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# On rational nature management and environmental policy in the Krasnoyarsk Territory

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**Abstract.** This article presents the results of the study of problems of rational nature management and state environmental policy in the Krasnoyarsk Territory. The study defines the concept of "rational nature management", characterizes and analyzes in detail all the constituent elements of rational nature management, reflecting the essential content of this phenomenon and determining the relationship of its elements and their essence. Moreover, the issues of the implementation of each element in practice in the territory of the Russian Federation are analyzed, the problems of functioning of all the elements are presented, and the ways of solving these problems are indicated. The paper also provides a brief description of the features of the Krasnoyarsk Territory as a region of the Russian Federation. Additionally, it analyzes in temporal dynamics the data on the influence of various spheres of economic activity of the Krasnoyarsk territory on the surrounding natural ecosystem, allowing to identify the main economic areas that require introduction of technologies for rational nature management, resource-saving technologies and environmental measures. Moreover, the study outlines the prospects for further development of the policy of rational nature management and protection of the environment and natural riches (resources).

## 1. Introduction

The relevance of the research topic is determined by modern trends in the development of human society and the state as a governing system for this society, since population growth and burgeoning needs of society often negatively affect the environmental sphere and natural resources. Rapid growth of cities, high rates of consumption of available resources and riches of the ecosystem force society to look for ways to use available natural resources rationally, ensuring their reasonable extraction, storage and consumption [1].

An increasing number of researchers [2],[3] of environmental problems come to the logical conclusion that consumerist attitude to nature and its resources and riches leads to the destruction of ecosystems and can cause the death of mankind, since the available resources will be consumed in a short period and can not be reproduced in a natural way.

Accordingly, many scientists are wondering how to ensure high rates of human development, economic growth and well-being of states and their people, and at the same time preserve and, in some cases, multiply valuable nonrenewable natural resources and riches, as well as preserve ecosystems suitable for human habitation.

Moreover, it should be noted that in the Russian Federation the problems of rational nature management are a priority for the state. The territory of the Russian Federation is quite extended and



includes various regions with different natural, climatic, and environmental conditions that determine the specifics of the state environmental policy in each territory.

It is for this reason that the consideration of issues of nature management and environmental policy in the territory of such a region as the Krasnoyarsk Territory seems very important and relevant, since this region has a special economic and geographical position determined by complex natural and climatic conditions and a significant distance from the central economically developed regions of the country.

## **2. Purpose of the study**

The main purpose of our research is to consider the problems of rational nature management and environmental policy, which are implemented in the Krasnoyarsk Territory.

## **3. Research questions**

The study will provide answers to the following questions:

- Which factors and conditions should be taken into account in the process of rational nature management; what is the meaning of the term "rational nature management"?
- Which constituent elements are included in the scope of the concept of "rational nature management"?
- What tasks and problems do the regional authorities face in ensuring rational use of natural resources in the Krasnoyarsk Territory?
- What measures for rational nature management are being implemented in the Krasnoyarsk Territory; how does the state, represented by regional authorities, participate in this process?
- What are the tasks and prospects of rational nature management in the Krasnoyarsk Territory, as well as in the territory of the Russian Federation as a whole?

## **4. Research methods**

Research methods used during the work:

In our research, we applied theoretical methods of systemic, logical and comparative analysis of scientific literature, analysis and comparison of the results of rational nature management in the Krasnoyarsk Territory.

## **5. Results and discussion**

Starting to discuss the results of our study, it is necessary to define the very concept of "rational nature management". We share the opinion of researchers [4],[5] who believe that rational nature management is a process of constant systemic interaction with the natural environment, which ensures further renewal of natural resources, prevents degradation and destruction of natural ecosystems, as well as significant irreparable damage to natural complexes, forming the possibility of permanent, unlimited use of the relevant natural area.

It should be understood that rational nature management is impossible without employing scientific approach, scientific and technical developments and research in this area.

Effective, efficient and careful interaction with the natural environment is possible only based on innovative approaches [6], which allow to calculate with digital accuracy all possible consequences of the extraction, storage, processing, and use of natural resources consumed by our society.

