

Community forest: a local attempt in natural resource management, economic value of ecosystem services, and contribution to local livelihoods

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Abstract

This survey-based research investigates current forest management at Khoa noi-Napang Community Forest, the 2004 Khon Kaen Province's best community forest. The study also analyzes forest structure and estimates economic value of non-timber forest product (NTFP) collection. Currently, harvesting of trees is prohibited, while NTFP collection remains open access. Eighty species (35 families) of trees were identified of which the three most important species are *Shorea obtusa* Wall. ex. Blume, *Dipterocarpus tuberculatus* Roxb. and *Memecylon scutellatum* Naudin (importance value index = 41.18%, 38.84% and 23.39% respectively). Twenty four NTFPs, classified into seven groups were reported being harvested by villagers. Net economic value of direct benefits derived from NTFPs is approximately US\$26,462 or US\$141 per household in 2007, accounted for 23.64% of an average annual household income. This value represents approximately US\$47 per Rai, while an average net benefit from rice growing is roughly US\$ 12-21 per Rai. Finally, the forest is observed by villagers that its conditions are much improved within 25 years of management. This reveals that local community can play a key role in natural resource management, which in return helps support local livelihoods.

Keywords: community forest, economic valuation, forest structure, Khon Kaen

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Introduction

Community forest management (CFM) constitutes a form of self-governance in which users of the forest are involved in making and adapting rules for collective-choices regarding inclusion or exclusion of participants, appropriation approach, responsibility of participants, monitoring and sanctioning, and conflict solution (Ostrom, 1999). Enforcement of rules ensures user rights and benefits and prevents outsiders or non-contributing members from benefiting from the groups' collective activities. Furthermore, CFM focuses on improving local livelihoods and treating community as a driving force of management decisions, therefore represents an alternative for forest sustainability (Klooster and Masera, 2000; Little, 1996; Long, and Zhou, 2001).

This study aims to explore current forest management at Khoa noi-Napang Community Forest (KNNPCF), analyze forest structure, and estimate economic value of the forest as a source for NTFP collection. KNNPCF was awarded the Khon Kaen Province's best community forest in 2004. The forest covers an area of 545Rais (1ha = 6.25Rais) of dry Dipterocarp. It locates adjacent to Phu Waing National Park, one of the provincial watershed forests, and is surrounded by agricultural areas e.g., rice paddies and sugarcane plantations (Figure 1).

Methods

The survey took place in June-August, 2007 at KNNPCM. Twenty quadrats (40x40m²) were used for forest structure analysis. Trees with height taller than 4m and circumferences at breast height greater than 10cm were identified. Quantitative measurements of the forest structure, including density, frequency, dominance, and importance value index were calculated (Cox, 2002).

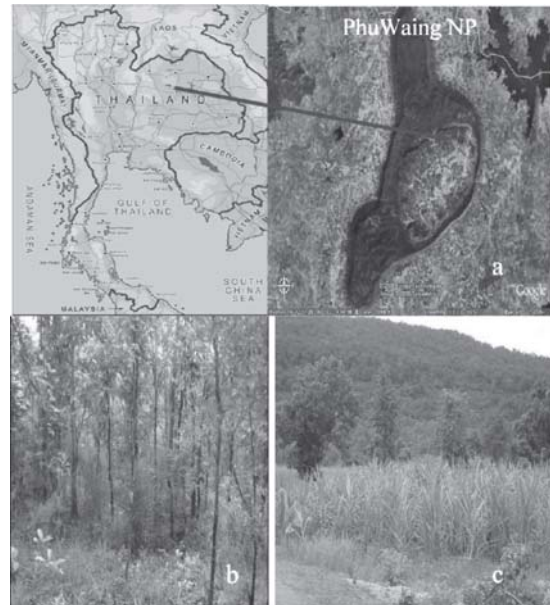


Figure 1. KNNPCF: a. location, b. forest condition, c. adjacent forest and farmland

Personal interviews of a Tambon¹ leader and KNNPCF management team representatives were used to collect data on forest management. Economic valuation focuses on direct-use value derived from NTFP collection. With a total number of 250 households from Khoanoi and Napang Village-the two villages responsible for KNNPCF management, 154 households were sampled². Semi-structured questionnaires were used to gather data on types and amounts of harvested NTFPs, market prices and harvesting costs. A net economic value of the resources was calculated from gross direct benefits (Eq. 1), subtracted by direct costs, including harvesting tools, equipment and traveling and labor costs (Eq. 2).

