



DIRECTIONS FOR IMPROVING THE ECONOMIC MECHANISM OF FOREST FUND LAND MANAGEMENT

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Abstract *This article examines the economic mechanisms of forest fund land management and identifies strategic directions for their improvement in the context of sustainable natural resource use. Forest resources play a vital role in ecological stability, climate regulation, and socio-economic development; therefore, enhancing economic instruments for forest land management is essential. The study builds on international practices, economic theories of resource management, and recent policy reforms related to forestry. The research highlights the effectiveness of economic incentives, market-based regulation, public-private partnerships, and digital governance tools in increasing the efficiency of forest fund land use. The findings indicate that strengthening economic planning, optimizing financial instruments, improving payment systems for land use, and expanding green investment opportunities can significantly improve forest land governance. Recommendations are provided for integrating economic mechanisms with ecological priorities and modernizing the national forest management system.*

Keywords: *forest fund lands, economic mechanisms, sustainable management, natural resource economics, land-use efficiency, forest policy, ecological-economic assessment, investment mechanisms, market-based regulation, green economy.*

Introduction

Forest fund lands constitute one of the most important categories of natural resources, serving ecological, economic, and social functions. Effective management of these lands is closely linked to the development of economic

mechanisms that ensure sustainable and rational land use. According to global assessments, economic instruments play a decisive role in promoting forest conservation, stimulating reforestation, and preventing degradation of natural ecosystems (FAO, 2020). In many countries, well-designed economic mechanisms—such as payment systems for land use, financial incentives, taxes, subsidies, and investment programs—form the backbone of forest sector governance (World Bank, 2021).

In Uzbekistan, forest fund lands cover diverse geographic zones, including mountain ecosystems, desert areas, valley forests, and riparian (tugai) forests. These variations require differentiated economic approaches to management, as the costs, ecological services, and economic value of forest lands differ substantially across regions. Recent reforms in the forestry sector have emphasized the need to improve economic instruments, expand investment opportunities, and integrate market-based tools into land-use planning (UNDP, 2022). However, several challenges remain: inadequate financing of forestry enterprises, insufficient economic incentives for sustainable land use, and limited integration of ecological-economic evaluation in policy design.

Economic mechanisms in forest land management include a combination of financial tools, resource valuation technologies, market instruments, and regulatory frameworks. As noted by Ganiev and Abdullayev (2021), accurate ecological-economic assessment is essential for determining the real value of forest resources and for designing effective management strategies. Furthermore, economic incentives such as subsidies, payments for ecosystem services, and green investment programs have proven effective in many countries, stimulating both public and private sector engagement in forest restoration (Nazarov & Mirzayev, 2023).

Therefore, this study aims to analyze the current state of economic mechanisms in forest fund land management and to propose evidence-based directions for their improvement. The research is grounded in international experience, economic theory, and modern principles of sustainable forest

management. It seeks to identify the most effective economic tools and strategies that can enhance forest fund land governance, ensure ecological stability, and support national green development goals.

Methodology

This research applies a comprehensive methodological framework combining theoretical, analytical, comparative, and empirical approaches to examine economic mechanisms for improving forest fund land management. The methodological basis is grounded in natural resource economics, sustainable forest management principles, and international policy frameworks (FAO, 2020; World Bank, 2021).

A systematic review of scientific literature, international reports, and national policy documents was conducted to identify existing economic mechanisms used in forest land management. The conceptual foundations were derived from:

- economic theories of natural resources (Pearce & Turner, 1990),
- the ecological-economic valuation framework (Costanza et al., 1997),
- sustainable forest governance models (FAO, 2020).

This method allowed identification of key economic tools such as land-use payments, subsidies, investment schemes, ecosystem service valuation, taxation, and market-based instruments.

A comparative study of economic mechanisms in forest management across selected countries (Finland, South Korea, China, and Kazakhstan) was conducted. These countries were chosen for their notable success in:

- reforestation financing,
- ecosystem service markets,
- digital forest monitoring systems,
- green investment programs (UNDP, 2022; OECD, 2019).

The comparative method helped reveal applicable economic strategies for Uzbekistan's forest sector.

To evaluate the effectiveness of current mechanisms in Uzbekistan, an ecological-economic assessment approach was used (Ganiev & Abdullayev, 2021). This included:

- cost-benefit analysis of reforestation activities;
- assessment of economic losses from land degradation;
- calculation of ecosystem service values (carbon sequestration, soil protection, biodiversity benefits);
- financial efficiency of forestry enterprises.

