Ethnicity as a Factor Influencing Sustainable Forest Resource Management: A Case Study of a Village in Taunggyi District in Myanmar’s Shan State

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Abstract. We investigated the impact of ethnicity on the adaptability of forest resource management in Myanmar. Within Myanmar’s ethnically diverse population, extensive economically motivated internal migration has led to the forming new villages comprising people of different ethnicities. Conditions and problems encountered in these newly formed villages may differ from those in ancestral villages where customary rights prevail. We assessed the livelihood systems and cooperative behaviours of different ethnic groups within a study village. Our findings were as follows: 1) households’ ethnicities influenced their levels of dependence on different livelihood sources, namely Non-timber forest products (NTFPs) and field crops, and 2) cooperation among the villagers of different ethnicity was weak. To achieve successful and sustainable natural resource management in such region, the characteristics of different ethnic groups should be taken into account in community forest management plan.

1. Introduction

Myanmar faces an urgent challenge of halting forest degradation and deforestation while developing rural livelihoods. Rural inhabitants in Myanmar account for approximately 71% of the country’s total population [1]. Around 42% of these inhabitants live in mountainous areas [2], with the majority of highland populations comprising ethnic minorities [3]. Rural communities depend heavily on forest resources for their subsistence [4-7] and especially on non-timber forest products (NTFPs) [8], which are a key source of subsistence and income generation for ethnic groups located in remote areas [8]. Myanmar’s deforestation rate is currently ranked as the seventh highest rate globally and the second highest rate within Asia [9]. Rural inhabitants who migrate to other rural areas in search of better livelihood opportunities account for approximately 6% of the country’s total population, constituting the second largest internal migratory flow according to the 2014 census data [10, 11].

Recognizing the importance of community involvement in forest management and the need to strengthen local livelihoods, the government of Myanmar released Community Forestry Instructions (CFI) in 1995. However, because community forestry (CF) emphasized local communities’ subsistence rather than their livelihood development, it did not result in enhanced local livelihoods [12, 13]. Moreover, it did not immediately reduce the pace of deforestation within Myanmar, although local-level forest conditions and ecosystem services have improved to some extent [13]. Consequently, the
amended CFI, issued in 2016, sought to strengthen community participation and authorize CF members to establish CF enterprises for livelihood development [12, 14].

The effective implementation and positive impacts of CF on forest management and livelihoods are not yet discernible. Moreover, previous studies of community-based forest management in Myanmar have highlighted the importance of considering diverse and varying conditions and characteristics of local communities and their members that range from income disparities or opportunities, land tenure, and forest use to individuals’ perceptions or awareness of local ecosystems and deforestation, and their willingness to participate in forest management [4, 6, 7, 15]. These studies draw attention to the importance of considering all of the characteristics of communities when implementing CF or any other collaborative intervention. Given that most ethnic minorities reside in rural areas and the large numbers of people who migrate from one rural area to another, a study that examines the interplay between ethnicity and collaborative community initiatives is pertinent. Thus, the aim of this study was to assess the behaviours of local people, especially ethnic groups and migrants, relating to the use of forest resources and their attitudes towards community participation in forest resource management and livelihood development in rural Myanmar. Specifically, we sought to identify potential factors contributing to successful CF that have not been fully explored.

2. Study Site
The study was conducted in the village of Taung kya, which falls within Pinlaung Township in Taunggyi District in the Shan state of Myanmar (Figure 1). The village is located in a reserved forest, which is at a distance of approximately 60 km from Nay Pyi Taw, Myanmar’s capital (about a two-hour drive by car).

![Figure 1. A map showing the location of Taung kya.](image)

In the 1970s, 18 households domestically migrated to and settled in this area. The settlers then invited their relatives to join them, resulting in the expansion of the residential area and the conversion of the surrounding forests into agricultural land. Gradually, social infrastructure, such as a school, a health clinic, a temple, and water supply were constructed. A road connecting Nay Pyi Taw to Pinlaung that
passes through Taung kya was paved in 2001. By this time, over 70 households have settled in the village and population continuously increased thereafter.

