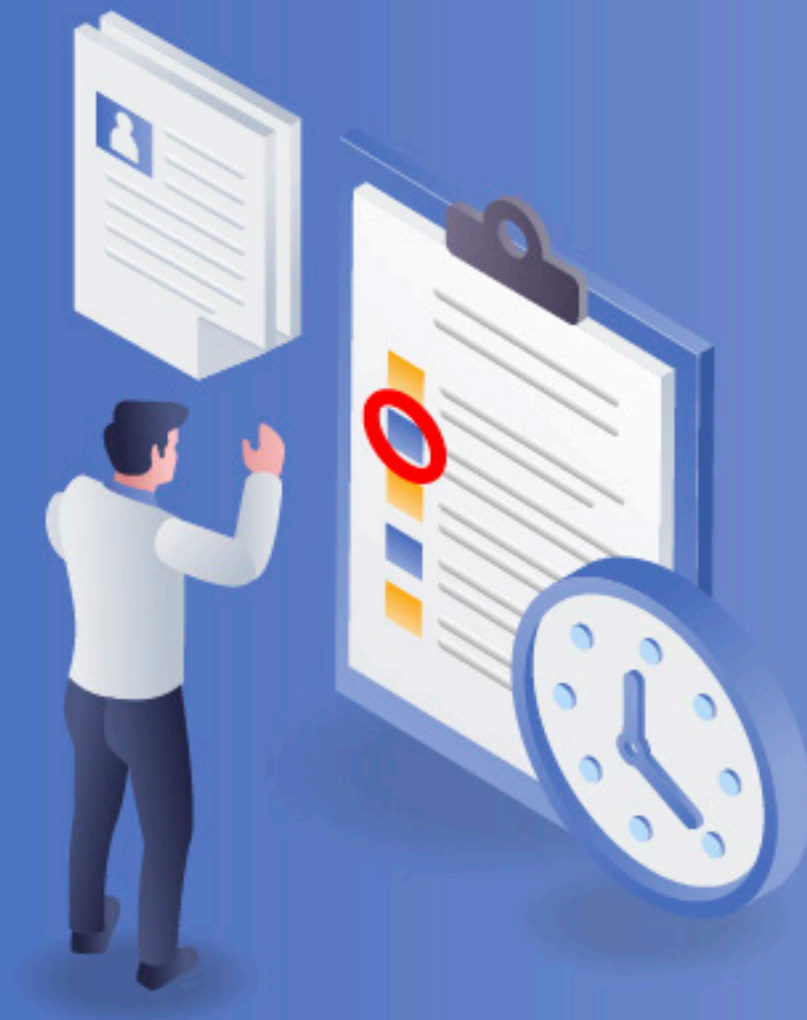




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Institutional Friction and Disbursement Inefficiency in PFES: Evidence from Dak Lak, Vietnam

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ABSTRACT

Payment for Forest Environmental Services (PFES) is a key market-based instrument for sustainable forest management in Vietnam, yet its financial efficiency remains underexplored at the provincial level. This study examines PFES implementation in Dak Lak Province during 2022–2025, focusing on contract performance, revenue structure, and disbursement efficiency. Using descriptive statistics and institutional analysis based on official financial reports, the study identifies a persistent “disbursement inefficiency”, where only 35–40% of planned funds reached forest owners, despite relatively stable revenue streams. The findings reveal three main constraints: over-reliance on hydropower-based revenue, delays in forest-area verification, and limited digital transparency in fund management. The study further highlights institutional fragmentation and weak inter-agency coordination as key barriers to efficient fund allocation. Policy implications suggest the need for digital monitoring systems, diversification of PFES revenue sources (including carbon markets), and simplified administrative procedures to enhance payment efficiency. The Dak Lak case provides practical lessons for improving the performance of PES schemes in developing economies.

INTRODUCTION

Forests play a crucial role in maintaining ecological balance, conserving biodiversity, and supporting socio-economic development, especially in the Central Highlands of Vietnam. Among these provinces, Dak Lak possesses one of the largest forest areas nationwide and serves as a key watershed for the region (Pham *et al.*, 2021). However, pressures from agricultural expansion, illegal logging, and limited financial incentives have resulted in continuing forest degradation and loss of forest cover over the past decade (Hoang *et al.*, 2013). Effective environmental governance is increasingly recognized as a cornerstone for achieving a green economy and ensuring long-term sustainability in resource-dependent regions (Ahmed, 2025).

