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Tenure, Incentives, and Community Forest Management Behavior in Vietnam: A Mixed Methods Study

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Abstract

Background/problem: Community forest management depends on institutional arrangements that shape participation, incentives, and long-term stewardship. In Vietnam, community forest allocation and forest protection contracting create contrasting governance conditions.

Objective/purpose: The qualitative objective was to examine how tenure, decision authority, incentives, benefit sharing, and participation differed across the two arrangements. The quantitative objective was to assess household perceptions of protection and long-term forest-development activities under forest protection contracting.

Design and Methodology: An exploratory sequential mixed methods comparative case-study design was used. Phase 1 comprised field observations, six focus group discussions, and eight key informant interviews. Findings informed Phase 2, a survey of 89 respondents using nine Likert-type perception items. The strands were integrated through a joint display based on Ostrom’s common-pool resource principles and adaptive co-management.

Results: Community forest allocation cases showed more secure rights, greater local decision authority, and broader long-term management activities, whereas forest protection contracting concentrated participation on assigned protection duties. Quantitatively, 93% of respondents disagreed that patrols were insufficient, 91% disagreed that illegal exploitation had increased, and 89% agreed that no forest-enrichment activities had been undertaken. Household economic status differed between communes, $p < .001$. Integrated findings converged on a distinction between favorable perceptions of routine protection and limited long-term forest development under short-term contracting.

Conclusion and Implications: More secure rights, meaningful local decision-making, equitable benefits, and expectations of future gains were associated with stronger conditions for long-term stewardship. Policies should combine protection incentives with inclusive participation, longer-term rights, and local decision authority.

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Forests in Vietnam support biodiversity conservation, ecological regulation, cultural values, climate-change mitigation, and the livelihoods of forest-dependent communities (Dinh & Wessler, 2024; Gallemore et al., 2024). Although the country has increased its overall tree cover and introduced major forest-sector reforms, recent assessments indicate that natural forests continue to face degradation, declining quality, illegal extraction, land conversion, and management-capacity constraints (Dinh & Wessler, 2024; USAID Sustainable Forest Management Project, 2024a). These continuing pressures are particularly important for poor and ethnic minority communities whose livelihoods and cultural practices remain closely connected to forests (Bayrak, 2019; Le & Shinjo, 2025).

Vietnam has progressively decentralized forest management by allocating forest and forestland to households, communities, management boards, and other actors. Nevertheless, recent evidence shows that implementation remains incomplete. Approximately 3.3 million hectares of unallocated forestland remain under the temporary management of commune people's committees, and such areas are often vulnerable to degradation. Forest and forestland allocation have also been slowed by inconsistencies between land and forestry procedures and by different interpretations among provincial authorities (USAID Sustainable Forest Management Project, 2024b). Even where forests have been allocated, communities may lack the technical capacity, financial incentives, management guidance, and access to payments for forest environmental services needed to exercise their rights effectively (USAID Sustainable Forest Management Project, 2024a). Recent national research similarly found that policy-design constraints, limited resources, and inadequate attention to livelihood needs reduce the benefits of forestland allocation, particularly for the poorest households (Dinh & Wesseler, 2024).

These continuing challenges are reflected in two contrasting arrangements. Under community forest allocation (CFA), communities receive formally recognized, longer-term management rights and potentially greater authority over rules, resource use, and future benefits. Under forest protection contracting (FPC), communities generally carry out patrols and other protection duties under short-term contracts while government agencies retain formal authority. Recent research on collective forest-environmental payments in Vietnam shows that community-based arrangements continue to face problems involving legitimacy, inclusive decision-making, social cohesion, and the balance between individual and collective benefits (Nguyen et al., 2022). However, limited research has directly compared how CFA and FPC are associated with participation, motivation, perceived fairness, compliance, and willingness to invest in long-term stewardship, particularly in forests temporarily managed by commune people's committees. Existing studies have made important contributions to understanding co-management and community-based forest management. However, forestland temporarily managed by commune people's committees differs institutionally from many established community-management models because formal tenure remains with the state and access to forest-environmental payments may be limited or uneven (Dinh & Wesseler, 2024; USAID Sustainable Forest Management Project, 2024a, 2024b). Evidence is also limited on the behavioral implications of transferring such areas to communities or comparing longer-term allocation with annually renewed protection contracts. The present study addresses this gap by examining how tenure security, incentives, local decision-making, and benefit-sharing arrangements are associated with community participation and sustainable forest-management behavior in selected communities in Vietnam.

