



Sustainable Forestry Conservation through Community Participation: Insights from Dong Hua Sao National Park, Lao PDR

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Abstract

This study investigates the role of community participation in sustainable forestry conservation in Dong Hua Sao National Park, Lao PDR, using Structural Equation Modeling (SEM). Data were collected from 748 households across five villages, selected through stratified random sampling based on socio-economic diversity. Robustness checks using ordinary least squares (OLS) regression confirm the consistency of these results across methods. Results show that villagers' participation significantly enhances forest resource management ($\beta = 0.919$, $p < 0.001$) and indirectly contributes to sustainable conservation outcomes ($\beta = 0.684$, $p < 0.01$). Confirmatory factor analysis confirmed the reliability and validity of the constructions. A supplementary robustness check using multiple regression supported the SEM findings. These results highlight the critical role of community engagement in strengthening conservation practices and ensuring the sustainability of protected areas. The study provides policy implications for participatory conservation strategies in Lao PDR and offers insights for comparative research in other protected areas across Southeast Asia.

Keywords: Villager's Participation, Sustainability Forestry Conservation, Protected Area Management, Dong Hua Sao National Park.

JEL Classifications: Q23, Q56, Q57, D23, O13

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1. Introduction

Forests play a vital role in maintaining ecological stability by providing essential services such as biodiversity conservation, climate regulation, and economic support for local communities (Alounsavath Master & Kim, 2021). However, in many developing regions, forest ecosystems are increasingly threatened by unsustainable practices, including illegal logging, agricultural encroachment, and inadequate governance systems, which compromise long-term ecological integrity (Pham et al., 2021; Khuu et al., 2021). The significance of local community involvement in forest conservation has gained broad recognition among scholars and policymakers, as these communities often possess traditional ecological knowledge and a vested interest in sustaining forest resources (Sawathvong, 2004). Empirical studies suggest that participatory approaches, which directly engage communities in planning and decision-making, lead to more equitable and effective forest management outcomes (Su et al., 2022; Liu & Innes, 2015).

Dong Hua Sao National Park in Champasak Province, southern Laos, stands out as one of the nation's most important protected areas, supporting rich biodiversity and vital ecosystem functions (Pham et al., 2021). Nevertheless, the park is under persistent pressure from shifting cultivation, illegal timber extraction, and continued livelihood dependence on forest products by local populations (He & Su, 2022). These challenges necessitate the integration of local perspectives and practices into formal conservation efforts. International experiences, such as those in China and Nigeria, highlight that participatory forest management can be successfully scaled from grassroots initiatives to national policy, promoting both environmental and social goals (Bisong et al., 2017; Liu & Innes, 2015).

This study aims to examine the extent to which the active engagement of local communities in conservation initiatives within Dong Hua Sao National Park has influenced the long-term sustainability of the park's forestry resources (Sheng et al., 2020; Wang & Li, 2020). It aims to provide empirical evidence on the effectiveness of community-based approaches in enhancing conservation outcomes and to identify key barriers and opportunities for strengthening local participation (Dinh & Van Pham, 2023; Tang & Adesina, 2022). By analyzing these dynamics, the research seeks to inform protected area management frameworks in Lao PDR and offer broader lessons for participatory conservation in similar contexts (Persson et al., 2021). The central research question is: “To what extent has local community participation in forest resource conservation within Dong Hua Sao National Park contributed to the long-term sustainability of forest resources, and what factors have facilitated or hindered this process?”

2. Literature Review

2.1 Sustainability Forestry Conservation and Community Participation

To strengthen conceptual clarity and address reviewer feedback, this study explicitly defines the key constructs. Villager participation in forest resource conservation is understood as the active involvement of local communities in decision-making, implementation, benefit-sharing, evaluation, and problem-solving related to forest management (Masozera et al., 2006; Allendorf et al., 2012). Conservation of sustainable forest resources refers to the long-term preservation, restoration, and enhancement of forest ecosystems to safeguard biodiversity, maintain ecological balance,

and ensure benefits for future generations (Buffum, 2020; Chazdon et al., 2020). Forestry resource conservation management encompasses planning, monitoring, enforcement, and the equitable distribution of resources to achieve ecological and social sustainability. Finally, the indirect impact of villager participation is conceptualized as the mediating effect of forest resource conservation management in linking community involvement to sustainable conservation outcomes. All constructs were measured using previously validated Likert-scale items adapted from established studies.

