

Forest reclamation in investment policy for sustainability and resource conservation

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Abstract. The article examines the role of the creation and reconstruction of reclamation protective forest plantations in the context of state investment policy aimed at achieving environmental stability and resource conservation. Special attention is paid to the strategy of integrating forest reclamation into national sustainable development programs. The author analyzes international experience, as well as government initiatives, emphasizing the importance of these measures to reduce environmental risks, improve soil fertility and strengthen biodiversity. The main economic and environmental benefits of investing in protective forest plantations are considered, including their impact on improving the microclimate, preventing erosion and sustaining water balance. The article offers recommendations for improving the efficiency of managing such projects and attracting private investors. It is concluded that there is a need for an integrated approach to the implementation of forest reclamation initiatives to ensure long-term environmental and economic well-being.

1 Introduction

In recent decades, the problem of deterioration and sustainability of protective forest plantations, as well as their inability to exert a full-fledged ecological and meliorative impact on agroecosystems, has become increasingly acute in the forest-agrarian landscapes of the regions of Russia. Scientific research and long-term experience in the fields of agriculture and animal husbandry, especially in forest-steppe and steppe regions, demonstrate that a complex of phytomeliorative measures can effectively neutralize many negative factors. The basis of this complex is the creation of protective afforestation systems, which play a central role in the formation and stabilization of the environment. These plantations have multifunctional properties, contributing to the normalization of the ecological situation and the formation of new, sustainable agroforestry landscapes.

The effectiveness of such a system increases with the expansion of the area occupied by planted forests.

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In this case, protective afforestation is considered as a vital element of the national strategy, the objectives of which are environmental protection, effective use and increase of natural resources, as well as solving environmental and food problems of the country. All actions in the field of protective afforestation should be planned taking into account environmental needs and national priorities. At the same time, it is important that these efforts do not become an obstacle to the realization of the goals of forest reclamation equipment for various categories of degraded agricultural and other lands. The strategy for the development of protective afforestation in Russia until 2020 [1] identifies a protective direction, sets long-term goals and objectives and describes ways to implement them. The implementation of this strategy can significantly improve the environmental situation in the agricultural sector of the country, enhance the level of food security and sustainability of agriculture. This, in turn, stimulates the growth of agricultural production and contributes to improving the quality of the environment.

2 Materials and methods

The theoretical and methodological basis of the research is based on key scientific research and developments focused on the sustainable development of the economy in general and the agricultural sector in particular. The methodology of the work is based on modern scientific approaches that explore the forms and methods of state investment policy in the creation and reconstruction of reclamation protective plantations in the region, based on systemic and institutional approaches. The regulatory framework of the study includes the laws of the Russian Federation, presidential decrees and orders of the Government of the Russian Federation, as well as regulatory documents of the Krasnodar Territory concerning the regulation of afforestation and the development of protective forest plantations. The information base of the study is compiled from accounting reports of organizations of the agro-industrial complex, data from the Federal State Statistics Service of the Russian Federation, the Ministry of Agriculture of the Russian Federation and the Ministry of Agriculture and Manufacturing Industry of the Krasnodar Territory, as well as publications on the topic in periodicals, materials from the Internet and the authors' own conclusions based on the analysis of available data.

3 Results

Forest (or forest protection) strips are protective forest plantations in the form of rows of trees and shrubs created among arable land, pastures, gardens, along irrigation and shipping channels, railways and highways, along the sides of ravines, on slopes, etc. Forest strips are created to overcome the harmful effects of dry winds on crops, to improve the water regime of the soil by trapping snow and reducing evaporation, to prevent soil erosion and the growth of ravines, as well as to protect railways and highways from snow and sand drifts [2-4]. Forest strips are part of protective forest plantations, which are used in steppe, forest-steppe and semi-desert areas for the above purposes, as well as for fixing sands [5].

