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Local Management for Conserving the Sustainability of Natural Resources: A Case Study of Thab Lan National Park, Thailand

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Abstract: National parks are designated natural areas set aside for the preservation of their resources. However, they suffer from several environmental problems resulting from human actions, exacerbated by a lack of effective management planning, including unsustainable biodiversity loss, deforestation, and wildfires. This qualitative research proposes practical sustainability conservation management based on the experience of Thab Lan National Park in Thailand, utilizing Community-Based Natural Resource Management (CBNRM) and Sustainable Development Goal (SDG) targets. Through in-depth interviews, data were collected from three residents and two operations-level staff members of the Thab Lan National Park. The findings highlighted local resource protection, park residency legality, and agricultural expertise as supportive factors. In contrast, ecosystem protection from slosh equity enabled them, which was detrimental due to the skewed distribution of benefits. Furthermore, the management level was found to have an impact on the long-term ecological benefits. Most importantly, unequal resource allocation has hampered conservation efforts, highlighting the need for community participation in sustainable resource management. This management strategy is a working approach that local authorities and regional policymakers can adopt as guidelines for the sustainable conservation of natural resources in the Thab Lan National Park and other similar settings.

Keywords: Community-Based Natural Resource Management (CBNRM); SDG 15; Sustainability; Thab Lan National Park

1 Introduction

National parks are cultural ecosystems set aside to protect natural resources, wildlife, and cultural heritage [1]. They yield an array of benefits, including sustaining conservation, guaranteeing ecosystem services such as clean air and water, and preserving the cultural aspects of society [2–4]. These parks play an important role in environmental monitoring, education, and tourism. National parks sustain comprehensive ecological processes, including important species and ecosystems, which provide significant opportunities for holistic, scientific, educational, and recreational purposes [5, 6].

Recently, national parks have faced several challenges related to human activities, including a lack of environmental awareness. These have negative impacts on natural resources, including habitat fragmentation and land-use changes [7], increased human-wildlife conflicts [8], and the need for ecotourism facilities and accommodations. These issues can lead to habitat loss and illegal hunting [9]. Climate change exacerbates these challenges by diminishing natural ecosystems and biodiversity, showcasing the resilience of national parks [10]. Therefore, effective management is necessary to address these challenges and ensure the sustainability of the natural resources in national parks. Research worldwide has indicated various methods for balancing developmental needs with the conservation of natural resources and the sustainability of national parks. Stakeholder participation has proven to be an effective strategy for conserving natural resources in Mexico's national parks [11] and mitigating conflicts between local communities and government bodies in the southeastern flanks of the Great East African Rift Valley [12]. In Vietnam, e-service initiatives have transformed visitors' travel motivations into their willingness to pay for nature conservation in national parks [13]. In

Poland, the Philippines, and Mozambique, systems thinking has been adopted to provide a practical framework for conservation evaluation [14] that can significantly aid in the conservation of natural resources in national parks.

The Thab Lan National Park in Thailand, as depicted in Figure 1, is a popular destination owing to its cool weather and wide range of attractions. Its popularity stimulates local economic growth through the development of resorts, homestays, and various tourism activities, thereby creating many job opportunities [15]. It is also a part of the Dong Phaya Yen–Khao Yai Forest Complex, which was declared a UNESCO World Heritage Site in 2005. This designation highlights its global significance and the need for conservation efforts [16]. The park is home to a diverse array of flora and fauna that contribute to its ecological importance. The diverse habitats within the park support a wide range of organisms. Despite its significance, it faces environmental challenges owing to developmental activities that lead to the degradation of its natural environment and biodiversity [17]. As a result, Thab Lan National Park must implement an effective management strategy for conserving its natural resources, especially in response to the United Nations' Sustainable Development Goals 15 (SDG 15), which focuses on "protecting, restoring and promoting the sustainable use of terrestrial ecosystems," and "sustainable forest management, stopping and reversing the land degradation and the biodiversity loss" [18].