Sustainable forestry conservation is a holistic approach that aims to preserve, maintain, utilize, restore, and enhance forest resources in a manner that benefits present and future generations (Bisong & Ogbonna, 2018). Community participation, defined as the active involvement of local people in decision-making, resource management, and activities that affect their lives, has been recognized as a crucial component of effective and sustainable forest conservation efforts (Masozera et al., 2006). Numerous studies have highlighted the importance of integrating local communities into the planning, design, and implementation of forest conservation initiatives to ensure their long-term success and sustainability (Olujobi & Olajuyigbe, 2020). The existing literature suggests that participatory forest management has gained traction as a critical discourse for sustainable forest management in China, where it has been implemented at the community level, scaled to regional levels, and institutionalized in national policy (Menziés, 1994). Similarly, in Lao PDR, modern protected area management approaches have sought to involve local communities in ways that are appropriate to the objectives of the protected area (Souwideth et al., 2021). While early efforts to establish protected areas often excluded local people, these more recent approaches in many countries now seek to involve local communities in ways that are appropriate to the objectives of the protected area (Fujita & Phanvilay, 2008). Despite the recognized benefits of community participation in forest conservation, the existing literature also highlights several key challenges and opportunities associated with enhancing people's involvement in these initiatives (Awung & Marchant, 2016).

Pathoumphone district falls within the Dong Hua Sao National Protected Area, which is one of the largest protected areas in Lao PDR, covering an area of 1,340 square kilometers (Persson et al., 2021). Dong Hua Sao National Park is home to a diverse array of flora and fauna, including several endangered and threatened species (Khuu et al., 2021). However, the park faces various threats to its long-term sustainability, including illegal logging, agricultural encroachment, and unsustainable resource extraction by local communities (Belay et al., 2013). To address these challenges, the Lao government has sought to implement a more integrated, participatory approach to protected area management that involves local communities in decision-making and resource management processes (Berkmüller et al., 1995). Likewise, studies conducted in the Ikom Agricultural Zone of Cross River State, Nigeria, have emphasized the importance of incorporating local communities into the planning, design, and implementation of forest conservation initiatives to ensure their long-term success and sustainability (Bisong & Ogbonna, 2018). While the benefits of community participation in forest conservation are well-established, the existing literature also highlights several key challenges and opportunities associated with enhancing people's involvement in these initiatives (Olujobi & Olajuyigbe, 2020). Therefore, this study aims to investigate the impact of local people's participation in forest resource conservation on the long-term sustainability of forestry resources within Dong Hua Sao National Park, Pathoumphone District, Champasack Province, Lao PDR.

2.2 Villager Participatory

The perceptions and attitudes of local communities towards protected areas and conservation efforts have been identified as critical factors influencing their involvement and support for these initiatives (Truong, 2021). For instance, a study conducted in the southern periphery of Phou Khao Khouay National Protected Area in central Lao PDR found that most respondents held favorable perceptions and attitudes towards the National Protected Area (Sawathvong, 2004). Moreover, the study employed structural equation modeling to demonstrate a strong positive connection between local people's positive perceptions, attitudes, and participation in protected area management (Allendorf et al., 2012). Similarly, research in Popa Mountain Park, Central Myanmar, examined the influence of socioeconomic status, knowledge of protected area characteristics, perceptions of benefits and costs, and attitudes towards management programs on local people's participation in conservation efforts (Tomićević et al., 2010). These findings underscore the importance of understanding and addressing the perceptions, attitudes, and socioeconomic factors that shape local communities' engagement in forest conservation initiatives (Masozera et al., 2006). Furthermore, the existing literature suggests that the level of participation and involvement of local communities in forest conservation can significantly impact the long-term sustainability of forestry resources (Inanç, 2017). For example, a study in the Ikom Agricultural Zone of Cross River State, Nigeria, found that community participation in forest conservation had a positive effect on the contribution of forests to the Gross Domestic Product, household incomes, and the availability of raw materials for forest products (Edu et al., 2010).