To address these challenges, the Vietnamese Government introduced the Payment for Forest Environmental Services (PFES) policy under Decree No. 99/2010/ND-CP. This market-based mechanism compensates forest owners and communities for maintaining and providing ecosystem services such as water regulation, soil protection, and carbon sequestration (Vietnam Government, 2010). After more than ten years of implementation, PFES has become one of the most important and innovative financial instruments for sustainable forest management in Vietnam (CIFOR-ICRAF, 2019).

Empirical studies across Vietnam and other countries

have demonstrated that PFES can provide a sustainable funding source for forest protection and contribute to poverty reduction in rural areas (Pagiola, 2008; Bluffstone *et al.*, 2013). However, many challenges remain, including unclear land tenure, limited participation of local communities, and weak fund management capacity (CIFOR-ICRAF, 2015; Nguyen *et al.*, 2021). Specifically, in Dak Lak Province, despite the widespread implementation of PFES since 2012, total revenues have declined, and the actual disbursement rate to forest owners remains low, indicating inefficiencies in fund utilization and payment distribution (Dak Lak Forest Protection and Development Fund, 2024).

While previous studies have examined the social and environmental outcomes of PFES, limited attention has been paid to quantitatively assessing fund disbursement efficiency, contract performance, and structural constraints at the provincial level in the Central Highlands. This study aims to fill this research gap by analyzing the actual status and performance of PFES in Dak Lak Province during 2022–2025. The paper focuses on (i) assessing the signing and execution of entrustment contracts, (ii) analyzing the structure and trends of PFES revenues and expenditures, and (iii) proposing feasible solutions to enhance financial efficiency and promote sustainable forest governance in the province.

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MATERIALS AND METHODS

Research design

This study adopted a descriptive and comparative research design to examine the implementation performance of the Payment for Forest Environmental Services (PFES) policy in Dak Lak Province during the 2022-2025 period. The research primarily relied on secondary data obtained from the Dak Lak Provincial Forest Protection and Development Fund and relevant government reports, which were supplemented with statistical data published by the Department of Agriculture and Rural Development and the Department of Natural Resources and Environment. Using a time-series comparison, the study analyzed changes in entrustment contracts, revenue sources, and expenditure structures to evaluate the fund's operational efficiency (Creswell & Creswell, 2018).

Data sources

Data were collected from three main categories:

- PFES fund reports from 2022 to mid-2025, including official financial statements, disbursement records, and summaries of entrustment contracts;
- Governmental and institutional documents, such as provincial reports, decrees, and decisions regulating PFES implementation (Vietnam Government, 2010; Dak Lak Forest Protection and Development Fund, 2024);
- Academic literature providing contextual understanding of PFES mechanisms in Vietnam and other Southeast Asian countries (CIFOR-ICRAF, 2019; Hoang *et al.*, 2013; Pham *et al.*, 2021).

Analytical methods

The study employed descriptive statistical analysis to identify trends in revenue, expenditure, and contract numbers, and comparative statistics to evaluate differences between planned and actual PFES disbursements across years. Data were processed using Microsoft Excel to compute ratios, growth rates, and disbursement efficiency indicators, allowing for a clear evaluation of fund performance (Nguyen *et al.*, 2021).

In addition, qualitative content analysis was applied to interpret financial reports and policy documents. This approach helped identify underlying structural and institutional factors affecting PFES implementation, such as delays in forest-area verification, administrative

bottlenecks, and low coordination among stakeholders.

Validity and reliability

To enhance reliability, data from the Provincial PFES Fund were cross-checked with related official sources, including the Provincial People's Committee and Department of Agriculture and Rural Development. Consistency among these data sources was verified through triangulation, ensuring that reported values were accurate and representative of actual PFES activities.

Study scope and limitations

The analysis covered the 2022–June 2025 period, which corresponds to the latest available financial data from the Provincial PFES Fund at the time of study. The research focuses on the financial efficiency and institutional performance of PFES but does not assess biophysical outcomes such as forest cover change or carbon sequestration. Future studies may incorporate remote sensing or household surveys to provide a more holistic assessment of PFES effectiveness (Pagiola, 2008).

RESULTS AND DISCUSSION

Contract performance and structural stability

The PFES mechanism in Dak Lak Province relies primarily on entrustment contracts (HDUT) between the provincial fund and entities that use forest environmental services. From 2022 to mid-2025, the number of active contracts remained relatively stable, fluctuating between 45 and 48 contracts (Table 1). Inter-provincial contracts accounted for approximately 37-40% of the total, representing large-scale contributors such as hydropower plants, while intra-provincial contracts involved industrial and clean-water facilities.

Although the number of contracts demonstrates stability, their composition shows limited diversification. Most contracts were concentrated in traditional sectors such as hydropower and clean water, with minimal participation from tourism or aquaculture—two sectors with high potential for generating PFES revenues (Pham *et al.*, 2021). This rigidity reflects insufficient adaptation to the broader PFES framework under Decree No. 156/2018/NĐ-CP, which encourages inclusion of emerging service users.

