Regional forest management in the Volga Federal District: trends and prospects

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Abstract. In the 21st century, it is difficult to overestimate the importance of forest resources. Every year the role of forests as the ecosystem is growing due to the settlement of the technogenic impact of domestic industry on the environment. Today, in regions where the forest is the raw material base of the forestry complex, a place of employment of the local population and a source of replenishment of the budget at various levels, it is important to conduct a comprehensive analysis of forest management in Russia and develop a strategy for socio-economic development of the use of forest resource potential to improve the well-being of the local population and ensure the ecological and economic balance of the territory on this basis.

The article reveals the trends of regional nature management on the example of the Volga Federal District. It is shown that especially negative trends are manifested in the fight against forest damage and fires, protection of forests from pests and diseases, preservation of forest biodiversity, their social and ecosystem functions. The issues of changing the structure of reforestation and the resulting problems of forest management are disclosed. Measures are proposed for the effective implementation of an intensive model of forestry management.

1 Introduction

Global changes in the conditions of the natural habitat, the increase in the consumption of forest resources require special attention to the reproduction of forests.

An important reason for the current deterioration of forests in Russia are miscalculations in forest restoration and afforestation due to insufficient consideration of environmental factors (climatic, soil, hydrological) and their impact on forest plantations.

As a result, economic activity in recent decades has been characterized by a decline in productivity and loss of biological stability of artificially created forest crops, weakening of their ecological, social and resource functions. Forest restoration and afforestation are considered in many scientific papers, modern technologies for creating forest crops, instructions, manuals, and the like are offered et.al. [1,2,3].
Currently, the issue of effective land exploitation and rational use of forest resources is acute. The multidimensional significance of forests in modern conditions is becoming particularly relevant. The general characteristic of protective plantings becomes ineffective, since the forests of each protective category have only their characteristic features in composition, structure, forestry and taxation indicators and the time of environmental impact. The increase in their ecological productivity is primarily due to the species composition of forests, however, the methodological foundations for the reformation of soft-leaved plantations into coniferous ones have been developed not enough. The state of the reforestation process under the influence of intermittent logging is rarely analyzed. Even less work is devoted to the effectiveness of the functions performed by protective forest plantations. In this regard, the development and implementation of more effective methods and methods of their reproduction and use in low-forest areas according to the target function are relevant. [4,5]. The forests of Russia, occupying a quarter of the world's forest cover and being one of the renewable natural resources, satisfy the multiple needs of the economy and society for forest resources, perform the most important environmental, environmental protection and other useful functions. Forestry activities are carried out mainly in boreal forests, which occupy about 65 percent of the forest area and grow in a harsh climate, which causes its relatively low productivity, low marketability of stands and high costs during harvesting and transportation of wood [6,7,8].

The area covered by forest vegetation is 795 million hectares (46.4% of the area of Russia). At the same time, the share of forest fund lands accounts for 97% of the forested areas (770.4 million hectares) and 2% of the lands of specially protected natural territories. Coniferous plantations (mainly larch, pine and spruce), occupying 76% of the area, predominate among the forest fund lands occupied by the main forest-forming species. Soft-leaved plantings (mainly birch and aspen) occupy 22% of the area, the rest of the territory falls on hard-leaved plantings. At the same time, it is necessary to note the extremely high proportion of larch in the composition of forests, which has limited use in the forest industry [9,10,11].

Now in Russia, an extensive way of managing forest resources prevails, or we can say «raw», when the forest is regarded as an irreplaceable resource, and enterprises are traveling ever greater distances in search of good forest areas deep into the forest. However, the experience of implementing pilot projects for the introduction of a model of intensive use and reproduction of forests in several regions of the Russian Federation has shown that the transition to intensive forest management will allow more efficient use of forest resources.

The purpose is to consider the problems of regional forest management on the example of the Volga Federal District and to justify the main targets in its development.