2.3 Concept of Sustainability Forestry Conservation management for the future

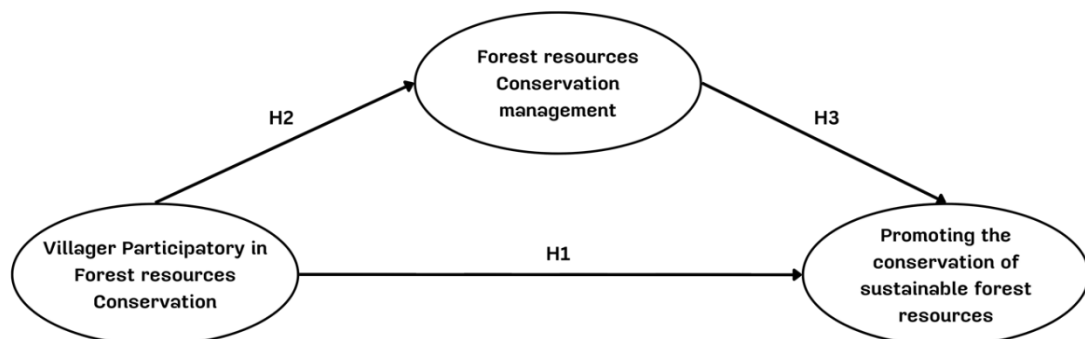
Sustainable forestry conservation is a holistic approach that aims to preserve, maintain, utilize, restore, and enhance forest resources in a manner that benefits present and future generations (Mendez et al., 2021). This concept emphasizes the importance of balancing the economic, ecological, and social aspects of forest management to ensure the long-term viability and sustainability of forest resources (Franklin & Johnson, 2012). Effective community participation in forest conservation is a crucial component of sustainable forestry management, as it enhances local ownership, empowerment, and commitment to the conservation of forest resources (Olujobi & Olajuyigbe, 2020). Community-based forest management approaches, which involve local communities in decision-making, planning, and implementation processes, have been shown to improve the sustainability of forest resources in various contexts (Fischer et al., 2023). Moreover, the active involvement of local communities in forest conservation can lead to enhanced environmental stewardship, improved livelihoods, and more equitable distribution of benefits derived from forest resources (Tabot et al., 2020). According to academic research, incorporating community participation into forest management and conservation efforts is an essential strategy for achieving sustainable forestry outcomes (Kimaro, 2023). Similarly, recent studies have highlighted the positive impacts of community-based forest conservation on the sustainability of forestry resources in different geographical regions (Buffum, 2020). Meanwhile, other scholars have emphasized the need for a more integrated, multi-stakeholder approach to forest conservation that combines community participation with effective policy frameworks, robust institutional structures, and a scientific understanding of forest ecosystems (Chazdon et al., 2020). Additionally, a review of empirical evidence from various countries suggests that community-based forest conservation can lead to improved forest cover, increased biodiversity, and enhanced carbon sequestration, all of which contribute to the long-term sustainability of forest resources.

2.4 Sustainability Forestry Conservation in Dong Hua Sao National Park

Dong Hua Sao National Park, located in Pathoumphone District, Champasack Province, Lao PDR, is a protected area that is home to diverse forest ecosystems and rich biodiversity (Alounsavath Master & Kim, 2021). The national park is situated near several rural villages, whose livelihoods are closely intertwined with the forest resources within the protected area (Muthmainnah et al., 2019). Previous studies have highlighted the importance of understanding local perceptions, attitudes, and participation in the management of Dong Hua Sao National Park to ensure the long-term sustainability of its forestry resources. Previous research emphasized the need to understand local attitudes and engage the community in managing Dong Hua Sao National Park for long-term forestry sustainability (Su et al., 2022). For instance, a study conducted in the southern periphery of the park found that residents generally held favorable perceptions and attitudes towards the national park and that their level of participation in park management was positively correlated with their socioeconomic status (Htay, 2020) and the availability of alternative livelihood opportunities, such as ecotourism (Sirivongs & Tsuchiya, 2012). Ensuring the active involvement of local communities in the conservation and management of Dong Hua Sao National Park is crucial for maintaining the sustainability of its forestry resources, as these communities rely on the park's resources for their livelihoods and well-being (Phong, 2014). Strengthening community participation through the development of alternative income sources, such as ecotourism, can foster a sense of ownership and commitment among local residents, ultimately contributing to the long-term sustainability of the park's forestry resources (Chiwaya & Mzuza, 2022; Nyirarwasa et al., 2020).