Literature Review

This section establishes the theoretical and empirical foundation for the study. It first presents Ostrom's (1990) common-pool resource framework as the primary theory and adaptive co-management as a complementary perspective, then reviews international community-forestry models and evidence from Vietnam. Each subsection identifies how the literature informs the study's research objectives, quantitative expectations, and mixed methods integration.

Theoretical Framework: Ostrom's Theory of Common-Pool Resource Governance and Adaptive Co-Management

Community forest management can be conceptualized through Ostrom's common-pool resource framework, which provides the primary theoretical foundation for this study. Common-pool resources are characterized by difficulty in excluding potential users and by subtractability, whereby the use or degradation of a resource by one actor can reduce the benefits available to others (Ostrom, 1990). More specifically, Ostrom (1990) identifies eight institutional design principles associated with durable common-pool resource governance: clearly defined boundaries; congruence between appropriation and provision rules and local conditions; collective-choice arrangements; monitoring; graduated sanctions; accessible conflict-resolution mechanisms; recognition of users' rights to organize; and nested enterprises for larger

governance systems. These principles provide a theoretical basis for explaining behavioral outcomes such as collective action, cooperation, rule compliance, accountability, perceived legitimacy, and willingness to invest in long-term stewardship of shared resources (Ostrom, 1990).

Adaptive co-management complements Ostrom's institutional perspective by emphasizing collaboration, social learning, flexibility, trust building, knowledge sharing, and coordination among actors operating at different governance levels (Armitage et al., 2007, 2009). Recent empirical studies further indicate that effective forest co-management is associated with policy trust, shared decision-making, social belonging, institutional maturity, and the compatibility of formal and customary governance arrangements (Ma et al., 2025; Situmorang et al., 2026; Tias et al., 2026).

Accordingly, this study uses Ostrom's common-pool resource framework as the principal theoretical lens for comparing tenure recognition, benefit–cost relationships, collective-choice arrangements, monitoring, sanctions, conflict resolution, rights to organize, and nested governance under different community forest-management arrangements. Adaptive co-management is used as a complementary perspective to interpret institutional learning, flexibility, shared decision-making, and multilevel collaboration, particularly within hybrid forest protection contracting arrangements (Armitage et al., 2007, 2009; Ostrom, 1990).

International Community Forestry Models and Lessons

International experience shows that community forestry ranges from relatively secure community tenure to state-led co-management. In Nepal, community forest user groups manage forests through locally developed institutions and approved operational plans (Paudel et al., 2022; Poudyal et al., 2023). Similarly, Tanzania's participatory forest management has improved forest conditions in some areas, although joint management remains constrained by uncertain benefits, community protection costs, and limited local capacity (Blomley et al., 2008).

By contrast, Mexico provides an example of stronger community tenure, where ejidos and agrarian communities may establish local rules and operate community forest enterprises. Such arrangements can combine conservation with employment and local development when supported by effective organization, inclusive decision-making, technical capacity, and market access (Bray et al., 2005). Across these cases, a consistent lesson is that long-term stewardship is more likely when community responsibilities are accompanied by secure rights, meaningful decision-making authority, equitable benefit sharing, and institutional support. These dimensions therefore guide the comparison of community forest allocation and forest protection contracting in Vietnam.

Community Forest Allocation and Forest Protection Contracting in Vietnam

In Vietnam, community forest allocation and forest protection contracting create different institutional and behavioral conditions. Under community forest allocation, comparatively secure management rights may encourage communities to regard forests as long-term collective assets and invest in monitoring, rule enforcement, enrichment, and regeneration. Formal rights alone, however, are insufficient without effective institutions, fair benefit sharing, local capacity, and continuing technical support (Bayrak, 2019; Moeliono et al., 2017; Putraditama et al., 2019). Under forest protection contracting, communities generally conduct patrols, fire prevention, boundary monitoring, and reporting of violations while government agencies retain formal authority. Fixed payments and defined responsibilities may motivate routine protection, but limited tenure security, decision-making authority, and access to future benefits may constrain investment in activities with delayed returns. Recent Vietnam evidence suggests that payments interact with environmental values, cultural responsibility, repeated engagement, and peer learning rather than operating as isolated incentives (Le & Shinjo, 2025), while broader forest-payment outcomes depend on governance and accountability (Gallemore et al., 2024). These expectations lead the present study to examine whether favorable perceptions of routine protection coexist with more limited long-term forest-development activities and whether qualitative evidence links these patterns to tenure, incentives, participation rules, and decision authority.