2 Materials and methods

The theoretical and methodological basis of the research was the scientific works of foreign and domestic scientists in the field of economic security, sustainable development, state forest management and regulation of the forest sector, strategic planning. In the course of the research, general and special methods of scientific cognition were used: abstract-logical, analysis and synthesis, and graphic. MS Office Excel and Statistica application software tools were used for statistical processing of information. GIS technologies were also used to map the results of the study.

3 Results and Discussion
The territory of the Volga Federal District is located in the central European part of Russia. The Volga Federal District includes the Republics of Bashkortostan, Mari El, Mordovia, Tatarstan, Udmurt, Chuvash; Kirov, Nizhny Novgorod, Orenburg, Penza, Samara, Saratov, Ulyanovsk regions, Perm Krai. The forest sector of the economy in it has a rich history since the time of Peter I. Forests are concentrated in the Kirov and Perm regions and in the north of the Nizhny Novgorod region. The operational forest predominates, mainly coniferous species (spruce, pine, fir), there are small-leaved forests - birch, aspen, willow, to the south - linden and oak. Too intensive exploitation for a long time has led to a significant depletion of the region's forest resources, especially conifers.

Forestry and forest management have always been regulated by normative legal acts, state policy in the field of use, protection, protection and reproduction of forests, determined by economic, natural and geographical conditions. In populated regions, as a result of the reduction of forest resources due to extensive forest exploitation, the importance of forests is increasing not only as a raw material resource, but also the consumption of ecosystem services. The problems of multi-purpose rational sustainable use of forests under state ownership of forests and private entrepreneurial form of management (forest business) have worsened during the transformation of the socio-economic system of Russia in the transition to market conditions.

The forest cover of the territory of the subjects of the Russian Federation – the regions of the Volga Federal District is characterized by extreme unevenness of forest distribution, the provision of the population with forest also differs sharply. The analysis of the forest cover of the territories showed that a large proportion of forests on the territory of the subject of the Russian Federation in the Perm Territory, the Kirov Region, the Republic of Mari El are multi-wooded areas. Regions with medium forest cover: Chuvash region, Ulyanovsk region, Republic of Mordovia, Republic of Bashkortostan, Penza region. Sparsely wooded areas: Saratov region, Samara region, Republic of Tatarstan, Orenburg region. The highest level of forest provision is in the Kirov Region and Perm Krai, the lowest level is in the Saratov, Samara, Orenburg regions.

Figure 1 reflects the change in the area of forests on the lands of the forest fund of the regions of the Volga Federal District, from which it can be seen that from 2010 to 2019, the area of forests, as a whole, increased by 245,000 hectares and soft-leaved and coniferous tree species predominate in the structure of forest areas (Figure 2), there is a significant the percentage of ripe and overgrown forests, which indicates problems in the forestry and woodworking industry of the district (Figure 3).
Fig. 1. Dynamics of changes in the area of forests on the lands of the forest fund, where forests are located in the Volga Federal District, 2010-2019.

Fig. 2. The areas occupied by various tree species in the Volga Federal District in 2019, 1,000 ha.
Figure 4 shows the distribution of timber reserves in the regions of the Volga Federal District by age composition, from which it can be seen that «young» predominate in the Perm Region, Kirov and Nizhny Novgorod regions, the Republic of Bashkortostan. There are overgrown forests in all regions of the Volga Federal District, but it prevails in the same regions.

The area of reforested forest lands, including crops and planting of forests, is maximum in the Perm Region, in the Kirov Region and the Republic of Bashkortostan. Mordovia ranks 10th in the Volga Federal District in terms of forest land area.

The analysis of the structure of the reforestation process showed that in the period from 2013 to 2019 there is an increase in the area of forest species and a decrease in the area of valuable and soft-leaved species. The areas of natural renewal during this period are also reduced [12,13]. During the same time, the planting and sowing of forests has decreased, as well as the natural renewal of forests.

Forest management requires the protection and protection of forests. In 2019, the maximum forest area covered by fires per 1 fire was registered on the territory of the forest fund of the Republic of Mordovia.