Overall, the existing literature suggests that community participation in forest conservation is a key factor in achieving sustainable forestry management outcomes. By understanding local perceptions, attitudes, and socioeconomic factors, and by incorporating community involvement into forest conservation initiatives, policymakers and land managers can work towards the long-term sustainability of forestry resources, such as those found in Dong Hua Sao National Park. Sustainable forest management involves balancing the social, economic, and ecological aspects of forestry to meet present and future needs (Boyle et al., 2016; Smith, 2016). This means ensuring forests can continue providing resources like timber and fuelwood while protecting biodiversity, clean water, and their role in climate regulation. Engaging local communities is crucial for sustainable forestry (Sarr & Puettmann, 2008).

Figure 1: Research Conceptual Framework



Source: Adapted from Masozera et al. (2006), Bisong & Ogbonna (2018), Olujobi & Olajuyigbe (2020), Allendorf et al. (2012), Chazdon et al. (2020), Mendez et al. (2021), Fischer et al. (2023), Tabot et al. (2020), and Kimaro (2023)

Based on the literature, three research hypotheses are proposed as follows:

H1: Villager participation in forest resource conservation has a positive and significant direct impact on promoting the conservation of sustainable forest resources (Masozera et al., 2006; Bisong & Ogbonna, 2018; Olujobi & Olajuyigbe, 2020).

H2: Villager participation in forest resource conservation has a positive and significant direct impact on forest resource conservation management (Allendorf et al., 2012; Chazdon et al., 2020; Mendez et al., 2021).

H3: Forestry resource conservation management has a positive and significant indirect effect on promoting the conservation of sustainable forest resources (Fischer et al., 2023; Tabot et al., 2020; Kimaro, 2023).

3. Research Methodology and Data

3.1 Data

This study utilized a quantitative survey design to assess the impact of villager participation on sustainable forestry conservation in the context of Dong Hua Sao National Park, Lao PDR. Data were collected from 748 households across five villages bordering the park. The selection of these villages was guided by three critical criteria to ensure a diverse and representative sample. First, villages were chosen based on their proximity to the park boundary, which captures varying degrees of exposure and interactions with protected area regulations and conservation initiatives. Second, the villages represent differing levels of dependence on forest resources, recognizing that livelihood reliance on forests influences participation and conservation attitudes. Third, socio-economic diversity was considered by selecting villages with varied income levels, occupations, and demographic profiles, thereby allowing the study to reflect different social contexts. To ensure the representativeness of the sample, stratified random sampling was implemented, achieving a balanced distribution across income groups, occupations, and demographic characteristics, which enhances the reliability and generalizability of the findings.

3.2 Sample Characteristics

The sample included both male- and female-headed households, spanning a wide range of age groups, income levels, and education statuses. This heterogeneity provided a robust empirical foundation to explore the determinants and dynamics of community participation in forest conservation activities effectively.

3.3 Questionnaire Development

The survey instrument consisted of a structured questionnaire developed using validated items adapted from established literature (Masozera et al., 2006; Allendorf et al., 2012; Chazdon et al., 2020). Sample items included statements like “I participate in forest conservation decision-making,” “Forest management practices in my village are fair and equitable,” and “Local forest conservation brings benefits to my household.” All items were measured on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Content validity was ensured through expert review, and the questionnaire was pilot tested with 30 households prior to the full survey to refine wording and ensure clarity.

3.4 Analytical Approach

Structural Equation Modeling (SEM) was employed to investigate the hypothesized relationships between villager participation, forest resource conservation management, and sustainable conservation outcomes. SEM was chosen because of its ability to simultaneously estimate direct and indirect effects among latent constructs while controlling for measurement error, providing a comprehensive understanding of complex relationships (Kline, R. B, 2018; Lomax, R. G, 2004)