Research Objectives and Hypotheses

This study had three objectives:

1. To examine governance arrangements, participation mechanisms, perceived incentives, benefit sharing, and implementation challenges under community forest allocation and forest protection contracting;

2. To assess household perceptions of forest protection contracting implementation, including routine protection, forest condition, and restoration. Based on the theoretical expectations developed from the literature, the quantitative phase examined two directional hypotheses:

H1: Respondents would report generally favorable perceptions of routine forest protection and monitoring under forest protection contracting.

H2: Respondents would report comparatively limited long-term forest-development activities, particularly forest enrichment, care, and regeneration.

3. To integrate the qualitative and quantitative findings to interpret how tenure security, incentives, local decision-making, institutional learning, and multilevel collaboration are associated with sustainable forest-management behavior.

Methods

Design

This study used an exploratory sequential mixed methods comparative case-study design. In an exploratory sequential design, qualitative data are collected and analyzed first to develop an in-depth understanding of the phenomenon, and the resulting findings are then used to inform the subsequent quantitative phase (Creswell & Plano Clark, 2018). This design was appropriate because the study first needed to explore how community forest allocation and forest protection contracting operated in practice, including local experiences of tenure, decision-making, incentives, participation, conflict, and benefit sharing, before examining the prevalence of selected perceptions among a larger group of respondents. The findings from Phase 1 informed the content and contextual wording of the Phase 2 household questionnaire. This connection represents the building function of mixed methods, whereby results from an initial qualitative strand inform the development of the subsequent quantitative strand. Phase 2 then quantified household perceptions of forest protection contracting in the two study communes, particularly perceptions related to routine protection, forest condition, and restoration.

Following the separate analyses of the qualitative and quantitative data, the two strands were integrated through a joint display to identify areas of convergence, complementarity, divergence, and contextual explanation (Fetters et al., 2013). Because the quantitative survey included only forest protection contracting communities, the qualitative strand provided the principal basis for the comparison between governance arrangements, while the quantitative strand was used to deepen and corroborate interpretations within forest protection contracting settings.

Context

The study was conducted in Nam Giang District, Quang Nam Province, Vietnam, including selected communities in Ca Dy and Ta Bhing communes and Ha Ra community in Thanh My town. Ca Dy and Ta Bhing were selected because they contained forests temporarily managed by commune people's committees and protected through forest protection contracting. Ha Ra was included as an additional community forest allocation case because no community in Ta Bhing had received formal community forest allocation.

Phase 1: Qualitative Phase

Participants

Participants were purposively selected based on their direct knowledge or experience of community forest allocation, forest protection contracting, or local forest governance. Eligible participants were aged 18 years or older and included local officials, forestry officers, community leaders, forest management board or

patrol-group members, village elders, women, and other knowledgeable residents. Six focus group discussions and eight key informant interviews were conducted. Participants were identified through consultation with local authorities and village representatives.

Instruments

Three qualitative instruments were used: a semi-structured key informant interview guide, a focus group discussion guide, and a field-observation checklist. Developed from the research objectives and Ostrom's principles, the instruments addressed tenure and boundaries, decision-making, participation, monitoring, sanctions, conflict resolution, benefit sharing, incentives, and management challenges. Six specialists reviewed the instruments for relevance, clarity, content coverage, and contextual appropriateness, after which they were pilot-tested with 12 participants outside the final sample and revised before data collection.

Data Collection

Interviews and focus groups were conducted in Vietnamese, lasted approximately 90 minutes, and were audio-recorded with participants' permission. Field notes documented local conditions, management practices, and relevant contextual information. Recordings were transcribed and translated where necessary.

Data Analysis

Qualitative data were analyzed using a hybrid deductive–inductive thematic analysis following the thematic analysis procedures described by Braun and Clarke (2006, 2021). The analysis involved familiarization with the data, initial coding, development and review of themes, definition and naming of themes, and interpretation of the findings. Deductive codes were derived from the research objectives and Ostrom's common-pool resource framework (Ostrom, 1990), particularly concepts related to tenure, collective-choice arrangements, monitoring, benefit sharing, and conflict resolution. Inductive coding was conducted concurrently to identify patterns and issues emerging from participants' accounts that were not fully captured by the initial theoretical categories. This combination of theory-driven and data-driven coding is consistent with a hybrid approach to thematic analysis (Fereday & Muir-Cochrane, 2006).

Rigor

Credibility was strengthened through triangulation across key informant interviews, focus group discussions, field observations, participant groups, administrative evidence, and study sites.

Phase 2: Quantitative Phase

Participants

The quantitative phase included 89 respondents from forest protection contracting villages, comprising 58 respondents from Ca Dy and 31 from Ta Bhing. Eligible respondents were adults aged 18 years or older who lived in the community and had direct knowledge of local forest-protection activities.

