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**Assessing Extension Needs to Enhance Participation of
Shifting Cultivators in Community Forestry Activities:
A Case Study of Paunglaung Watershed**

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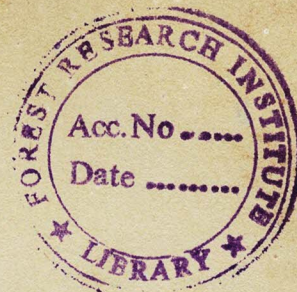
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Abstract

Shifting cultivation is the most widely -used tropical soil management technique and has long been practiced as a traditional way of subsistence living. Therefore, it is interwoven with social and cultural factors. However, it has been commonly regarded as a waste of land and human resources as well as a major cause of soil erosion and environmental degradation. Therefore, there has not been a room for it in forest policy objectives of present day societies.

Since Community Forestry (CF) emphasizes on a particular significance of the link between forestry and community's basic needs. CF has therefore, through the use of agroforestry, a high potential for checking shifting cultivation problems, and entails a sound socioeconomic consideration. However, people participation is essential in developing CF activities.

It is reportedly known that Paunglaung watershed is critically affected by shifting cultivation. Therefore, the urgent actions for checking shifting cultivation are needed in the area. Accordingly, the present study assesses the opportunities and obstacles for developing CF programs to enhance participation of shifting cultivators in CF.

Participatory Rural Appraisal (PRA) method was adopted to collect community level and household level data. The survey results are expressed in details and are also summarized to highlight the significant points. Finally, recommendations are, based on the findings of the survey, made for planning an effective forestry extension program in order to enhance participation of shifting cultivators for developing CF in the Paunglaung watershed area.

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1. Introduction

Paunglaung watershed provides water resource for Paunglaung multipurpose dam, which is under construction and would be the largest one in Myanmar. The dam will be used to generate hydropower and irrigate more than 50,000 acres of cultivated lands for double and triple cropping. Paunglaung watershed forms a part of Hindu-Kush Himalayas and covers an area of more than 1 million acres, falling in two townships-Pyinmana township of Mandalay division and Pinlaung township of Shan state. It has an undulating topography of mountains and valleys, with the elevation ranging from 500' to 5,500' above sea level. It is heavily affected by shifting cultivation practised by inhabitants.

Shifting cultivation is a major livelihood of the area. However, as a policy mandate to phase out shifting cultivation all over the country, the control on it has become more intensified in the area in view of watershed conservation and rehabilitation and regional development. In the prevalence of watershed degradation in general and deforestation in particular resulted from the age-old livelihood of the local communities, footing of sustainable forestry and landuse practices is not an easy task.

In fact, local communities play a major role to switch from conflict to collaboration in establishing functional resource and land management system, which would not upset the socioeconomic pattern of the area and, instead, facilitate the efforts for conservation and rehabilitation of the watershed. However, introduction of new management system, that may better satisfy the social and environmental needs of the area, remains challenging. The management system should be tailored to respond to prevailing problems and opportunities. Hence, rapid diagnostic study within the area, which examines local management problems and potentials, will help to meet this need.

As a means to Sustainable Forest Management (SFM) in Myanmar, Forest Department has issued the Community Forestry Instruction (CFI) since 1995 to provide legal supports for developing the CF especially in the areas with severe forest degradation. Agroforestry practices are allowed in the context of CF to provide both short-term and long-term benefits for local communities.

At the same time, International Centre for Integrated Mountain Development (ICIMOD) is promoting development of CF management in northern part of Myanmar, which falls within its project areas. The Institute of Forestry (IOF) is also an area of interest particularly for capacity development for training and research in CF and SFM through participatory approach. Therefore, in combination with other activities, the ICIMOD came up with an offer of research fellowship program to IOF for the undergraduate and postgraduate students in a wide range of issues, such as social, institutional, ecological, silvicultural and management pertaining to CF management. The purposes of the program are: to increase awareness and develop skill of forestry graduates in CF and participatory resource management; to raise trainers on CF; and to raise the students the discipline and methodology of conducting scientific research.

In looking at the potential of CF development in the Paunglaung watershed and taking advantage of the program, the present diagnostic study was carried out to provide necessary information for CF development programs in future.

2. Rationale and Objectives of the Study

Shifting cultivation is the most widely used tropical soil management technique and has long been practised as a traditional way of subsistence living especially for mountainous communities. It generally comprises all agricultural systems in which the forests are cleared (usually by fire) and cultivated for shorter periods than they are left under fallow. It was defined as a strategy of resource management in which fields are shifted in order to exploit the energy and nutrient capital of the natural vegetation-soil complex of the site.

Even though shifting cultivation is a subsistence strategy of mountainous communities, it has been commonly regarded as a wasteful means of land and labour due to soil erosion, environmental degradation, and meagre return for labour. Therefore, there has not been a room for it in forest policy objectives of present day societies. Tremendous efforts have been invested in order to turn shifting cultivation into a permanent agricultural production system for sustainable community development.

It is, however, still a suppressing challenge for effective forest resource conservation and sustainable development of mountainous communities. We become aware that the crucial issues of resource conservation and sustainable development can only be addressed if people enjoy a secure livelihood. In response to such a challenge, conventional forest policy and strategies were revised and forestry development activities were reoriented.

Accordingly, CF has evolved as an option for effective forest management and sustainable community development. It stems from concerted efforts to set up a new partnership with local people and to respond to the subsistence needs of growing rural population. It, therefore, emphasizes on a particular significance of the link between forestry and community basic needs such as food security, off-farm employment, and household energy. In other words, it is the integration of trees in resource management by community.

Food and Agriculture Organization (FAO) of the United Nations initially defined the CF as "any situation which intimately involves local people in a forestry activity". It generally encompasses a spectrum of activities: establishing woodlots, growing trees at the farm level, and processing of value-added forest products, by forest dwelling communities.

It is undoubtedly clear that community participation is an essence of CF development in a particular area. However, innovation of such a new concept as CF may have a certain extent of opportunity and constraint. An effective extension service is required to raise awareness on the new concept and idea and to build institutional and technical capacity for implementation of CF.

The study is carried out to achieve the following objectives:

- (1) to observe the socio-economic status of the shifting cultivators in the Paunglaung watershed area,
- (2) to identify the opportunities and constraints of CF development in the areas, and
- (3) to assess the extension needs to enhance participation of shifting cultivator in CF activities.

3. Methodology

First of all, a 7-day Training/ Workshop on Community Research was organized at the Institute of Forestry. It was thoroughly designed to enhance capacity of the research team in conducting Participatory Rural Appraisal (PRA) exercise, that would be adopted to gather data on socio-economic and attitudinal aspects on forest and trees of local communities. Next, a pilot survey was conducted at Sin-thawt village to gather baseline information and socio-economic conditions of the area. Then preset questionnaire was modified based on the findings of the pilot survey.

In the second round, other six villages were randomly selected to collect detail information. In each village, group discussions were made to collect community level information through interactive interviews and men and women of all levels from different tribes and religions actively participated in the respective group discussions. Various techniques of PRA, namely mapping and diagramming of resources, drawing up of seasonal calendar, ranking and scoring were also conducted. Additionally, geographical transections were laid by a few knowledgeable persons to assess the pattern of landuse and farming systems. Formal and informal discussions were also made with the villages' authorities, leaders and knowledgeable persons.