The study of international practices in the area of financing forest reclamation projects demonstrates sustained interest and significant purchases from the world's leading economies. The United States, China and European countries are deservedly among the leaders in terms of investment in this particularly relevant area. These States actively interact with the global scientific community by submitting regular reports and studies that emphasize the importance of agroforestry as a critical tool for sustainable land management, especially in agricultural regions. In the United States, forest plantations are considered a key element of a comprehensive environmental protection strategy. Various programs are being

implemented on the territory of the country at the federal and local levels, such as Conservation Compliance, Sodbuster, Swampbuster, as well as Conservation Reserve Programs (CRP). These initiatives aim to provide financial incentives to owners of private agricultural land for the conservation and expansion of forest lands. Thus, they emphasize the critical importance of forest plantations in sustaining ecological balance and conserving biodiversity. In Europe, active attention is paid to the integration of forest management solutions into agricultural practices. Using the principles of sustainable development, European countries are implementing programs aimed at restoring natural ecosystems and creating buffer forests zones. This not only helps to improve climatic conditions, but also protects agricultural land from various kinds of environmental risks. China, in turn, is actively developing and implementing new forestry techniques aimed at acting against desertification and improving land fertility. The country invests heavily in programs to create new forest plantations, which in the long term contributes to climate stabilization in vast regions of their territory. Against the background of global environmental challenges, investments in forest reclamation projects are becoming strategically important. They not only help in actions against climate change and loss of biological diversity, but also have a positive impact on the economy and social development, providing favorable living conditions for current and future generations.

Agroforestry, due to its potential in environmental protection and the provision of a variety of ecosystem services, has become an essential part of the integration of forests into agricultural systems. Farmers and landowners have long intuitively felt the benefits of this approach, but scientific research and data confirming these benefits have begun to appear relatively recently. Despite the variability of national approaches and methods of forest reclamation implementation, international organizations such as the World Bank and the Food and Agriculture Organization (FAO) have already adapted their forest strategies to include the principles of agroforestry. This highlights the global importance and effectiveness of such programs in addressing environmental and economic challenges, strengthening the sustainability of the agricultural sector and improving the quality of life in rural areas.

They see it as an integrated system of sustainable land use, providing both individual and community benefits. Financial support of forest reclamation is justified in case of its current high profitability, which has become possible thanks to the diverse ecosystem services provided by this practice: regulatory, functional and cultural services.

In Russia, research on evaluating the effectiveness of the use of forest protection strips in agricultural areas was initially developed in the context of a planned economy. At that time, significant funding was allocated for the creation of such forest plantations, but the attention of economists was mainly focused on improving crop productivity. With the transition to a market economy, interest in agroforestry declined, and many landowners began to consider it less profitable compared to other methods. Unlike direct agrotechnical measures such as irrigation and fertilization, forest reclamation benefits appear only after a certain period of time. It takes several years for young forest plantings to get stronger and begin to have a positive impact on the environment and the economy. In the current market conditions, where rapid return on investment is an important factor, farmers often prefer projects with faster profits. Long-term investments in forest protection measures are less attractive due to delayed visibility of the result. This is especially important when resources are limited and farmers strive to maximize benefits in the shortest possible time. Not every farmer is ready to allocate part of his land for forest stripes, as this requires not only significant initial investments, but also constant care. This may cause additional cost increases and a reduction in the area for the main crops. However, in the strategic perspective, forest reclamation proves its effectiveness. Long-term benefits include improving soil fertility, preventing erosion, conserving moisture and improving microclimatic conditions, which generally contributes to

a more sustainable and healthy agroecological environment, favorably affecting agricultural productivity.

As the forest protection strips grow, they undergo changes in their taxation characteristics and structure, which affects their protective effectiveness. These forest formations are able to adaptively change the level of protection of agricultural territories depending on their composition and condition. Research shows that modification of the solutions of forest stripes can significantly affect their range and effectiveness on certain areas of the earth.