Land tenure and related laws and regulations were a major concern for the villagers because they had settled into the Forest Department-managed reserved forest. In 2004, a group of 12 villagers applied for permission to establish a CF for conserving forest and was granted permission to manage forest resources in 2005. Another group of 191 villagers applied to establish a CF in 2014 to secure land use rights for pursuing their livelihoods and was granted permission to do so in 2017.

Taung kya village comprises two sub-villages at different elevations, with the upper village located 500 m above the lower village. The upper village lacks paddy fields, and a gently sloping tract of land in the lower part of the village is used for paddy cultivation (single-crop rice), while the surrounding land is used for orchard plantations and for cultivating dry field crops like turmeric and ginger. Cattle and water buffaloes are scarce in the village, and NTFPs are collected from the entire village area and surrounding forests. Secondary forest areas formed from fallow lands are located approximately 4–9 km away from the main road. The sites from which NTFPs are collected are no further than 15 km from the village and are accessed by foot or motorcycle by the locals, who make day trips to the sites, sometimes camping there for several days.

As of February 2020, there were around 300 households in the upper and lower villages of Taung kya. The households belong to various ethnic groups, among which the Karen constitute two-thirds of the total village population, followed by the Burmese, with a few households belonging to the Pa’O and Chin ethnic groups. In the upper village, which was settled earlier than the lower one, the majority of the households are Karen (75%), whereas both Karen and Burmese households are prevalent in the lower village. Table 1 shows the numbers of households belonging to each ethnic group in the upper and lower villages elicited through an interview with the village head.

|                  | Karen | Burmese | Pa’O | Others (e.g. Chin) |
|------------------|-------|---------|------|-------------------|
| Upper village    | 150   | 50      | 0    | 5                 |
| Lower village    | 50    | 40      | 5    | 5                 |

3. Methodology

3.1. Land Cover Dynamics from 2008 to 2018

Changes in the forest cover around Taung kya were evaluated using Landsat Thematic Mapper (TM) data and Landsat 8 Operational Land Imager (OLI) satellite images taken over a 10-year period during the dry seasons in 2008, 2013, and 2018. The forest cover classification was done with object-based analysis in ESRI ArcGIS using Support Vector Machine (SVM) classifier. In natural colour displaying of the satellite imageries, forest areas appeared in dark green colour, roads and settlements appeared bright colour while cultivation lands were light green colour. Based on these spectral differences in the satellite imageries, dark green areas were assigned as forest cover and those areas in bright and light green colours were assigned as non-forest areas. The images were analysed and categorized into forest and non-forest areas that were further analysed according to their distance from roads.

3.2. Socio-Economic Survey and Data Analysis

We conducted a survey to gather general information about living conditions in the village along with detailed household-level socio-economic data in January and February of 2020. We conducted semi-structured interviews using a modified version of the methodology employed by a previous study [16] as well as key informant interviews and focus group discussions (FGDs).

Key informant interviews were conducted to obtain village-level administrative information and an overview of village conditions and to identify NTFPs-related challenges. FGDs were held with different
village stakeholders (four FGDs were organized attended by total of 22 attendees) to determine the characteristics of human and NTFP resources within the village.

In light of the detailed information compiled on topics such as Taung kya’s governance structure, the population’s ethnic composition, and the extent of NTFP use in the village, we stratified all of the households in the village based on their locations (upper or lower village), ethnicity, and poverty level. To analyse issues relating to NTFPs, we conducted stratified sampling, which enabled us to identify households to be surveyed.

The household survey was conducted to assess socio-economic conditions in the village. To avoid any bias in the data, we followed the recommendations [17] and randomly selected more than 30% of all of the households (109 out of 300) to participate in the survey. Household-level questionnaires, which were administered through a face-to-face survey, contained 26 questions divided into four broad categories. These categories were basic information (e.g., family structure, ethnicity, and residential history), household assets and budget (e.g., household income and work calendar), NTFP-related information (e.g., level of dependence on NTFPs, collecting conditions, and collecting and sales systems), and the households’ livelihood maintenance capacities (e.g., knowledge exchanges, collaboration, and decision making). Most of the responses were recorded using a five-point Likert scale. During the survey, additional qualitative information was also collected through semi-structured interviews.