Furthermore, four households of shifting cultivators from each chosen village were randomly selected for personal interview to cross-check and collect household level information about access to land resources, livelihood, farming systems, and livestock management etc. Personal interviews were conducted with the use of sub-level questionnaire. In addition, home visits were paid to as many households as possible in all villages selected to make informal discussions personally.

Formal and informal discussions were also held with officials and field staff of the Forest Department to find their views, commitment, and involvement in CF and agroforestry.

Table1. Villages Visited in the Course of Survey

	Village	Household interviewed (number)	Township	Remark
1	Sin-thawt	8	Pyinmana	pilot survey
2	Ngar-te-su	4	Pyinmana	
3	Kyauk-than-bat	4	Pyinmana	
4	Hlwe-gyi	4	Pinlaung	
5	Taung-gya	4	Pinlaung	
6	Lane-lee	4	Pinlaung	
7	Kyet-gyi	4	Pinlaung	
	Total	32		

Table 2. Forest Department Personnel Discussed in the Course of Survey

	Name	Designation	Duty Station
1	U Myint Khaing	Staff Officer	Pyinmana
2	U Ohn Than	Range Officer	Pyinmana
3	U Kyaw San	Forest Ranger	Sin-thawt
4	U Soe Ye	Forester	Sin-thawt
5	U Myint Lwin	Forester	Sin-thawt
6	U Mauna Win	Forest Ranger	Taung-gya

4. Description of the Study Areas

4.1. Location

The present study covers seven villages, all of which lie within the Paunglaung watershed. Most of the villages under study are located just beside the Pyinmana-Pinlaung motor-road. However, Sin-thawt has a distance of 5 miles from the main road, whereas Kyet-gyi is also around 6 miles upstream from Lane-lee, Ngar-te-su is situated near the dam site and needed the use of cart track (See Appendix 1.)

4.2. Demography

Of the seven villages under study, Kyauk-than-bat and Lane-lee were established more than 50 years ago. Villagers from Kyet-gyi recounted that their village was formed in 1920 (last 80 years) but resettled again in 1990. Similarly, Hlwe-gyi was started with 10 households migrated from the lowland areas for seeking fertile lands 14 years ago. Other villages were formed in between past 30-40 years.

Hlwe-gyi is composed of 100 households with the largest population of 500, while Kyet-gyi has only 28 households with the smallest population of 100. The number of households of Sin-thawt, Ngar-te-su, Kyauk-than-bat, Taung-gya, and Lane-lee are 48, 31, 84, 74, and 81, respectively. The average size of household in Sin-thawt and Kyet-gyi are 4.1 and 3.6, whereas the remaining villages have an average of around 5 members per household. One interesting thing is that woman population outnumbers that of man in all villages under study (see Table 3).

Table 3. Demography of Different Villages

	Villages	Length of settlement (year)	Household (number)	Family Size	Population (number)		
					Male	Female	Total
1	Sin-thawt	36	48	4.1	91	109	200
2	Ngar-te-su	40	31	4.8	67	82	149
3	Kyauk-than-bat	53	84	5.3	209	237	446
4	Hlwe-gyi	14	100	5.0	221	279	500
5	Taung-gya	32	74	4.6	155	183	338
6	Lane-lee	50	81	4.4	160	192	352
7	Kyet-gyi	10	28	3.6	48	52	100

4.3 Tribal and Religious composition

Bhama, Kayin and some other tribes are found inhabiting in the villages under study. Sin-thawt and Ngar-te-su are pure Kayin villages, while the majority of people living in Lane-lee and Kyet-gyi, where few people of other tribes can be found, are Bhama. In the three remaining villages, Kayin and Bhama are living together, though the majority is Kayin.

Some Kayin people are devoted to Christianity, but some to Buddhism. However, almost all Bhama believe in Buddhism. Among the villages under the study, only four villages namely Ngar-te-su, Kyauk-than-bat, Hlwe-gyi, and Taung-gya have Christians. More than 30% of households in Kyauk-than-bat and 80 % in Hlwe-gyi are Christians; in contrast, the number of Christians in Taung-gya and Ngar-te-su is very small. All inhabitants of Sin-thawt, Lane-lee, and Kyet-gyi are Buddhists (see Table 4). Accordingly, only Kyauk-than-bat and Hlwe-gyi have churches, though there are monasteries in all villages.

Table 4. Tribal and Religious Composition (number of households)

	Villages	Total Household	Tribal composition			Religious composition	
			Bhama	Kayin	Other	Buddhist	Christian
1	Sin-thawt	48	-	48	-	48	-
2	Ngar-te-su	31	-	31	-	30	1
3	Kyauk-than-bat	84	20	64	-	56	28
4	Hlwe-gyi	100	20	80	-	20	80
5	Taung-gya	74	12	62	-	68	6
6	Lane-lee	81	75	-	6	81	-
7	Kyet-gyi	28	27	-	1	28	-

4.4 Community organizations

All villages under study have Young-men Group, Young-women Group and Religious Group in addition to the Village Peace and Development Council (VPDC) and the Union Solidarity and Development Association (USDA) (see Table 5). Members of all the organizations, except the VPDC which is deemed for local official administration, provide voluntary assistance on occasions of joy and grief in their communities.

Table 5. Community Organization

	Villages	PO	UI	YM	YW	IG	RE
1	Sin-thawt	✓	✓	✓	✓		✓
2	Ngar-te-su	✓	✓	✓	✓		✓
3	Kyauk-than-bat	✓	✓	✓	✓		✓
4	Hlwe-gyi	✓	✓	✓	✓		✓
5	Taung-gya	✓	✓	✓	✓	✓	✓
6	Lane-lee	✓	✓	✓	✓	✓	✓
7	Kyet-gyi	✓	✓	✓	✓		✓

Note: PO = political organization
 UI = Union
 YM = Young-men group

YW = Young-women group
 IG = Income generating group
 RE = Religious group

4.5 Livestock population

All villages under study raise livestock both for domestic consumption and sale for generating secondary income. Swine are reared mainly for sale. Among the villages, the number of swine is highest (125) in Kyauk-than-bat, while it is the lowest (10) in Kyet-gyi. Buffaloes are raised to plough lowland paddies. Therefore, all villages with lowland paddies, have buffaloes. However, villagers of Lane-lee who have no lowland paddies also rear buffaloes, even with the largest population in the community. In Hlwe-gyi, the second highest swine population (60) is found, but no cattle is reared. Cows are raised only in Lane-lee (see Table 6).

Table 6. Livestock Population

	Villages	Buffaloes	Cows	Swine
1	Sin-thawt	8	-	20
2	Ngar-te-su	20	-	52
3	Kyauk-than-bat	5	-	125
4	Hlwe-gyi	-	-	60
5	Taung-gya	28	-	40
6	Lane-lee	120	13	40
7	Kyet-gyi	10	-	10

4.6 Farming systems

Almost all people inhabiting in the study villages are shifting cultivators. All villages, except Hlwe-gyi and Lane-lee, have no landless people. They have fallow lands the ownership of which was traditionally recognized. However, 25 people from Hlwe-gyi and 18 from Lane-lee did not have any land of their own (see Table 7).