In the Krasnodar Territory, according to the methodological recommendations for the design and management of forest plantations in forest-steppe and steppe regions, it was concluded that optimal solutions should provide the necessary degree of transparency and blowing. This creates balanced conditions under which forest stripes effectively perform their role by regulating air flows and preventing soil weathering. Approaches that take these aspects into account are becoming important elements of an integrated strategy for managing agricultural landscapes. Thus, it is important to see forest reclamation not only as part of agricultural policy, but also as a key element of sustainable management of natural resources, which can become a guarantee of long-term environmental and economic well-being. An important environmental and economic problem of the Krasnodar Territory is land degradation, which affects both the ecology and the economy of the region. Currently, 1.1 million hectares are already subject to erosion, and another 2.6 million hectares are at risk of this process. More than 150 thousand hectares of protective forest plantations with various functional tasks have been created in the region, of which 135.6 thousand hectares are protective forest strips.

Forest strips positioned to withstand destructive easterly and northeasterly winds are an important part of the protective strategy. Despite the fact that the completeness of the network of forest strips reaches 90%, the coverage of agricultural fields with forests leaves much to be desired, amounting to only 3.4%. This level is clearly insufficient to provide full protection, as it covers only 60% of the required level. The main part of the trees turned out to be at the stage of renewable maturity, which marked the beginning of a decrease in their growth and the loss of some protective functions. As a result, trees become less effective in their actions against erosion processes.

Approximately 70% of the protective forests were laid on the territory before the mid-1960s, which means that at the moment they have a solid age from 41 to 60 years. The rest of the plantations were made in the late 1960s and in the 1970s. The oldest of these forest stripes, which are more than 40 years old, usually consist of a variety of varieties of trees and shrubs planted in rows. They have a fairly dense structure with a distance between rows of one and a half meters and an interval between trees from 0.7 to 1.0 meters. Such plantings are often dominated by one or more main tree species. As for the forest stripes planted in a later period, their age varies from 25 to 35 years. These forest stands mainly consist of *Robínia pseudoacácia* and are organized in rows, where the row spacing is from three to four meters. They include from two to six rows of plants, creating a characteristic pattern of plantings.

This diversity of ages and plant compositions forms a complex ecosystem that, despite its disadvantages, plays an important role in protecting the environment. Such strips help to prevent soil erosion, sustain biodiversity, and also contribute to improving the microclimate in their surroundings. In addition, they serve as natural barriers to wind and help retain moisture in the soil, which is especially important in dry regions.

It is important to take into account that every year these plantings are approaching the limit of their life cycle, and in the future they will need to be renewed and reconstructed to sustain their functionality and effectiveness in environmental protection tasks. The renewal process may include planting new species, introducing a variety of shrubs and grasses, as well as adjusting the distances between rows to ensure more optimal use of the land and

improve the environmental benefits of these plantings. Thus, despite their mature age, these forest stripes continue to make a significant contribution to sustain the ecological well-being of the territory.

To increase the effectiveness of such forest stripes, it is necessary to carry out measures to rejuvenate and replenish their composition, as well as the introduction of more stable and fast-growing species of trees and shrubs. The main goal should be to create adaptive forest barriers that can effectively resist erosion processes and ensure the sustainability of agricultural landscapes [6].

The forest plantings are dominated by such trees as *Robinia pseudoacacia*, *Fraxinus pennsylvanica*, *Fraxinus excelsior*, *Quercus robur*, *Gleditsia triacanthos*, as well as various types of *Populus*, including *Populus canadensis*, *Populus nigra* and *Populus pyramidalis*. The most common combination of species is a combination of *Robinia pseudoacacia* with *Fraxinus pennsylvanica* or *Fraxinus excelsior*, covering from 30% to 49% of all forest stripes in this region. About 30% of these stripes are composed exclusively of *Robinia pseudoacacia*. A significant part, amounting to 45%, is represented by stripes of *Quercus robur* and *Fraxinus* trees. Single-species stripes with *Fraxinus pennsylvanica* and *Fraxinus excelsior* occupy from 12% to 30% of the total number. Very rare, making up less than 1% of all forest plantations, are three-species compositions, including *Fraxinus excelsior*, *Gleditsia triacanthos* and *Quercus robur*, or combinations consisting of *Fraxinus* trees, *Gleditsia triacanthos* and *Robinia pseudoacacia*, or *Populus nigra*, *Fraxinus* trees and *Gleditsia triacanthos* [7].

