted in this work for eight landscape-ecological areas of the Yamal municipal district and the following factors: the specific weight of specially protected territories, industrial development (Figure 2).

**Figure 2 (a, b, c).** Factors for assessing the environmental sustainability of a municipal district.

1. The largest proportion of specially protected territories relative to the area of the landscape-ecological area in the first and fifth districts is, respectively, 100% and 59.8%. As for the third district, the share of these territories is 31.5%, in the eighth – 15.1%, and in the second – 2.0%.

2. Industrial development is characterized as follows: in the second landscape and ecological district it covers 25.2%, in the third – 19.8%, the fourth – 11.3%, the fifth – 5.2%, the sixth – 30.4%, the seventh – 31.7%, and in the eighth – 22.5% of the territory.

Based on the analysis of the formation, development, use and condition of land and natural resources of the Yamal region, when calculating the coefficient of environmental sustainability of its territory, it is proposed to introduce correction decreasing coefficients reflecting: anthropogenic impact (Cai) on land resources and the manifestation of the structural-tectonic factor (Cstf), causing geodynamic processes.

The coefficient of environmental sustainability was 0.258, so 25.8% of the territory of the studied municipal district is provided with environmental sustainability. This result confirms the need to develop a set of measures to improve the organization of land use in the spatial-territorial model of the district.
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4. Conclusion
A comprehensive analysis of the state of land resources and lands allows us to make a number of recommendations on improving the production material of the spatial and territorial organization of the studied area:

1. Organization of the agricultural use subzone: deer pastures represented in the intensive use zone (northern and central parts of the region) are characterized as limited-favorable feeding grounds, the ecological sustainability coefficient of these territories is low and amounts to 0.15. Moreover, this territory is in the zone of technogenic impact and active geodynamic processes.

When making this decision, it is first necessary to:
1) Organize the use of reindeer pastures in compliance with a number of requirements, primarily related to the normalized grazing of deer; the preservation of seasonal pastures, which will speed up the process of restoring yagel feed. To this end, it is proposed to resume the development of land management and, first of all, reindeer husbandry enterprises on the basis of the results of a comprehensive survey of feeding lands and the factors of technogenic and anthropogenic impact on them. The results of the development should be included in the implementation of the spatial organization of the district.

2) Propose, as a second option for organizing the use of reindeer pastures, the use of a corral type of deer keeping, which allows (in the opinion of Russian scientists) restoration of the yagel feed and planning the production of additional reindeer herding products (as an option).

2. Organization of a tourist and recreational zone, the development of which is not limited to specially protected territories, objects of cultural heritage, and covers an industrial development zone, territories of limited favorable pastures, which violates the criteria for choosing potentially suitable territories for organizing tourist and recreational use. In this regard, it is proposed to assess the variability of landscapes in the tourist and recreational use of land, as well as a comprehensive study of potentially suitable territories for the organization of tourist and recreational use [7].

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