



Contribution of Local Protected Areas to the Protection of Natural Resources and the Livelihood of Community Members in Northern part of Cambodia

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Abstract This study explores the economic benefits of locally managed protected areas (LPA), the role of natural resources in local livelihoods, and the future existence of natural resources in connection with community-based natural resource management. The study selected eight Local Protected Areas (LPAs): three Community Forestry (CF) areas in Kampong Thom province and five Community Protected Areas (CPA) in Siem Reap provinces, Cambodia. The study interviewed 320 households that are members of the eight LPAs. In addition, a total of 17 key informant interviews (KIIs) were conducted with relevant stakeholders and eight group interviews with the eight LPA committee members. The study revealed that agriculture, forest-related activities, and labor are major sources of income, with forest-related income contributing an average of 23%. Livelihood changes are linked to income sources, the perceived importance of LPAs, and participation in natural resource (NR) protection. Despite conservation efforts, challenges such as deforestation and limited financial support persist. Women significantly contribute to livelihood activities but are less involved in NR management activities. A perception gap exists between the poor and non-poor regarding NR benefits. NR persistence was influenced by the benefits people received and their participation in protective activities. Therefore, enhancing community awareness, especially among the poor, along with financial and technical support, is crucial for sustaining NR use. Awareness-raising programs, government financial support, and external assistance to address challenges and seize opportunities are recommended.

Keyword community forestry, protected area, natural resources management, natural livelihood

INTRODUCTION

Cambodia's forest cover was 46.86% in 2018 (MoE, 2018), with 70% of all households in Cambodia having their income-related activities with natural resources (MoP, 2020). As of 2022, 57% of Cambodian households were engaged in agriculture (MoP, 2022), which contributed 22.2% to the country's gross domestic product (GDP) (The World Bank, 2025). The sustainability and productivity of this sector are closely linked to forest resources (APFNet, 2020). At the national level, forestry management in Cambodia is overseen by two key institutions: the Ministry of Environment (MoE) and the Ministry of Agriculture, Forestry and Fisheries (MAFF), whereas at the community level, local protected areas are managed by the community. Community Protected Areas (CPA) and Community Forestry (CF) are terms used by the MoE and MAFF, respectively.

Currently, 648 CFs and 193 CPAs have been established in 21 and 15 provinces, respectively (FA, 2023; MoE, 2023). Forestry resources are critical to the livelihoods of rural Cambodian communities. Chou (2017) highlighted the roles of Non-Timber Forest Products (NTFPs) in livelihoods and ecosystem services within a protected area in Cambodia, noting that the importance of these resources is often overlooked due to their non-monetary value. Ehara et al. (2016) reported an inverse relationship between household wealth and NTFP dependence, indicating that as households become wealthier, they rely less on forest resources. Socioeconomic development has drastically impacted natural resources, particularly forest cover, which declined from 10.7 million hectares in 2002 to 7.9 million hectares in 2021, with the most significant decline occurring between 2010 and 2013 (MoE, 2020). This accelerated reduction has adversely affected rural livelihoods, contributing to internal and external migrations (Oudry et al., 2016).

OBJECTIVES

This study aims to understand the contribution of natural resources within local protected areas (LPA), specifically CF and CPA, to LPA members within the Kampong Thom and Siem Reap provinces. This study seeks to provide insights into how changes in forestry resources affect economic benefits, community roles, and perceptions regarding natural resource protection and management.

METHODOLOGY

Study Area and Samples

There is a total of eight Local Protected Areas (LPAs), three Community Forestry (CF) and 5 Community Protected Areas (CPAs), located in Kampong Thom and Siem Reap provinces, in the northeastern part of Cambodia, that were included in the study (Fig. 1). This study employed both qualitative and quantitative methods to explore the economic benefits of LPAs in response to community members' needs.