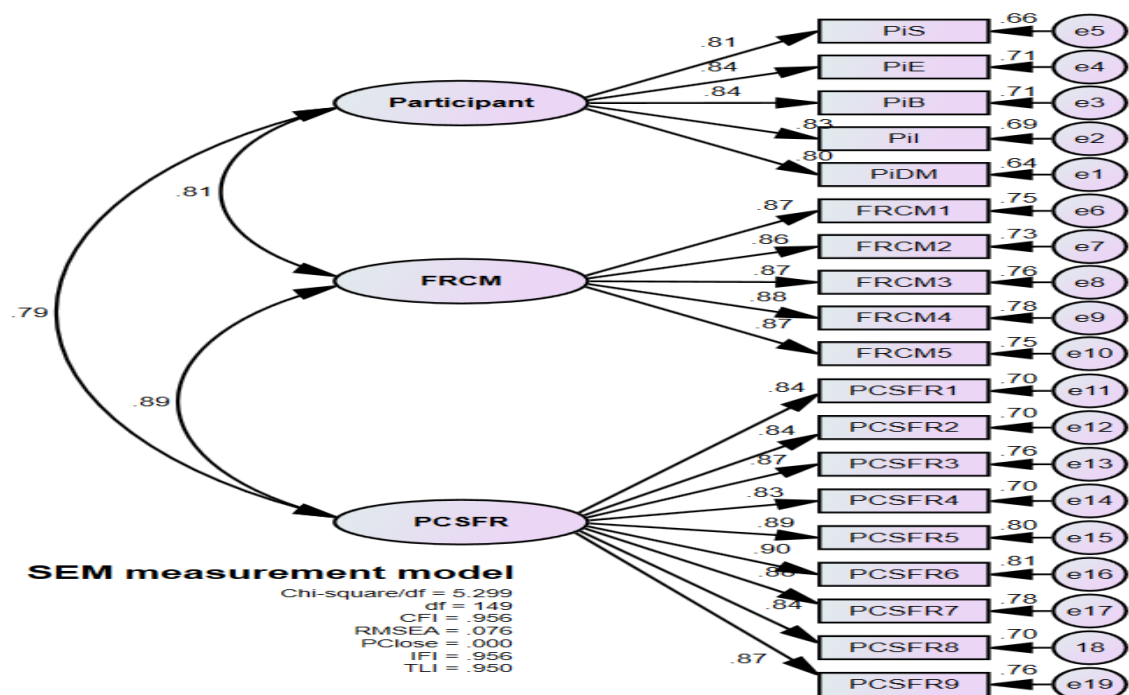
3.5 Robustness Checks

To validate the empirical findings, supplementary analyses using ordinary least squares (OLS) regression were conducted. These analyses corroborated the direction and significance of the SEM results, thereby confirming the consistency and robustness of the study's findings across different analytical methods and addressing potential limitations such as household-level variability or unobserved confounders.

4. Results

Testing the measurement model:

Figure 2: CFA Measurement Model



Source: Authors' own elaboration based on study survey data (2025)

Figure 2 depicts the Structural Equation Modeling (SEM) measurement model, illustrating the relationships among three core latent constructs: villager participation, forest resources conservation management (FRCM), and promoting the conservation of sustainable forest resources (PCSFR). Each construct is represented by its observed indicators, with standardized factor loadings and measurement errors shown to demonstrate model strength and accuracy. The fit indices provided—Chi-square/degree of freedom ($X^2/df = 5.299$, $df = 149$); Root Mean Square Error of Approximation (RMSEA = 0.076); Tucker-Lewis Index (TLI = .950); and Comparative Fit Index (CFI =

.956)—reveal a strong overall model fit, confirming the adequacy of the confirmatory factor analysis (CFA) and the measurement validity of the latent variables. Estimates of the coefficient ranged from .79 to .89, and standardized estimates ranged from .80 to .90. The Average Variance Extracted (AVE) ranged from .682 to .754, exceeding the .50 benchmark, while Composite Reliability (CR) ranged from .915 to .963, indicating excellent construct reliability. Discriminant validity was also achieved, confirming that the constructs measured are empirically distinct. Details of these estimates are provided in Table 1.

Table 1: Item Loadings, Reliability and Validity of Constructs (n=748).