¹Tambon is an administrative level equivalent to a sub-district.

²The sample size was indicated using the Yamane's formula [6] with a 5% precision level where confidence level is 95%.

$$\text{Gross benefit} = \sum_{i=1} (q_{ij} \cdot p_i) \quad \text{Eq. 1}$$

Where q = quantity of products, p = market prices, i = product item and j = households reported of harvesting products.

$$\text{Net benefit} = \sum_{j=1} [\sum_{i=1} (q_{ij} \cdot p_i) - C_j] \quad \text{Eq. 2}$$

Where C = harvesting costs, including tools, equipment, traveling and labor costs.

Results

Background and management

KNNPCF represents a local attempt for 25 years of managing the forest resources. Historically, the forest was occupied and used for logging concession and agricultural purposes. In particular, several areas of Dry Dipterocarp Forest were cleared for kenaf (*Hibiscus cannabinus* Linn) and cassava (*Manihot esculenta* Crantz) cultivation. When the regional prices of kenaf and cassava dramatically declined in the early 1970s, villagers made the decision to stop their cash crop cultivation. Due to relatively low human pressure on the resources in the area, remaining stumps of trees were given time to regenerate and begin producing healthy shoots.

In 1973, Khoa noi and Napang villages in cooperation with the Royal Forest Department (RFD) initiated a forest conservation program, including establishment of a forest protection group, development of rules and regulations, and demonstration of grazing sites in clear-cutting zones. Later the demonstration grazing sites were abandoned (1982), and then a community forest was begun. Although KNNPCF falls under a national reserve forest tenure and

management jurisdiction of the RFD, villagers were allowed to maintain and use the forest resources as a common property for subsistence. In addition to rules and regulations, a formal group of forest patrols and plantations were established in attempts to improve forest conditions.

In 1995, KNNPCF was approved by the RFD for its management practice. As the community forest management continues and becomes well recognized due to its success, KNNPCF received a “Tong Pitak Pha Peu Raksa Cheewit” or “Save the Forest to Save Lives” from Her Majesty Queen Sirikit, which is one of the most prestigious awards for community-based resource management in the country, in 1997. Subsequently, in 2004 KNNPCF was awarded the Khon Kaen Province’s best community forest.

From community conflicts caused by resource overexploitation to a grass-roots initiative, the forest is now recovering and helps support local livelihoods. KNNPCF provides goods and services, including NTFPs, fresh water, nutrient cycling and local climate regulation. From the interviews, since the forest has been protected, a water level at a local pond in the forest increased. Available water was used to produce community’s running water (Figure 2). In addition, the forest provides grazing areas along the forest edge and great amounts of NTFPs where villagers can harvest for household consumption and sale. Currently, harvesting of all trees is prohibited, while NTFPs are open to all users. Fire prevention and tree plantation are the main projects implemented to improve forest conditions.



Figure 2. The forest provides fresh water: a. Nong Hee—a pond located inside the forest area and b. community's water tank.

Forest structure

The major vegetation at KNNPCF is dry Dipterocarp forest. The forest is a secondary growth, recovering from clear cut for timber production and agricultural activities. After 25 years of management, villagers expressed that the forest becomes denser and trees get bigger. For example, circumferences of some dominant species i.e. *Shorea obtusa* Wall. ex. Blume and *Dipterocarpus tuberculatus* Roxb. increased from about 20–30 cm and 40–60 cm to 30–50 cm and 60–80 cm, respectively.

