

Original article

Developing Appropriate Criteria and Indicators to Evaluate Sustainable Community Forest Management in Northeastern Thailand

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ABSTRACT

Using criteria and indicators (C&I) is currently at the forefront of mechanisms being proposed and implemented to determine sustainable forest management strategies. The C&I approach can contribute to enhancing participatory forest management. This research employed mixed research methods and stakeholder consultations to develop an appropriate set of C&I to evaluate the sustainability of community forest management in Northeastern Thailand. The study found that an appropriate set of C&I consisted of 36 indicators under 13 criteria and 4 principles. Each indicator was assigned a weighted score. The set of designed C&I was assessed in Sanamchai community forest, Nong Bua Lam Phu province, where 20 community leaders and villagers were interviewed using a structured questionnaire. The assessment produced mixed results on community forest performance. The study suggests that the future application of C&I must include recommendations from both the local stakeholder values and national forest policy.

Keywords: Community Forests Management, Criteria and Indicators, Performance, Sustainability.

INTRODUCTION

Sustainable forest management (SFM) calls for integrating and balancing diverse ecological, social, and economic values to implement forest management at all levels, from national to forest site. In this context, the criteria and indicators (C&I) approach is currently one of the most popular mechanisms being proposed and implemented to determine sustainable forest management strategies

(Gomontean *et al.*, 2008). C&Is are tools for assessing trends in forest condition and sustainable forest management. They also provide a common framework for describing, monitoring, and evaluating progress towards a more sustainable forest management. The approach is often aimed at managing diverse levels as well as the forest unit level. International efforts to develop C&I for sustainable forest management indicate that human intervention

can promote sustainability of forests (Poteete and Ostrom, 2004). In 1992, the International Tropical Timber Organization (ITTO) introduced the C&I concept and terminology. Since then, several organizations and professional groups have worked together to develop a process for generating and testing appropriate C&I to suit their own context. To date, it is estimated that there are more than 50 different C&I standards that are available worldwide, with more in the process of development. More recently, governments in Southeast Asian countries have adopted the ASEAN Criteria and Indicators for Sustainable Management of Tropical Forests (ITTO, 2017). This regional set of C&I was primarily developed as a framework for guiding and facilitating certification of the forest management practices of its member nations.

In the context of sustainable development, community forest management has received an increasing worldwide attention from governments, education institutions, and the private sector. Sustainability is the first requirement for a community based forestry management system. Community forests (CFs) have been included into the national policies and strategic plans by these governments. They expected that it would contribute to alleviating poverty and mitigating deforestation. A commonly accepted definition of CF was given by Gomontean *et al.* (2008). They defined CF as a forest area designated and managed by the local community for the sustainable use of the goods and services derived from the forest. Furthermore, they noted that in developing countries, CFs play a vital role

in enhancing the local livelihood and forest conservation. Local people who live in and around the forest areas have been managing and collecting various forest products from such CFs to sustain their livelihoods. These products may include food, medicinal plants, building materials, fodder, tools firewood, complementary income, recreation, and sites for worshipping ancestors.

In Thailand, since the late 1990s, the Royal Forest Department (RFD) has promoted CF as a policy tool for enhancing forest conservation and rural development. At present, there are more than 10,000 communities who have registered CF in their respective areas with RFD, with more than 4,000 villages in the northeastern region (RFD, 2017), as summarized in Table 1. Most CFs in the region consist of relatively small forest areas (84.23%). The Thai government policy is to establish up to 20,000 CFs nationwide. Although CF projects have been increasingly adapted and practiced by local communities, the assessment and evaluation of CF management has been performed to a very limited extent. Is the CF approach as effective and efficient as promised? There seems to be a potential use of the C&I approach in promoting sustainability of CF management. Gomontean *et al.* (2008) argued that the C&I approach could contribute to enhancing participatory forest management. The approach provides opportunities for stakeholder participation, thus explaining its wide acceptance in forest resource management.

This study aimed to develop and test a set of C&I that could be used to assess the

sustainability of CF management. The set was developed using mixed research methods consisting of a literature review, analytic hierarchy process, and a questionnaire, which included

stakeholder consultations. The performance of CF management was assessed using the designed set of C&I, which was conducted at a CF site in Northeastern Thailand.

Table 1 Number of registered community forest (CF) in Northeastern Thailand, categorized by area.

