

Forest resources and people's basic needs in northwestern Myanmar: Case study in Kathar District, Sagaing Region

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Abstract: How to meet people's basic needs while sustaining forest resources is one of the critical challenges in northwestern Myanmar. This study examined forest resources and socio-economic current conditions in Kathar District, Myanmar where community-based forest management (CBFM) program has been implemented to regain environmental stability and address basic needs of the local community. The household interview, focus group discussion with the semi-structure interview and home visits were carried out to collect the data about socio-economic status of local livelihood and utilization of forest resources. The rapid inventory by split-plot design was administered with participatory action research approach. In study areas, we found that fuel-wood extraction, collection of fruits and vegetables and bush-meat gathering are the major activities. The local people are aware of decreasing trend of forest resources because of extraction timber, gold mining, fuel-wood collection, shifting cultivation, plantation establishment and forest fire. The utilization pattern of forest resources is different depending on local condition and knowledge, even under a similar local setting. This study found that the relationship between forest resources and people mainly relied on local knowledge of the utilization of forest resources. These findings will be useful to promote more effective implementation of CBFM at local level.

Key words: *forest resources, local people, socio-economic condition, livelihood improvement, Myanmar*

1. INTRODUCTION

The importance of forests and of nonindustrial forest products to the quality of life and survival of rural people has been increasingly recognized, and also rural people in tropical developing countries now seems indisputable¹⁾. The forest which provides various materials for subsistence or commercial value is the basis for livelihood systems, including hunting and gathering, rotational agricultural systems. The forest thus constitutes an integral part of the habitat and of the social and cultural framework of those living within it²⁾, and shows the importance role for rural peoples' livelihoods. Forest resources and products as a part of ecosystem services have been studied by a number of researchers with providing valuable analyses as to the benefits they can generate for local people's livelihoods³⁾. And the value of ecosystem services was often calculated through markets⁴⁾, but the limited studies reported the non-market aspects of ecosystem services until the late 1960s⁵⁾. Most ecosystem frameworks illustrate that the environment provides a range of ecosystem services which provide us various

benefits^{6), 7)}. In this context, the role of natural capital can be defined as underpinning ecosystem services delivery^{7), 8)}. The link between forest resources and the local people's livelihoods can be assessed by identifying the role of ecosystem services for local people under recent economic, cultural and social changes. Understanding the relationships is crucial for institutions and government to adapt to changing patterns management of forest resources for both forest dependent peoples and environmental conservation sustainability⁹⁾.

Myanmar is one of the most natural resource-rich countries in Southeast Asia, and is still endowed with forest areas covering 45% of the country's total land area¹⁰⁾. The covering forest areas are natural forests and 70 % rural people are depending on forest resources. This study focused on investigating the local conditions between the forest resources and the utilization of forest resources by the local people in northwestern Myanmar where is one of the highest rural population areas, and highly dependent on agricultural production activities and forest resources for their survival and income. The farming are mostly shifting cultivation and rain-

fed cultivating, as well as most households generate an income by collecting forest products but that are mostly for own consumption from the natural forest near the villages, which is recognized as one of the richest forest resource areas in Katha District, Myanmar.

2. MATERIALS AND METHOD

(1) Study area

The study areas are located in Banmauk (BM), Wuntho (WT), Kawlin (KL) and Pinlebu (PLB) Townships, Katha District, Sagaing Region of northwestern Myanmar (**Fig.1 and Table 1**). The study areas encompass between 200 and 400 m above sea level with humid weather (83.4 %) and high average annual rainfall of > 4000 mm during June – September and around maximum temperature is 38.6° C and minimum with 8.5° C⁽¹¹⁾. The study areas are mostly moist upper mixed deciduous (MUMD) natural forest types⁽¹²⁾ and covered by the natural forest of around 76 % of total district land area that are under the management of forest department. Shan, Kadu, Kanan and Burma ethnic groups are living in the study areas with rain-fed cultivation of local main economy. Above 89% of total population of study areas is rural population, and mostly depended on forest resources for their daily basic needs such as food, fodder, fuel and shelter, and their livelihoods especially for shifting cultivation in the forested area to get fertile soil which is one of the major drivers of deforestation. In order to control shifting cultivation in forested areas including the study area – Katha District, forest department with the collaboration of line departments has been implementing agroforestry, community forestry (CF) practices and other sustainable land-use

practices in shifting cultivation areas through pursuing and encouraging shifting cultivators with the aspects of protection of traditional and customary practices on land-use and cultural⁽¹³⁾. While implementing these practices, forest department is facing the challenges of people's participation. The connectivity between local people and forest should be explicitly indicated to promote awareness for further people's participation.

