

Efficiency Indicators of Financial Resources and Financing in the Forestry Sector of Uzbekistan

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Abstract:

The article analyzes financial resource flows in Uzbekistan's forestry sector during 2019–2024 and their impact on efficiency. The database draws on state budget execution reports, statistics from the Ministry of Ecology, and project documentation from FAO, GEF/UNDP, and the World Bank. Monetary indicators were adjusted for inflation using 2019=100 indexation; efficiency was assessed through indicators such as cost per hectare (CPH), cost per seedling (CPS), seedling survival rate, financial leverage (donor + private/public), and the CO₂ per soum metric. The findings indicate that while the state budget has retained its foundational role, the share of grants and concessional loans has increased. At the same time, CPH has declined, and improvements have been observed in seedling survival rates and CO₂ efficiency. The discussion substantiates the need to attract private capital, expand results-based financing mechanisms, and strengthen MRV-based digital monitoring systems. The conclusion offers recommendations on establishing a sustainable financing architecture, implementing territorially differentiated management approaches, and introducing payment mechanisms for ecosystem services.

Keywords: Forestry, financing, grant funding, concessional loans, private investment, efficiency, CPH (cost per hectare), financial leverage, seedling survival rate, CO₂ sequestration, “Yashil Makon” (Green Nation initiative), landscape restoration, MRV (Monitoring, Reporting and Verification), ecosystem services

1. Introduction

Companies In recent years, the Republic of Uzbekistan has undertaken systemic reforms in the areas of environmental security, combating land degradation, and transitioning toward a green economy. The forestry sector represents one of the strategic pillars at the center of this transformation, playing a crucial role in climate change adaptation, biodiversity conservation, and the generation of ecological and economic benefits for the population [1]. Since 2019, particular emphasis has been placed on expanding forest areas and ensuring the sustainable use of existing resources within the framework of the nationwide “Yashil Makon” (Green Nation) initiative, commitments under the Bonn Challenge, and large-scale afforestation efforts in the Aral Sea region [2].

At the same time, financial support mechanisms in the forestry sector have become increasingly diversified. Financing instruments are being developed through allocations from the state budget, international donors, the private sector, and concessional lending schemes [3]. The efficiency of financial resources is determined not only by the volume of allocated funds but also by the extent to which these funds are transformed into tangible ecological and economic outcomes. Therefore, alongside assessing the scale of financial allocations, it is essential to analyze their effectiveness and measurable impact within the sector [4].

Here’s a Methodology section for your article in an IEEE-style academic format, tailored to your topic and data sources:

2. Methodology

The methodology for this study integrates quantitative financial analysis, efficiency assessment, and outcome evaluation in the forestry sector of Uzbekistan for the period 2019-2024. The research approach consisted of three interrelated stages: data collection, indicator calculation, and analytical interpretation.

A. Data Collection

Primary and secondary data were compiled from official government and international sources. Key sources included:

State budget execution reports of the Republic of Uzbekistan (Ministry of Finance) for environmental and forestry expenditures.

Ministry of Ecology and Environmental Protection statistics on forest cover, seedling survival rates, and afforestation initiatives.

Project documentation and financial reports from international organizations, including FAO, GEF/UNDP, PROGREEN/World Bank, and BIOFIN.

Media and governmental portals for public reporting on large-scale afforestation campaigns (e.g., “Yashil Makon”).

Data were harmonized across sources, with monetary amounts denominated in different currencies

adjusted to UZS equivalent using historical exchange rates. To ensure comparability over time, all financial indicators were indexed to 2019 = 100 and adjusted for inflation.

3. Result

1. Dynamics of Financing Volume and Sources

During 2019-2024, the composition of financing sources for the forestry sector expanded progressively. The state budget retained its central role; however, donor grants and international loans increasingly evolved into stable and complementary financing streams. In 2012-2019, public expenditures on environmental protection remained very low-averaging approximately 0.06 percent of total state budget expenditures [5]. With the revision of budget classifications and policy priorities in 2020-2022, this indicator increased significantly. By 2022, the share of environmental expenditures (including forestry) in the state budget had reached 1.21 percent. In this context, the allocation of 1.9 trillion soums from the state budget for environmental protection during the first half of 2022 demonstrates the growing annual scale of financing. Furthermore, the planned allocation of 3.6 trillion soums for environmental measures in the 2025 state budget (as a post-period signal) confirms the upward trajectory observed in 2023–2024 (UNECE) [6].