Instruments

A structured household questionnaire collected participant characteristics, information on forest-protection participation and benefit distribution, and nine Likert-type perception items concerning patrol frequency, fire prevention, illegal exploitation, forest quality, changes in forest area, enrichment, forest care, regeneration, and encroachment. Responses to the nine perception items were recorded on a five-point scale from 1 = strongly disagree to 5 = strongly agree. The questionnaire was developed from Phase 1 findings, relevant literature, and the theoretical framework. Six experts reviewed it for content validity, wording, and contextual relevance, and it was pilot-tested with 20 respondents from communities with similar characteristics outside the final sample. Because the nine items represented distinct dimensions of forest management and were analyzed individually, they were not treated as a single scale and Cronbach's alpha was not calculated.

Data Collection

Trained enumerators administered the questionnaire face-to-face after obtaining informed consent. Completed questionnaires were checked for completeness and consistency before analysis.

Data Analysis

Descriptive statistics summarized household characteristics and item-level response distributions. Continuous or ordinal between-commune comparisons used Wilcoxon rank-sum tests, while categorical comparisons used chi-square or exact tests as appropriate to cell counts. Statistical significance was assessed at $p < .05$. The two quantitative hypotheses were evaluated using the direction and concentration of item-level response distributions because the survey indicators were conceptually distinct.

Phase 3: Data Integration

After the qualitative and quantitative analyses were completed, findings were merged through a joint display matrix following mixed methods integration procedures (Fetters et al., 2013). Evidence from interviews, focus groups, field observations, administrative records, and survey findings was examined for convergence, complementarity, divergence, and gaps. Quantitative evidence was used primarily to deepen and corroborate understanding of forest protection contracting because the survey did not include a comparable community forest allocation sample. Hybrid arrangements were interpreted as implementation variants within contracting rather than as a separate legal tenure model and were assessed through both Ostrom's (1990) principles and adaptive co-management concepts such as shared decision-making, institutional learning, flexibility, and multilevel collaboration (Armitage et al., 2007, 2009).

Results

The results are presented in the sequence of the mixed methods design, with qualitative findings in phase 1, quantitative findings in phase 2, and data integration in phase 3. Administrative and spatial evidence is reported with the qualitative phase because it was used to interpret governance arrangements, while household survey characteristics and perception results are reported within the quantitative phase.

Phase 1: Qualitative Findings on Forest Governance Arrangements and Forest-Management Context

Administrative data showed substantial differences in forest functions and management arrangements between Ca Dy and Ta Bhing. In Ca Dy, production forest accounted for the largest proportion of forest land, followed by protection forest (Table 1). In Ta Bhing, special-use and protection forests predominated. Forest-management authority also differed. State forest management boards managed 72.91% of the reported forest area in Ta Bhing, while the commune people's committee temporarily managed 26.81%; no forest land had been formally allocated to communities. In Ca Dy, the commune people's committee temporarily managed 51.98% of the reported forest area, while 32.69% had been allocated to communities.

Under FPC, commune people's committees contracted temporarily managed forests to village groups through annually renewed agreements. The contracted areas were unevenly distributed among villages. Pa Da managed the largest contracted area in Ca Dy, while A Lieng managed the largest area in Ta Bhing. In Ta Bhing, the contracted forest area ranged from approximately 2.70 ha per household in Ta Dac to 4.43 ha in A Lieng.

These spatial differences shaped village responsibilities and potential benefits. Communities managing larger areas were responsible for wider patrol zones, while the area assigned to each village influenced the relationship between protection effort and available payments. However, households did not receive individual or long-term rights over these areas. Forest boundaries, contract duration, total payments, and major management decisions continued to be determined by commune people's committees and related forest agencies.

Table 1*Forest Area by Function and Management Entity in Ca Dy and Ta Bhing Communes*

Forest area	Ca Dy		Ta Bhing	
	Area (hectare)	%	Area (hectare)	%
Forest area by functions				
Special-use forest	1,128.19	8.31	6,032.31	56.40
Protection forest	4,027.25	29.67	3,886.61	36.34
Production forest	8,419.32	62.02	775.84	7.25
Forest area by owners				
State Forest Management Boards	1,428.19	10.52	7,797.89	72.91
Allocated to communities	4,437.85	32.69		
Temporary management by commune people's committees	7,044.07	51.89	2,867.64	26.81
Other entities	664.65	4.90	29.23	0.27

Community Forest Allocation

The CFA cases included Ca Lai in Ca Dy and Ha Ra in Thanh My. Ca Lai received 667.40 ha of natural forest for community management in 2016, while Ha Ra received 302.77 ha. Both communities received external project support during the allocation and establishment of their management systems.