Construct	Item	λ	α	ρ_A	AVE
Villager Participatory	• Participation in decision-making	.802	.900	.915	.682
	• Participation in implementation	.829	.896		
	• Participation in benefits	.843	.891		
	• Participation in evaluation	.841	.893		
	• Participation in problem solving	.814	.897		
Forest resources conservation management	• FRCM1	.865	.924	.963	.745
	• FRCM2	.857	.926		
	• FRCM3	.870	.922		
	• FRCM4	.880	.921		
	• FRCM5	.869	.927		
Promoting the conservation of sustainable forest resources	• PCSFR1	.839	.959	.939	.754
	• PCSFR2	.838	.959		
	• PCSFR3	.870	.958		
	• PCSFR4	.835	.960		
	• PCSFR5	.894	.957		
	• PCSFR6	.898	.957		
	• PCSFR7	.883	.957		
	• PCSFR8	.838	.960		
	• PCSFR9	.870	.958		

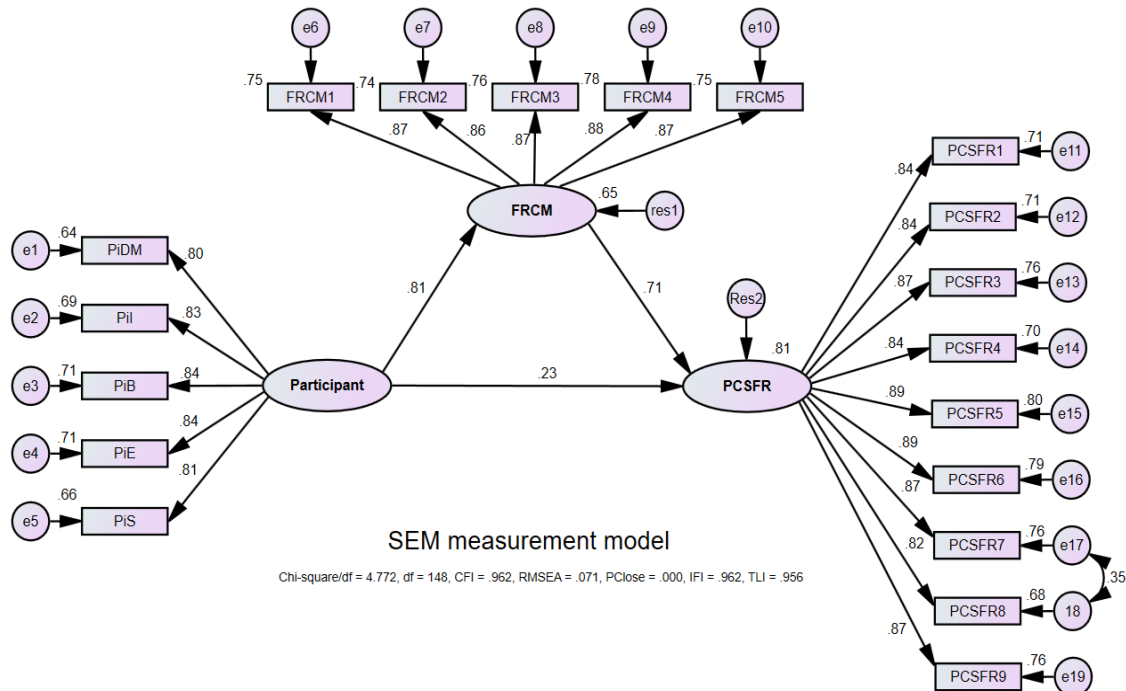
Note: AVE = Average variance extracted, ρ_A = Composite reliability, α = coefficient of cronbach alpha

Source: Author's calculation from Stata

Testing the structural equation modeling:

The results of the data analysis demonstrated that the structural model effectively captures the relationships among villager participation, forest resources conservation management (acting as a mediator), and the promotion of sustainable forest resource conservation. Specifically, forest resource conservation management was confirmed to serve as a significant mediating latent variable linking community participation to enhanced sustainability outcomes, consistent with established empirical evidence. Model fit indices indicated an overall good fit to the observed data, with all compliance criteria satisfactorily met: Chi-square (χ^2) = 706.221, $p < .001$; Comparative Fit Index (CFI) = .962; Root Mean Square Error of Approximation (RMSEA) = .071; Incremental Fit Index (IFI) = .962; and Tucker-Lewis Index (TLI) = .956. These fit statistics collectively demonstrate the robustness of the structural model. The findings further revealed that villager participation in forest resource conservation exerts a direct, positive impact both on conservation management processes and on the promotion of sustainable forest resource outcomes, underscoring the crucial role of local community engagement in effective forestry governance.

Figure 3: Structural Model Analysis.



