

# Forest Protection as an Important Component in the Preservation of Ecology

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**Abstract:** The article deals with the problems associated with the peculiarities of modern nature management and the need for greening of production activities, according to the principles of sustainable development. The necessity of transition to a green economy that promotes the growth of public welfare and social justice while significantly reducing the risks to the environment and its degradation is pointed out. The main threats to the natural processes of climate regulation leading to global warming are identified, among which human production activities associated with greenhouse gas emissions into the environment play an important role. It is noted that forests have the greatest importance in carbon sequestration, and this is determined not only by their predominance in area, but also by the current state of forests. Today, the problem of afforestation is becoming more and more urgent, especially in Western European countries, while in Africa the problem is the reduction of tropical forests. The problem of forest conservation is also important for Russia, especially in connection with the widespread illegal logging, which, according to experts, reaches 20-30%. Therefore, the preservation of forest wealth is one of the most important areas of state policy.

## 1 INTRODUCTION

Modern nature management is considered as a megasystem of interaction between nature and society, in which the biosphere, atmosphere, pedosphere, lithosphere, hydrosphere are second-order systems for nature, and the social and economic spheres are society systems. The process of nature management means the unity of anthropogenic impact on nature and the response of nature to it.

Each stage of people's activity in nature management had its own principles. Thus, the criterion of economic efficiency until the second half of the 20th century was the receipt of material benefits. This model of environmental management, led by the "economic principle" lasted until the 60-70s of the last century. At the same time, environmental activities were distinguished by a charitable nature at the mercy of the conqueror of nature - man and were reduced to separate environmental measures. Meanwhile, man-made environmental impacts have become akin to natural disasters in their scale.

The overall goal of modern environmental

management is the greening of human activity, according to the paradigm of sustainable development, that is, bringing it into line with the developed environmental laws and regulations (Reimers, 1994). This goal includes the problems of optimizing the interaction of society and nature, taking into account the interests of future generations, the preservation and restoration of biosphere balance, meeting the needs of society for natural resources based on their rational use, protection and reproduction, conservation of biological diversity, creation of a healthy habitat for people.

## 2 MATERIALS AND METHODS

In the course of this scientific research in the field of the development of environmental protection and the green economy, the works of well-known both Russian and foreign scientists interested in the problems of modern nature management were used.

Thus, according to Reimers N.F., the greening of modern production and bringing it into compliance with the adopted environmental laws and regulations

should be the goal of modern environmental management.

Kiryushin V.I. points out the high importance of forests in the modern practice of creating an ecological framework, based on the various ecological and socio-economic functions they perform, including maintaining the composition of air in the atmosphere.

As noted by Vasilyuk A., Kolomyshch G., the creation of forests on upland lands is a very complicated and difficult task, due to the contradictions of the aborigine and the newcomer.

According to Yanitskaya T.O., in Russia it is important to solve the problem of degradation of exploited territories, since an extensive approach with the use of mostly clear-cutting prevails in forestry, which does not contribute to the development of forest growth processes in young forests.

In the works of Kulik K.N., the essence and content of such a category as the forest-agrarian system is defined, presented as a combination of the territories of forest plantations with flora, fauna and population located on it.

The replacement for the extensive model of forestry management, according to Romanyuk B.D., should be an intensive forestry model based on high-quality reforestation, with less loss of forest resources during forest fires, from diseases, pests and directed against illegal use of forest wealth.

During the work on this article, such scientific methods as functional analysis, statistical analysis, comparative analysis, as well as methods of positive and normative analysis were used. The scientific research was conducted in accordance with the problem-chronological principle, the principles of consistency and scientific objectivity.

### 3 RESULTS AND DISCUSSION

In Rio de Janeiro, within the framework of the UN conference "Rio+20" in June 2012, a declaration entitled "The future we want" was proclaimed, which marked the transition to the development of a green economy, the goal of which is to increase the well-being of people, social justice while reducing emerging risks for the environment and the processes of its degradation. The conference addressed issues related to the importance of economic systems in modern environmental management, which should be aimed at preserving natural resources, while balancing the needs for growth and fair use.