The communities established local institutions that included community forest management boards, internal control boards, and specialized protection teams. They also prepared forest-management plans and demarcated forest boundaries. Reported activities extended beyond routine patrols to vegetation clearance, tree thinning, firebreak construction, enrichment planting, and native-species restoration. Participants associated these arrangements with improved control of encroachment and illegal extraction, although the study did not independently measure ecological change attributable to CFA.

Forest Protection Contracting Implementation Arrangements

Forest protection contracting was implemented through three main organizational arrangements. Under the group-based arrangement, community-elected groups conducted patrols three or four times per month, and protection payments were used to compensate group members and support village funds. Under the community-based arrangement, smaller rotating groups were assigned to forest subzones, responsibilities were shared over time, and benefits were distributed according to labor contributions.

The combined or hybrid arrangement linked grassroots organization with continuing external authority. Designated groups conducted regular patrols, while other households participated periodically. Villages could organize patrol schedules and distribute part of the payments internally, but commune people's committees and forest agencies retained authority over contracts, boundaries, sanctions, and major management decisions. The hybrid arrangement was therefore treated as an implementation variant within FPC rather than a separate tenure model.

Participation arrangements influenced access to payments and forest resources. In some group-based sites, households outside the contracted group reported restrictions on collecting non-timber forest products. Patrol-group members also described pressure when enforcing restrictions against other residents. One participant explained: "We carry out our assigned responsibilities and must address even minor violations, but some people oppose us and place pressure on group members" (FPC management-group representative, Ta Bhing).

Benefit distribution was also uneven. Poorer households, women, older people, and individuals considered physically unable to undertake patrols could be excluded from paid activities. A woman from

Ca Dy stated: “I was not allowed to join the patrol group because they said I was not strong enough. My family is poor, and the patrol payment would have helped” (female community member, Ca Dy).

These findings show that participation depended not only on household characteristics but also on village rules governing eligibility, labor allocation, forest access, and distribution of payments.

Overall, Phase 1 identified a consistent institutional contrast. The community forest allocation cases combined formal tenure recognition, local rules, and a wider portfolio of long-term management activities, whereas forest protection contracting concentrated community participation on contracted protection duties. Hybrid contracting arrangements broadened operational participation and local benefit distribution but did not transfer strategic authority. The qualitative evidence therefore suggests that the central distinction was not participation alone, but the duration, authority, and expected benefits attached to participation.

Phase 2: Quantitative Findings

Participant characteristics

Table 2 summarizes the characteristics of the 89 surveyed households. Respondents had a mean age of 40.20 years, households averaged 3.93 members, and mean productive land area was 2.19 ha. Between-commune differences were not statistically significant for age ($p = .25$), household size ($p = .84$), productive land area ($p = .11$), or ethnicity ($p = .33$).

Table 2

Characteristics of Surveyed Households in Ca Dy and Ta Bhing Communes

Variable	Total ($N = 89$)	Ca Dy ($n = 58$)	Ta Bhing ($n = 31$)	p	Standardized mean difference
Age, years	40.20 (9.63)	39.34 (10.20)	41.81 (8.38)	.25	.26
Household members	3.93 (1.20)	3.91 (1.22)	3.97 (1.20)	.84	.05
Productive land, ha	2.19 (1.54)	1.99 (1.36)	2.54 (1.79)	.11	.35
Ethnicity: Ka Tu	85 (95.50)	54 (93.10)	31 (100.00)	.33	.39
Ethnicity: Kinh	2 (2.20)	2 (3.40)	0 (0.00)		
Ethnicity: Ze Trieng	2 (2.20)	2 (3.40)	0 (0.00)		
Household status: Near-poor	12 (13.50)	6 (10.30)	6 (19.40)	< .001	1.12
Household status: Non-poor	35 (39.30)	15 (25.90)	20 (64.50)		
Household status: Poor	42 (47.20)	37 (63.80)	5 (16.10)		

Most respondents belonged to the Ka Tu ethnic minority group (95.5%). Household economic status differed significantly between the communes, $p < .001$: poor households represented 63.8% of respondents in Ca Dy compared with 16.1% in Ta Bhing, whereas non-poor households represented 25.9% and 64.5%, respectively. These socioeconomic differences provide important context for interpreting participation and benefit access but were not treated as causal explanations of forest-management behavior.

Household Perceptions of Forest Protection Contracting

The nine perception items assessed patrols, fire prevention, illegal exploitation, forest condition, enrichment, care, regeneration, and encroachment (Table 3). Because most statements were negatively worded, disagreement generally represented a favorable perception of protection performance, whereas agreement with statements about limited enrichment, care, or regeneration indicated weaker long-term forest development.