We performed IBM SPSS Statistics Ver. 25 and conducted statistical analyses of the collected data according to ethnicity and sub-village to determine the relationship between NTFP dependence and livelihood systems. Moreover, we conducted canonical discriminant analysis (CDA) to elucidate differences in the livelihood systems of the ethnic groups, considered as an indicator for assessing the relationship between natural resource use and social systems. These results were then compiled and assessed to yield insights that could inform the planning and development of CF as a form of cooperative resource management and to propose potential initiatives in this direction.

4. Results and Discussion

4.1. Overview of the Study Site and Changes in Forest Cover

Our analysis of satellite images, combined with semi-structured interviews, revealed a decline in shifting cultivation (Taungya) in the village that has been replaced by non-shifting cultivation in plots located along the main road (Figure 2). This change in the use of land and natural resources is associated with decreased dependency on Taungya within rural communities and their increased reliance on NTFPs, even those collected from distant areas. Thus, commencing during 2008 to 2012, the level of households’ dependence on NTFPs increased.

![Figure 2](Figure 2. Changes in forested and non-forested areas according to their distances from roads over time (in 2008, 2013 and 2018).)
4.2. Level of Dependence on NTFPs by Ethnicity

Face-to-face semi-structured interviews and FGDs conducted in Taung kya revealed that rural inhabitants collected four main NTFPs to generate incomes: 1) bamboo shoots (July–October), 2) konjac (September–October), 3) turmeric (May–June), and 4) bamboo (year-round). Bamboo species with edible shoots are distributed throughout Myanmar, and the shoots are commonly consumed in the country. Bamboo is also widely used in construction, and most of the bamboo produced in Taung kya is shipped to destinations within Myanmar. By contrast, nearly all of the konjac produced in this region in Myanmar is exported to China, and a significant proportion of the turmeric produced in the country is also exported. Broom grass, which is collected in January and February, is another important NTFP that grows along the edges of forests or in regenerated vegetation after Taungya. We found that the villagers’ dependence on NTFPs varied significantly according to their ethnicity. Whereas Karen households earned approximately 480,000 kyat/year from NTFPs in average, Burmese households earned almost double this amount at approximately 956,000 kyat/year in average. Areas of land owned, the distance of houses from farmland, and degrees of households’ involvement in cooperative activities also varied according to households’ ethnicity (Table 2).

Table 2. Land ownership, NTFP-derived household incomes, and inclinations towards cooperation among different ethnic groups in Taung kya.

| Item (explanatory variables) | Karen households $(n = 47)$ | Burmese households $(n = 55)$ | Other ethnic groups $(n = 7)$ |
|------------------------------|-----------------------------|-------------------------------|-----------------------------|
| Land ownership (Acres with SD) | 7.3 (5.0) | 5.2 (4.2) | 2.8 (2.4) |
| Distance to farmland owned (Miles with SD) | 1.2 (1.8) | 0.7 (0.8) | 0.4 (0.4) |
| Satisfaction with household income (5-point Likert scale) | 2.4 | 3.0 | 1.9 |
| Amount of knowledge to gain income (5-point Likert scale) | 2.1 | 2.7 | 2.3 |
| Understanding of the importance of cooperation (5-point Likert scale) | 2.3 | 2.0 | 3.6 |
| Frequency of participation in cooperative work (5-point Likert scale) | 2.6 | 1.7 | 1.7 |
| Frequency of sharing NTFP-related knowledge (5-point Likert scale) | 3.5 | 2.9 | 2.6 |
| Years since arrival in village (3-point Likert scale) | 1.4 | 2.0 | 2.0 |

SD: Standard Deviation

We conducted CDA in relation to three ethnic groups: Karen, Burmese, and others using the explanatory variables shown in Table 2. The results, shown in Tables 3 and 4, indicated that the overall rate of accurate classification was high (72.5%). The characteristics of land use (level of dependence on natural resources) and livelihood systems varied significantly among the three ethnic groups. Village-wide rules regulating NTFP access rights and knowledge sharing appeared to be necessary for strengthening cooperative NTFP management.
Table 3. Explanatory variables and standardized canonical discriminant function coefficients for the three ethnic groups in Taung kya.