Rational environmental management includes several important constituent elements that reflect its essential content.

For instance, one of the most important elements of rational nature management is ecology [7], considered in the context of this research as a system of ecological foundations of interaction with the biosphere, which allows to guarantee preservation of nature without damaging its resource base.

In this regard, environmental standards (requirements) allow for a certain degree of negative stress, associated with consumption of natural resources by human society, taking into account the

capabilities of ecosystems and organisms, while preserving their properties and ability to further exist, as well as reproduce subsequently.

And, accordingly, violation of environmental standards (requirements) leads to irreversible degrading processes in the natural environment, which can cause both complete death of the ecosystem and its degeneration, changing it in a negative direction.

Environmental requirements are developed and established by each state independently. However, it is important to understand that the more developed the state is, the more significant resource base it has, and, accordingly, it becomes able to implement more stringent environmental standards (requirements) within its territory. And vice versa, the less resources the state has for meeting high requirements for environmental management, the more irrationally it uses its natural resources and bases.

In the Russian Federation, for example, the maximum permissible concentrations of pollutants in the atmosphere, soil, water, etc. (further abbreviated as MPC) are established, the observance of which is carried out jointly at the federal, regional, and municipal levels of government.

At the same time, we consider it necessary to note that the MPC regulations are not a perfect environmental tool, since they do not take into account the moment of accumulation of harmful pollutants in the natural environment, and are determined without taking into account the geographical, climatic and other natural features of each specific region of the Russian Federation.

In general, completing the analysis of this structural element of rational nature management, we should note that environmental standards (requirements) should be scientifically substantiated, taking into account the specifics of each natural zone, ecosystem of a particular territory.

Another important component of rational nature management is technology as a process of improving the technical means of extraction and processing of natural resources, through which direct interaction with the environment is carried out.

In this regard, we would like to note that initially technological progress moved exclusively along the path of the fastest, less labor-intensive extraction of natural resources in increasing volumes, without taking into account the consequences for ecosystems. If any actions to restore or minimize the damage were taken, they were often situational, haphazard in nature and based on a persistent sense of society that the goal (economic benefit) justifies the technologically imperfect means. Moreover, all the measures were taken to deal with negative consequences that had already occurred, and not with their causes.

It is important that this element of rational nature management closely interacted with environmental rules (requirements), i.e. due to the development of innovative technologies, entities involved in the process of consumption of natural resources should be able to ensure compliance with environmental rules (requirements).

The third component, even the basic element, of rational nature management is economic feasibility.

Currently, the content of this element has changed significantly. Previously, only direct economic benefits from the extraction and consumption of natural resources were calculated, but now economic profits from the implementation of measures of environmental protection are taken into account, deducing economic losses from indirect and direct medium- and long-term negative consequences.

In other words, a comprehensive approach to determining the economic feasibility of any process of extraction, processing, storage, and consumption of natural resources, which includes not only indicators of profitability, labor, time, etc., but also the costs of preserving the natural ecosystem, as well as revenues from environmental activities, etc., is promising from the point of view of rational nature management.

The next structural element of the system is the process of management and regulation of nature management, one of the essential components of which is the legal provision of rational nature management [8].

Thus, it is possible to ensure fulfillment of economically and scientifically based environmental requirements (rules), to mandate the use of appropriate resource-saving and environmental

technologies in production only through legal regulations provided by the coercive force of the state at all levels of state power.

In addition, regulatory legal acts in the field of rational nature management should be developed and function on the basis of carefully scientifically grounded environmental requirements, innovative and promising technologies for extraction, processing, storage and use of natural resources that are economically feasible for application, and not declarative, outlinear in nature [9].

In addition to the regulatory framework for rational nature management, it is necessary to debug the mechanism of law enforcement, which will facilitate correct and competent implementation of laws in the field of environmental protection and rational nature management, ensuring inevitability of legal responsibility for non-compliance with the regulations and rules established by the state.

The fifth element of the rational nature management system is monitoring of the state of the environment as an objective indicator of the effectiveness of measures and the process of rational interaction with ecosystems [10].