The study area – Katha District is one of the target places of forest department to implement the high land agriculture practices to eliminate shifting cultivation. Accessibility to study areas is more difficult in rainy season (June-September) and study villages located between 11 km and 72 km away from the nearest towns and about 0.5 to 6 km away to the neighboring forest from the human habitation.

(2) Field data collection

Study data were collected in November 2015 and April 2016. Quantitative and qualitative techniques were conducted as field based data collection. The study implemented the focus group discussion (FGD) with village head and the elder person, the household interview to collect the information about socio economic status of local livelihood and their utilization of forest resources. The sample households were randomly collected by the 10% sampling ratio at each study village (**Table 1**). Household survey questionnaires mainly comprised of household demographic information, physical conditions such as building/ house type and utilized materials, crop land and livestock ownership, income sources, the forest resources that local people harvest and utilize for their daily basic needs and the local people's perspectives on benefits of forest (ecosystem services) and forest conditions. The plant diversity status in the forests was also investigated by the rapid inventory by split-plot design with random sample plots which were circle in shape, and sample plot size was 0.03 ha.

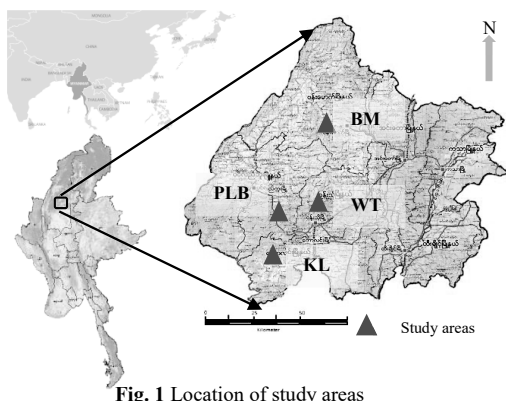


Fig. 1 Location of study areas

Table 1 Geographic location and estimated households of study community townships

Study community townships	Location	Estimated HH*	Sample HH
Banmauk (BM)	24° 24' N, 95° 50' E	534	65
Wuntho (WT)	23° 54' N, 95° 40' E	284	38
Kawlin (KL)	23° 46' N, 95° 41' E	559	60
Pinlebu (PLB)	24° 52' N, 95° 22' E	495	53

*HH = households

Total inventory sample size for one community (place) was about 1.0 ha. All stands in the sample plots were measured in height which was measured by Suunto clinometer and diameter at breast height (DBH) which was measured with a diameter tape, and local species names were also recorded. For both forest inventory and socio-economic survey were conducted by the participatory action research (PAR) approach.

3. RESULTS

(1) Local people reliance on forest resources

In all study areas, we found that local people used one or more food items from forest, and they cooked their foods by using wood fuels. They also collected traditional medicines from plant and animal products, and use wood and fibers for construction. They generated some of their income from forest products such as honey and orchids.

a) Utilization of timber for building and fuel-wood

In all study areas, the 93% of the buildings (house) were found as a wooden type (*Floor* (bamboo, wood), *Wall* (bamboo, wood), *Roof* (thatch, zinc)) and 7% are masonry type (*Floor* (wood, brick), *Wall* (brick), *Roof* (zinc)) (Fig.2). We found the local people utilized forest resources for building materials from their surrounding forest, and they preferred 2 species (*Tectona grandis* Linn.f and *Dipterocarpus tuberculatus* Roxb.) among 12 species that were mostly used for buildings. And the local people mostly used 11 species for fuel-wood but they also preferred 2 species (*Quercus glauca* Thunb. and *Terminalia crenulata* (Heyne) Roth) and the agricultural residues were rarely found for uses of fuel-wood in the study areas. Annual average fuel-wood consumption of household was found between 3.4 and 4.0 ton (1 ton = 50 ft³) based on the household members.

b) Utilization of non-timber forest products

The reliance on non-timber forest products (NTFPs) was found generally 23%, 22%, 17% and 12% of total household of PLB, KL, BM and WT, respectively. Their regular basis uses of NTFPs included vegetables, fruits, mushroom, bamboo-shoot, honey, orchids, bush meat, and medicinal plants, and bamboo, thatch (Table 2). Mostly the local people used the NTFPs more for own consumption than household cash income.

Honey and orchids were main cash income source among the NTFPs.