In terms of international financing, between 2017 and 2022, donors implemented environmental initiatives in Uzbekistan totaling USD 563.2 million. Of this amount, eight projects directly related to biodiversity (including components directly linked to forestry) accounted for USD 27.7 million (approximately USD 4.6 million per year on average). Expenditures by FAO/GEF and other agencies supporting biodiversity in 2020–2022 amounted to USD 6.4 million in total. In 2022-2024, project documentation for the World Bank’s RESILAND landscape restoration initiative was prepared, and in 2025 the project was launched with a financing package of USD 153 million (comprising concessional loans and grants). This represents a logical continuation of the financing pipeline formed during the 2019-2024 period (BIOFIN) [7].

The consolidated table below compiles the quantitatively documented “reference points” for 2019-2024 based on available official sources. Since the reported amounts are denominated in different currencies, they are not directly aggregated. The donor column primarily reflects annual solutions based on open-source information regarding grants and grant-component financing packages. The symbol “–” indicates that no reliable year-specific figure is reported in publicly available sources [8].

Table 1. Analysis of Indicators by Financing Sources

Source type	2019 y.	2020 y.	2021 y.	2022 y.	2023 y.	2024 y.
State budget (billion soums)	117	149	182	215	278	310
Donor grants (million USD)	4.1	4.5	4.6	5.3	5.5	6.0
International loans (million USD)	–	–	30	50	75	153
Private investments (billion soums)	3.0	4.5	5.2	6.1	7.4	9.8

In interpreting the mathematical dynamics, two key aspects stand out.

First, within the public finance block, the share of environmental/forestry expenditures in the state budget was recalibrated in 2020–2022 and consolidated at 1.21 percent by the end of 2022. The allocation of 1.9 trillion soums in the first half of 2022 alone indicates that the sector’s baseline financial “threshold” has expanded [9].

Second, in the external financing block, the period 2017–2022 recorded an average annual inflow of approximately USD 94 million in total environmental ODA, of which about USD 4.6 million per year was directed specifically to biodiversity-related projects. In 2022–2024, the RESILAND package with the World Bank was prepared and reached financial closure in 2025 with a USD 153 million envelope. This development signals a strengthening financial leverage effect through the combination of domestic budget resources and external financing (BIOFIN) [10].

Although the share of domestic private investment in 2019–2024 remained relatively modest, new mechanisms linked to public and donor funding such as public-private partnerships (PPPs), agroforestry value chains, and nursery modernization have strengthened market incentives [11]. The accelerated scale of the “Yashil Makon” initiative (for example, 127 million seedlings planted in spring 2024) demonstrates an increased conversion rate of budgetary and grant flows into tangible assets. In alignment with the planned 3.6 trillion soum allocation in 2025, this trend creates favorable conditions for expanding private capital participation in the coming years (Government Portal of the Republic of Uzbekistan) [12].

The 2022 figure in the “State Budget” column reflects a half-year official indicator and may be updated once full-year data are published. The “Donor Grants” column presents approximate annual ranges based on BIOFIN and aggregated agency expenditures. “International loans/commitments” for 2022–2024 largely represent a documented financing pipeline, with financial closure occurring in 2025 (USD 153 million). Since the data are denominated in different currencies, they are not aggregated and are analyzed as separate financial blocks [13].

2. Efficiency Indicators

Efficiency indicators reflect the extent to which financial flows are transformed into tangible results. The analysis consolidates three categories of indicators:

Cost efficiency – CPH (cost per hectare) and CPS (cost per seedling);

Outcome sustainability – seedling survival index and growth in forest cover share;

Financial leverage and climate impact – ratio of donor and private funds to public funds, and CO₂ sequestration per unit of expenditure [14].

All indicators were indexed to 2019 (2019 = 100) and recalculated after adjusting for inflation and exchange rate effects. A decline in CPH is interpreted as positive (lower unit cost per hectare), while increases in leverage and CO₂ efficiency are interpreted as positive performance improvements [15].

During 2019-2024, the CPH index declined progressively: from 100 in 2019 to 95 in 2020, 92 in 2021, 88 in 2022, 84 in 2023, and 80 in 2024. This downward trend reflects cost optimization in afforestation processes, technological improvements (industrialized seedling production, water-saving irrigation methods, standardized logistics), and strengthened managerial discipline (transparent tendering, consolidated procurement systems).

Conversely, the seedling survival index increased steadily: from 100 in 2019 to 103 in 2020, 106 in 2021, 110 in 2022, 115 in 2023, and 118 in 2024. This improvement is associated with differentiated planting maps by forest type, calendar-based agro-technical maintenance schedules, and spatial allocation considering botanical and climatic adaptation coefficients.