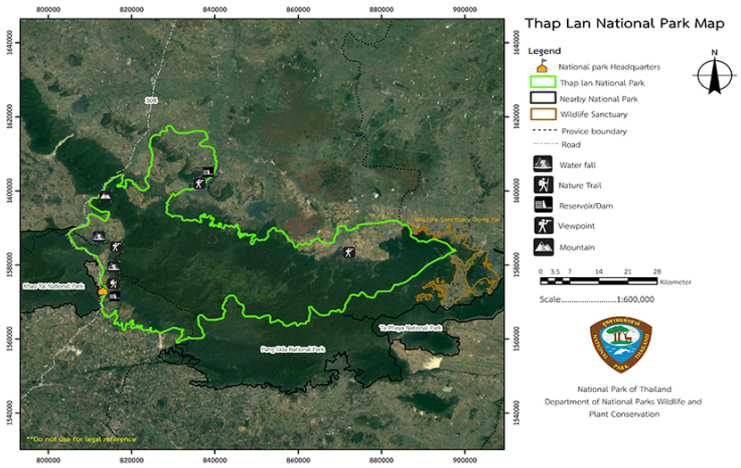

Figure 1. Map of Than Lan National Park

Source: Department of national parks, wildlife and plant conservation, n.d. [19]

Recent research indicates that national parks have developed and adopted strategies to conserve their natural resources, such as adaptive management and monitoring, timely government action, integrated management, buffer zones, and payments for ecosystem services [12, 14, 20, 21]. However, none of these strategies was created based on the Community-Based Natural Resource Management (CBNRM) principles proposed by the WWF (2006), which emphasize the following four dimensions: 1) the resource must have measurable value to the community; 2) communities must live with the resource; 3) the scale of the area; and 4) decision-making, benefits, and equitable resource accessibility [22], all while aligning with the targets of SDG 15 [18]. This strategy tackled environmental degradation and biodiversity loss by empowering local communities. It shifted their role from passive recipients of aid to active agents of change. The approach also linked community development directly to conservation, creating a self-sustaining cycle where progress spurred communities to protect the biodiversity essential for their livelihoods. Therefore, this research studied the current situation within Thab Lan National Park using these concepts and proposed management guidelines as a strategy for conserving the sustainability of its natural resources. Local policymakers and authorities can effectively implement these guidelines to achieve SDG 15 within the National Park, thereby ensuring the long-term sustainability of Thailand's natural resources.

2 Methodology

This qualitative research aimed to analyze the current situation in Thab Lan National Park based on the CBNRM principle proposed by the WWF (2006) and the targets of SDG 15. Data were collected through in-depth interviews with key informants, comprising three local individuals who cultivated land and two operations-level officers from the Thab Lan National Park, each with at least five years of work experience in the area. They were selected due to their expertise and firsthand experience related to the research objective, which represents purposeful sampling within qualitative research [23]. This approach provided the authors with a comprehensive understanding of local initiatives, including their strengths and weaknesses, drawing on local knowledge that provided contextually rich information [24]. This method enabled the authors to devise targeted policy recommendations.

2.1 Participant and Data Collection

Participants were selected using purposive sampling as this technique allows researchers to choose key informants to obtain a detailed understanding of the current situation and essential information from specific experiences and roles, which is crucial for advancing knowledge and theories in the field [25]. Purposive sampling was employed to identify key informants and gather detailed insights. In-depth interviews were chosen to explore nuanced opinions and experiences [26].

2.2 Research Instrument

The in-depth interviews consisted of eight questions based on the CBNRM principle proposed by the WWF (2006) and the targets of SDG 15.

2.3 Data Analysis

Content analysis was used to analyze the qualitative data obtained from the interviews. First, the data generated from the qualitative interviews were transcribed. Next, the transcribed data were coded and analyzed to identify themes and subthemes, which helped dissect the current situation in Thab Lan National Park.

3 Findings

This study applied the CBNRM principle proposed by the WWF (2006) and combined the targets of SDG 15. The research findings were summarized in the Table 1.

Apart from providing funding and technical support, safeguarding local resources, providing lawful habitation within parks, and nurturing agricultural understanding are deemed vital under CBNRM Principles 1. However, deforestation and biodiversity loss within Thab Lan National Park biased the distribution of benefits, undermining CBNRM Principle 2 and ecosystem protection. The unfairness of this situation hampers cooperative conservation despite anti-poaching attempts. Under CBNRM Principle 3, effective cooperative conservation is predicated on self-organized local groups that promote intergenerational sustainability for long-term ecological payoffs. Finally, CBNRM Principle 4 states that the greater the conservation action taken at the regional level, the greater the local action. These findings demonstrate that community participation in resource management is essential, alongside redefining locals as active guardians of the forest, to strengthen park-community relations.