Table 7. The Status of Landholdings (number of households)

	Villages	Total Household	Landless Household	Land-owned Household
1	Sin-thawt	48	-	48
2	Ngar-te-su	31	-	31
3	Kyauk-than-bat	84	-	84
4	Hlwe-gyi	100	25	75
5	Taung-gya	74	-	74
6	Lane-lee	81	18	63
7	Kyet-gyi	28	-	28

Highland rice is the main crop of shifting cultivation. Rice harvested is usually used for home consumption. Other seasonal crops such as chili, maize, various pulses and beans, and different varieties of banana are inter-cropped with rice in shifting cultivation sites. The seasonal calendar of main crops grown on shifting cultivation sites is shown in Appendix 2. Banana plantations remain established after harvesting of the paddy and other seasonal. These banana plantations are productive up to 5 years with a very limited capital and labor

input. Common varieties are Rakhine, Phegyan and Shweni. Among them, Shweni is the most valuable one. However, it can only be planted on very fertile sites (i.e. good-forested lands or well-matured fallow lands). Banana is the most viable cash crop in the area. Turmeric with a high demand is sometimes grown in the shifting cultivation sites instead of paddy for cash income.

There are lowland paddies in almost all villages under study with the exception of Hlwe-gyi and Lane-lee. However, the area is not so large and it is just between 4 and 15 acres in each village.

Some villages have established permanent farms. Hlwe-gyi has a large extent of such farms (more than 200 acres). However, Sin-thawt, Lane-lee, and Kyet-gyi have no permanent farm, whereas others have only nominal amounts. Mango, jackfruit, and djenkol bean are mainly grown in such farms. Betel vine is also commonly grown. Likewise, cardamom plants are grown in the shade of various trees as a cash crop. A villager from Hlwe-gyi has established a coffee plantation in his home gardens.

Cultivation on land formed by the process of silting is carried out in Lane-lee where there are such lands beside the Paunglaung river. In Lane-lee, peanut and turmeric are grown on silted lands of the Paunglaung river in winter when the water level is low enough to form such alluvial lands. Productivity of these lands is comparatively higher than that of shifting cultivation sites. However, the extent of alluvial lands is not substantial (see Table 8).

Table 8. Farming Systems Practiced in the Area other than Shifting Cultivation (acres)

	Villages	Lowland rice	Farmyard	Alluvial land
1	Sin-thawt	15	-	-
2	Ngar-te-su	7	1	-
3	Kyauk-than-bat	4	2	-
4	Hlwe-gyi	-	202	-
5	Taung-gya	5	1	-
6	Lane-lee	-	-	60
7	Kyet-gyi	15	-	-

Accordingly, the basic farming system of the area is obviously shifting cultivation for subsistence needs. It is noticeable that local people depend mainly on banana for their income. Turmeric cannot be grown with the paddy, the extensive cultivation of turmeric on the shifting cultivation sites is therefore somewhat limited. It simply implies that within a limit of family labour there is not enough room for cash crops that are mutually exclusive with paddy on shifting cultivation sites.

4.7 Daily Schedule

As shifting cultivators, they have to get up very early in the morning (about at 4-5 a.m.) to start daily work. After having a heavy breakfast, men leave for working at the shifting cultivation sites. They need to spend 1-2 hours in walking to get to there. They have to work nearly the whole day with a short break for lunch around noon. They usually return and get back home when the daylight nearly vanishes. They take a short rest and then have dinner prepared by their wives. Shortly after the dinner, they usually go to bed at 8: 30-10:00 p.m.

Generally, housewives wake up earlier than their husbands to prepare breakfast for the entire family. They also have to do a lot of household works- preparing lunch and dinner, preparing livestock feed and feeding them, collecting firewood and carrying water- with a brief rest after having lunch. They usually have dinner with their family at about 6:00 p.m. After dinner, they enjoy visiting to neighbours for some talks and sometimes go to video show for relaxation of the day's drudgery. Frequently, childless housewives go together with their husbands to the fields especially during the planting season.

Daily schedule of both men and women seems very tight engaging in working at the field for production or at home for household chores. They generally have to follow such a tight schedule for 6 days a week (see Box 1).

Box 1. Daily Schedule of Kyauk-than-bat village

Male		Female
	04:00	getting up & preparing breakfast
getting up	05:00	feeding livestock
having heavy breakfast	05:30	having breakfast
leaving for the field	06:00	doing house keeping, carrying water, collecting firewood
getting the field & starting work	07:00	
having lunch at the field	12:00	having lunch at home with children
restarting work	13:00	
	14:00	carrying water, preparing dinner,
	15:00	
returning home	16:00	feeding livestock
getting back home	17:00	
having dinner	18:00	having dinner
taking a rest		paying a visit to neighbors
		(video show)
going to bed	20:00	going to bed

4.8 Resource availability

Land resource

Even though all the lands are at the Government's disposal, there are usufruct rights to holding and utilizing lands in the area. Local people traditionally, though not, recognize and respect the ownership of fallow lands upon those who clear them first for practicing shifting cultivation. Generally, the majority of local people have enough fallow lands, either near or far from villages, to make annual shift in a specified rotation (i.e. 7-10 years). Some landless people are found in the area because they have settled too late to get a share of lands for shifting cultivation. Upon request, these landless people can, on loan basis, grow seasonal crops on other's fallow land. Sometimes, they may even get parcels of land for exercising shifting cultivation in places rather far from the villages.

Therefore, land is at an open access in the area with little or no formal control and regulation. Accordingly, availability of land for shifting cultivation is not a problem yet unless external pressure (such as regional development activities, intensifying law enforcement to check shifting cultivation and so on) is imposed.

Water resource

Almost all villages under the study are situated on the slope of the undulating ground. One or more perennial streams or rivulets flow in the vale between the hills. Lane-lee and Kyet-gyi lie just beside the Paunglaung River while Hlwe-gyi across the Hlwe-gyi creek (stream), one of the great feeders of the Paunglaung River. Therefore, water is available for use. Water supply system with the use of bamboo pipes is observed in Hlwe-gyi.

The use of water from the perennial streams through the man-made canals for lowland paddy cultivation is common in all villages where lowland paddy fields are located. Lowland paddy fields are formed wherever the plains are available on the floor of the valleys by making contoured terraces along the streams. Then water is diverted from the higher points and channeled to the paddy fields. Reliable water supply increases the productivity of such fields.

Forest resource

Most of the villages under the study seem originally being set up at the center of the forests. Inhabitants successively cut and cleared the forested areas near by their villages for shifting cultivation. As a result, forest areas have dwindled and degraded to fallow lands and retreated from villages year after year. Now, a large extent of good forest can seldom be found within the radius of 3-6 miles from the villages (see Appendix 3). As shifting cultivation is the mainstay of the inhabitants, fertile lands are more essential for it than for forests. Consequently, they inevitably cut down the forests for their survival and livelihood.