| Explanatory variable                                      | Standardized canonical function coefficients Function 1 | Function 2 |
|-----------------------------------------------------------|--------------------------------------------------------|------------|
| Years since arrival in village (3-point Likert scale)     | -0.836                                                 | -0.071     |
| Land ownership (Acres)                                    | 0.323                                                  | 0.390      |
| Distance to farmland owned (Miles)                        | 0.419                                                  | 0.033      |
| Satisfaction with household income (5-point Likert scale) | -0.035                                                 | 0.622      |
| Amount of knowledge to gain income (5-point Likert scale) | -0.437                                                 | 0.231      |
| Frequency of participation in cooperative work (5-point   | 0.284                                                  | -0.082     |
| Likert scale)                                             |                                                        |            |
| Understanding of the importance of cooperation (5-point   | -0.065                                                 | -0.631     |
| Likert scale)                                             |                                                        |            |
| Frequency of sharing NTFP-related knowledge (5-point      | 0.347                                                  | 0.093      |
| Likert scale)                                             |                                                        |            |

Table 4. The results of the canonical discriminant analysis conducted for the three ethnic groups in Taung kya.

| Predicted ethnic groups | Burmese households | Karen households | Other ethnic groups | Total |
|-------------------------|--------------------|------------------|---------------------|-------|
| Original ethnic groups  |                    |                  |                     |       |
| Burmese households      | 33 (70.2%)         | 3 (6.4%)         | 11 (23.4%)          | 47    |
| Karen households        | 9 (16.4%)          | 41 (74.5%)       | 5 (9.1%)            | 55    |
| Other ethnic groups     | 2 (28.6%)          | 0 (0.0%)         | 5 (71.4%)           | 7     |

4.3. Challenges Associated with NTFPs Identified by Stakeholders During Focal Group Discussions

While the different stakeholders associated with NTFPs use and/or management were identified during the semi-structured interviews, existing challenges relating to NTFP management were elicited during FGDs held with each group and a problem tree (Figure 3) was made. The discussions revealed that the inhabitants of Taung kya were aware that the decline in quantities and varieties of NTFPs was a major problem. However, they are unable to reduce their dependence on NTFPs because of the lack of alternative income sources, effective collaborative forest resource management, and market information which may help to collect the right amount of NTFPs.
4.4. Future Approaches for Managing Forest Resources through Community Forestry or Other Cooperative Schemes

We identified differences in the extent of villagers’ dependence on NTFPs and their participation in cooperative initiatives according to their ethnicity. Previous studies have highlighted the significance of socio-economic variation (e.g. ‘[17]’). This finding is also supported by the study of Dinh (2020) that migrated ethnic groups are not participated in collective resource management and conservation activity unlike those in ancestral villages where customary rights prevail [18]. Moreover, Taung kya lacks systems or customs relating to the collaborative management of forest resources and NTFP-related knowledge sharing. We posited that the different ethnicities of the inhabitants who migrated to the village from different areas at different times could partially account for this finding. In light of our findings, we present the following recommendation for future consideration.

First inputs and support from academics as well as the engagement of local governmental officials would be strengthened as they facilitate the development of collaborative actions that promote sustainable resource utilization. Second, potential relationship between difference of land area owned by ethnic group and the degree of NTFP dependence on their income would be taken into consideration in order to improve use of the resource and prevent resource competition within the village.

Additionally, village level forest resource management rules should be formulated by villagers themselves through learning to build collaborative efforts as villagers have been aware of the reduction of NTFP resources, yet without the understanding of importance of cooperation, especially among Burmese. This aligns with CFI’s purpose for collaborative forest resource management.

Above points feed directly into the development of a collaborative CF plan and the implementation of other related schemes, for example REDD+ (Reducing emissions from deforestation and forest degradation plus the sustainable management of forests, and the conservation and enhancement of forest carbon stocks) activities. This approach would foster a synergistic effect through discussions held to formulate a 30-year CF plan that is aligned with the CF policies formulated by the government of Myanmar.

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