Table 1. Current situation of Thab Lan National Park based on CBNRM and targets of SDG 15

Concept and Questions	Findings	Implications for Policymakers
CBNRM Principle 1 (Measurable Value) & SDG 15. a, 15. b, and 15. c (Financial & Technical Resources and Supports):		
1. What are the economic advantages for your community in protecting the natural resources of Thab Lan National Park?	Most key informants agreed that if locals could protect the natural resources and live within the national park by the laws and regulations, the park could provide economic benefits for locals, provided this did not conflict with its rules. One of the key informants said, *"We did not mind giving them the right to plant or even build something under the park's laws and regulations, but what I wanted most was to collaborate in preserving and protecting the natural resources."*	Policymakers focused on integrating the economic benefits to the local community from the natural resources of Thab Lan National Park while maintaining a balance with conservation objectives, prioritizing complete information and knowledgeable assistance, especially in sustainable farming and park regulations. Such efforts advanced local sustainable resource management capacity and encouraged quantifiable conservation value.
2. What specific financial resources (e.g., funding, grants) and technical support (e.g., training, equipment) would be most helpful for your community to manage the park's resources sustainably?	Most key informants agreed that we provided them with knowledge in various areas, including agricultural knowledge and rights related to living in national parks. One key informant stated, *"Agricultural knowledge was one of the local needs, and we supported them with it."*	

Continued

Concept and Questions	Findings	Implications for Policymakers
CBNRM Principle 2 (Benefit distribution) & SDG 15.1, 15.2, 15.5, and 15.7 (Ecosystem Protection, Biodiversity, and Poaching & Trafficking):		
3. What are the consequences of benefit distribution on forest protection, deforestation prevention, and biodiversity conservation in the park?	Most key informants indicated that Thab Lan National Park's lack of equitable benefit distribution fueled population growth and settlement expansion, directly leading to forest shrinkage and biodiversity loss. Communities resorted to land-use changes that degraded the park without receiving benefits, diminishing their incentive for conservation. One key informant remarked, *"Socially, it had both good and bad effects. Now, more people live here. Some of them had come before it was a national park. The problem was that the forest was shrinking owing to settlement."* Moreover, the unequal distribution of benefits in the timber sector, characterized by past concession controversies and corruption, hindered forest protection and biodiversity conservation. This system prioritized resource extraction over sustainable management, thereby accelerating the rate of deforestation. As one key informant noted, *"Timber trade was strong. Critics blamed state concessions for deforestation, but it was a management issue hampered by controls and corruption."*	Policymakers addressed the inequitable distribution of benefits, as it directly contributed to forest shrinkage, biodiversity loss, and unsustainable land-use changes. There was a critical need to revise timber concession policies to prioritize sustainable management over resource extraction and combat corruption. Implementing fair benefit-sharing mechanisms incentivized local communities to participate in conservation efforts.
4. How do you expect the preservation of Thab Lan National Park's resources to contribute to global efforts against poaching and trafficking?	Most informants agreed that as Thab Lan National Park was a UNESCO World Heritage Site, it had to adhere to and uphold specific criteria, and preventing poaching and trafficking was one of the missions that should have been prioritized. One of the key informants stated, *"We had our officers patrolling; these individuals sacrificed their lives to preserve the national park. Furthermore, we utilized technology to detect all crimes in the national park. We expected to do our best to sustain our national park no matter what, and we hoped the world would acknowledge our efforts."*	
5. How could local community involvement, based on the principles of CBNRM (e.g., valuing resources, benefit sharing, local decision-making), help combat poaching and trafficking?	Most key informants stated that cooperative biodiversity conservation efforts, such as species protection and reforestation, experienced diminished community motivation and effectiveness when equitable benefits were not distributed. A key informant said, *"The authorities were trying to cooperate. However, it was down to the communities. They needed to understand the big picture—the sustainability of the forest—before they just thought of their economic gains."*	
CBNRM Principle 3 (Scale of management) & SDG 15.3, 15.4, 15.8 (Land Degradation & Mountain Ecosystems):		