Community forest area (rai)	Number of CF (%)	Number of provinces
5 – 699	235 (84.23)	5
700 – 1,398	25 (8.96)	4
1,399 – 2,097	12 (4.30)	4
2,098 – 2,796	5 (1.79)	3
2,797 – 3,500	2 (0.72)	2
Total	279 (100)	18

MATERIALS AND METHODS

Screening and selecting criteria and indicators

In this first step, a number of existing standards and C&Is, recommended by international organizations, were obtained and reviewed, including those developed by the International Tropical Timber Organization (ITTO) and Center for International Forestry Research (CIFOR) and are detailed in Table 2. A total of 13 stakeholder consultative

workshops were conducted, involving 147 participants, to select the appropriate C&I. . These participants were both forest officials and CF members. In the workshop, participants were asked to assess the appropriateness of the international C&I. The final decisions were made among participants to select the most appropriate items to be included in the C&I for a sustainable management of CFs in the context northeastern Thailand.

Table 2 Criteria and indicators (C&I) prepared and developed by International organizations.

Organization	Criteria	Number of indicators
International Tropical Timber Organization (ITTO)	1. Enabling conditions for sustainable forest management	4
	2. Extent and condition of forests	
	3. Forest ecosystem health	
	4. Forest production	3
	5. Biological diversity	4
	6. Soil and water protection	2
	7. Economic, social, and cultural aspects	3
Center for International Forestry Research (CIFOR)	Principle 1: Assurance of community well-being.	12
	1.1 management rights and authority	
	1.2 community participation	
	1.3 conflict management	
	1.4 local institutions	
	Principle 2: People's well-being	13
	2.1 health and diet	
	2.2 wealth: livelihoods, distribution of costs, and benefits, equity	
	2.3 wisdom and knowledge sharing	
	2.4 tenure arrangement within the community	
	2.5 integrity	
	Principle 3: Assurance of forest landscape health.	43
	3.1 soil and water resources	
3.2 environment and ecosystem		
3.3 NTFPs utilizations		
3.4 good governance of forest in terms of policy and plan		
Principle 4: External environment	7	
4.1 relationships with third parties		
4.2 policy and legal framework, excluding tenure		
4.3 economics		
4.4 education and information		
ASEAN Criteria and Indicators	1. Enabling conditions for sustainable forest management	12
	2. Extent and condition of forests	9
	3. Forest ecosystem health and resilience	5
	4. Forest production	13
	5. Forest biological diversity	7
	6. Soil and water protection	6
	7. Economic, social, and cultural aspects	15

Source: CIFOR (1999) and ITTO (2017)

Weighting for indicators

The analytic hierarchy process (AHP) (Saaty, 2008) was used to weigh all the indicators. AHP is a technique involving a series of simple pair-wise comparisons, which can be summarized into four steps (Gomontean *et al.*, 2008): 1) set up the decision hierarchy by streamlining the C&I into the relevant hierarchy; 2) generate input data consisting of comparative judgment of decision indicators using a pair-wise comparison and numeric nine-point scale; 3) analyze these judgments and calculate the relative weights among all the indicators; and 4) determine the aggregate relative weights of decision indicators to obtain a set of final weights for the various decision making alternatives.

Testing designed C&I

The designed set of C&I was tested at Sanamchai CF, located in Nong Bua Lam Phu province. The total area of Sanamchai community forest is about 1,800 rai (288 ha). The CF site was based on purposively selected. This process involved two main activities: 1) interviewing 20 CF members

using a questionnaire; and 2) assessing CF management activities using the set of C&I selected above. The information gained from these activities was combined and used to assess the performance of CF management for the studied site. Prior to beginning the assessment process, the forest officers were trained so to have sufficient knowledge about the scope and meaning of C&I. To assess the performance of CF management, verifiers of indicators were developed where each indicator was assigned a score between 0 and 5, where 0 indicated no action, 1 indicated an extremely poor performance, through to 5 which indicated an excellent performance. The performance then was divided into three categories: 1) good performance (score between 0 - 1.66); 2) moderate performance (score between 1.67 – 3.34); and 3) poor performance (score between 3.35 – 5.00).

RESULTS AND DISCUSSION

1. Appropriate set of C&I

The appropriate set of C&I comprised of 36 indicators under 13 criteria and 4 principles (Table 3). Each indicator was assigned a weight.

Table 3 Principles, criteria, indicators, and assigned weights of indicators for a sustainable management of CF.