Generally, they always engage in working on the fields almost all the year round with a tight daily schedule. Market access for collected non-wood forest product is rather difficult with the poor infrastructure of the area. Accordingly, they collect different non-wood forest products not for marketing, but for supplementing to their diet. However, it is reportedly known that people from outside the area come to collect such forest products as bamboo, mushroom, and medicinal plants for marketing.

Most of the houses in all villages under the study are constructed with large posts of most durable wood, either Teak or Pyinkado. Therefore, their houses require only minor repair for subsequent years. Consequently, the requirement of wood products from forest is fairly low. Firewood can be gathered easily from the vicinity of the villages. Hence, availability of forest resources in the area is believed to be good.

4.9 Infrastructure and basic educational status

Accessibility within the Paunglaung watershed used to be very difficult. Cart tracks and timber extraction tracks were only communication among the villages. Around 1990, a project of Pyinmana-Pinlaung motor road, a short cut to Kayah state, was started in order to improve transportation. This road came into service in 1991. After that accessibility between the villages within the Paunglaung watershed and Pyinmana became improved. The road crosses the watershed in its middle part. However, most of the areas there still have a difficult access to the road. The accessibility rating of villages under the study is expressed in Table 9.

All villages under the study have primary schools. There can see even a middle school in the Hlwe-gyi village. Therefore, opportunity to get basic education is quite. Moreover, the rate of the primary school enrollment is also reported high. However, middle school students from villages without a middle school have to join other villages, while high school students need to join high schools in either Yezin, Pyinmana or Pinlaung. It is happy to hear that two students from Sin-thawt are studying university education in the University of Distance Education (UDE) (see Table 10).

Table 9. Accessibility Rating

	Village	Rating
1	Sin-thawt	Poor
2	Ngar-te-su	Poor
3	Kyauk-than-bat	Good
4	Hlwegyi	Good
5	Taung gya	Good
6	Lane-lee	Good
7	Kyet-gyi	Fair

Remark: Poor = only access with card road; Fair = indirect access to main road

Good = direct access to main road

Table 10. Educational Status

	Village	Number of School			Number of Students			
		Primary	Middle	High	Primary	Middle	High	University
1	Sin-thawt	1	-	-	31	9	3	2
2	Ngar-te-su	1	-	-	28	-	-	-
3	Kyauk-than-bat	1	-	-	96	3	-	-
4	Hlwegyi	1	1	-	128	17	5	-
5	Taung gya	1	-	-	37	11	-	-
6	Lane-lee	1	-	-	72	6	1	-
7	Kyet-gyi	1	-	-	40	-	-	-

Even though all villages under study have good access to basic education, there are illiterate people in all villages. The highest number of illiterate men (15) is found in Kyauk-than-bat and the highest number of (18) illiterate women in Taung-gya. Illiteracy is somewhat obvious in most villages under the study while Kyet-gyi village shows a highest rate (around 28% of total population) (see Table 11)

Table 11. Illiteracy

	Village	Illiterate (number)			% of Total Population
		Male	Female	Total	
1	Sin-thawt	1	4	5	3.2
2	Ngar-te-su	2	8	10	12.7
3	Kyauk-than-bat	15	5	20	9.2
4	Hlwegyi	2	5	7	3.0
5	Taung gya	2	18	20	11.0
6	Lane-le	-	17	17	14.9
7	Kyet-gyi	6	8	14	27.9

5. The result of Survey

5.1 Tree management

In the course of survey, the following general criteria which local people use to select a shifting cultivation site were recorded: a gentle sloping ground; eastern aspect (if possible), presence of bamboos especially Tin-wa (*Cephalostachyum pergracile*), Kya-thaung (*Bambusa polymorpha*), Kyalo (*Dendrocalamus brandisii*); equal mixture of medium sized trees and bamboos; presence of softwood tree species as Thitpot (*Dalbergia kuzil*), Thitkazaw (*Dalbergia grandiflora*), Sagawa (*Michelia champaca*); absence of Bebya (*Cratogeomys merriamii*); presence of well-decomposed woods and bamboos; well saturated and porous soil.

All respondents expressed that trees apart from very large ones of various species are felled and then burnt down at the shifting cultivation sites. They believe that any trees left after felling might be killed while burning down the debris. They feel that such dead trees would likely be uprooted or at least 'drop dry branches on the crop grown underneath, resulting in crop damages. They also assume that leaves shedding from the trees would favour termites' invasion into the site. Moreover nearly all respondents fear that the shade of trees would disturb the growth of crops.

Most of the shifting cultivators interviewed had the opinion that the trees on their fields would provide negative influences rather than positive ones on crops and associated sites. Most of them also agreed that trees provide shade, home for birds and pests and competition for space and water with crops. However, none of positive impacts of trees on crops and sites was accounted. It was confirmed that trees were not usual to plant inside or along the boundaries of the shifting cultivation plots except perennial crops that bear fruits.

All interviewees acknowledged that they had experience of using almost all parts of trees namely fruits, seeds, leaves, barks, roots, stems for food, fodder, fuelwood, medicine, and timber. However, they said that they usually grew only fruit-bearing perennials such as mango, jackfruits, djenkol bean inside their homesteads for supplementing their diet. But, most homesteads were found not spacious enough for planting more trees.

All respondents showed their preference on Teak (*Tectona grandis*) and Pyinkado (*Xylia dolabriformis*) for such premium properties of their wood as durability, hardness and marketability. They also expressed their likeness on Pauluk (*Pterocarpus macrocarpus*), Yamane (*Gmelina arborea*), Sagawa (*Michelia champaca*) Taung-tama (*Cedrela multijuga*) for their quality timber. Most of the interviewees showed their knowledge on poisonous tree, Hmyaseik pin, (*Antiaris toxicaria*) from which poisoning can be tapped for smearing on the tip of hunting arrow.

5.2 Fertility management

According to the results of interviews shifting cultivators do not use any farmyard manure in the shifting cultivation plots. However, observation indicated that some local people applied farmyard manure in their permanent farms. Most interviewees replied that mulching was applied to a certain extent for banana grown on shifting cultivation sites. Weeds, straw, maize stalks were generally used as mulch. They expressed that mulching operation was carried out at the time of weeding usually in July and August and /or after harvesting of maize usually in November.

No indication of applying artificial or chemical fertilizers was observed in the course of survey. All respondents confirmed that shifting cultivators always take a good care to get thorough burning for producing ash, that temporarily improves soil fertility.

Observation suggested that most of the local people grow pigeon pea in the shifting cultivation sites. But all respondents did not know any green manure plants and benefits of green manure. The answers indicated that they did not prepare and use any kind of compost even though they knew application of compost would increase the productivity. It was noted that all crop residues were left in their planting sites either with or without intention to maintain soil fertility. Some respondents claimed that they deliberately left the crop residues to maintain soil fertility, but most of them confessed that after harvesting of the valuable parts of the plants, the remaining was generally left behind as standing.

5.3 Crop management

Local people used to practise scrape weeding with the use of hoes in the early period of cultivation to improve initial growth of the crops. Later on, just slash weeding with swords is applied to lessen competition of weeds to crops grown. Most shifting cultivators interviewed replied that they did not take any special measure to decrease weeds in their plots. Some gave, however, an appropriate answer that tried to eliminate weed seeds and bamboo sprouts through having a good burn.