Continued

Concept and Questions	Findings	Implications for Policymakers
6. Do you believe that smaller groups (localized) in a community could manage these resources (including monitoring and controlling the alien species) more effectively than larger (centralized) efforts?	Most key informants stated that the efficacy of collaborative conservation relied on localized groups prioritizing intergenerational sustainability, which facilitated more effective resource management and helped control alien species. One key informant remarked, *"Yes, there was collaboration with the locals, but it would have been much better if those groups had focused on long-term sustainability, you know, for their children. That would have made their control efforts far more effective."* Furthermore, effective resource management required communities to adopt a long-term sustainability perspective to ensure lasting ecological benefits for future generations. One key informant noted, *"Local management could have been improved, but only if they had considered the long-term effects for future generations. That is when their local monitoring would have been significant."*	Policymakers fostered community-based groups regarding resource management, especially in the monitoring and control of alien species, by instilling a sustainable, intergenerational, long-term thinking framework. This localized approach, combined with a regard for future generations, proved more effective in achieving conservation outcomes.
CBNRM Principle 4 (Decision-making, benefits, and equitable resource accessibility) & SDG 15.6, 15.9 (Equitable Access & Integration):		
7. What role do local communities have in utilizing and fairly distributing Thab Lan's natural resources?	Most key informants indicated that local communities, recognized for residency before the park's establishment, played a conditional role in decisions regarding Thab Lan's natural resources. Their right to reside within the park depended on their involvement in forest conservation and tree replacement. This exchange of benefits suggested that communities had some influence over resource use, albeit within a framework established by park authorities. One key informant remarked, *"Locals had a say in resource matters, but only if they assisted with conservation. It was like a trade-off."* Adequate and equitable resource management needed substantial community involvement in developmental planning, emphasizing collaborative governance and sustainable outcomes. One of the key informants stated, *"The authority had to allow the community to help decide how to use resources, or it wouldn't be fair or last long."*	Policymakers defined and enhanced the participation of local communities, particularly those residing near the park, in the decision-making processes concerning the natural resources of Thab Lan. Such collaboration stemmed from a governance model that allowed for community participation in conservation (for example, reforestation) and was directly tied to their rights and access to resources.
8. Are traditional resource management methods from local communities incorporated into the park's conservation strategies?	Most key informants agreed that, due to the limited number of staff in the national park, effective collaboration between the park and the local community was the most effective approach to its preservation. The locals acted as the guardians of the forest, while the national park equipped them with essential tools and knowledge. One key informant remarked, *"At that time, we maintained a strong connection with several village leaders who consistently understood and supported our policies, sharing their knowledge with the community. We would have loved to extend this connection to the nearby villages; then, we would have seen the light at the end of the tunnel."*	

4 Discussion

The findings highlight practical management based on CBNRM and the targets of SDG 15. Three interesting points must be discussed.

4.1 Lawful Residency Within the National Park

Antunes et al. [27] stated that legal acknowledgment of the use of local land and resources allows local populations to commit to conservation. This acknowledgment facilitates the integration of local populations in governance processes and the economic opportunities created by the national park system, leading to healthier interactions between humans and the environment. This approach fosters community attachment to the ecosystems within parks and motivates communities to actively engage in conservation efforts [28], thereby enhancing the sustainable protection of natural resources.

The research findings indicate that lawful residency within the national park is essential, which aligns with the work of Gursoy et al. [29], who examined the key determinants influencing the behavior of Chinese residents regarding their responsibilities towards cultural heritage. Enhancing the residents' sense of local identity and satisfaction fosters a deeper understanding of their obligations to heritage preservation and strengthens their commitment to protecting and conserving heritage resources. This also relates to the research by Toruńczyk-Ruiz and Martinović whose studies showed that extended residency cultivates a stronger sense of local attachment and perceived entitlement to local decision-making [30]. Moreover, equitable benefit distribution from conservation, particularly stemming from the legal recognition of local residency in national parks, relies on robust monitoring and enforcement. This involves establishing clear, state-recognized records of all land rights (statutory, customary, temporary) through participatory mapping and registration. Monitoring is directly linked to these transparent records and the active involvement of both community members and local authorities. Enforcement depends on legitimate local governance structures that can fairly resolve disputes, address grievances (possibly via an ombudsman), and apply sanctions. Crucially, the process must build trust, prevent elite capture, and incorporate independent audits to ensure financial integrity and compliance. The overarching goal is to strengthen local autonomy without disrupting existing protective customary arrangements, particularly for vulnerable groups, to address systemic inequalities beyond individual conflicts [31].

4.2 Benefit Distribution and Ecosystem Protection

The distribution of benefits is critical in various fields, including environmental governance, project management, and social policies [32]. This enhances ecological conservation. When residents receive a fair distribution of benefits, their motivation to protect the ecosystem increases, resulting in the successful conservation of natural resources [33].

These findings suggest that the distribution of benefits and ecosystem protection in Thab Lan National Park suffered from inequitable sharing, resulting in deforestation and biodiversity loss. Despite anti-poaching efforts, this lack of fairness undermines cooperative conservation, which aligns with the work of Benetti and Langemeyer. The results showed that although the protected areas play a crucial role in biodiversity and landscape conservation, conservation initiatives often fail to meet the needs of local populations, resulting in disputes and insufficient community support [34, 35]. To address this issue, local authorities must play a vital role in ensuring fair distribution to all stakeholders by facilitating residents' engagement in related activities. This includes developing clear benefit-sharing mechanisms, establishing participatory monitoring committees, conducting independent audits, setting up grievance redressal mechanisms, and incentivizing compliance. This approach can foster trust and support sustainable conservation [36].