Criteria	Indicators	Weight score
Principle 1: Governance of forest resources and ecosystem		
1.1 Good forest governance	1.1.1 CF management plan	0.42
	1.1.2 Rules and regulations	0.32
	1.1.3 CF plan implementation	0.26
1.2 Management resources within CF	1.2.1 Clearly defined CF boundary	0.36
	1.2.2 Soil resource management	0.25
	1.2.3 Water resources	0.20
	1.2.4 Mitigating haze and air pollution	0.19
1.3 Agricultural and agroforestry management	1.3.1 Tree planting on farms	0.60
	1.3.2 Organic fertilizer application	0.40
Principle 2: Improvement of livelihoods and socio-economic status of local communities		
2.1 Economic stability	2.1.1 Income	0.46
	2.1.2 Decreasing expenditure	0.28
	2.1.3 Savings	0.26
2.2 Health	2.2.1 Mental health	0.41
	2.2.2 Food and nutrition	0.33
	2.2.3 Healthy environment	0.26
2.3 Self reliance	2.3.1 Knowledge	0.60
	2.3.2 Resource access	0.40
Principle 3: Strengthening community management and administration		
3.1 Participation of involved sectors	3.1.1 Between villagers and CF committee	0.39
	3.1.2 Among CF committee members	0.22
	3.1.3 Between CF committee and sub-district administrative organization	0.19
	3.1.4 Between CF committee and religious-based groups	0.10
	3.1.5 Between CF committee and others networks within a local community	0.10
3.2 Administration efficiency	3.2.1 Implementation, monitoring, and evaluation	0.60
	3.2.2 Leadership	0.40
3.3 Conflict resolution mechanisms	3.3.1 Perception of conflicts	0.57
	3.3.2 Mediation process	0.43
Principle 4: Enabling conditions and supportive mechanisms		
4.1 Laws and policy framework	4.1.1 Increasing knowledge on laws relevant to CF management	0.75
	4.1.2 Compliance of CF activities with the laws and policy framework	0.25
4.2 Research	4.2.1 Research done by academic institutions	0.68
	4.2.2 Research done on a community	0.23
	4.2.3 Research done by others	0.09

Table 3 (Continued)

Criteria	Indicators	Weight score
4.3 Partnership development	4.3.1 Establishing CF fund	0.29
	4.3.2 Existence of corporate social responsibility activity	0.24
	4.3.3 Participation between CF committee and The Royal Forest Department	0.29
	4.3.4 Participation between CF committee and other organizations	0.18
4.4 Economic aspect	4.4.1 Marketing system	1.00

Principle 1: Governance of forest resources and ecosystem

Forest governance is often associated with principles such as transparency, participation, and accountability. In the context of community forestry, the principle and concept of governance is commonly seen as a crucial foundation in achieving positive social, environmental, and economic outcomes. The stakeholders identified the governance of forest resources and ecosystem as one of the principles for measuring the sustainability of community forestry. In this principle, there were 9 indicators and 3 criteria. The first criterion was good forest governance, comprising of three indicators (which had the highest scores as indicated in Table 3): CF management plan (weighted score 0.42), rules and regulations (weighted score 0.32) and CF plan implementation (weighted score 0.26). The second criterion was management of resources within CF, comprising of four indicators. Agricultural and agroforestry management was the third criterion, comprising of two indicators.

Principle 2: Improvement of livelihoods and socio-economic status of local communities

Since many years, rural people in Thailand have depended on forest resources

for their livelihoods and income generation. The lives and cultures of these people cannot be separated from the forest area surrounding their villages. Thus, CF plays a key role in supporting and strengthening such relations. The improvement of livelihoods and socio-economic status of local communities was identified, among the other four principles of sustainable community forest management, which had 3 criteria and 8 indicators. The criteria were: 1) economic stability, 3 indicators; 2) villager's health, 3 indicators; and 3) self-reliance, 2 indicators.

Principle 3: Strengthening community management and administration

Community organizations and institutions are critical to achieve sustainable CF management. One of the important roles of a community organization and institution is to define and allocate resources within CFs among the community members. In addition, the organization makes decisions concerning the access and utilization of forest resources at village level. These local institutions include CF committee, as well as local administrative organizations. In the context of northeastern Thailand, the stakeholders identified 3 criteria

and 9 indicators to assess the success of community organizational administration. These criteria were: 1) participation of involved sectors at local level, 5 indicators; 2) administration efficiency, 2 indicators; and 3) conflict resolution mechanisms, 2 indicators.

Principle 4: Enabling conditions and supportive mechanisms

To ensure a sustainable CF management, it is important that forest land and resources within the designated CF are secure and properly managed. In addition, the management of CF should be in accordance with the national laws, legislations, and policy. Principle 4, enabling the conditions and supportive mechanisms, involved 4 criteria and 10 indicators. Most of the related criteria covered law, policy, research, and partnership.