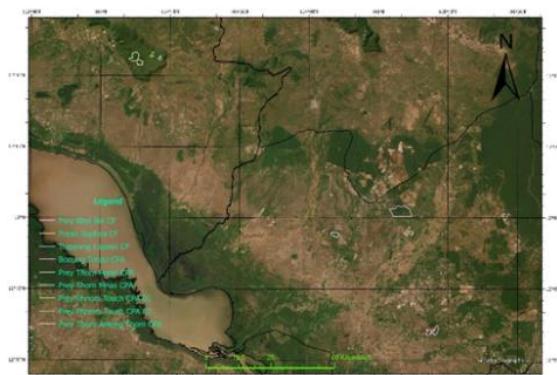


Fig. 1 Map showing location of the study area

The sample for the study was calculated from the 1,719 member households of the selected eight LPAs. Using Cochran's sample formula with a 95% confidence interval, 5% margin of error, and 50% proportional response, the number of households to be interviewed was determined to be 315. The final number of samples included in the survey was 320 households across eight LPAs. Of the 320 respondents, 252 were women. A structured questionnaire was used for the household interviews after completing the questionnaire testing. In addition to the quantitative survey, the study utilized qualitative interviews with 17 key informants: three (3) from natural resource protection Non-Governmental Organizations (NGOs), two (2) officials from the Provincial Department of Environment, four (4) commune leaders, and eight (8) village leaders. Additionally, eight (8) group interviews were conducted with eight (8) community-based protection committee members representing each LPA, as shown in Table 1.

Table 1 Demographic and samples of the study

No.	Community	Total Area (ha)	Total HH Members	Total People	Female	Sampled HHs	Female Respondents
1	Boeung Toteul CPA	772	402	1,889	957	41	40
2	Trapeang Lapeak CF	325	300	400	180	42	23
3	Preah Sophea CF	384	293	1,393	720	38	31
4	Prey Kbal Bei CF	2,587	62	152	82	41	34
5	Prey Thom Anlong Thom CPA	798	308	1,186	624	37	20
6	Prey Phnom Moneas CPA	113	109	463	233	41	40
7	Prey Phnom Kduoch CPA	92	141	656	335	40	35
8	Prey Thom Popel CPA	365	104	410	204	40	29
Total		5,436	1,719	6,549	3,335	320	252

To measure the respondents' perception, a five-point rating scale was applied and considered an interval scale for the analysis of the data.

Data Analysis and Interpretation

Descriptive statistics were used to describe the respondents' general responses. Additionally, Pearson product-moment correlation (Pearson's r), multiple regression analysis, and binary logistic regression were employed to determine the correlation and predictability of factors influencing the socioeconomic situation of LPA members. Qualitative data were analyzed using narrative and content analysis to understand the actual situation and how the community received support, as well as their mechanisms for responding to challenges to ensure the longevity of the natural resources. Qualitative data were used to triangulate the reviewed documents and quantitative data.

RESULTS AND DISCUSSION

Contribution of Natural Resources to the Livelihood of the Community

The analysis indicated that dependence on natural resources remains highly significant for members of community-based natural resource management, with natural resources being one of the three major income sources: agriculture (82%), forest-related activities (66%) – slightly below the report of MoP (2020) at 70% – and laborers/workers (48%). Moreover, the average share of income from forest-related sources within the households among the surveyed respondents was 23%, following agriculture (61%) and laborers/workers (41%) income. This portion reflects a strong connection with natural resources. The findings suggest a significant change in the role of natural resources in the livelihoods of the poor, with the proportion of income from forest-related sources decreasing to 23% from 41%, as reported by McKenney et al. (2004). To understand the changes in community members' livelihoods, correlation and multiple regression analyses were conducted. As shown in Table 2, the results showed that livelihood changes were significantly associated with eight factors: income from forest-related sources, income from non-forest-related sources, perceived importance

of locally protected areas (LPAs), current importance of natural resources, benefits received after joining LPAs, changes in pest and disease prevalence, current severity of pest and disease changes, and the number of natural resource protection activities.