Biogeophysical functions and mechanisms play an essential role in climate regulation, including:

regulation of energy flows observed between the Earth's surface and its atmosphere in the form of albedo, heat flows, wind speed; reduction of wind strength by vegetation and damage from hurricanes and storms; regulation of moisture flows between the surface and the atmosphere in the form of influence on cloud formation processes, the amount of precipitation.

Biogeophysical climate-regulating functions of ecosystems can have a strong influence on the climate at the regional and global levels. The main threats to the natural processes of climate regulation are: inadequate forest management strategies, unauthorized logging and forest fires, burning of steppes, drainage of peat bogs and peat fires, extensive agriculture with excessive tillage and low yields, irrational use of fertilizers. At the global level, these problems are complemented by many others, but the heavy "breathing" of industry, energy and other types of management associated with greenhouse gas emissions is particularly harmful.

The main climate changes result in global warming, when the average annual temperature on the planet increased by about 0.8 °C in the period from 1880 to 2010 and 2/3 of this warming occurred after 1975, since then its growth rate has reached 0.15–0.2 °C in a decade (Pachauri, 2007). An increase in atmospheric temperature by 2 °C is considered as a tipping point, after which the change will be catastrophic. This value has been adopted as a guideline in the framework of international climate policy. On Earth, according to the Intergovernmental Panel on Climate Change, from 20 to 30% of all available species of flora and fauna may disappear with an increase in the average temperature of its atmosphere by 1.5–2.5 °C (Pachauri, 2007).

According to the majority of scientists dealing with this problem, the negative climate change is largely affected by the production activities of the society, leading to greenhouse gas emissions. And although there are experts who do not consider production to be the main cause of warming, the presence of a consensus that assigns great importance to the anthropogenic factor in the ongoing changes on the planet is not excluded.

Forests make the greatest contribution to the carbon sequestration, which is due not only to the predominance in area, but also to the current state of forests. Forests in the modern practice of creating an ecological frame of the territory (EFT) are considered as a basic category by the number of ecological and socio-economic functions that they perform in these frameworks:

- ensuring biodiversity;

- maintaining the composition of air in the atmosphere (oxygen production, absorption of excess CO<sup>2</sup>);
- climate-forming function;
- water protection and water-regulating functions (water regulation of lakes, rivers and other water bodies, ensuring protection of river banks, hydrologic behavior of watersheds, etc.);
- protection of soils from water, wind erosion and other types of degradation;
- recreational functions;
- sanitary and hygienic functions;
- aesthetic functions;
- preservation of unique natural complexes (Kiryushin, 2021).

Some of these functions can be used as ecosystem services, provided an adequate market is created. According to this condition, the following 4 categories of ecosystem services are defined as the most promising:

- regulation of water resources, air quality, climate, erosion prevention;
- biodiversity conservation services (preservation of unique ecosystems, plant and animal species, genetic diversity);
- preservation and use of the values of the aesthetic and cultural view of landscapes;
- carbon sequestration.

The latest ecosystem service has a solid global market.

The functions of natural forests are more or less inherent in forest plantations, especially large tracts of restored and planted forests, although to a lesser extent this concerns biodiversity. In cities, towns, recreation areas, the influence of forest plantations on reducing the level of air pollution with dust and gases, reducing noise levels, wind speed is particularly increasing, the sanitary role of phytocenoses is actively manifested here. The problem of afforestation is becoming more widespread, especially in Western Europe, while in Africa the problem of reducing tropical forests does not lose its relevance.

The report of the UN Conference on Environment and Development in 1992 focused on the need to expand the area of forest cover through reforestation and artificial planting of trees and forests on unproductive lands affected by degradation and deforestation. In recent years, this task has been motivated by the need to reduce CO<sup>2</sup> in the atmosphere and curb global warming. To this end, it is planned to double the forest area of Ukraine, Poland, the Czech Republic, Germany and France

through forest plantations on treeless lands.