Three forest strata were identified with the top canopy of approximately 15–20 m height (Figure 3). Eighty species (35 families) of trees were identified. The three most important species include *Shorea obtusa* Wall. ex. Blume, *Dipterocarpus tuberculatus* Roxb. and *Memecylon scutellatum* Naudin (importance value index = 41.18%, 38.84% and 23.39% respectively).

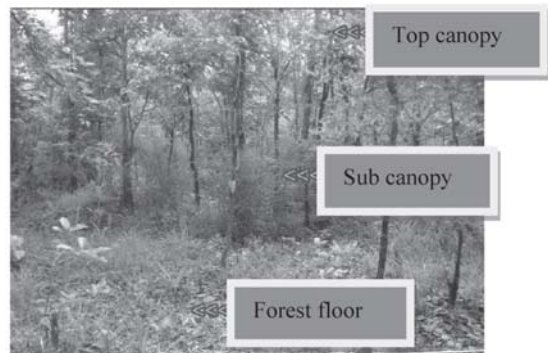


Figure 3. Forest strata—top canopy, sub canopy e.g., shrub and saplings and forest floor

Collection and economic value of NTFPs

Survey data indicates that subsistence use of NTFPs generally remains large and important. Approximately 75% of the respondents reported that they harvested NTFPs in the community forest. Villagers described that forest products were available all year but the highest productivity was in the rainy season. Generally, harvested NTFPs were used for household consumption, while some excessive products were sold in local markets. Only a certain group of villagers intentionally harvest NTFPs for a market sale purpose alone. From the survey, a household earned approximately US\$21 from selling NTFPs annually.

A variety of NTFPs is reported being gathered by villagers. These can be classified into seven groups—mushrooms, vegetables, insects and animals, ant's eggs, honey, fuelwood, and medicinal plants from the total of 24 NTFPs. Mushrooms account for the largest proportion of all harvested products (Figure 4). Gross economic value of direct benefits derived from NTFPs was estimated US\$ 27,260 in

2007. Harvesting costs, representing the sum of tools and equipment, traveling and labor costs is equivalent to US\$798. As a result, the net economic value is US\$26,462 or US\$141 per household.



Figure 4. A variety of mushrooms, which is considered the largest proportion of all NTFPs collected by villagers

Discussion and Conclusions

KNNPCF represent one of the forest management best practices in Khon Kaen. In particular, it illustrates of how local community can play a key role in natural resource management outside protected areas. In return, the forest provides great amounts of goods and services that support community livelihoods. According to the study, the net economic value from NTFP collection is accounted for about 24% of the annual household income, including both direct cash and non-cash benefits. Moreover, the net economic value was estimated approximately US\$47 per Rai, while an average net benefit from rice growing is

roughly US\$12–21 per Rai. These illustrate how important the forest is to local communities, especially as an alternative source of family income and diet supplements.

The case study of KNNPCF can be a lesson learned for effective management to other CFs. Management practices were implemented according to community know-how and forest management guidelines from the Royal Forest Department. For example, fire breaks were built to prevent wildfires. Trees were planted to enrich forest conditions. Moreover, a local forest protection group was established to patrol the forest, especially for illegal logging and forest fires. This fire suppression implementation is necessary for an early stage of forest recovery. It reduces disturbance to the forest so that allows saplings and young trees to grow. In addition, although there is no prescribed burning and thinning, NTFP collection, including fuelwood and mushrooms, helps reduce fuel load that can cause a major forest fire.

These management activities at KNNPCF illustrate a community investment in terms of local participation and contribution to protect their dependent resources. Returns from the investment, including great amounts of NTFPs and ecosystem services, can be observed now and will last long for future generations. In conclusion, healthy forests will provide ecosystem services such as water purification, nutrient cycling and C-sequestration that enable to better diffuse pollutants. Thus, to a certain extent sustainable forest will enhance and is so necessary for effective diffuse pollution management.

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