Forest fires had a grassroots character on 61 hectares and riding on 8 hectares. The highest relative burnability on forestry was noted in the stands of Temnikovsky and Kovylkinsky districts of the republic.

The main cause of forest fires remains the anthropogenic factor. In this regard, much attention is paid in the republic to fire prevention, conducting mass explanatory work among the population aimed at fostering a conscious and careful attitude to the forest. Another important reason was agricultural fires.

![Fig. 3. The age structure of the forests of the Volga Federal District in 2019, 1,000 ha.](image_url)
24 cases, it accounts for 38% of all forest fires. The maximum areas of forests were destroyed in the republic during a particularly dry summer – 2000, 2002, 2004, 2006, 2010, 2021.

Fig. 4. Distribution of wood stocks by age composition by subjects of the Volga Federal District in 2019.

Fig. 5. The area of forests covered by fires, per 1 fire in the regions of the Volga Federal District

According to experts, in order to further improve the protection of forests from fires and increase the level of ground protection, it is necessary:

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We will consider the issues of protection of the forest fund in violation of the forest legislation of the Russian Federation. In connection with the adoption of the new Forest Code of the Russian Federation on December 4, 2006, from January 1, 2007, a significant range of powers in the field of forest relations was transferred to the subjects of the Russian Federation.

The main violation of forest legislation on the territory of the Republic is illegal logging. This problem has ceased to be purely departmental; it includes illegal transportation of wood and trade in it, processing of illegally harvested wood. The analysis of the dynamics of unauthorized logging committed in the forest fund of the republic in recent years [14] shows a tendency to decrease the number of cases and volumes of violations of forest legislation.

4 Conclusion

Thus, the poor quality of reforestation works leads to the widespread process of replacing coniferous species with deciduous ones, the transfer of forest plots to forest plantations without taking into account the breed structure, the lack of further provision of restored forests with proper care. Therefore, in general, the current system of forest reproduction does not provide a balance between the areas of reforestation and forest disposal. To change the situation, it is necessary, first of all, to modernize the system itself, the approach to forestry itself, not only among the owners and managers of forest industry complexes, but also at all levels of government. As for planting material for reforestation, there are currently not enough high-quality raw materials (seedlings) on the territory of Russia, existing nurseries use old methods used since Soviet times when growing. In most cases, large logging enterprises, especially with the participation of foreign capital, purchase seedlings abroad. In addition, now the planting of forests after continuous logging for tenants is more of an encumbrance than a strategy for future development. Therefore, according to the author, it is possible to focus on the creation of plantations of accelerated growth. Plantation reforestation, focused on accelerated production of a large amount of wood, provides for a high level of use of selective planting material, intensive agricultural technology and forestry care, chemical and biological reclamation, regulation of the density of stands. The proposed cultivation of wood through plantations of accelerated growth allows you to obtain wood with the specified characteristics. Moreover, enterprises evaluate such costs as investments, the key goal of which is to ensure the raw material safety of production in the future.

The target vision of the forest complex provides for ensuring the domestic demand of Russia for the products of the forest complex. The target vision in the field of forestry provides:

- The use of selective planting material to ensure the balance of the forest fund.
- The application of advanced agricultural technology and reclamation methods to increase the efficiency of wood production.
- The regulation of the density of stands to ensure optimal growth conditions for trees.
- The use of high-quality raw materials (seedlings) for reforestation works.
- The application of modern forest management techniques to ensure sustainable forest use.

According to WWF's forecast, by 2050 the global demand for wood will increase threefold. The forests of Russia could become one of the sources of satisfaction of the increasing demand of mankind for wood. In this sense, the implementation of the project to create
plantations of accelerated growth within the framework of vertically integrated enterprises of the full forest industry complex cycle will allow obtaining wood with the necessary characteristics that meet the needs of the market in a shorter time frame, as well as reproducing forest plantations of the right quality on time, thereby ensuring the forecasted demand for raw materials.

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