(2) Forest plant diversity

The forests surrounding the study areas were natural forests with dominance by deciduous species, and of reserved forests and un-class forests types. In this study, the distribution of diameter at breast height (DBH) classes conformed to a reverse “J” shape curve, with 53.88% in BM, 82.13% in WT, 72.05% in KL and 95.27% in PLB of individual trees between 1.0 – 10.0 cm DBH of the total trees found in inventory data, while the trees laying in larger diameter classes were few (Fig.3). The present of larger number of tree in small diameter class (< 10cm) indicated that the study area was in the level of succession, it could be sustaining itself. Otherwise, it may be due to the recurrent human disturbance. Based on that, the forest is found as a secondary forest type.

The diversity indices were better measures of the species diversity of forest than the species density and mixture ratio and more informative than species counts alone¹⁴. Table 3 described the plant species diversity indices as Shannon-Weiner diversity index, Simpson's diversity index and Hill's diversity index of the study areas. Species richness was observed total of 63, 54, 67 and 86 in BM, WT, KL and PLB's forests, respectively. We found that the dominance of 4 species that contributed 10 % of total stand density in KL's forests, and that of 5 species was 26 % in PLB's forest, 47% in BM's forest and 45 % in WT's forest; here dominance species was based on IVI value (> 10). So these species occupied the top niche and the remaining species shared the intermediate and lower niches more or less equally. The Shannon diversity indices observed in the present study were 0.73 in KL, 0.79 in PLB, 1.40 in BM and 1.47 in WT's forests. Based on Shannon indices, the plant diversity in all study areas was relatively low that showed the forest community had an equivalent diversity with few common species. This contributed the human impacts activities such as fuel-wood collection, tree felling for timber which accounts for the reduced plant diversity.

(3) People perspectives on forest

People perceived multiple benefits from the forest that were shown as provisioning, regulating and cultural ecosystem services in Fig.4. While PLB community showed the highest provisioning

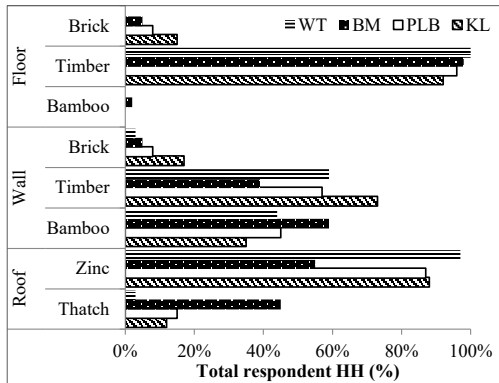


Fig. 2 Building materials at the study areas

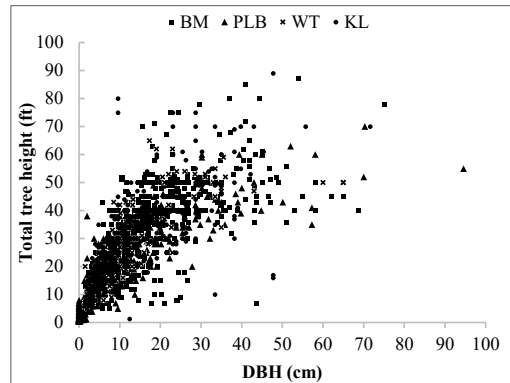


Fig. 3 Trees distribution in the forests of study areas

Table 2 The respondent household percent (%) who collected NTFPs from the forests near their villages of study areas

NTFPs	KL (N=61)	PLB (N=54)	BM (N=44)	WT (N=34)
Orchid	15	15	11	6
Honey	22	13	25	9
Vegetables	20	49	23	25
Medicinal plants	35	25	30	31
Bush meat	5	25	52	50
Thatch	47	34	32	
Mushroom	58	81	43	47
Bamboo shoots	62	89	59	47
Bamboo	68	81	75	88

Table 3 Plant species diversity indices of the forests near the study areas

Diversity indices	BM forest	WT forest	KL forest	PLB forest
Species richness (S)	63	54	67	86
Simpson's diversity index (D)	0.94	0.95	0.90	0.95
Shannon-Weiner's diversity index (H)	1.40	1.47	1.34	1.53
Species evenness	0.75	0.85	0.73	0.79
Hill's diversity index				
N0 (species richness)	63	54	67	86
N1	4.06	4.35	3.82	4.62
N2	1.06	1.05	1.11	1.05

and regulating services, BM community got the highest cultural services among the study areas. Based on the local people perspectives on the ecosystem services, the provisioning services are the most importance for their livelihood, then cultural and regulating services followed. Local people noticed that the forest's condition where their surrounding forests, was decreasing that impacted on their daily basic needs. They pointed out the causes of forest decrease as shifting cultivation, fuel-wood collection, establishment of forest plantations, gold mining and illegal timber harvesting. And we found local people have some affirmative view on changing of forest's condition (decreasing forest's condition) as 27%, 26%, 10% and 3% of total HH in BM, KL, PLB and WT, respectively.