4.3 Equitability

Equitability ensures that stakeholders maximize their ecological, social, and economic benefits. This principle is essential for the equitable distribution of benefits among stakeholders in the decision-making process. Effective governance is crucial for promoting this mechanism, resulting in equitable outcomes for humans, society, and the environment [37, 38].

Achieving equitable national park management requires robust, inclusive local governance that extends beyond fair benefit distribution. Effective local governance must actively facilitate community participation in decision-making processes through accessible platforms, fostering genuine collaborative governance. It also plays a pivotal role in implementing conservation policies on the ground by empowering local groups to monitor compliance and address issues. Furthermore, local governance mediates resource-related conflicts and ensures accountability and transparency in park operations, all of which are crucial for long-term conservation success [31, 39].

The results indicate that the degree of local influence is linked to conservation activities, necessitating genuine engagement by residents for efficient resource governance, and portraying residents as forest stewards through strengthened park-community relations. This result was consistent with the findings of Armitage et al. These findings suggest that community-focused conservation governance is crucial for achieving equity in conservation at all levels [40]. This also relates to the work of Abukari and Mwalyosi. Their results highlight the need for friendly local governance of parks and acknowledgment of local communities' roles and rights. These approaches would enhance the position of communities surrounding the protected parks to support conservation campaigns actively [41].

Fostering community members' social and human capital, as well as their participation in designing management structures, improves governance at the local level. Moreover, effective federal and local government relations are crucial for enhancing policies and collaborative activities among governmental, non-governmental, and community-based organizations to improve governance [42]. The coverage of the region will focus on subnational inclusive governance, which empowers communities, enhances citizen participation, and promotes equity in resource allocation within the area.

5 Conclusion and Recommendation

Local participation in management can serve as a practical resource to enhance the sustainable conservation of Thab Lan National Park's natural resources. Based on these findings, three main areas were considered.

1). Promoting the legal recognition of local residency is crucial for the successful conservation of national park areas. When residents are connected to natural resources, they develop a sense of tenacity and belonging that fosters protection and sustainability.

2). Local authorities should facilitate fair distribution to all stakeholders by encouraging residents' participation in related activities. This approach can help build trust and support sustainable conservation efforts.

3). Inclusive governance should be developed and implemented at the local level. This development will empower local communities, enhance collaboration, and ensure equitable resource management.

4). Prioritize strengthening local governance by establishing formal, inclusive mechanisms for community participation in resource management decision-making and conflict resolution, fostering transparency and accountability for sustainable and equitable conservation.

5). Implement legal recognition for long-term local residency within national parks with clear rights and responsibilities. Concurrently, develop and enforce robust, transparent mechanisms for equitable benefit distribution, including participatory monitoring and effective grievance redressal, to ensure fair sharing among all stakeholders.

6). Prioritize the establishment of robust, inclusive local governance structures to facilitate community participation in management strategies and policy formulation actively, fostering genuine collaborative governance essential for equitable national park management.

7). Empower local governance to play a pivotal role in the effective implementation of conservation policies, including empowering local groups for monitoring compliance, mediating conflicts, and ensuring comprehensive accountability and transparency in all park operations.

6 Implication of the Study

Local management is formulated from two sustainability-centered concepts that highlight the participation of local citizen stakeholders. Local and regional policymakers should adopt this practice to ensure effective natural resource management through participatory community engagement. Moreover, implementing the results of this study in other national parks will enhance the conservation of terrestrial natural resources, aligning with the objectives of SDG 15. It may also serve the purpose of benefiting all local communities.

7 Limitations and Recommendations for Future Research

While the results offer valuable management guidelines for conserving natural resources in Thap Lan National Park, the research team faced limitations, as they were unable to collect data from certain key informants due to sensitive issues at the site. The small sample size affects the generalizability of the findings, meaning that the conclusions may not be applicable to other contexts in a broad sense. The potential biases introduced by relying solely on interviews should also be acknowledged. Therefore, future research should expand to different national parks, gathering more diverse information to develop broader strategies for resource conservation.

Author Contributions

Study concept and design: O.To-aj. Acquisition of data: O.To-aj and S.K.. Analysis and interpretation of data: O.To-aj, S.K. and N.C. Drafting the manuscript: O.To-aj, S.K., and N.C. Critical revision of the manuscript for important intellectual content: O.To-aj. Statistical analysis: S.S. Study supervision: O.To-aj and W.P. All authors have read and agreed to the published version of the manuscript.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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