Table 1: Number of Entrustment Contracts in Dak Lak Province (2022–2025)

Contract type		2022	2023	2024	2025*
Inter-provincial		17	18	18	18
Intra-provincial	Hydropower	10	9	9	9
	Clean water	3	3	3	3
	Industrial facilities	15	18	18	18
Total		45	48	48	45

*Data as of June 2025.

Source: Dak Lak Forest Protection and Development Fund (2025)

The slow expansion of new contracts indicates institutional challenges in identifying and enforcing payment obligations among eligible service users and enforcing payment obligations among small-scale industrial users. Similar challenges were observed in other provinces such as Lâm Đồng and Sơn La, where PFES implementation was hindered by limited cross-sector coordination and high administrative costs (Hoang *et al.*,

2013; Nguyen *et al.*, 2021).

Revenue trends and financial instability

The total PFES revenue in Dak Lak exhibited a consistent downward trend from 2022 to 2025 (Table 2). In 2022, the fund achieved 102% of its planned revenue, but by mid-2025, this figure had dropped to 53.5%, marking a substantial financial contraction.

Table 2: PFES Revenue in Dak Lak Province (2022–2025)

Unit: Actual disbursement (VND) Disbursement rate (%)						
Items			2022	2023	2024	2025 (AS OF JUNE)
Planned revenue	Central coordination		72.136.923	75.010.915	81.708.000	-
	Intra-provincial revenue	Hydropower	6.723.006	7.164.225	8.621.000	-
		Clean water	1.127.354	1.101.347		-
		Industrial facilities	65.837	76.139		-
	Deposit interest		130.000	100.000	130.000	-
	Total planned revenue		80.183.120	83.452.626	90.495.000	-
Actual revenue	Central coordination		70.993.852	65.021.098	52.479.000	42.438.111
	Intra-provincial revenue	Hydropower	9.692.778	8.085.511	7.167.000	3.947.339
		Clean water	952.227	977.060		
		Industrial facilities	91.721	109.027		
	Deposit interest		89.615	143.122	43.000	16.913
	% of plan achieved		81.820.193 (102% of plan)	74.335.818 (89.1% of plan)	59.689.000 (66% of plan)	46.402.363 (53.49% of plan)

*As of date 14/12/2022

**As of date 14/12/2023

***As of date 02/12/2024

****As of date 19/06/2025

Source: Dak Lak Forest Protection and Development Fund (2025)

The decline in revenue was driven primarily by the reduction in centrally coordinated transfers and the instability of hydropower-based contributions—two major revenue pillars (CIFOR-ICRAF, 2019). This pattern indicates a high dependence on external funding rather than on diversified, locally sourced payments. Such dependence threatens the fund's financial sustainability and its capacity to ensure timely payments to forest owners (Pagiola, 2008).

Furthermore, the revenue share from local industrial users and clean-water facilities remained marginal, suggesting a missed opportunity for domestic resource mobilization. The absence of effective enforcement mechanisms to compel small industries to pay PFES fees remains a persistent governance issue (Nguyen *et al.*, 2021).

Expenditure structure and disbursement efficiency

The expenditure analysis reveals an even more concerning picture. Across all years, the actual disbursement rate

remained below 50% of the approved plan, and dropped to only 14.4% in the first half of 2025 (Table 3).

A closer look shows that spending on forest owners—the most crucial expenditure component—remained at only 35-40% of the plan, while administrative costs were almost fully disbursed. This imbalance reflects a structural inefficiency that undermines the incentive mechanism intended to support forest protection: resources intended to incentivize forest protection are not reaching their intended beneficiaries (Dak Lak Forest Protection and Development Fund, 2024).

Delays in forest-area verification, incomplete contract documentation, and overlapping mandates between agencies have contributed to slow disbursement (Pham *et al.*, 2021). Similar findings were reported in studies from Costa Rica and Indonesia, where procedural complexity led to payment delays and reduced stakeholder motivation (Pagiola, 2008; CIFOR-ICRAF, 2015).