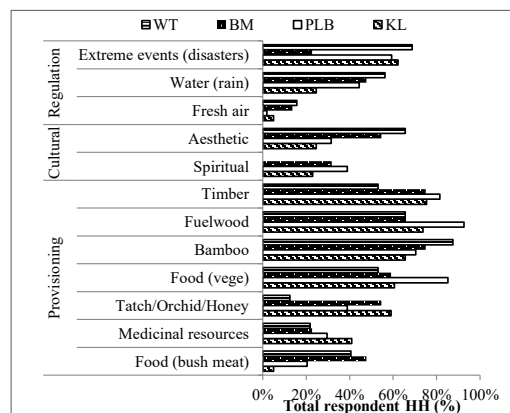


Fig. 4 People perspectives on forest benefits from the forests of study areas

4. DISCUSSION

In all study areas, although their household income sources were agriculture, forest resources, daily wages, they mainly depended on forest resources for their own consumption. Fuel-wood and timber extraction, collection of edible fruits during fruiting seasons, vegetables and bush-meat gathering were the main activities in their surrounding forests where is located average 3 km away from the village. And they demarcated their own forest boundary by discussing with neighbor villages and usually collected forest products within their forest boundary – it made them no issue relating to forest ownership between the villages. Although local people in the study areas, showed shifting cultivation was one of the surrounding forests' declining courses, shifting cultivation was being increased year by year because of encroachment or/ and increasing population pressure which were likely to lead to shortened fallow periods, declining productivity then leading to progressive degradation of remaining forests. Shifting cultivation in the study areas seldom provided a basis for livelihood improvement and they were often difficult to sustain, even at the present level. Shifting cultivation may be able to increase market opportunities by transforming to other cultivation systems such as agroforest systems that provide more productive use of forest area¹⁵).

Natural capital in the forest area consisted of mainly secondary forests with relatively low species diversity. These forests were established after deforestation and abandonment before the current generations were born. In BM areas, fallow or secondary forests that had been abandoned after shifting cultivation were converted to pasture for livestock. According to the interviewees, the residents spend about 2 years and more to convert forests to pasture, which was one of the main causes of deforestation. Although rural local people conserved forest tree species, the local demand of forest resources has exceeded the capacity of forest resources as natural capital.

Some conflicts were noticed such as between local people and wild elephants especially for the crop cultivations, and also outsiders who are working on (private) gold mining company, fuel-wood extraction, come from nearest towns, and illegal timber harvestings even though the forests are under the forest department's management. Even if a government tries to take action related to natural resource conservation, successful outcomes are difficult to achieve because most

territories consist customary uses designated by local people. Thus rural development initiatives aimed at improving the quality of people's live play importance role in the conservation of biodiversity.

Most areas selected for this study are relatively remote, i.e. road and/ or railroads reached later than other parts of the regions. We therefore faced a classical less developed periphery situation. Our data contained a certain gender bias, and limited answers by the interviewees with some influences of translators. We noticed that local people in all the study areas have their own perspectives on the forest resources that they depend on for their daily basic needs, but less awareness on ecosystem services as the benefits of forests.

5. CONCLUSION

Forests and forest resources are the sources of a variety of foods that supplements and complement what is obtained from agriculture, of fuel to cook food, and of a wide range of medicines and other products that contribute to health and hygiene. The local people appreciate various benefits from surrounding forests. The utilizations of forest resources are different even though there is a similar local condition. One of the main factor of the connectivity between forest resources and people is their knowledge on the utilization of forest resources. Most forest resources/ ecosystems worldwide have been influenced by human activities. The effect of anthropogenic disturbances has to be taken into account to understand the present ecosystem dynamic and to make the sustainable management of forest ecosystem in the future.

In this study, we found that timber extraction and gold mining, fuel-wood collection, shifting cultivation are main causes of forest resources reduction. To establish more useful ways of assessing the significance of people's uses of, and reliance on, the outputs of forests and trees, a number of other fundamental factors need to be taken into account. Based on the study findings, one of the important challenges will be how to manage forests both for economic growth and a safety net by conceptualizing socio-ecological systems. These findings will be useful to promote more effective implementation of CBFM at local level – by matching institutional arrangements with studying more about changing patterns of demand, use and supply in specific areas.

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