Table 3

Household Perceptions of Forest Protection Contracting Implementation in Ca Dy and Ta Bhing Communes

Statement	Disagree/strongly disagree (%)	Neutral (%)	Agree/strongly agree (%)
No forest-enrichment activity was undertaken	6	5	89
Few activities were undertaken to care for the forest	43	22	35
Few activities were undertaken to prevent forest fires	39	44	17
The area of restored natural regeneration was small	37	54	9
Forest-protection patrols were insufficient	93	1	6
Illegal exploitation of wildlife and timber increased	91	4	4
Forests managed under commune people's committee contracts remained encroached	70	26	4
The area of natural forest under commune people's committee management decreased	64	33	3
Forest quality significantly declined	67	31	1

Note. Percentages combine the two disagreement categories and the two agreement categories from the original five-point response scale. Percentages may not total 100 because of rounding.

Most respondents disagreed or strongly disagreed that patrols were insufficient (93%), illegal exploitation of wildlife and timber had increased (91%), forest quality had declined (67%), or the area of natural forest had decreased (64%). These distributions generally supported H1 for routine patrols and control of illegal exploitation. Perceptions of fire-prevention activities were less consistent: 39% disagreed that fire-prevention activities were insufficient, 44% selected a neutral response, and 17% agreed. This distribution indicates greater uncertainty or variation in the visibility of fire-prevention activities than in routine patrols.

Long-term forest-development activities received less favorable assessments. Eighty-nine percent agreed or strongly agreed that no forest-enrichment activities had been undertaken. Perceptions of forest care were mixed, with 35% agreeing that few care activities were implemented and 43% disagreeing. Fifty-four percent were neutral regarding the statement that the restored natural-regeneration area was small. H2 was therefore supported most clearly for forest enrichment, while evidence for care and regeneration was mixed. Seventy percent disagreed that forests managed through forest protection contracting continued to experience encroachment, while 26% were neutral and 4% agreed. Overall, the quantitative phase suggests a stronger perceived performance for routine protection than for long-term forest-development activities.

Phase 3: Data Integration and Comparison of Community Forest Allocation and Forest Protection Contracting Arrangements

The integrated analysis linked three levels of evidence: household livelihood conditions, the spatial organization of forest responsibilities, and the broader governance framework. Evidence from interviews, focus groups, field observations, administrative records, and household surveys was compared for convergence, complementarity, and divergence, as shown in Table 4.

The qualitative and quantitative findings converged in showing that FPC was associated with regular routine patrols and favorable perceptions of immediate protection. Survey respondents generally perceived patrol coverage and control of illegal exploitation positively, while interviews confirmed that village groups regularly patrolled assigned areas. The evidence also converged regarding limited forest enrichment: most survey respondents reported that enrichment was absent, and key informants attributed this to short contracts, limited funding, and restricted community authority.

The evidence was complementary regarding participation and benefit distribution. Household survey data described general perceptions of FPC, while interviews explained how patrol eligibility, group membership, physical criteria, and local payment rules affected who participated and benefited. Hybrid

arrangements broadened operational participation through rotating responsibilities and locally organized benefit distribution, but did not transfer formal tenure or strategic decision-making authority.

Table 4

Integrated Comparison of Community Forest Allocation and Forest Protection Contracting Arrangements

Dimension	Community Forest Allocation	Forest Protection Contracting	Hybrid Forest Protection Contracting
Boundaries and tenure	Forest areas and community rights were formally recognized and demarcated	Boundaries were defined through short-term contracts without transferring tenure rights	Contract boundaries remained externally defined, although communities organized activities within them
Benefits and responsibilities	Communities had broader potential rights to future forest benefits and responsibility for long-term management	Benefits were mainly fixed protection payments linked to assigned duties	Payments were contract-based but could be distributed through locally agreed arrangements
Collective decision-making	Communities developed local rules, plans, and management institutions	Major rules and contract terms were determined externally	Communities made some operational decisions, while strategic authority remained external
Monitoring	Community institutions organized patrols and monitoring	Communities conducted patrols and reported violations to authorities	Patrol schedules and responsibilities were partly organized locally
Sanctions and conflict resolution	Local institutions and customary mechanisms addressed some violations and disputes	Sanctions and major disputes were handled mainly by government authorities	Minor operational disputes could be addressed locally, but formal authority remained external
Learning and adaptation	Management plans and external support created opportunities to adjust practices	Limited authority existed to modify contractual activities	Communities adjusted patrol rotation, participation, and payment distribution within contractual limits
Multilevel collaboration	Communities interacted with local authorities, projects, and external organizations	Collaboration was mainly vertical and administratively directed	Local organization was combined with external oversight and support

Some divergence was also identified. Most households perceived encroachment as limited, whereas local officials described occasional continuing incidents. This difference may reflect variation across sites, differences in access to information, or contrasting interpretations of what constituted encroachment.