Local people frequently encounter the infection of different pests on crops grown on the shifting cultivation sites. Nonetheless, all interviewees gave the same answers that they did not use any pesticide in their field. Furthermore, majority of the respondents said that no

pest control measure was taken in the past. However, some denounced tobacco leaves were used for banana to check pest attacks on it without any recognizable effect.

5.4 Livestock breeding

Most people raised a flock of poultry for home consumption. Twenty out of thirty - two respondents raised swine as a live saving for immediate cash when needed. Two shifting cultivators, one from Lane-lee and one from Kyet-gyi who had alluvial lands bred a couple of draught cattle each. They said that draught cattle were kept for harrowing the lands. Other remaining shifting cultivators replied that draught cattle were not serviceable in preparing shifting cultivation sites which were on slope and full of tree stumps remained. They went on saying that cattle need a special care preventing from insect pests, particularly gnat. Two respondents were found to keep a couple of buffalo useful in tilling their low land paddy fields.

5.5 Farm production and income

Even though local people have permanent farms and lowland paddy fields, the major strategy of livelihood is still shifting cultivation. The main crop grown in the shifting cultivation is paddy. Its yield was counted in the course of interview as from 15 to 50 baskets per acre. Climatic factors were found so influential on paddy yield that it showed such a high fluctuation.

With favorable conditions, average yield of 20 baskets was said to be a good estimate. All the paddy produced is kept for their own consumption. The average yield of other major crops grown in shifting cultivation is shown in Table 12. As a rule, local people use family labour to perform almost all operations in shifting cultivation practice. Therefore, they seldom need cash investment. They generally earn income of 47,500 kyats in a year from each acre of shifting cultivation in addition to paddy for home consumption. However they seriously recounted that there were nothing to harvest in their shifting cultivation plots in some years due to crops' failure caused by drought and wild animals.

Table 12. Production and Income of Current Year Shifting Cultivation Plot

	Crop	Per acre yield (Average)	Unit Price (kyat)	Cash Income		Remark
				K	P	
1	Paddy	20 Baskets	-	-	-	consumed
2	Chili	50 viss	100	5000	00	
3	Maize	5 baskets	1000	5000	00	
4	Banana (Rakaine)	2500 hands	15	37500	00	
5	pulses & bean	2 baskets	-	-	-	consumed
Total				47500	00	

Note: A large amount of money (4-7 times that of Rakaine) could be expected by planting more valuable banana varieties. However, these varieties have to be grown in more distant areas with very fertile soil, cutting back nearly 50% of income in transport of the produce from farms to villages.

Actually, a household of 5 members clears a 2 acre-plot (i.e. maximum extent of land holding) of land each year. Therefore, they could receive 95,000 kyats annually from the current shifting cultivation plot. Normally, they can harvest from a banana plantation for 5 years. Consequently, they can have a substantial income from old banana plantations. The production of and income from old banana plantations are expressed in Table 13. It can be seen that in the 2nd year, banana plantations are more productive than the current year plantations because the bulbs usually produce more basal shoots in the second year, having more fruiting stems. However, production decreases gradually afterward.

Table 13. Production and Income of Old Banana Plantations

	Old plantation	% of Young plantaton	per acre Yield (Hand)	Unit Price (kyat)	Cash income	
					K	P
1	2 Year Old	125 %	3125	15	46875	-
2	3 Year Old	60%	1500	15	22500	-
3	4 Year Old	50 %	1250	15	18750	-
4	5 Year Old	30 %	750	15	11250	-
Total					99375	-

Accordingly, the annual income from shifting cultivation of a common household is that 95,000 from current plot plus 198,750 kyats from old banana plantations, amounting to kyats 293,750. It implies that a common shifting cultivator with sufficient fallow lands could have a large portion of saving from his or her income.

5.6 Off-farm income

25% of shifting cultivators were found making off-farm income for various reasons. Significant reasons they mentioned were: having insufficient land to cultivate annually, having limited workforce in the family to carry out shifting cultivation for producing enough food, and making the most of excess workforce of the family. Supplementing low return to labour input and uncertainty of production from shifting cultivation and generating secondary or additional income were cited as other reasons.

Two respondents from Hlwe-gyi ran small shops to sell odds and ends for household use. Amount of sale was found small. One interviewee from Ngar-te-su produced brooms made of locally available grass while one respondent from Kyet-gyi made bamboo mats for generating additional income through the efficient use of family labour. However their production seemed marginal.

One interviewee from Lane-lee earned a profit of 20,000 kyats per year as a broker for trade of turmeric and various pulses and beans. Other sources of income they listed in the course of survey were sawing timber, carrying banana, hunting, collecting yam and working as waged labourers on other farms. They can gain around 200-500 kyats a day, but working days are limited.

5.7 Access to facilities

All respondents expressed that they went to Pinlaung and Pyinmana to sell and buy various things. Most interviewees said that personnel from Forest Department, Agricultural Service, Health Department and UNDP projects came to their villages to provide extension service. However their visits to the villages were very limited, just once or twice a year. In contrast, all interviewees from Sin-thawt indicated that they could see a frequent visit of forestry personnel in their village because it was situated inside the Training Forest Institute of Forestry.

Most respondents from Sin-thwat proudly said that they had a revolving fund system for Forest Users group, which was established by the Institute of Forestry. Since all villagers have been members of the Forest Users groups, they could access the soft loan through individual pledge or collective responsibility for repayment. Apart from Sin-thawt, no villages visited had such a credit program.

All interviewees expressed that in their rural community they contributed labour on a reciprocal basis to help each other in farming, building, etc. One respondent from Hlwe-gyi village said that they had to contribute $\frac{1}{2}$ small basket of rice and 40 kyats from each household on the occasion of death of a person in their village.

5.8 Recent changes

All respondents gave their view that there were no recognizable changes in food supply, firewood supply, crop yield, crop quality, livestock population and family size. However, they further expressed the exception that they faced crop failure in shifting cultivation and high mortality rate of livestock (especially of poultry) due to disagreeable climatic conditions and outbreak of diseases in some years.

5.9 Participation in community development activities

The United Nations Development Program (UNDP) has already initiated water and sanitation project in Pinlaung Township. Falling in the Pin-laung Township, Taung-gya, Lane-lee, and Kyet-gyi have some project activities such as improving water supply, construction of school buildings and the fly-free latrines. Nearly all respondents from these villages said that they participated in these activities. It could be identified that there were Income Generation Groups (IGG) funded by UNDP in Taung-gya and Lane-lee. But any of interviewees from these villages was member of the IGG.

It is also informed that Sin-thawt village has, with the support of Institute of Forestry, formed a Forest Users Group according to the Community Forestry Institution (CFI) issued by the Forest Department. All respondents were members of the group and have been participating in community forestry activities.

All interviewees believed that the existing community development activities were effective, and valuable for them but the scope and extent needed to be extended. Respondents expected to have the following community development activities in the future: to set up a rural dispensary staffed with at least a midwife and health worker, to improve the level of the school staffed with adequate number of appropriate teachers and to upgrade development facilities of the villages.

Yezin based Christian Association (YMCA) provided assistance to Kyauk-than-bat and Hlwe-gyi for some rural development activities such as construction of school, establishment of demo-farms with the use of SALT (Sloping Agricultural Land Technology).