In this regard, the danger of afforestation of the preserved virgin areas of the steppe gives cause for concern. Many environmentalists rightly insist on excluding them from afforestation plans. As for mass afforestation in the steppe zone, especially in the dry steppe, its possibilities are limited by forest-growing conditions characterized by additional surface or ground moisture. These are sections of the hydrological network, ravine-beam complex, etc (Kiryushin, 2021). On upland lands, the creation of forests is an extremely complex and difficult task associated with the contradictions of the aborigine and the newcomer. The fall of sod grasses forms steppe mat, which contributes to the wet deposition, which is used by them more effectively than by wood ones. As a result, woody vegetation on watershed areas covered with steppe turf falls out quickly. This is the difference between steppe ecosystems and ravine and floodplain forests, confined to moistened and shaded relief depressions and river valleys. Steppe cereals cannot exist for a long time under the closed canopy of a deciduous forest. In the forest plantations of the steppe zone, trees are in sharply unfavorable environmental conditions, so they are almost always weakened and are characterized by increased vulnerability to pests and diseases. Because of these reasons, the canopy does not form or quickly falls apart. There is a gradual return of sod cereals, followed by rapid degradation of forest plantations and, eventually, the restoration of the steppe ecosystem (Vasilyuk, 2002).

Forest management and its sustainability today represent a rather acute and controversial problem. The definition of the sustainability of forest management was given in 1995 in the draft declaration of the Ministerial Conference on the Protection of Forests held in Helsinki, which is the management of forests and their areas, as well as their use, contributing to their biological diversity, productivity, the ability to renew, as well as the ability in the present and in the future to perform various functions of social, environmental, economic nature without negative impact on other ecosystems at different levels (local, national and global).

In the Russian Federation, according to various estimates, the forest cover of the land reaches from about 48% to 51%, which is significantly higher than the global average of 27%, which was 70% in pre-agricultural time. Today, the use of the potential of Russian forests is characterized by low efficiency. In Russia, with its approximately 1/4 of all world forest resources, world forest products account for only about 3%, less than 25% in general, the size

determines the permissible size of the use of the forest of the estimated cutting area. The amount of income that the state has from the use of forest resources does not reach even half of the budget funds spent for forest protection and forestry in the country (Chernov, 2015).

The forests of the state forest fund in the country are divided into three groups, according to the forest legislation of the country and in accordance with their importance for the national economy, location and functions performed (Kiryushin, 2021). To a greater extent in modern Russia, the forest cover is represented by secondary forests of different stages of restoration, thereby contributing to the high activity of the processes of their carbon deposition into the Earth's atmosphere.

The problem of degradation of exploited territories is quite acute in the country, since the forest management system is far from optimal. In the forest industry, for the most part, there is an extensive approach based on clear-cutting, which is not very suitable for reforestation on young forest lands. Undisturbed forests in this case act as the most important resource for the needs of industrial forest management and forestry development, and care is not fully provided for productive young plots, as well as for middle-aged and maturing forests. On average, the area of deforestation in low-disturbed forest areas in the European part of the country from 2000 to 2004 reached 19,700 hectares annually. The area of low-disturbed forest territories is reduced by 1.2-1.9% per year (Yanitskaya, 2008).

A significant amount of mature and valuable forests, mostly located in the southern territories, are used in industrial forest management on the principles of long-term lease. The sad picture of industrial forest management is aggravated by the widespread illegal logging. The share of illegally cut wood in the country is estimated by experts at 20-30% (Kiryushin, 2021). Illegal logging is especially dangerous for forests with high biodiversity and for protective forests adjacent to roads and settlements. The requirements of the Forest Management Standard of the Forest Stewardship Council (FSC) are often ignored locally.