The general condition of the forest stripes can be assessed as satisfactory, but in order to ensure their longevity and sustainability, it is important to focus on measures to care for and increase the viability of these plantations. This implies timely implementation of forestry measures, which may include strengthening the structure of plantations, improving conditions for growth and the use of methods to protect against diseases and pests. The development of forest stripes is accompanied by changes in their taxation characteristics and structure. Forest reclamation complexes have the ability to maintain homeostasis. The protection of an agro-landscape area can vary from complete to minimal, depending on the specifics of its invariant. Studies have shown that changes in the structure of forest stripes can significantly affect the radius of their reclamation impact. The Kubangiprozem Institute, together with the Kubanleskhozproekt Scientific Center, provided data indicating that systems aimed at forest reclamation remain incomplete in 21 districts of the region. To complete them, it is necessary to create new protective plantations on an area of 20 thousand hectares. Along small rivers, it is necessary to increase this area by another 6,000 hectares. In addition, there is a significant part, namely 106 thousand hectares of already existing protective forest plantations, which are in urgent need of regular care and restoration measures to correct environmental disturbances. Also, the old plantings, covering an area of 12.9 thousand hectares, require complete reconstruction to restore their useful properties.

In the Rostov region, forest lands managed by agricultural organizations represent an important component of the ecological network of the region. These lands include protective forest stripes, as well as plantings that play a critical role in acting against erosion in areas such as ravines, gullies and sandy areas. The total area of these forest lands reaches 275.1 thousand hectares, which indicates the significant potential of their contribution to the sustainability of agricultural landscapes. Despite this, the protective afforestation of arable land is only 3.5%, which indicates the need to increase this proportion for more effective soil protection and improvement of the microecological climate. In this territory, protective forest plantations cover 240.2 thousand hectares, of which 120.0 thousand hectares are directly occupied by protective stripes. These stripes are home to tree species such as oak, maple, ash and white acacia, which ensure the diversity and vitality of the ecosystem. However, the situation is complicated by the lack of proper registration of ownership of these forest plots, which leads to their actual abandonment.

Without legal status and responsible management, they remain without the necessary care — neither sanitary cutting nor reconstruction work is carried out. As a result, annual efforts to create new forest reclamation systems are insufficient and do not allow sustaining soil fertility at the proper level. In conditions where the average age of existing forest stands ranges from 40 to 50 years, they are approaching the limit of their biological cycle. In the absence of urgent measures for their reconstruction and sustainable management aimed at creating optimal protective agroforestry systems, in 10-15 years the region may face mass destruction of these key plantations. This will jeopardize the stability of productive lands and require significant efforts and investments to restore them. Therefore, it is important to plan and actively implement forestry measures aimed at improving the situation right now [7].

The main direction of development in this area is environmental investment, which is a key element of sustainable development aimed at conserving and improving the environment. This approach is a strategic tool that allows not only to minimize the negative impact on our ecosystem, but also to actively restore it. Investing in protective plantations has a number of important advantages, both for nature and for society as a whole. First of all, protective afforestation contributes to improving air quality and reducing pollution levels. Trees absorb carbon dioxide and produce oxygen, which significantly improves the quality of atmospheric air. In the context of constantly increasing industrial emissions, this is becoming especially relevant. Secondly, protective forest stands play an important role in the conservation and restoration of biodiversity. Investing in protective afforestation also has economic benefits. In case of all these factors, environmental investment in protective afforestation should be considered as an integral part of a sustainable development strategy aimed at creating a greener and healthier future for all. «Green investments» should be understood as any financial resources and property rights that are aimed at supporting entrepreneurial activity with an emphasis not only on making a profit, but also on improving the environmental situation both locally and globally.