5.10 Community forestry and agroforestry

Villagers from Sin-twat, Kyauk-than-bat and Hlwe-gyi could discuss community forestry and agroforestry. But villagers from others under the study had not known yet what is community forestry and agroforestry. Interestingly, one respondent from Lane-lee could express the concept of agroforestry, but he did not know about the community forestry.

5.11 Access to extension media

It could be determined through the course of survey that 30% of respondents were listening to the radio, 20% watching television and 30% going to video show very frequently.

5.12 Farming systems related problems

In the course of survey, various farming system related problems could be identified and analyzed in a series of discussions and personal interviews. The problems and the results of analyses are given in detail hereunder.

Problem 1 Intensifying control on shifting cultivation.

Causes:

- effective conservation & rehabilitation efforts to check severe deforestation on the critical watershed
- expansion of regional development activities

Constraints:

- National Forest Policy

Opportunities:

- permit to establish permanent farms within five years
- providing right for setting up agroforestry farms through community forestry
- abundance of land in farther places where there is no effective control

Current Solutions:

- use immature fallow lands (shorter fallow periods)
- clear the land at more distant places
- seek other sources of income (such as carpentry, pottery, weaving baskets, waged labour, etc.)

Desired solutions:

- to establish permanent farms
- to raise more livestock
- to establish horticultural farm of the most valuable banana variety (Shwe Ni)

Problem 2 Disease and pest infestation on paddy and most valuable banana varieties grown on taungya.

Causes:

- drought
- Paddy variety presently grown becomes vulnerable to disease and pest attack.
- use of immature fallow lands
- keep on producing basal shoot from over-aged banana bulbs
- uncontrollable weed growth

Constraints:

- expensive to substitute the existing paddy variety with new one.(longer life-span, limited availability of seed)
- necessary to keep over-aged banana bulbs for sustaining income level

Opportunities:

- to use more hardy varieties
- to use pesticides
- to use artificial fertilizers

Current solutions:

- use kitchen ash
- use of tobacco leaf for controlling banana diseases
- cut and burn down infested stems
- use a more hardy variety of banana

Desired solutions:

- to replace with more hardy variety of paddy
- to ask for technical advice
- to use chemical fertilizer adequately

Problem 3 Death of betel leaf vine and no fruiting of djenkol bean trees grown on the permanent farms

Causes:

- rotting root especially in raining season (betel leaf vine)
- causes of producing no fruit have not been identified yet (djenkol bean tree)

Constraints:

- pathogens of both betel leaves vine and djenkol bean have not been identified as yet.

Opportunities:

- to grow betel leaf vine on slope rather than flat lands

Current Solution:

- thinning congested trees, making stimulatory cut on the stem for fruiting and topping for disease control on djenkol bean trees
- providing fertilizer to djenkol bean trees
- use pesticides for betel leaf vine

Desired solutions:

- to ask for technical advice

Problem 4 Decrease of crop yield from Taungya**Causes:**

- unreliable climatic conditions
- damages caused by wild animals (especially wild boar)
- shorter fallow period

Constraints:

- uncontrollable climatic factors
- habitats of wild animals

Opportunities:

- to catch up with favorable climatic conditions
- to use firearms to kill and frighten wildlife

Current solutions:

- kill & frighten wild animals with hand-made traps or firearms

Desired solutions:

- to establish permanent farmyards
- to bring out lowland rice fields

Problem 5 Outbreak of forest fire**Causes:**

- careless use of fire by outsiders
- accidental spread of fire from taungya burning

Constraints:

- source of income for other people (fisher men, collectors of forest produce, etc.)

Opportunities:

- to constitute restricted areas
- to prevent fire through collective efforts

Current solutions:

- designating restricted area for outsiders
- constructing fire breaks and carefully supervised burning of taungya

Desired solutions:

- to restrict more seriously outsiders' encroachment
- to take legal actions

Problem 6 Predicament in bringing out lowland paddy fields and Setting up permanent farms

Causes:

- requiring considerably high labour and capital inputs
- fear on security of land tenure.

Constraints:

- Lack of labour, capital, skill
- difficult to get qualified planning stock.
- water supply
- costly fertility management

Opportunities:

- abundance of uncultivated and vacant lands.
- able to bring out gradually.

Current solutions:

- start with manageable scale.

Desired solutions:

- to seek external aid for technology, fund, credit, and heavy machinery.

Problem 7 Predicament in livestock breeding.

Causes:

- annual outbreak of disease (especially for poultry and swine)
- higher hazards of pest (especially of sand-fly, gnat, and mite)
- absence of pasture.
- high initial investment for draught cattle.

Opportunities:

- good supply of fodder (especially for poultry and swine)
- able to start breeding adult swine in August, September
- a higher market demand for meat
- easy access to soft loan from revolving fund for livestock breeding

Current solutions:

- reducing number of livestock to be bred.

Desired solutions:

- to carry out livestock breeding systematically as a source of main income

6. Summary of Findings

1. Shifting cultivators are ever seeking for good forest lands generally not for trees and tree's products, but particularly for fertile soil maintained and improved by trees and forests.
2. Even then when they look at trees, they just see it as no more than physical entities composed of timber.
3. They consider that trees provide only negative influences on crop growth, so trees are mutually exclusive with crops, which are necessary for food and income.
4. They deliberately use fire as the one and only tool to improve productivity of shifting cultivation sites given the capacity of family labour. They do almost nothing except utmost attempt to get a good burn in their shifting cultivation fields in order to reduce labour input, improve fertility and productivity, and prevent from diseases and pests.
5. Even though other farming systems can be found in the area, the major strategy for survival and livelihood is shifting cultivation. Inhabitants usually intercrop food grains and cash crops on their field for effective and efficient use of lands.
6. The staple food of the area is rice so that paddy is essentially grown as subsistence crops. Likewise, banana is the most viable cash crop and it is therefore given second priority after paddy for sustaining dependable cash income.
7. Shifting cultivators sometimes face crop failure due to unpredictable climate. However, the majority of them can generate substantial income from shifting cultivation practice in most years. Accordingly they have personal saving to offset the deficit in family budget at the time of crop failure.
8. They know that shifting cultivation is a very risky production system. Moreover, they have some ideas for establishing permanent farms and bringing out lowland paddy fields in order to secure food production and generate reliable income. However, there are many predicaments that could not be overcome with the prevailing physical resources (labour, capital, skill, etc.).
9. With the necessity in their livelihood, they are also desirous to rear livestock not only for farming activities but also for second major source of livelihood. Nevertheless, practical implementation will not be possible without technical and financial inputs from outside to phase out overwhelming existing obstacles.
10. Some shifting cultivators who have not enough fallow lands require alternative sources of income. However, dependability and viability of the existing off-farm activities in the area is too uncertain to supplement deficient income from farming.
11. High transportation cost of farm produces to distant marketplace lowers the margin of profits. Present level of extension services and credit system needs to be enhanced for community development.
12. Scope and extent of community development activities is very limited. Some are religion-oriented.
13. Awareness on and initiatives of community forestry and agroforestry among the local people is still in infancy.
14. Access to basic educational facilities and extension media is satisfactory. However enrollment in middle school which are quite far from most villages is rather low.