Table 3: PFES Expenditure and Disbursement in Dak Lak Province (2022–2025)

Unit: Actual disbursement (VND) Disbursement rate (%)					
Items		2022	2023	2024	2025 (AS OF JUNE)
Planned expenditure	Management costs	8.018.312	8.345.263	9.046.000	8.674.573
	Contingency costs	3.923.035	4.073.747	4.458.000	4.266.586
	Costs for forest owners	66.691.597	69.253.694	75.789.000	72.531.968
	Expenditure from unidentified	1.660.866	2.161.917	1.297.000	1.272.602
	Total planned expenditure	80.293.810	83.834.620	90.590.000	86.745.729
Actual expenditure	Management costs	7.799.870	7.764.104	7.956.000	4.245.384
	Contingency costs	0	0	0	0
	Costs for forest owners	24.689.782	22.958.565	27.458.000	8.257.053
	Expenditure from unidentified	1.609.700	2.120.488	1.273.000	0
	of plan achieved (%)	34.099.352 (42.4% of the planned target)	32.843.157 (39.2% of the planned target)	36.687 (40.5% of the planned target)	12.502.437 (14,41% of the planned target)

*As of date 14/12/2022

**As of date 14/12/2023

***As of date 02/12/2024

****As of date 19/06/2025

Source: Dak Lak Forest Protection and Development Fund (2025)

Institutional and Financial Constraints in PFES Implementation

Despite notable achievements, the implementation of the PFES policy in Dak Lak Province continues to face several institutional, financial, and technical challenges that constrain its overall effectiveness and long-term sustainability.

Financial dependence and unstable revenue structure

One of the most critical challenges lies in the heavy dependence on centrally coordinated transfers. More than 80% of Dak Lak's PFES revenue originates from hydropower and clean-water facilities, with minimal contributions from industrial and tourism sectors. As a result, fluctuations in hydrological conditions and changes in national revenue allocation directly affect the province's financial stability (CIFOR-ICRAF, 2019; Dak Lak Forest Protection and Development Fund, 2024).

The lack of diversified revenue sources also exposes the PFES Fund to risks of underfunding, especially during periods of drought or reduced electricity production. This issue mirrors findings in other provinces where PFES revenues are highly sensitive to market and climatic variations (Pham *et al.*, 2021).

Delays in forest-area verification and contract renewal

The slow process of verifying forest areas eligible for payment remains a major obstacle. In many cases, annual verification and mapping activities are delayed due to overlapping responsibilities among provincial agencies

and limited technical capacity. As of mid-2025, Dak Lak had not yet completed its 2025 forest-area verification for all forest owners, leading to late disbursements and temporary fund advances (Dak Lak Forest Protection and Development Fund, 2025).

This procedural delay not only affects the timing of payments but also reduces trust among forest owners, who depend on PFES income for livelihood support. Similar issues of bureaucratic delay and insufficient spatial data management have been documented in other PFES systems globally (Pagiola, 2008; CIFOR-ICRAF, 2015). Inefficient disbursement and unbalanced expenditure structure

The disbursement rate for forest owners remains critically low, averaging only 35-40% of the approved budget during 2022-2025. Meanwhile, administrative and management expenses are almost fully disbursed each year, indicating a misalignment between operational efficiency and the program's social objectives (Nguyen *et al.*, 2021).

The complex multi-level approval process, combined with rigid fund allocation procedures, has further slowed the flow of payments. These inefficiencies have weakened community motivation for forest protection and led to growing dissatisfaction among beneficiaries.

Weak coordination and monitoring mechanisms

Inter-agency coordination among the Forest Protection and Development Fund, Department of Agriculture and Rural Development, and local People's Committees

remains fragmented. The absence of a shared digital monitoring platform makes it difficult to synchronize data, verify forest conditions, and track payment progress (Hoang *et al.*, 2013).

Although the province has initiated steps toward GIS-based forest mapping, the system is not yet fully operational, leading to inconsistencies in payment records and delays in fund reconciliation.

Limited community engagement and awareness

A lack of comprehensive training and community participation has reduced the local ownership of PFES programs. Many forest-dependent households perceive PFES payments as irregular and unpredictable, which discourages their active involvement in forest protection activities (Bluffstone *et al.*, 2013).

Additionally, awareness of the broader environmental objectives of PFES remains limited, as most beneficiaries focus solely on short-term financial gains rather than long-term forest stewardship.

Discussions

The findings of this study reveal a persistent disbursement inefficiency in the PFES system of Dak Lak Province, where only 35-40% of planned payments were delivered to forest owners during the 2022-2025 period. This gap between financial mobilization and actual disbursement highlights a critical limitation in the operational performance of PFES, suggesting that revenue generation alone is insufficient to ensure policy effectiveness.