There are many types of monitoring [11], for example, geochemical, geographical, biological, ecological, etc.

We believe that all types of monitoring are quite important, but we distinguish among them environmental monitoring in particular, which allows us to systematically monitor the degree and consequences of the negative impact of anthropogenic factors on the ecospheres of various territories. Sometimes some researchers call it geocological monitoring [12].

Thus, we believe that environmental monitoring and state environmental control are important components of rational nature management. They facilitate collection and analysis of information on the state of the environment in each specific territory of the Russian Federation, ensure storage of this information for subsequent comparative analysis by time periods, and also allow to understand in which direction a particular ecosphere is developing, whether environmental measures are effective in each individual region, and what measures for rational nature management should be introduced within specific natural zones.

Another element of rational nature management is environmental education of the population, increasing environmental literacy and proficiency, including through educational events on the subject. This element facilitates formation of a careful, caring, respectful attitude to the environment from an early age, and in the future should allow the majority of members of society to understand the exhaustibility of natural resources and the need to preserve them for future generations on a mass scale.

We believe that all elements of rational nature management have a value and effective function only in their totality and cannot provide proper results with separate accounting and use.

Having considered the constituent elements of the phenomenon under study, we proceed to the analysis of issues of rational nature management in the Krasnoyarsk Territory, a region of the Russian Federation. Such an analysis will allow us to clearly demonstrate how interaction with the natural environment is carried out at the regional level, how rational nature use is facilitated by the state.

It should be noted here that the Krasnoyarsk Territory has rich and unique reserves of fuel and energy and mineral resources, which naturally directs the development of economic activity towards the extraction of such natural resources. In addition, 70% of the landmass of the Krasnoyarsk Territory is occupied by forests, respectively, the forest fund of the region is 160 million hectares. At the same time, to ensure the extraction of minerals, logging requires a developed infrastructure, a sufficient amount of labor resources, etc. All this, of course, contributes to the growth of urban settlements concentrated in places of extraction and processing of natural resources. This, in turn, cannot but affect the ecosystems of the Krasnoyarsk Territory [13].

Taking into account the above, we propose to consider the impact of certain spheres of economic activity on the state of the environment of the Krasnoyarsk Territory.

For example, figure 1 demonstrates the dynamics of the volumes of emissions of pollutants into the atmosphere from stationary sources by types of economic activity in the Krasnoyarsk Territory.



**Figure 1.** Volumes of emissions of pollutants into the atmosphere from stationary sources by type of activity in the Krasnoyarsk Territory, 2019 and 2020, in thousand tons.

As can be seen from the data in figure 1, emissions into the atmosphere have increased significantly (more than 3 times) from such economic activity as mining, more than 2 times from transport and communications, as well as operations with real estate, rent, and provision of services, there is also an increase in emissions from the generation and distribution of electricity, gas, and water; the decrease is noted only in the sphere of processing and in agriculture, hunting, and forestry.

The economic life of the Krasnoyarsk Territory has an impact not only on the atmosphere, but also on the water resources of the region. The data reflected in Table 1 clearly demonstrate the situation.

**Table 1.** Main indicators characterizing the impact of economic activities on water bodies of the Krasnoyarsk Territory in 2019 and 2020.

Types of economic activity	Fresh water withdrawn, mln m <sup>3</sup>		Wastewater dumped into surface water bodies, mln m <sup>3</sup>	
	2019	2020	2019	2020
Generation, transmission and distribution of electricity, gas, steam and hot water	1 481.1	1 362.4	1 183.3	1 088.9
Processing	172.2	188.4	126.7	135.5
Mining	179.6	180.9	62.2	63.4
Transport and communication	1.6	1.0	1.6	1.6
Agriculture, hunting and forestry	5.9	8.8	7.0	6.7

As can be seen from the above figures in the Table 1, the leaders in the wastewater dumping into water bodies are such areas of the economy of the Krasnoyarsk Territory as the generation, transmission and distribution of electricity, gas, steam, and hot water, processing industries, and mining: they account for more than 90% of dumping.