7. Recommendations

People's participation, local capacity building, and information are the prerequisites for promoting community forestry activities. Then, consultation with local people, collaborative efforts, incentive mechanism, gender consideration, and land titling are basic for motivating people to participate. To form the basis for enhancing people's participation in community forestry development of the area, the following points are recommended.

1. The awareness campaign should firstly be organized to raise public awareness on essential roles of forests and trees in productivity and sustainability of all farming systems.
2. Equity in resource use between upstream and downstream, sensitivity of a critical watershed, environmental costs of shifting cultivation should be the main theme of the campaign.
3. Radio and television could be used for effective extension in addition to informative pamphlets and leaflets.
4. Forest Department ought to organize a series of public talks at a wide range of villages to make known about Community Forestry Instructions (CFI) issued by Forest Department and further conduct public training courses on nursery practices, agroforestry to enhance local capacity for community forestry development.
5. Forest Department should also organize more trainings on community forestry, agroforestry, and extension, which are well designed to enhance capability of departmental personnel regarding the principles, concepts and implementation of extension activities for community forestry development.
6. More frequent visits of forestry field staffs are suggested to get more transparency, trust, and mutual respect for improving collaboration between department and local communities.
7. Agroforestry demonstration plots with different designs reflective of local socioeconomic context should be established in almost all strategic sites to provide self-evidence to local communities.
8. Forest Department should also arrange farmer-to-farmer visits to other places with successful stories in community forestry activities for those who show keen interest in community forestry.
9. Community forestry activities should be initiated with the small group of shifting cultivators who show strong interest in it to get smooth implementation and recognizable results, and then extended gradually to larger groups and community.
10. Arrangement ought to be made for Forest Users Group to mortgage the community forestlands and its products in order to obtain a soft loan from financial institutions for developing community forestry activities.
11. Post-formation supports to the Forest Users Group should be guaranteed to assist in all dimensions of sustainability (biological, organizational, and economic) of community forestry activities.
12. Objectives of community forestry should also be reviewed in order to operate community forestry activities as a land-based production system for producing both forest products and cash crops on commercial scale through agroforestry.

13. Forestry extension activities should be coordinated and integrated with others especially agriculture and livestock breeding for better accomplishment of the desired objectives.
14. Credit system should be established in all villages in order to provide an easy access to soft loan not only for community forestry activities but also for all community development.
15. Short vocational training courses both for men and women ought to be conducted in different villages for promoting value added production, employment opportunity, and cottage industry.
16. Community groups (e.g. Village Young-men Group) should be enhanced to be a community institution (e.g. Co-operative) for increasing collective actions vital for self-help community development.

8. Conclusions

Inhabitants of the Paunglaung watershed have for a long time practiced shifting cultivation as their mainstay. Therefore, shifting cultivation is interwoven with other social and cultural factors. Consequently, any attempts to check shifting cultivation should entail sound socioeconomic consideration. Introduction of community forestry in such areas affected by shifting cultivation as Paunglaung watershed is one of the best ways to solve the shifting cultivation problem. Community forestry here is nothing, but forestry of the people, for the people, by the people.

There are some significant incentives (such as lease of lands for 30 years, tax exemption etc.) in implementation of community forestry activities according to Community Forestry Instruction (CFI) issued by the Forest Department. However, there still exist many constraints and obstacles in implementation phase of community forestry. It is not easy task to motivate and encourage shifting cultivators to conserve forests and trees, who necessarily cut down and clear them for producing food for survival.

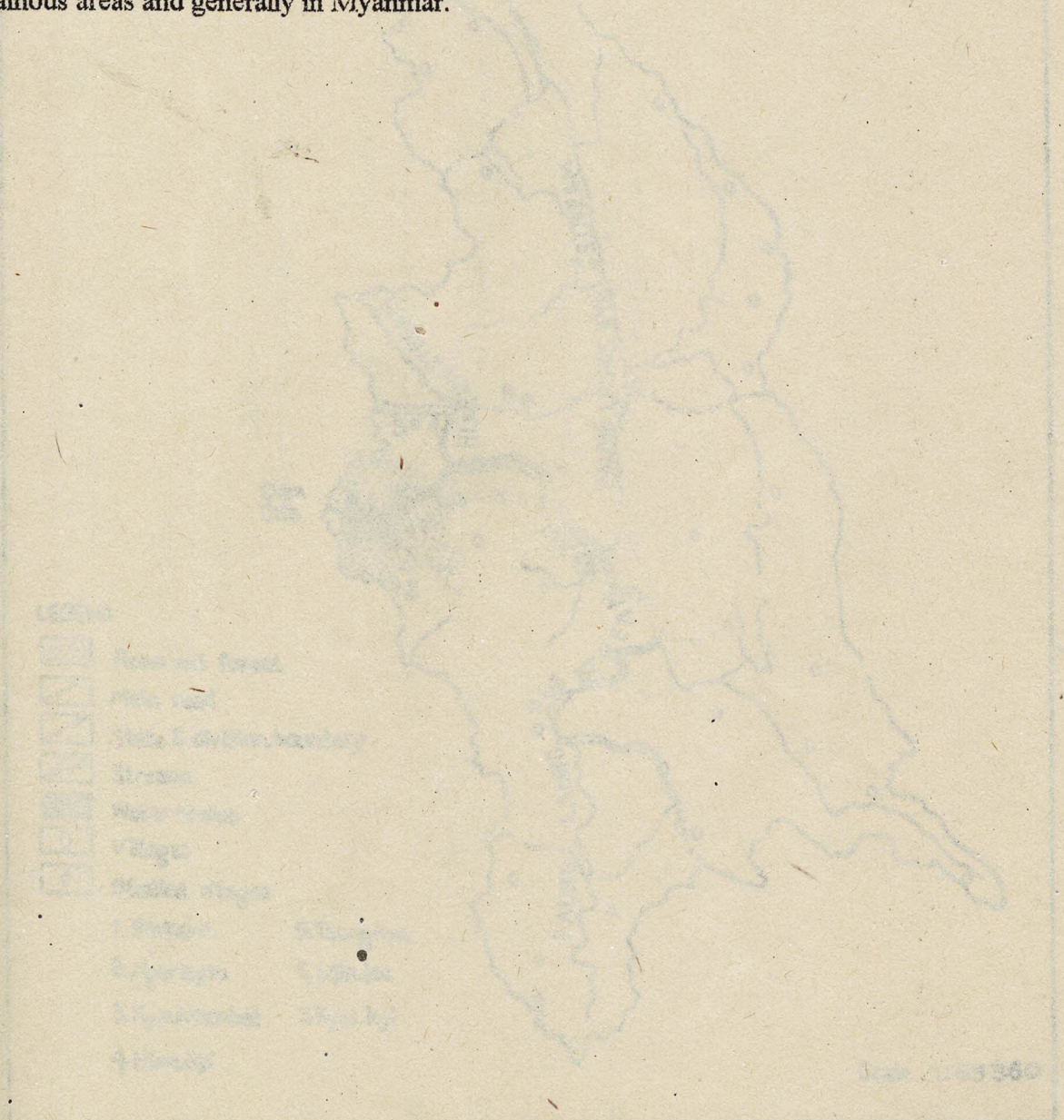
Generally, forestry activities are long-term ones. Benefits could be enjoyed after waiting long period of time. Therefore, forestry activities to be implemented by the local people should produce both short-term and long-term benefits. In this context, agroforestry become meaningful to apply as an effective tool in implementation of community forestry. However, it should be noticed that agroforestry is an intensive land management system which needs more input (labour, capital and skill) than shifting cultivation.