Figure 1 shows the stages of developing an investment strategy for the creation and renewal of reclamation protective forest plantations in the region.

At the initial stage of strategy development, a detailed assessment of the current state of investment activity is required. The next step involves determining the volume of planned investment injections for the coming period, including planning the expansion of business by increasing fixed assets, financial and other assets, taking into account adjustments in unfinished capital investments. At the third stage, investment forms are selected based on the key areas of investment activity. Further, on this basis, the identification of potential investment objects is carried out, with a thorough study of the proposed alternatives and an expert assessment of their potential value. The fifth stage includes a comprehensive justification and analysis of selected projects through the preparation of a business plan. The sixth stage is devoted to conducting a strict control selection in order to optimize the use of investment resources. At the final seventh stage, it is necessary to identify and qualitatively assess all possible risks associated with the selected investment objects to ensure their sustainability and effectiveness.

In order to successfully implement an effective investment policy and achieve the set goals, it is necessary to create a set of favorable conditions that will stimulate the development of private business and interaction with government bodies. Another key element is ensuring transparency of financial flows for all participants in the process — both for public and private investors. This approach also makes it possible to allocate resources more efficiently and direct them to projects that bring the greatest benefit to the economy and society as a whole. One of the indispensable conditions for the successful implementation of investment programs is careful forecasting of their effectiveness. This includes a comprehensive analysis of potential risks and uncertainties related, in particular, to long-term

leases of land and other resources. Such an analysis should take into account both current trends and potential changes in the economic and political environment [8].