Thus, we can state that such economic spheres as mining, processing, generation, transmission and distribution of electricity and gas are in particular need of the introduction of rational nature management (all its constituent elements described above) and state environmental control.

In this regard, the question arises as to how the regional state policy in the field of rational nature management and environmental protection is implemented.

It should be noted here that a separate ministry deals with issues of rational nature management, the Ministry of Ecology and Rational Nature Management of the Krasnoyarsk Territory.

This ministry carries out regional state environmental supervision. This ministry implements all its activities in accordance with the Federal Law of 10.01.2002 No. 7-FZ "On Environmental Protection".

The main problem implemented by the Ministry is to provide public authorities, local government bodies, individuals (citizens), and legal entities with legislation in the field of environmental protection and environmental safety of the Krasnoyarsk Territory.

It should be noted that the Ministry maintains a register of objects of negative impact in the Krasnoyarsk Territory, in which 3 676 objects are registered as of 2020. We should mention that in 2019–2020, the number of objects registered in this register has grown significantly, just in 2020 the increase was 499 objects.

Inspection activities of both planned and unplanned nature, carried out by authorized officials of the Ministry, are very important. According to the results of the inspections, persons responsible for the irrational use of natural resources are brought to administrative responsibility. In addition, in 2020, 37 materials were prepared to suspend the activities of enterprises that violate environmental legislation. Most decisions on suspension are primarily due to the lack of gas purification equipment, the lack of various kinds of permits, etc.

In addition, a significant amount of measures is associated with the suspension of the activities of wood shipment points that are not registered as objects of negative influence and do not dispose of their own sawmill waste.

In addition, in 2020, 50 lawsuits were sent to the court for the dismantling of illegal emission sources.

The Ministry also supervises the protection and use of wildlife and their habitat. So only in 2020, 4 056 raid activities were carried out revealing 1 390 violations in the field of protection and use of wildlife objects.

These and many other control and supervisory measures are also implemented by other state structures both jointly and independently.

Thus, it can be stated that the state policy in the field of rational nature management in the Krasnoyarsk Territory is important and is aimed at maintaining, preserving, and restoring natural ecosystems.

However, taking into account the volume of pollution and the revealed violations of environmental legislation, it cannot be said that the state policy in the field of environmental management is exhaustive.

Accordingly, the regions of the Russian Federation, including the Krasnoyarsk Territory, still face the task of developing innovative resource-saving technologies for the extraction, processing, storage, and use of natural resources in order to preserve them, with the possibility of subsequent renewal. Environmental control and monitoring, carried out on a systematic basis, is the key and objective indicator of effective and efficient nature management.

It is the rational, careful, respectful attitude to the environment that can provide future generations with clean air, water, and soil, and will allow humanity to develop and exist in safe conditions.

## 6. Conclusions

For the Russian Federation as a whole, and for the Krasnoyarsk Territory in particular, the problems of rational nature management are one of the priority values, and great attention is paid to the issues of energy- and resource-saving technologies for extraction, processing, storage, and use of natural resources of ecosystems.

The constituent elements of rational nature management are: ecology, technology, economic feasibility, system of management and legal regulation of rational nature management, monitoring of the state of the environment, environmental education of the population. At the same time, all these elements are important and should function in close interrelation and interdependence, which will ensure effective and efficient nature management in any territory and in any region.

It is necessary to understand that rational land use should take into account all the features of each specific region, the particulars of environmental systems existing in each individual territory, for the most rational extraction, processing, storage, and use of available natural resources.

In the Krasnoyarsk Territory, interaction with the environment is quite intensively carried out due to the presence of unique reserves of fuel, energy and mineral resources, as well as forest resources. This causes a rather serious negative anthropogenic impact on the environment [14], which increases the need and importance of rational nature management in such areas of economic activity as mining, processing, generation, transmission, and distribution of electricity and gas.

The state policy of the Russian Federation and the state regional policy of the Krasnoyarsk Territory in the field of rational nature management have multileveled and multifaceted nature [15] for the maximum preservation of natural resources and ecosystem resources.

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