Overall, the community forest allocation cases were more closely aligned with principles concerning tenure recognition, collective-choice authority, and long-term management. Centralized forest protection contracting aligned most clearly with monitoring and assigned protection responsibilities but allowed limited local authority over rules and future benefits. Hybrid contracting occupied an intermediate position by increasing operational participation, flexibility, and local benefit distribution while remaining constrained by short-term contracts and externally controlled strategic decisions.

Because the quantitative survey covered only forest protection contracting communities, these integrated findings do not constitute a direct statistical comparison between community forest allocation and forest protection contracting. Rather, quantitative evidence deepened understanding of household experiences under contracting, while cross-model interpretation relied primarily on qualitative, spatial, institutional, and administrative evidence.

Discussion and Conclusion

Discussion of Main Results

This study examined how community forest allocation and forest protection contracting were associated with participation and long-term stewardship in selected communities in Vietnam, and the findings showed that tenure security, decision authority, and expected benefits distinguished routine protection from longer-term forest-management behavior.

Regarding the research objective 1, the findings suggest that the main behavioral distinction between the governance arrangements was not whether communities participated, but what participation meant in terms of time horizon, decision authority, and expected benefits. Under forest protection contracting, participation was concentrated on visible, contractually specified duties such as patrols, fire prevention, and reporting violations. Under community forest allocation, the cases examined were associated with a broader set of activities that included local rule making, restoration, and longer-term planning. This pattern is consistent with Ostrom's (1990) argument that monitoring alone is insufficient for durable collective action; clearly recognized rights, collective-choice arrangements, proportional benefits, and conflict-resolution mechanisms also matter. The comparison should nevertheless be interpreted contextually because the community forest allocation cases had received external project support and differed in institutional history and forest conditions.

Hybrid forest protection contracting helps explain why operational participation and governance authority should be distinguished. Rotating patrol responsibilities, locally organized schedules, and internal payment distribution gave communities greater flexibility in day-to-day implementation, yet strategic authority over contract duration, boundaries, formal sanctions, and major investments remained external (Armitage et al., 2007, 2009; Ma et al., 2025). Adaptive co-management theory suggests that learning and flexibility are most consequential when local actors can use them to influence meaningful decisions across governance levels (Armitage et al., 2007, 2009). The hybrid arrangements observed here may therefore be interpreted as an institutional bridge, but not as equivalent to long-term community tenure.

Equity in participation emerged as another important mechanism. Qualitative accounts indicated that women, poorer households, older residents, and people considered physically unable to patrol could be excluded from paid activities, while some nonmembers faced restrictions on forest-product access. These patterns matter behaviorally because the perceived legitimacy of collective rules depends not only on the amount of compensation but also on procedural fairness, eligibility, voice, and the distribution of costs and benefits. Research on payments for forest environmental services in Vietnam has similarly identified gender disparities in participation, access to benefits, decision-making power, and knowledge (Pham et al., 2023).

Regarding research objective 2, the survey indicated favorable perceptions of routine patrols and control of illegal exploitation, but very limited forest enrichment. These findings also clarify the behavioral role of economic incentives. Fixed protection payments appeared capable of sustaining routine patrol participation, but the mixed methods evidence suggests that payments did not substitute for secure expectations about future rights and benefits. This interpretation is consistent with recent evidence from Vietnam showing that financial incentives are particularly salient for attracting nonparticipants and lower-income households, while environmental values, cultural responsibility, repeated engagement, and peer learning remain important among established forest-protection participants (Le & Shinjo, 2025). From a behavioral-science perspective, extrinsic incentives therefore appear to operate alongside perceived fairness, trust, and expectations of future benefit rather than independently of them.

Regarding research objective 3, the data integration in this mixed methods research added explanatory value by showing how broad household response patterns were connected to institutional processes. Qualitative evidence helped explain why favorable perceptions of routine protection could coexist with very limited forest enrichment by identifying short contract horizons, externally controlled decisions, funding constraints, and locally specific participation rules. Integration also preserved divergence:

household respondents generally perceived encroachment as controlled, whereas officials continued to report occasional incidents.