This framework supports economically justified recommendations.

Regulatory documents, national forestry programs, and economic policy directives were analyzed, including:

- Uzbekistan's "Green Economy Strategy,"
- national forestry development programs,
- land-use payment regulations,
- investment and subsidy mechanisms for environmental projects (UNDP, 2022).

This method clarified institutional gaps and potential economic reforms in the forest sector.

Semi-structured interviews were conducted with forestry economists, policymakers, and specialists from regional forestry enterprises. Expert opinions were collected regarding:

- financial limitations in forestry;
- existing economic incentives;
- investment needs;
- barriers to adopting market-based mechanisms.

These insights helped validate the analytical findings and enhance policy recommendations.

All collected data were examined through thematic and economic synthesis to create a structured model of economic mechanisms. The synthesis focused on:

- identifying priority areas for economic reform;
- integrating ecological and economic indicators;
- proposing practical mechanisms for increasing financial sustainability of forest management.

All interview participants were informed about confidentiality principles. No personal data were collected. Only open-access documents and ethical research methods were used.

Results

The findings of this study reveal several significant insights into the current state and potential improvement of economic mechanisms for forest fund land management in Uzbekistan. The results highlight structural gaps in financing, insufficient economic incentives for sustainable land use, and the need for market-oriented instruments to enhance efficiency. Analysis of national forestry programs and financial data shows that forestry enterprises in Uzbekistan operate with limited funding and outdated financial models. Compared with international standards, the share of reinvested income, state subsidies, and green financing remains low (World Bank, 2021). This shortage reduces the capacity for:

- reforestation,
- land rehabilitation,
- protection of degraded areas,
- investment in digital monitoring technologies.

Experts confirmed that without diversified financing sources, economic mechanisms remain largely administrative rather than incentive-based.

The findings demonstrate that existing payments for land use and forest resource utilization do not fully reflect the ecological value of forests. Economic incentives such as:

- tax benefits,
- payment for ecosystem services (PES),
- low-interest green loans,

- subsidy mechanisms,

As a result, stakeholders have limited motivation to invest in forest conservation or sustainable land practices.

Using ecological-economic assessment, the study identified substantial annual losses due to:

- soil erosion,
- reduction in forest cover,
- desertification processes,
- declining carbon absorption capacity.

These losses, when monetized, exceed existing expenditures on afforestation and land restoration. This aligns with findings from Ganiev and Abdullayev (2021), who argue that insufficient investment leads to long-term economic decline in forest ecosystems.

The results indicate that the introduction of GIS monitoring, remote sensing, and digital forest inventories significantly increases management efficiency. Pilot projects using digital mapping demonstrated reductions in illegal land use and improvements in data transparency. These outcomes are consistent with global experiences showing that digital governance tools enhance economic accountability and reduce monitoring costs (OECD, 2019; FAO, 2020).

Interviews with experts showed strong support for:

- carbon credit markets,
- ecosystem service markets,
- forest lease mechanisms,
- public-private partnerships (PPPs),

These instruments can attract private investment and diversify revenue streams for forestry enterprises.

Document analysis revealed several weaknesses in the regulatory framework:

- Absence of clear economic standards for forest valuation;
- Lack of mechanisms for green bonds or environmental investment funds;

- Limited integration of forestry into the national green economy strategy.

These institutional gaps limit the ability to implement economically efficient forest land management policies.

The results enabled formulation of key strategic directions:

1. Enhancing financial sustainability through diversified investments, subsidies, and green financing.
2. Implementing market-based mechanisms such as PES and carbon markets.
3. Strengthening economic planning based on ecological-economic valuation.
4. Introducing digital economic tools for monitoring and financial accountability.
5. Improving institutional regulations to support economic incentives and public-private participation.

These directions constitute the foundation for modernizing the economic mechanism of forest fund land management.

Discussion

The results of this study illustrate that the economic mechanism of forest fund land management in Uzbekistan requires substantial modernization to meet contemporary sustainability and efficiency standards. The identified gaps—limited financial resources, weak incentives, insufficient valuation tools, and institutional shortcomings—are consistent with global challenges faced by forest-rich developing countries (FAO, 2020; World Bank, 2021). However, comparative analysis suggests that these issues can be effectively addressed through a combination of economic reforms, digital innovation, and market integration. First, the finding that forestry enterprises suffer from chronic underfunding aligns with international assessments indicating that adequate financing is a prerequisite for sustainable forest management. Countries with advanced forest economies, such as Finland and South Korea, allocate significant public and private investment to reforestation, digital monitoring, and long-term land rehabilitation (OECD, 2019). This comparison highlights the necessity for Uzbekistan to diversify financial sources, introduce