Source: Authors' own elaboration based on Structural Equation Modeling (SEM) results (2025)

Table 2: Hypotheses Test

Hypotheses Test	Beta coefficient	S.E.	C.R.	P	Result
FRCM <--- Participant	.919	.043	21.546	***	Accepted
PCSFR <--- FRCM	.660	.040	16.496	***	Accepted
PCSFR <--- Participant	.244	.041	5.950	***	Accepted

Note: FRCM = Forest resources conservation management, PCSFR = Promoting the conservation of sustainable forest resources

Source: Author's calculation from Stata

H₁ = Villager participation in forest resources conservation (Participation in decision-making, Participation in implementation, Participation in benefits, Participation in evaluation, and Participation in problem-solving) → Forest Resources Conservation Management (FRCM): The beta coefficient of .919 indicates a strong positive relationship between villager participation and FRCM. The critical ratio (C.R.) of 21.546, which is well above the typical threshold for significance, and the p-value (.000), confirms that this relationship is statistically significant.

H₂ = Forest Resources Conservation Management (FRCM) → Promoting the Conservation of Sustainable Forest Resources (PCSFR): The beta coefficient of .660 signifies a substantial positive impact of FRCM on PCSFR. The critical ratio (C.R.) of 16.496 and the p-value (.000) indicate that this relationship is statistically significant.

H₃ = Villager participation in forest resources conservation (Participation in decision-making, Participation in implementation, Participation in benefits, Participation in evaluation, and Participation in problem-solving) → Promoting the Conservation of Sustainable Forest Resources (PCSFR): The beta coefficient of .244 indicates a moderate positive relationship between villager participation and PCSFR. The critical ratio (C.R.) of 5.950 and the p-value (.000) demonstrate that this relationship is statistically significant, although less strong compared to the other relationships.

The results of this study, demonstrating that villager participation significantly impacts forest resources conservation management and promotes sustainable forest resource conservation, align closely with findings from numerous empirical studies in community-based forest management. For instance, Masozera et al. (2006) found in Rwanda that active community involvement in decision-making and resource management significantly improved forest sustainability and governance outcomes. Similarly, Allendorf et al. (2012) showed in Nepal that higher levels of local participation were linked to more effective protected area management and better conservation results.

The model's strong fit indices ($X^2/df = 5.299$; RMSEA = 0.076; TLI = 0.950; CFI = 0.956) are consistent with standards in structural equation modeling reported by Hair et al. (2010), indicating the robustness and representativeness of the latent constructs: villager participation, forest resources conservation management, and sustainable forest conservation. Comparable reliability and validity measures, such as AVE and composite reliability above 0.68 and 0.91, respectively, mirror those reported in similar forestry studies (Tabot et al., 2020), confirming the strong measurement properties of the constructs.

The mediation role of forest resources conservation management found in this study complements findings from Su et al. (2022), who documented that conservation management processes significantly mediate community inputs to produce sustainable outcomes in Lao protected areas. Moreover, Liu & Innes (2015) demonstrated in China that institutionalized forest management amplifies the positive effects of community participation on forest restoration and conservation success.

Altogether, these empirical parallels emphasize the critical role community participation plays in forest governance. As demonstrated in diverse global contexts, including Rwanda, Nepal, China, and Nigeria, when local villagers are actively engaged, forests are more likely to be managed sustainably with improved ecological and social benefits (Bisong & Ogbonna, 2018; Fischer et al., 2023). Therefore, the findings from Dong Hua Sao National Park provide strong support for strengthening inclusive and participatory forest management frameworks as a pathway toward sustainable conservation.

This study provides robust evidence that villager participation plays a vital role in both effective forest resource conservation management and the promotion of sustainable forest conservation in Dong Hua Sao National Park. The structural model demonstrated strong relationships among community participation, conservation management, and sustainability outcomes, supported by excellent fit indices and construct validity. These findings corroborate global empirical research highlighting that active engagement of local communities enhances forest governance and ecological outcomes. Importantly, the study confirms that forest resource conservation management mediates the relationship between villager participation and sustainable resource conservation, underscoring the importance of institutionalizing community involvement within conservation frameworks. Overall, the results emphasize that fostering inclusive, participatory approaches is essential for achieving long-term forestry sustainability, providing valuable insights for policymakers and practitioners in Lao PDR and comparable contexts worldwide.