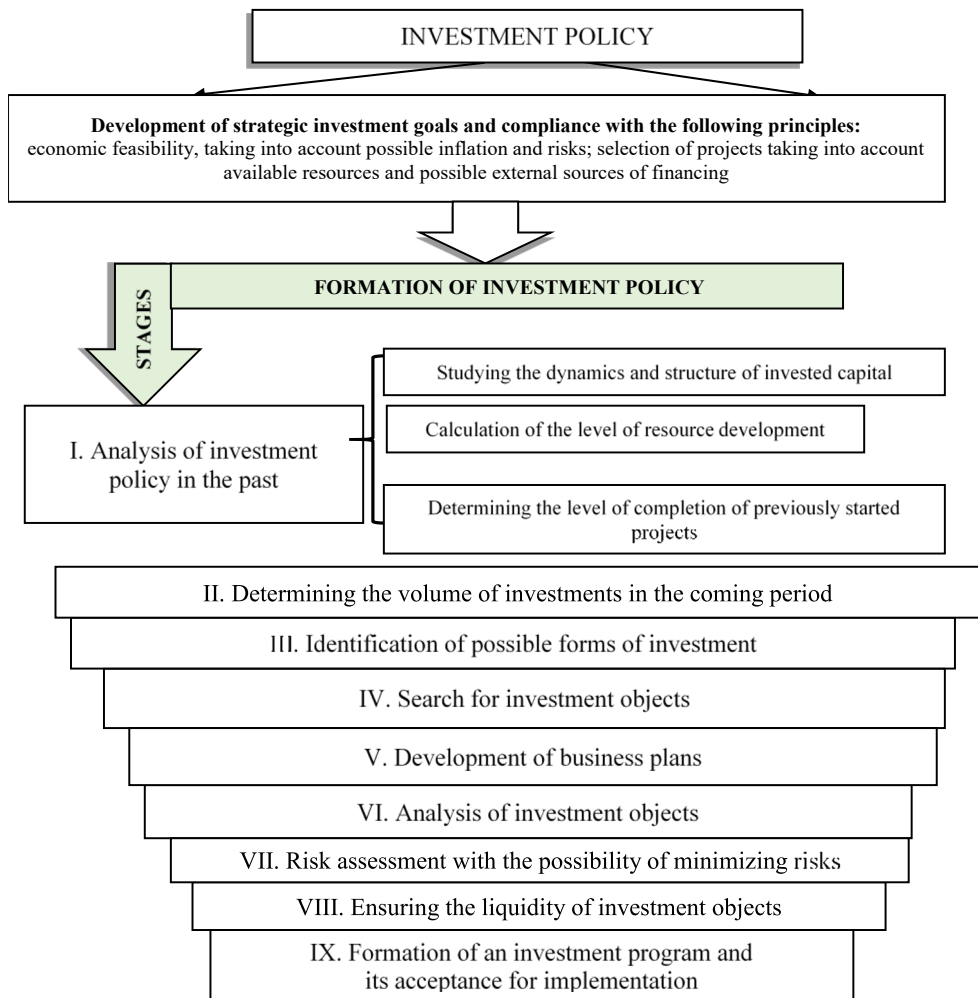


Fig. 1. Stages of investment policy formation

Source: author's research

To achieve success in the investment activities of the Krasnodar Territory in the agro-industrial complex, it is important to develop a policy of protective forest management focused on society and the environment. Strict compliance with legal norms and regulations is an important condition for cooperation between the public and private sectors in the reconstruction of reclamation protective forest plantations (RFPF). Compliance with the recommendations and regulations from the current regulations ensures effective interaction. This will make it possible to coordinate and optimize all stages of the implementation of investment projects in the reconstruction of the RFPF. One of the key areas for investment is to support initiatives in the reconstruction of the Ministry of Agriculture within the framework of the national projects "Ecology" and "Small and Medium-sized Enterprises". The implementation of such investments contributes to the intensification of entrepreneurial activity and supports launched national initiatives. The reconstruction of the RFPF, covering

various areas, plays a strategic role in ensuring the sustainable development of the environmental situation and the small and medium-sized business sector.

Financing the reconstruction of the RFPF will require significant investments, which can be provided through priority investments within the framework of national projects, thereby accelerating the implementation and achievement of the set results. To facilitate investments and the creation of new capacities in the reconstruction of the RFPF, it is important to increase the availability of loans and support entrepreneurs. Those interested in investments will need to apply for a long-term lease of RFPF plots for a period of 49 years without competitive procedures, with a preferential rental rate reduced by 50% until the project pays off.

Cooperation with the Ministry of Agriculture of the Russian Federation within the framework of an integrated approach to investments can provide legal and financial support for the transfer of RFPF plots for lease. The Ministry plays an important role in the development of a regulatory framework governing the procedure and conditions for the provision of these plots. For effective planning and implementation of projects, it is necessary to compile an expanded list of investment initiatives, including the name and description of each project, complete information about the investor (including its name, address and details), as well as an indication of the location in the Russian Federation where the project is planned to be implemented. It is also necessary to provide information on the planned volume of investments [9-11].

In order to successfully implement an investment project, a potential investor must comply with a number of conditions:

1. Financial viability: The investor is obliged to prove the availability of the necessary funds, which may be his own or borrowed. For projects lasting up to three years, the amount of these funds should be at least 50% of the total investment. If the project period is shorter, then for the first two years it is necessary to have at least 25% of the total investment.

2. Project start dates: The project should start no earlier than two years before the application is submitted. This requirement serves to confirm the seriousness of the investor's intentions and his willingness to implement the project.

3. Financial discipline: The investor is obliged to fulfill all obligations to the budget of the Russian Federation, demonstrating good faith and following the legislation in the use of finance.

4. Stable financial position: The investor should not be involved in the process of reorganization, liquidation or bankruptcy, since such circumstances pose risks to the successful implementation of the project [12-14].