green loans, and stimulate private-sector participation. Without such reforms, forestry enterprises remain dependent on limited state allocations, restricting their capacity for innovation and large-scale restoration activities. Second, the study confirms that existing economic incentives in Uzbekistan are insufficient to motivate stakeholders toward sustainable forest land use. Payment for ecosystem services (PES), carbon trading systems, and ecological subsidies have proven effective in many countries by translating ecological benefits into financial returns (UNDP, 2022). The absence of such market mechanisms limits opportunities for monetizing ecosystem services such as carbon sequestration, soil protection, and biodiversity conservation. The results emphasize the need to integrate market-based instruments into national forestry policies to enhance economic sustainability. Third, the significant economic losses caused by land degradation—identified through ecological-economic assessment—underscore the urgency of reforming the economic mechanism. Degradation-driven losses often exceed the cost of preventive measures, confirming the findings of Ganiev and Abdullayev (2021), who argue that early investments in afforestation and soil protection provide long-term economic benefits. This supports the argument that the economic mechanism should prioritize preventive policies rather than reactive restoration. Fourth, the positive impact of digital technologies—including GIS monitoring and remote sensing—highlights the transformative potential of digital governance. These technologies not only improve transparency but also reduce transaction costs, enhance monitoring accuracy, and support data-driven decision-making. The results validate global research asserting that digitalization strengthens both economic efficiency and regulatory enforcement in natural resource management (OECD, 2019; FAO, 2020).

However, despite these positive trends, the study identifies institutional barriers that hinder the full adoption of economic instruments. Weak regulatory frameworks, insufficient coordination between agencies, and the absence of standardized forest valuation methodologies limit the effectiveness of economic

reforms. Addressing these issues requires the development of comprehensive legal frameworks and the strengthening of institutional capacities.

Furthermore, expert interviews indicate a growing readiness among specialists to adopt innovative economic mechanisms, particularly carbon markets, forest leasing models, and public-private partnerships (PPPs). This optimism suggests that policy reform, if supported by training and regulatory incentives, could successfully integrate these mechanisms into national forest management strategies.

In summary, the findings demonstrate that improving the economic mechanism of forest fund land management requires a holistic approach that integrates financial reforms, digital tools, market-based incentives, and institutional modernization. When effectively combined, these components can create a resilient, efficient, and ecologically responsible forest management system capable of supporting Uzbekistan's long-term green economy goals.

Conclusion

This study demonstrates that improving the economic mechanism of forest fund land management is essential for ensuring sustainable use, ecological stability, and long-term economic efficiency in Uzbekistan. The findings show that current mechanisms—although undergoing gradual reform—remain limited by insufficient financing, inadequate economic incentives, weak ecological-economic valuation systems, and institutional constraints. These challenges hinder the effective implementation of forest conservation, reforestation, and land restoration strategies.

The research highlights several priority directions for modernizing the economic mechanism. First, strengthening financial sustainability through diversified investments, including green financing, public-private partnerships, and low-interest environmental loans, is critical for enhancing the operational capacity of forestry enterprises. Second, integrating market-based economic tools—such as payment for ecosystem services (PES), carbon markets, forest leasing, and green bonds—can create new revenue streams and incentivize sustainable land use practices, in line with international best practices (FAO, 2020; UNDP, 2022). Third,

implementing comprehensive ecological-economic valuation methods will enable policymakers to better assess the true economic value of forest ecosystem services and incorporate these values into land management decisions. Such valuation is necessary for cost-benefit analysis, long-term planning, and effective allocation of resources (Ganiev & Abdullayev, 2021). Fourth, digital tools including GIS monitoring, remote sensing, and digital land inventories offer significant opportunities to improve transparency, reduce monitoring costs, and enhance regulatory efficiency. Finally, institutional reforms—such as updating policy frameworks, standardizing forest valuation methods, and strengthening inter-agency coordination—are essential for supporting the adoption of advanced economic mechanisms. Successful implementation requires capacity-building programs, technical training, and integration of forestry policies into national green economy strategies.

In conclusion, modernizing the economic mechanism of forest fund land management demands a comprehensive, multi-dimensional approach that aligns financial, ecological, technological, and institutional components. When effectively integrated, these improvements will support sustainable forest governance, reduce land degradation, enhance climate resilience, and contribute to Uzbekistan's broader green development goals.

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