Table 2 Livelihood activities of the membered household

No.	Sources of Income	Total	Percent	Percent Share	SRP	Percent	Percent Share	KPT	Percent	Percent Share
1	Agriculture	261	82%	61%	129	82%	59%	132	81%	63%
2	Forest related	211	66%	23%	110	70%	25%	101	62%	21%
3	Laborers or workers	155	48%	41%	93	59%	43%	62	38%	38%
4	Vendors/business	31	10%	55%	15	9%	57%	16	10%	53%
5	Wage workers	20	6%	47%	3	2%	37%	17	10%	49%
6	Migration	5	2%	26%	1	1%	50%	4	2%	20%
7	Vendors at tourism site	3	1%	40%	2	1%	50%	1	1%	20%
8	Government salary	4	1%	50%	2	1%	40%	2	1%	60%
9	Others	56	18%	29%	9	6%	14%	47	29%	32%
Total		320	100%	100%	158	100%	100%	162	100%	100%

However, stepwise multiple regression analysis indicated that only three factors—income from forest-related sources, income from non-forest-related sources, and the number of natural resource protection activities—were predictors of livelihood changes among the members, with a prediction level of 30%. These results highlight the critical importance of participation in natural resource protection, suggesting that participants possess the necessary knowledge, courage, sacrifice, and commitment to both natural resource and livelihood development. This confirms that although natural resources have changed their contribution to the country's GDP from 8.3% in 1995 to 1.9% in 2017, and only 0.8% in 2021 (The World Bank, 2025), the contribution of the NR to rural households is still highly important.

Roles of Locally Protected Areas in the Protection of Natural Resources

Locally protected areas (LPAs) have been prominent players in protecting natural resources, supported by various organizations. The government has recognized the importance of these communities and allowed their establishment. Interviews with committee members confirmed the significant contribution of these communities to managing and protecting natural resources, with some suggesting that natural resources might not exist without community involvement. Four of the eight interviewed communities reported significant forest loss adjacent to the LPAs. Qualitative data also indicated that the existence of LPAs is closely tied to the livelihoods of community members, and without direct benefits, their role in protection diminishes. Multiple regression analysis showed that the existence of natural resources depends on two key factors: the level of poverty and the perceived importance of LPAs by community members, suggesting that protection improves as living conditions and community acknowledgment of LPAs' importance increase.

Despite positive conservation and protection activities, challenges remain, including the continuous degradation of natural resources, limited law enforcement (e.g., land grabbing, deforestation, illegal logging, and fishing), insufficient financial and technical support, limited knowledge, lack of environmental responsibility, and difficulties in dealing with powerful land grabbers. The capacity of the committees to sustain LPAs without external support is a concern. However, opportunities such as promoting sustainable agriculture, eco-tourism linked to cultural and natural resources, advancing non-timber forest products (NTFPs) processing and marketing, and developing financial sustainability models have been identified. These opportunities require technical and financial support to be realized.

Roles of Women in Natural Resources Management

Key informant interviews confirmed that women play crucial roles in livelihood activities, including savings, handicrafts, and agricultural production, across all locally protected areas (LPAs) related to

natural resources. However, their involvement in the management and conservation of natural resources, particularly in planning and patrolling activities, is limited due to household responsibilities and safety concerns, as patrolling and a number of conservation activities occur in forest areas where women find it challenging to participate. Despite this, women are the most affected group if natural resources vanish. Several anecdotal evidence has reported the positive contribution of women to the improvement of effectiveness and efficiency in conservation efforts. However, systematic and scientific research on the roles of women in natural resource management for local protected areas in Cambodia is not available to confirm this finding.

Awareness and Perception Regarding the Importance of Natural Resources

A comparison of perceptions between the poor and non-poor regarding natural resources revealed that out of 20 variables tested, only one showed a significant difference: the perceived benefits received from natural resources. The poor perceived these benefits as being lower than the non-poor. In contrast, the income contribution from forest resources was 25% for the poor and 23% for the non-poor, a difference that was statistically insignificant. This figure somehow suggests that the poor value natural resources less than the non-poor, possibly due to limited knowledge and understanding of their importance for livelihood. This is aligned with the findings of Qamruzzaman (2024), where the association between natural resources and financial benefits contains both negative and positive aspects, indicating the complexity in managing natural resources, which needs a proper understanding of the actual context, especially those involving conservation activities.