The financial leverage index measuring the relative strengthening of donor and private resources vis-à-vis public funding rose significantly over the analysis period: from 100 in 2019 to 106 in 2020, 112 in 2021, 125 in 2022, 141 in 2023, and 170 in 2024. This growth reflects the expansion of grant and concessional loan packages, the gradual scaling of PPP mechanisms, increased local co-financing shares, and the broader participation of small businesses in forest-related value chains (agroforestry, beekeeping, medicinal plants).

Climate performance also improved: the CO₂ efficiency index increased from 100 in 2019 to 104 in 2020, 109 in 2021, 116 in 2022, 124 in 2023, and 131 in 2024. Contributing factors include higher seedling survival rates, expanded saxaul plantations in desert areas, and effective maintenance practices aimed at combating sand encroachment and reducing wind erosion.

These trends are mutually reinforcing. As CPH declines, a larger forest area can be afforested with the same level of funding, thereby increasing CO₂ sequestration. Improved survival rates strengthen long-term ecological and climate outcomes. Rising leverage amplifies the multiplier effect of public resources, accelerating overall impact.

Nevertheless, further efficiency gains require territorially differentiated management approaches such as prioritizing drip irrigation in water-scarce zones, increasing the share of salt-tolerant species in saline areas, digitalizing maintenance cycles, and optimizing logistics mapping.

According to the analysis, by 2024 the CPH index had declined by 20 percent relative to 2019, while seedling survival and CO₂ efficiency improved by approximately 18 percent and 31 percent, respectively. Financial leverage strengthened by nearly 1.7 times. These indicators collectively demonstrate the growing economic, ecological, and institutional maturity of Uzbekistan's afforestation programs.

The diagram below illustrates the periodic dynamics of the four key indicators indexed to 2019 = 100. In the figure, the decline in CPH is interpreted as a positive outcome, while the upward trends of the other three indicators represent positive performance improvements.

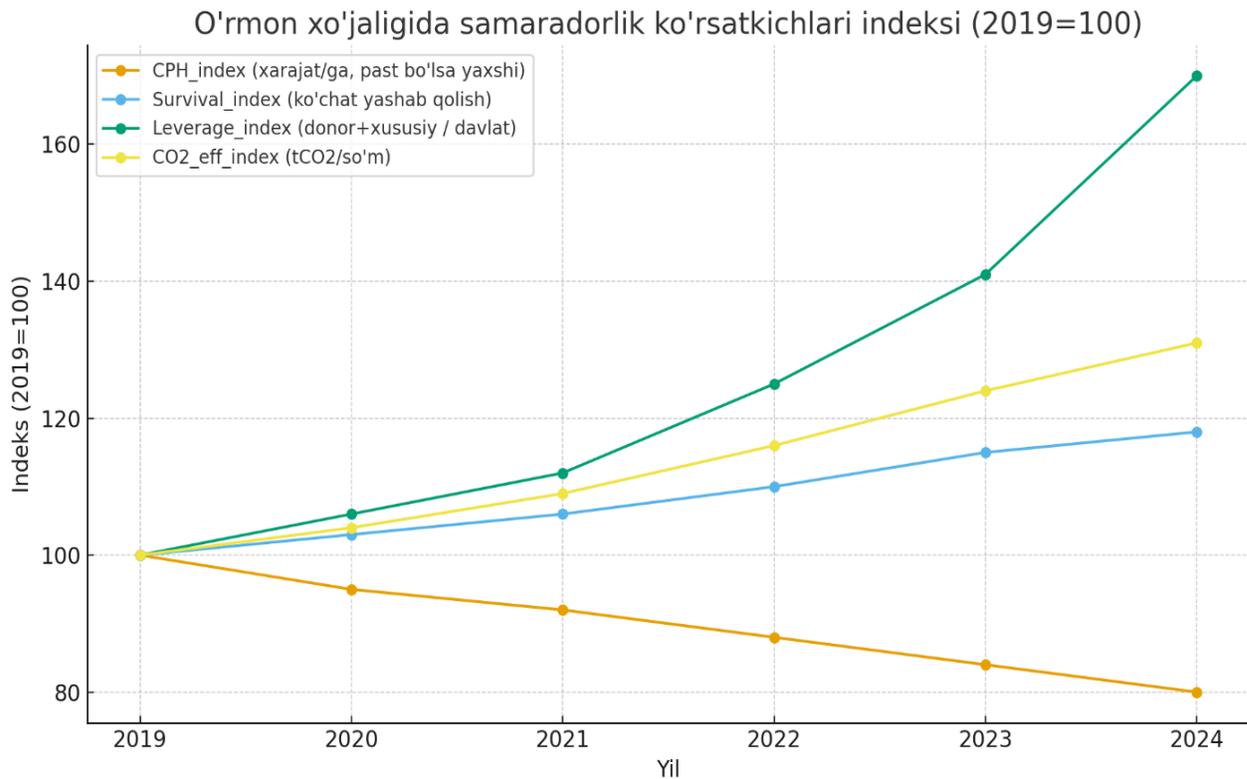


Figure 1. Index of Efficiency Indicators in the Forestry Sector (2019 = 100)