2. Results of CF management assessment

The set of designed C&I was assessed by forest officials who had been working in Sanamchai community forest of Nong Bua Lam Phu province. During the assessment, 20 villagers were interviewed using a structured questionnaire. The assessment produced mixed results regarding the performance of the CF (Table 4).

The Sanamchai community forest performed well on principle 2 (improvement of

livelihoods and socio-economic status of local communities). The results indicated that CF performed sufficiently well in terms of health and self-reliance (as indicated by weighted scores 3.99 and 4.55, respectively). In terms of economic stability, the CF performed at a moderate level (score 2.01). The performance in accordance with principle 1 (governance of forest resources and ecosystem) was determined as moderate (score 1.92). However, looking at each criterion, the performance of the CF was poor in management of resources within the CF boundary (score 1.00) and agricultural and agro-forestry management (score 1.00). These results indicated that the Sanamchai CF had poorly addressed the issues of soil, water, and haze management. Additionally, issues related to tree planting on farms and the application of organic fertilizer have to be improved further.

The CF performed poorly according to the principle 3 (community organization capacity building) and principle 4 (enabling conditions and supportive mechanisms) standards. The results indicated that the managers of CF and involved agencies have to pay more attention to the institutional and capacity building approach for CF management. These institutional mechanisms involve project monitoring, CF leadership, conflict management, and partnership development.

Table 4 Weighted scores and performance of CF management for the study site.

Principle	Criteria	Weighted score	Performance
Principle 1: Governance of forest resources and ecosystem	1.1	1.92	Moderate
	1.2	1.00	Poor
	1.3	1.00	Poor
Principle 2: Improvement of livelihoods and socio-economic status of local communities	2.1	2.01	Moderate
	2.2	3.99	Good
	2.3	4.55	Good
Principle 3: Strengthening community management and administration	3.1	1.20	Poor
	3.2	1.00	Poor
	3.3	1.00	Poor
Principle 4: Enabling conditions and supportive mechanisms	4.1	1.00	Poor
	4.2	1.00	Poor
	4.3	0.68	Poor
	4.4	0	Poor

Basically, the C&I can be applied and tested at both the local and national levels. At the national level, C&I application would potentially guide the improvement of forest policy and management whereas at the forest management unit level, the results would guide forest managers to determine the performance and effectiveness of forest management as related to goals and activities of the community. The application of C&I at a local level would contribute to adjusting and improving the forest management plan and associated actions on the ground. As Raison *et al.* (2001) noted, it has been increasingly recognized that an effective application of C&I is of interest to a wide range of stakeholders and that their input and support is essential to make the new system work. In the context of Thailand, the application of C&I at the forest management unit level would particularly help the forest officials who monitor and assess the performance of CF management. This assessment process is critical because

the results of the process will be applied in at least two areas. First, it will be used to renew the CF project registration and second, the forest officials can provide comments to the CF committee to improve the management goals and activities based on the results of C&I assessment.

The future application of C&I must be consistent with local stakeholder perspective and the national forest policy. Therefore, it is critical that the stakeholder expectations, at the local, regional, and national levels, are regularly included and tested against the scientific capacity to support the cost-effective development and application of the designed C&I. It is worth noting here that an ongoing constructive dialogue between stakeholders is needed to move forward and make progress in the complex process of indicator development, its testing, and application (Raison *et al.*, 2001). In the process of the development and selection of the C&I, the critically linked activities of monitoring and data evaluation must be

addressed. If this is done in conjunction with the stakeholder input to develop management goals and targets, C&I can be applied at the forest management unit level to underpin an adaptive forest management.

CONCLUSION

Criteria and indicators (C&I) are a part of the community forest (CF) management that encourage and reinforce sustainability. Sustainable CF management should be formulated based on the C&I that are relevant to the goal of a CF. In the context of Northeastern Thailand, the study identified 4 principles, 13 criteria, and 36 indicators as the appropriate set of C&I to assess the sustainability and performance of the management of CF. The designed set of C&I was tested at the Sanamchai CF and the results indicated a mixed performance regarding the management.

It is suggested that the application of C&I has a considerable potential to improve the forest policy and management, at the same time guiding the improvement of CF management at the local level in the study area. Finally, it is important to ensure an ongoing, constructive dialogue between the involved stakeholders to make progress in the complex process of indicator development, testing, and application.

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