According to the FSC standard, there should be a program at the enterprise that assumes a transition from clear-cutting with a large volume of areas to strip cutting, gradual (multi-intake) and/or selective logging, the withdrawal of cutting areas along the natural boundaries of landscapes, taking into account the prevention of their degradation, conservation of biodiversity, recreational attractiveness and economic feasibility. Of particular importance is the

creation of forest-agrarian landscapes in areas prone to desertification. Dagestan, Kalmykia, Tyva stand out among them, where almost the entire pasture territory is classified as desolate, up to 1.2 million tons of food units annually losing forage productivity.

Only economically efficient intensive and environmentally sustainable forest management, when a balanced approach is used to solve socio-economic problems, preserving a favorable environment and natural wealth of the state, meeting the needs of both present and future generations of Russians (Decree of the President of the Russian Federation No. 440, 1996), can give the country's forest-industry complex the necessary competitiveness in the world (Dobrynin, 2013).

The market, and especially the wood processing market, dictates the need to switch to an intensive type of forest management in this area, in which there is a significant increase in both the volume, quality and cost of the resulting wood. To a greater extent, this method is effective for secondary forests, leading to the formation of a developed social infrastructure, the necessary raw material base, and an increase in the need for labor resources. Farms per unit area at the division level receive wood per year using an intensive forest management model, despite the need to constantly improve the road network and make more costs per unit of forest area with this method, about four times more in cost. In countries such as Sweden and Finland, where intensive forest management in the modern sense originated, they have high results from its application in the form of obtaining more timber and income (Romanyuk, 2013).

The All-Russian Research Institute of Agroforestry (VNIALMI) has developed ecologically balanced forest-agrarian ecosystems for certain regions of the country, presented as a combination of forest plantations with cultural and wild vegetation of various life forms located on a certain territory, as well as animals and population living on it (Kulik, 2006).

For various natural conditions, there are several types of forest-agrarian systems developed, the main of which are:

1. agroforestry (agricultural crops and woody vegetation);
2. agro-silvo-pastoral (pastures, agricultural crops, woody plants and animals);
3. silvo-pastoral (woody plants, pastures, animals).

Agroforestry ecosystems of the country are mostly observed in the subhumid zone and in the provinces of the semiarid zone with its systematic

irrigation, while agro-silvo-pastoral ecosystems - in the semiarid zone and in the arid zone - are silvo-pastoral systems. Within the areas of dominant ecosystems, ecologically and organizationally-economically related forest fruit (woody forest and cultivated plants yielding edible fruits and berries), aqua-forest (stocked water bodies among tree plantations), entomo-forest (tree plantations as an object of beekeeping and rearing of silkworms), recreational forestry (forest phytocenoses for forestry exploitation with intermediate types of forest management - berry picking, mushrooms, tourism, recreation, etc.) (Kiryushin, 2021).

As a result of the activities of VNIALMI, it became possible to replace the traditional design of protective forest plantings (PFP) systems with automated design of adaptive landscape systems for agroforestry development of the territory (CAD).

A necessary condition for the development of a multi-purpose forest management system is landscape and ecological planning - environmental management planning based on the balanced use of all types of natural resources and a minimum of negative environmental consequences. Such planning should provide a basis for the adaptation of forestry to the natural conditions of a particular area.

Ecological and economic assessments in landscape and ecological planning are among its key elements. Not so long ago, they were considered only to assess the value of wood, and sometimes non-wood products of the forest. With the development of the concept of common economic value, which proposes to evaluate not only the material benefits represented by the forest, but also a large number of other types of services such as biodiversity, recreation, tourism, ecosystem and environmental protection functions performed by forests, the situation has radically changed (Kiryushin, 2021).

## 4 CONCLUSIONS

Today, sustainable forest management is considered to be the most important factor in economic and social development, environmental protection and, in general, the system of maintaining life on the planet. In the Russian forest industry today, it is necessary to actively introduce an intensive production model, which is more efficient and less resource-intensive compared to the extensive one. Using economically sound planning, new regulations, especially in the logging system, based on the control of results rather than processes, the intensive model motivates producers of this sphere to a greater extent to

sustainable and long-term forest management (Romanyuk, 2013).

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