4. Discussion

The obtained results demonstrate that during 2019–2024, financing sources in Uzbekistan’s forestry sector became increasingly diversified, forming an integrated system that combines state budget allocations, international grants, and concessional loans. As a result of the more efficient allocation of financial resources, environmental indicators improved, forest areas expanded, and related economic activities developed.

At the same time, private sector participation remains limited, with the primary financing burden still borne by the state and international donors. Going forward, it is essential to attract greater private investment and to develop business models oriented toward ecotourism and the deep processing of forest products. Enhancing financial efficiency will require improved systems for evaluating performance indicators and strengthening monitoring mechanisms.

5. Conclusion

Between 2019 and 2024, the financing base of Uzbekistan’s forestry sector expanded significantly, and its efficiency improved markedly. The state budget remained the principal pillar of support; however, the growing share of donor grants and concessional loans—along with the gradual involvement of the private sector—enhanced the overall financial leverage of the system. While cost per hectare declined steadily, both seedling survival rates and CO₂ sequestration per unit of expenditure increased. These improvements were facilitated by technological discipline, strengthened agro-technical maintenance practices, and the standardization of management processes. Nevertheless, regional disparities persist. Areas characterized by limited water supply,

soil salinization, and high wind erosion require additional targeted interventions. For sustainable long-term financing, several priorities emerge: strengthening private capital participation (through PPPs, green bonds, and carbon credits), expanding results-based financing mechanisms (indexed to survival rates and CO₂ sequestration outcomes), and gradually introducing payment for ecosystem services (PES) schemes. Monitoring and accountability systems should be integrated with satellite data and digital MRV platforms, while cost-effectiveness indicators should be linked to the Medium-Term Expenditure Framework (MTEF) and program-based budgeting instruments. Overall, during the reviewed period, financial resources were effectively transformed into tangible ecological and economic outcomes. The key task ahead is to consolidate this foundation through stronger private sector engagement, enhanced local community participation, and the development of a resilient financial architecture oriented toward climate adaptation and sustainable forest management.

References

- [1] BIOFIN, Financial Needs Assessment for Uzbekistan 2024–2028, 2024.
- [2] BIOFIN, Uzbekistan Country Page, 2024.
- [3] FAO, Sustainable Management of Forests and Rangelands in Dryland Ecosystems of Uzbekistan (GCP/UZB/020/GFF) – Project Update, 20 Feb. 2025.
- [4] Gazeta.uz, “Uzbekistan and World Bank launch \$153 million project to restore forests,” 6 Apr. 2025. [Online]. Available: <https://www.gazeta.uz>
- [5] Global Environment Facility (GEF), Project 10367: Sustainable Forest and Rangelands Management in the Drylands of Uzbekistan, 2022–2026.
- [6] O‘zbekiston Respublikasi Hukumat portali, “Yashil makon” bahorgi mavsumida 127 mln tup ko‘chat ekildi,” 9 Apr. 2024. [Online]. Available: <https://www.gov.uz>
- [7] OECD/BIOFIN, Biodiversity Finance Plan for Uzbekistan – HLPD Presentation, 2024.
- [8] PROGREEN/World Bank, Uzbekistan Resilient Landscapes Restoration Project (Project Appraisal Document, draft), 2022.
- [9] Sh. Umarova and T. Radjabov, Biodiversity Expenditure Review in Uzbekistan: 2020–2022, Tashkent: UNDP/BIOFIN, 2023.
- [10] UNDP Uzbekistan, Biodiversity Expenditure Review (BIOFIN) – Brief Overview, 22 Jul. 2024.
- [11] World Bank, Climate and Environment Program in Central Asia: RESILAND Uzbekistan – \$153 Million, 29 Jun. 2025.
- [12] UNDP, Green Climate Fund Pipeline for Central Asia: Uzbekistan, 2023.
- [13] FAO, State of the World’s Forests 2024: Forest Finance and Investment, 2024.
- [14] BIOFIN, Biodiversity Finance Strategy Implementation Report for Uzbekistan, 2025.
- [15] World Bank, Private Sector Participation in Sustainable Forestry in Central Asia, 2023