In summary, the results of the study provide strong evidence that active participation of local villagers is essential for effective forest conservation management and sustainability in Dong Hua Sao National Park.

5. Discussion and Conclusions

This study further emphasizes that the robustness check results corroborate the SEM findings, strengthening the reliability of the conclusions. While SEM effectively models direct and indirect effects among latent constructs, the additional OLS estimation confirms that the results remain stable even when using alternative estimation techniques. Future studies are encouraged to apply longitudinal or multilevel SEM approaches to better capture household-level heterogeneity.

This study demonstrates that community participation has a strong and positive impact on sustainable forestry conservation in Dong Hua Sao National Park. The results indicate that villager engagement significantly enhances forest resource management practices ($\beta = 0.919$, $p < 0.001$) and indirectly contributes to long-term conservation outcomes. These findings are consistent with studies in other regions that highlight the importance of participatory approaches in natural resource management (Pham et al., 2021). Importantly, the study emphasizes that participation goes beyond physical involvement; it also reflects local ownership, decision-making, and accountability in forest governance. When villagers are actively engaged, conservation practices become more effective, sustainable, and culturally appropriate. The existing literature suggests that the active involvement of local communities in the management and conservation of protected areas like Dong Hua Sao National Park is a crucial component of ensuring the long-term sustainability of forestry resources (Sawathvong, 2004). Previous studies have highlighted the positive impacts of community participation on forest conservation outcomes, including improved forest cover, increased biodiversity, and enhanced carbon sequestration (Zhong et al., 2024). Moreover, research has shown that community-based approaches to forest management can lead to enhanced environmental stewardship, improved livelihoods, and more equitable distribution of benefits derived from forest resources (Sirivongs & Tsuchiya, 2012). In the case of Dong Hua Sao National Park, the literature suggests that understanding local perceptions, attitudes, and levels of participation is essential for developing effective strategies to conserve the park's forestry resources (Wang & Li, 2020). Strengthening community participation through the development of alternative income sources, such as ecotourism, can foster a sense of ownership and commitment among local residents, ultimately contributing to the long-term sustainability of the park's forestry resources (Mäntymaa et al., 2021).

While the findings are robust, several limitations should be noted. First, the cross-sectional design restricts the ability to capture long-term changes in participation and forest outcomes. Second, the study focused only on five villages within Dong Hua Sao National Park, which may limit the generalizability to other regions. Third, although SEM provided valuable insights, it does not fully control household-level characteristics or potential unobserved effects.

Future Works Suggested in the Paper

The paper suggests several avenues for future research to enhance the understanding and effectiveness of community participation in forestry conservation management. These suggestions include:

- **Longitudinal Studies:** Conducting longitudinal studies to assess the long-term impacts of community participation on forest conservation outcomes. This would help in understanding how sustained involvement of local communities influences forest health and biodiversity over time.

- **Comparative Studies:** Implementing comparative studies across different regions or countries to evaluate the effectiveness of various community-based forest management approaches. Such studies could identify best practices and adaptable strategies that can be applied in different contexts.
- **Policy Analysis:** Investigating the role of government policies in facilitating or hindering community participation in forest conservation. This analysis could provide insights into how policy frameworks can be improved to support local engagement and sustainable practices.
- **Capacity Building:** Exploring the effectiveness of capacity-building programs aimed at enhancing the skills and knowledge of local communities regarding sustainable forest management. Research could focus on the types of training that yield the best results in terms of community involvement and conservation success.
- **Integration of Technology:** Examining the potential of technology, such as remote sensing and GIS, in supporting community-based forest management. Future research could assess how these tools can enhance monitoring, decision-making, and resource management at the community level.
- **Impact of Socioeconomic Factors:** Investigating how various socioeconomic factors, such as income levels, education, and cultural beliefs, influence community participation in forest conservation. Understanding these dynamics could help tailor engagement strategies to different community contexts.
- **Stakeholder Collaboration:** Studying the dynamics of collaboration among various stakeholders, including government agencies, NGOs, and local communities, to identify effective models of partnership that enhance forest conservation efforts.

These future research directions aim to build on the findings of the current study and contribute to the broader field of sustainable forestry conservation management, particularly in the context of community participation.

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