In this connection, local people are required to make changes to apply agroforestry in the implementation of community forestry. However, they are resource poor farmers and usually prefer conventional practices for their livelihood. They, therefore, rarely want to make changes. Accordingly, the spread and extensive use of new idea and skill is a slow process, which takes time.

In this step, the role of extension becomes cardinal. Here, extension generally is the process of information sharing between outsiders and local people to promote indigenous livelihood system particularly based on local resources. In this sense, forestry extension particularly covers any situation in which local people are directly and willingly involved in forestry activities from which they will derive some recognizable benefits of time.

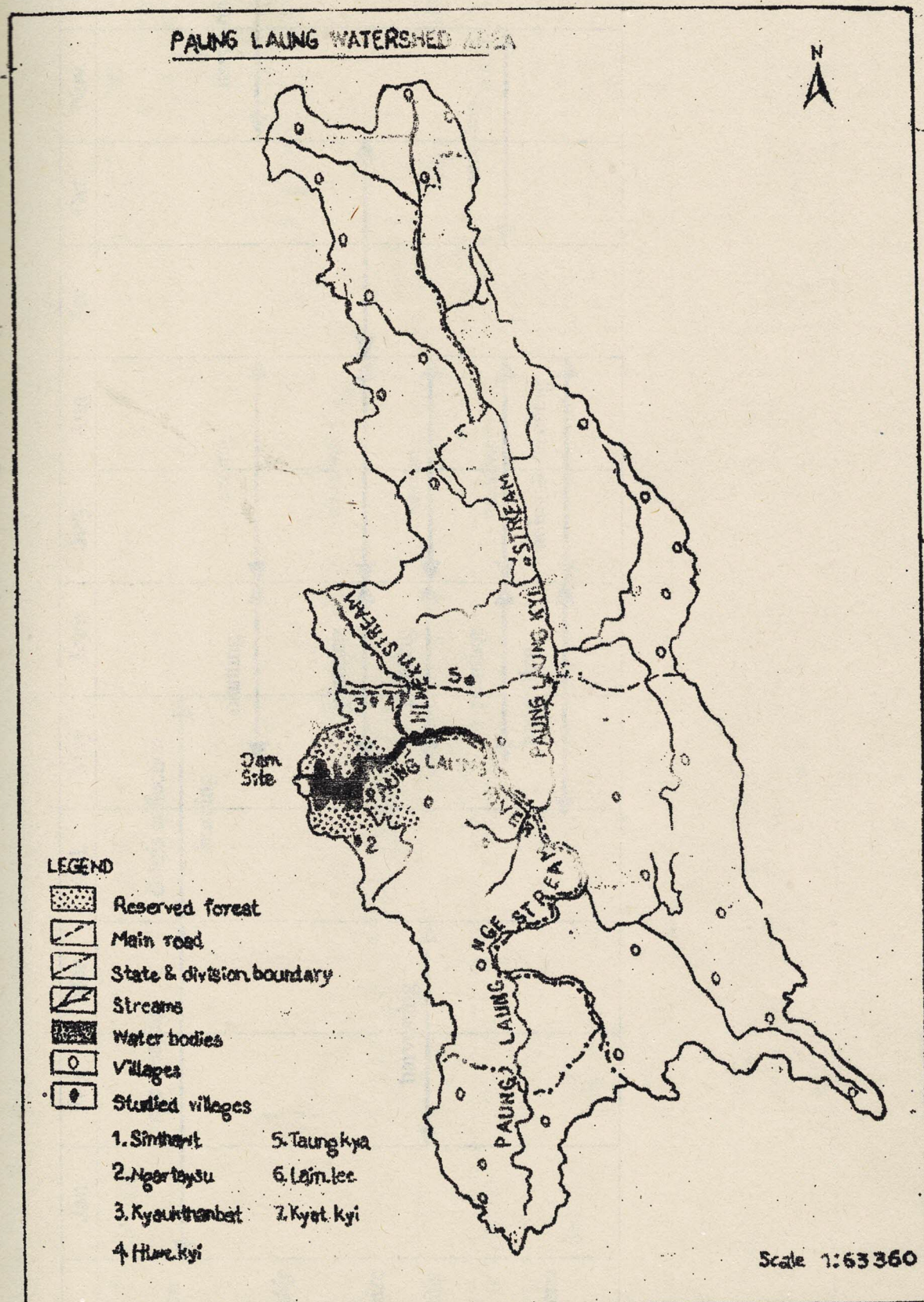
However, forestry extension alone cannot be claimed to deal with all obstacles to community development, but it can promote an interest in tackling them. Therefore, it is logical to integrate forestry extension efforts into the general pattern of agriculture, livestock and community development in the area.

According, implementation of community forestry with active local participation is a time consuming process. It is necessary to provide effective extension service in order to build up local capacity for taking forest management responsibilities through organizing awareness and educational campaigns, trainings, and so on. This calls for a large amount of input (capital, human resource) to be invested in the area. In this context, financial and technical support of ICIMOD and students participation in conducting community research activities will substantially contribute to promotion of community forestry particularly in mountainous areas and generally in Myanmar.



9. Appendices

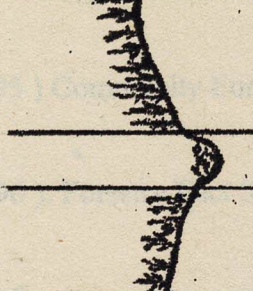
Appendix I. Map showing Location of villages under study



Appendix II. Seasonal Calendar of main crops of shifting cultivation practice

	Jan	Feb.	Mar.	Apl.	May	June	July	Aug.	Sec.	Oct.	Nov.	Dec.
Shifting Cultivation		site clearing		debris collection burning								
Paddy					planting	weeding					harvesting	
maize					planting	weeding						
chilly		harvesting			planting	weeding						
banana					planting harvesting	weeding cleaning & weeding				weeding		

Appendix III. Landuse transect of Taungya-village

Distance		0 mile		1 mile		2 miles	
							
		village	Fallow	Current year plot	Fallow	current year plot	Fallow
use pattern		residents		growing crops		growing crops	no legal logging
species composition		Jack fruit, banana, papaya, pineapple, coconut	bamboo, soft-wooded trees, shrub, herbs	paddy, chilly, cucumber, turneric, pumpkin, maize	bamboo, soft-wooded trees, shrub, herbs	paddy, chilly, cucumber, turneric, pumpkin, maize, pulses	bamboo, soft-wooded trees, shrub, herbs
Product		Vegetable fruits	firewood, bamboo, fodder	food grain, cash crops, vegetable	firewood, bamboo, fodder	food grain, cash crops, vegetable	firewood, bamboo, fodder
							wood, non-wood, pole

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