Qualitative interviews further confirmed that committee members of locally protected areas (LPAs) have a better grasp of the importance of natural resources. They are more aware of both the short- and long-term benefits to their community. In contrast, community members typically focus on immediate physical and financial benefits rather than broader, more abstract advantages, such as biodiversity and ecosystem services.

Predicting the Future Existence of Natural Resources

Logistic regression analysis was conducted to predict the future existence of natural resources (NR). The results suggest that halting the destruction of NR is likely dependent on the benefits that individuals can derive from these resources. Correlation analysis indicates that preventing NR destruction is positively influenced by several factors: the perceived importance of the local protected area (LPA), the number of participants in NR protection activities, the shift in income sources away from forest-related occupations, and the frequency with which people currently benefit from NR. The likelihood of NR existence was positively estimated at 96%. UNDP (2019) reported that human resource development is negatively associated with a country's forest cover, which is the same as Ehara et al. (2016). Therefore, it can be concluded, based on the findings here, that improved human development is negatively associated with forest cover only applicable to the country overall, whereas the people who are located and directly benefited from the protected areas are in the opposite direction.

Additionally, the level of change in benefits from NR over the next 10 years is influenced by multiple factors, including changes in income sources, the importance of NR, benefits before and after joining LPAs, past and current severity of pests and diseases, and participation in NR protection. These factors were significantly associated with the level of impact expected over the next decade. Stepwise multiple regression analysis predicted the impact levels based on six key factors: participation in NR protection, benefits after joining the LPA, current severity of resource changes, current resource changes, current pest and disease changes, and changes in income sources from forest-related occupations. The prediction model estimated a 45% impact proportion.

CONCLUSION AND WAY FORWARD

At the local level, individuals and organized communities, including local organizations, play a crucial role in protecting natural resources. It has been confirmed that without their efforts, these resources would likely have vanished, as evidenced by the degradation of the nearby areas. Currently, natural resources continue to be vital for the livelihoods of community members, contributing significantly to household incomes and influencing livelihood stability. Local protected areas offer a positive outlook on the future preservation of these resources, with communities believing in the potential for significant conservation. However, the study also indicates that without community recognition of the importance and benefits of these resources, their condition would be worse than it is now. This contrasts with the perception of some leaders, who anticipate resource depletion due to changing economic conditions. Although government support is gradually improving, it remains limited in terms of finances. The poor exhibit a lower recognition of the NR's contribution to their livelihoods than the non-poor, which may contribute to resource degradation. The study also highlights that long-term changes in benefits significantly impact people's livelihoods with a high level of predictability. While challenges persist in community-managed areas, opportunities have also been reported.

The study suggests that special attention should be given to the poor and vulnerable in recognizing the benefits of natural resources and promoting their participation in the protection of natural resources. Awareness-raising efforts should focus on understanding the risks and threats to these resources, as community members' views often differ from those of their leaders. Simultaneously, promoting women's participation in grassroots-level management is crucial to ensure gender inclusiveness. In addition, different financial models are needed to grasp the opportunities for generating income for the protection of natural resources, such as the payment of ecosystem services, ecotourism, handicraft, and NTFP generation. This could be achieved if the government considers regular financial allocations to LPAs to support resource management. External and technical support are necessary to leverage opportunities and address challenges and threats. Lastly, further research on developing financial and management models of LPAs should be considered to protect NR and the role of women in protecting natural resources.

DATA STATEMENT

The Ministry of Environment's data on Community Protected Areas (CPA) statistics and Community Forestry statistics from the Forestry Administration are available only through direct access to the institution and are not officially available online. The authors can provide them upon request.

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