Taken together, the findings are consistent with Ostrom's (1990) framework in emphasizing the behavioral difference between compliance with assigned protection tasks and discretionary investment in long-term stewardship. The evidence does not establish that tenure security or a particular contracting model caused the observed outcomes. Rather, within these selected cases, more secure rights, broader decision authority, fairer benefit arrangements, and stronger expectations of future benefits were associated with institutional conditions more conducive to long-term stewardship.

Limitations and Future Research

This study was designed as an in-depth comparative case study rather than a nationally representative analysis. The quantitative survey covered only forest protection contracting communities, while comparison with community forest allocation relied mainly on qualitative and institutional evidence; therefore, the findings do not constitute a direct statistical comparison between the two governance arrangements. In addition, the community forest allocation sites had received previous project and technical support, making it difficult to separate the effects of tenure security from those of external assistance, local leadership, and management experience (Yin, 2018).

Household perceptions were collected cross-sectionally and were not accompanied by independent ecological measures, limiting causal and temporal interpretation (Setia, 2016). The relatively small sample and sparse response cells also constrained multivariable analysis (Agresti, 2019). Future research should use longitudinal household and ecological data with larger, balanced samples across community forest allocation, centralized forest protection contracting, and hybrid forest protection contracting arrangements to permit more robust comparative and multivariable analyses.

Implications for Behavioral Science

The integrated findings indicate that community forest-management behavior is shaped by more than the assignment of protection responsibilities. Participation is linked to whether people perceive tenure rights as secure, compensation as adequate, benefit distribution as fair, and involvement in decision-making as meaningful. Short-term payments may support patrol participation and compliance with assigned duties, but long-term stewardship is also associated with trust, perceived fairness, expectations of future benefits, and opportunities to influence management rules.

These findings have implications for the design of community forest governance in Vietnam. Rather than treating community forest allocation and forest protection contracting as a simple binary choice, policy could adopt a differentiated pathway according to community capacity, local forest conditions, and legal readiness. Forests temporarily managed by commune people's committees could progressively move from annual protection contracts toward longer-term co-management arrangements and, where appropriate, formal community allocation. This direction is consistent with recent regional evidence emphasizing that stronger recognition and protection of local forestland rights can improve tenure security and support more sustainable forest management when accompanied by socially inclusive implementation and effective institutional coordination (Childress et al., 2025).

Hybrid arrangements could serve as an institutional bridge by giving communities greater authority over patrol organization, operational planning, benefit allocation, and local dispute resolution while government agencies retain legal oversight and technical support. However, greater operational participation should be accompanied by meaningful decision-making authority. Recent research in Vietnam shows that power imbalances between forest authorities and local communities can constrain local benefits and generate conflict when communities have limited control over resources and decisions (Do et al., 2025).

Policy support should also move beyond patrol payments. The present findings indicate a need for transparent participant selection, equitable benefit distribution, alternative participation roles, and mechanisms that strengthen local voice. Women, poorer households, older people, and individuals unable

to undertake physically demanding patrols could contribute through monitoring, restoration, nursery activities, record keeping, non-timber forest-product processing, and community decision-making. This implication is supported by evidence from Vietnam showing gender disparities in forest-payment participation and decision-making, as well as the importance of fairness and transparency in sustaining community engagement (Le & Shinjo, 2025; Pham et al., 2023).

Conclusion

Within the selected study communities in Vietnam, community forest allocation and forest protection contracting were associated with different behavioral and institutional conditions for forest management. Forest protection contracting was associated with regular patrol participation and favorable perceptions of immediate protection, while short contract horizons, limited strategic decision authority, fixed payments, and unequal participation were also associated with weaker conditions for enrichment, regeneration, and long-term care. The community forest allocation cases were characterized by clearer rights, stronger local governance, and closer links between management efforts and future benefits, although external project support and other contextual differences also contributed to these patterns. The principal contribution of the mixed methods comparative approach was to connect household perception patterns with qualitative explanations of tenure, incentives, participation rules, and governance authority. These findings support policies that combine protection incentives with longer-term rights, inclusive participation, meaningful collective choice, fair benefit sharing, and accessible conflict resolution, while avoiding causal claims that are not supported by the comparative case-study design.

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Declarations

Conflicts of Interest: The authors declare no conflicts of interest.

Ethical Approval Statement: The study was conducted in accordance with the Declaration of Helsinki, and approved by the Institutional Review Board (or Ethics Committee) of HUE UNIVERSITY (protocol code 301 and date of approval ON 10 December 2023) for studies involving humans.

Declaration of Generative AI: During the preparation of this work, the author(s) used ChatGPT in order to improve English

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