From an institutional perspective, this inefficiency can be conceptualized as a form of “institutional friction”, in which administrative complexity, fragmented governance, and procedural delays impede the effective flow of financial resources. Unlike classical market-based instruments that assume efficient transmission of incentives, the PFES mechanism in this case is constrained by bureaucratic processes, particularly the reliance on manual forest-area verification and multi-level approval systems. These findings are consistent with previous studies in Vietnam, which emphasize the role of governance constraints and limited administrative capacity in shaping PFES outcomes (Nguyen *et al.*, 2021). A comparative analysis further reinforces this argument. In Costa Rica, the PES system has achieved relatively high disbursement efficiency due to its centralized institutional structure, standardized procedures, and effective monitoring mechanisms (Pagiola, 2008). In contrast, both Vietnam and Indonesia exhibit challenges related to institutional fragmentation and coordination

failures, resulting in moderate or inconsistent payment performance (CIFOR-ICRAF, 2015). However, the Dak Lak case demonstrates a more pronounced disbursement gap, indicating that delays in verification and administrative processing are particularly critical bottlenecks in the Vietnamese PFES system.

The results also highlight a structural imbalance between administrative expenditures and payments to forest owners. While management costs are consistently disbursed at high rates, payments to beneficiaries remain significantly below planned levels. This imbalance undermines the fundamental principle of PFES as an incentive-based mechanism and may weaken the motivation of local communities to engage in forest protection. Moreover, the success of such environmental programs often depends on addressing the perceived costs and barriers that local stakeholders face during the adaptation process (Akhtar & Islam, 2025). In this regard, the study contributes to the broader literature by emphasizing that the effectiveness of PES schemes depends not only on financial inputs but also on the efficiency and equity of fund allocation mechanisms.

Another important insight concerns the vulnerability of PFES to revenue concentration. The heavy dependence on hydropower and centrally coordinated transfers exposes the system to external shocks, including climate variability and fluctuations in energy production. This finding aligns with existing research suggesting that PES systems in developing countries often lack diversified funding sources, thereby limiting their long-term sustainability (CIFOR-ICRAF, 2019). The absence of significant contributions from sectors such as tourism and carbon markets further reflects untapped potential within the PFES framework.

From a policy perspective, the findings suggest that improving PFES performance requires a shift from a purely financial approach to a more institutionally adaptive model. First, digitalization of forest monitoring and payment systems, including the use of GIS and remote sensing technologies, can significantly reduce verification delays and enhance transparency. Second, simplifying administrative procedures and clarifying the roles of relevant agencies would help reduce coordination costs and accelerate disbursement processes. Third, diversifying revenue sources by integrating carbon credit markets and private sector participation could enhance financial resilience and reduce dependence on hydropower-based contributions.

Overall, this study provides empirical evidence that

Table 4: Comparative performance of PES/PFES systems across selected countries

Country	Disbursement performance	Key constraints	Source
Vietnam (Dak Lak)	35-40% of planned disbursement	Administrative delays, verification issues	Dak Lak FPDF (2024, 2025)
Indonesia	Moderate, constrained by governance inefficiencies	Institutional complexity, coordination gaps	CIFOR-ICRAF (2015)
Costa Rica	High efficiency (>70-80%)	Strong centralized system	Pagiola (2008)

institutional design plays a decisive role in determining the effectiveness of PES mechanisms in developing economies. The case of Dak Lak illustrates that without addressing governance inefficiencies and administrative bottlenecks, the PFES system risks underperforming despite its strong theoretical foundation. These findings contribute to the growing body of literature on environmental governance by highlighting the importance of aligning financial mechanisms with institutional capacity to achieve sustainable outcomes.

CONCLUSION

This study provides a comprehensive evaluation of the PFES mechanism in Dak Lak province, highlighting both its financial potential and its operational bottlenecks. While PFES has successfully mobilized significant resources for forest protection, the structural inefficiencies in disbursement and the lack of revenue diversification pose serious threats to its long-term viability.

To bridge the gap between policy intent and local impact, this research offers three key policy lessons for Vietnam and other developing economies:

Digitalization of Forest Monitoring:

Transitioning from manual verification to satellite-based and GIS monitoring is essential to ensure timely and transparent payments.

Revenue Diversification: Expanding the PFES buyer base beyond hydropower to include carbon sequestration services and ecotourism will stabilize the fund against environmental fluctuations.

Decentralized Governance: Empowering local communities through simplified administrative procedures will enhance participation and ensure that the ‘polluter pays’ principle translates into meaningful ‘guardian rewards.’

In conclusion, the “Dak Lak case” serves as a critical reminder that financial mobilization is only the first step. The ultimate success of PES schemes in the global South depends on the agility of the institutional framework and the speed at which financial benefits reach the actual stewards of the forest.

Declaration of conflict of interest

The authors affirm that there are no conflicts of interest regarding the research, authorship, or publication of this article.

Ethical Approval

This study does not involve human participants or animals.

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