Thus, the initiation and encouragement of the creation of reclamation protective forest plantations (RFPF), including their renewal, is a key factor in attracting investment in this sector. To achieve this goal, it is necessary to establish stable and flexible relationships that will recognize the contribution of entrepreneurs and reward their work according to the terms of lease agreements. It is important that these conditions are regularly reviewed taking into account changes in the economic and legal environment. The successful implementation of the work on the renewal of the RFPF requires reducing the financial burden on investors and minimal additional costs. Government assistance is crucial here, it significantly increases the attractiveness of the sector for investment. The concept of public-private partnership in land reclamation and modernization of protective forest plantations can be implemented through agreements with private companies, which are entrusted with the functions of financing, construction, reconstruction and management of public infrastructures. An example of a successful program is the subprogram for the development of protective afforestation in the Volgograd region, where the regional budget provides 56% of funding, the federal budget — 28%, and the remaining 16% comes from extra-budgetary sources.

We suggest using management consulting as a comprehensive tool to support agro-industrial enterprises in need of government support. This approach can become the basis for

agricultural companies with protective forest plantations. The effectiveness of such enterprises will be assessed on the basis of an analysis of accounting statements, which will allow determining indicators of resource efficiency. In the process of analysis, it is especially important not only to identify problems, but also to identify internal and external reserves that can contribute to improving the productivity of enterprises.

4 Conclusion

The reduction in the scale of afforestation and insufficient volumes of forestry work, as well as the almost complete cessation of protective afforestation in recent years, have accelerated the processes of aging, deterioration and decrease in the sustainability and renewable capacity of forest plantations. Forest reclamation is a dynamic and active natural resource management strategy that has a positive impact on arable land and strengthens the sustainability of agricultural production. However, its benefits extend not only to farmers and local communities. Forest reclamation in a broader context significantly improves the environmental situation, helping to solve urgent problems of environmental management.

In the context under discussion, it is impossible not to recognize that the creation of forest-reclamation plantations, such as forest stripes, is recognized both at the national and international levels as one of the most effective methods of integrated improvement of agricultural landscapes. Agroforestry measures have a unique ability to be autonomous, minimizing the need for constant technical intervention and effectively using natural ecological interactions between different biological systems, which makes them an environmentally friendly solution.

The economic benefits of the introduction of forest plantations are also significant. This approach reduces the cost of agricultural production by 13%, while increasing profits by an impressive 70%. The average increase in net income is 15%, which is facilitated by increased yields and more rational use of irrigation systems. In order to improve the attractiveness of forest reclamation and boost the inflow of investments from both private and public sources, it is necessary to take a course towards solving a number of fundamental tasks. One of the primary tasks is to eliminate the shortage of start-up capital among land users. These may be subsidy programs or the provision of concessional loans that will help reduce the financial burden at the initial stage of creating forest plantations. Reducing bureaucratic barriers and simplifying procedures for compensating the costs of creating forest plantations also plays a key role. After all, it is the speed and transparency of these processes that can become decisive factors for future investors. In addition, the creation of a scientific and technical support infrastructure for landowners will not only facilitate the introduction of advanced technologies, but also improve the quality of project implementation. In the light of the reduction of investments in fixed assets aimed at environmental protection and rational use of natural resources in the Krasnodar Territory, it is proposed to develop a new investment strategy in agriculture in the region aimed at improving the environmental situation. The stages of its formation include an analysis of the current state of investment activity; determination of the required investment volumes with planning for the growth of fixed assets and assets; selection of investment forms based on business lines; search for investment objects through research of proposals and expert assessments; justification and evaluation of projects by creating business plans; careful analysis and selection; as well as risk assessment for selected objects.

The study proposes a mechanism for public-private partnership in protective afforestation and modernization of protective forest plantations, which can be carried out on the terms of transfer to the private sector, on the terms of contracts and agreements, the functions of financing construction, reconstruction of the Ministry of Agriculture, operation of infrastructure owned by the state.

A number of recommendations contained in the study can be used in the process of developing regional laws, regulations, as well as in the preparation of strategic plans of the Ministry of Agriculture and Manufacturing Industry of the Krasnodar Territory.

Thus, an effective state investment policy in this area contributes not only to improving the environmental situation, but also stimulates the economic development of the region by increasing the productivity of agricultural land and creating new jobs.

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