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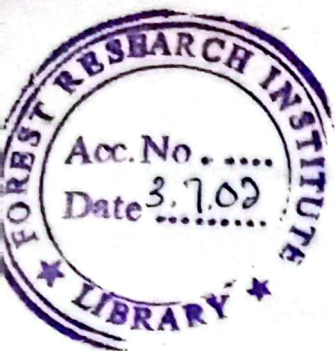
**Sustainability of Natural Resources Through
NWFP- based Income Generation Activities in
Paunglaung Watershed Area**

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ပေါင်းလောင်းရေဝေရေလဲ ဧရိယာအတွင်း သစ်မဟုတ်သည့် အခြားသစ်တော
ထွက်ပစ္စည်းများကို အခြေခံသည့် ဝင်ငွေရလုပ်ငန်းများ၊ ဆောင်ရွက်ခြင်းဖြင့်
သဘာဝသယံဇာတများကို ရေရှည်တည်တံ့ နိုင်မြဲစေခြင်း၊

ဓာတ်မီးအကျဉ်းချုပ်

ပေါင်းလောင်းရေဝေရေလဲ ဧရိယာသည် ဟိမဝန္တာတောင်စဉ်ဒေသအတွင်း ပါဝင်ပါသည်။
၎င်းဧရိယာအတွင်း တောင်ပေါ်နေ ကျေးလက်အစုအဖွဲ့များသည် ၎င်းတို့၏ ဘဝအသက်ရှင်သန်မှု
အတွက် သစ်တောပေါ်တွင် အဓိကမှီခိုလျှက်ရှိပြီး သစ်တောသယံဇာတများကို စားဝတ်နေရေး
အတွက်လည်းကောင်း၊ ဝင်ငွေရရှိရေးအတွက်လည်းကောင်း၊ ပုံမှန်သုံးစွဲလျက်ရှိကြပါသည်။
သစ်တောကို အဓိက မှီခိုသူများအတွက် တောင်ယာစိုက်ပျိုးခြင်းလုပ်ငန်းသည် ၎င်းတို့၏ အဓိက
ဝင်ငွေရလုပ်ငန်းတစ်ခုဖြစ်ပါသည်။ ၎င်းအပြင် ကျေးရွာလူထုသည် သစ်မဟုတ်သည့် အခြား
သစ်တောထွက်ပစ္စည်းများကို စုဆောင်း၍ ဝင်ငွေအပိုရရှိရေးအတွက် ဆောင်ရွက်ကြပါသည်။
ပေါင်းလောင်း ရေဝေရေလဲဧရိယာ အနီးအပါးဒေသမှ သစ်တောကို မှီခိုသူများသည်လည်း
၎င်းဧရိယာအတွင်း ဝင်ရောက်၍ ၎င်းတို့၏ အလုပ်အကိုင်နှင့် ဝင်ငွေရရှိရေး အခွင့်အလမ်းများ
အတွက် သစ်မဟုတ်သည့် အခြားသစ်တောထွက်ပစ္စည်းများကို စုဆောင်း၍ အသက်မွေးဝမ်း
ကျောင်း ပြုကြပါသည်။

ဤသုတေသနပြု လေ့လာမှုအတွက် သစ်တောကို အဓိကမှီခိုသည့် ကျေးရွာ (၆)ရွာနှင့်
သစ်တောကို သွယ်ဝိုက်မှီခိုသော ကျေးရွာ(၂)ရွာအား ၎င်းတို့၏လူနေမှု စီးပွားရေးဘဝများနှင့်
ဆက်စပ်လျက်ရှိသော သစ်မဟုတ်သည့် အခြားသစ်တောထွက်ပစ္စည်းများကို အသုံးပြုခြင်းနှင့်
ဈေးကွက်တွင် ရောင်းဝယ်ဖောက်ကားခြင်းများကို လေ့လာရန် နမူနာကျေးရွာများအဖြစ် ရွေးချယ်
ခဲ့ပါသည်။ ၎င်းနမူနာကျေးရွာများမှ ဒေသခံပြည်သူတို့၏ လူနေမှုစီးပွားရေးဘဝများကို ၎င်းတို့၏
ဝင်ငွေ၊ ပညာရေးနှင့် ကျန်းမာရေးအဆင့်အတန်းများ၊ လမ်းပန်းဆက်သွယ်ရေး၊ သတင်းအချက်
အလက်များရရှိမှု၊ သစ်တောထွက်ပစ္စည်းများကို ရောင်းတန်းဝင်ထုတ်ကုန်များအဖြစ် ပြုပြင်
ပြောင်းလဲခြင်းနှင့် ဈေးကွက်သို့ပို့ဆောင်ရောင်းချခြင်း၊ ပတ်ဝန်းကျင်ထိမ်းသိမ်းမှုအပေါ် အလေး
ထား စိတ်ဝင်စားမှု စသည့် အခြေအနေများအား လေ့လာ၍ အကဲဖြတ်တိုင်းတာပါသည်။

ရရှိသော အချိန်ကာလ အတိုင်းအတာအတွင်း ဤသုတေသနပြု လေ့လာမှုများမှ တဆင့်
၎င်းဧရိယာအတွင်း သစ်တောသယံဇာတများကို စဉ်ဆက်မပြတ် ထုတ်ယူသုံးစွဲမှုကြောင့်
သစ်တောများ ပြန်းတီးလာနေသည်ကို လေ့လာတွေ့မြင်ရပါသည်။ သို့သော်လည်း ၎င်းဧရိယာ
အတွင်းနေ ကျေးရွာလူထုမှာမူ သစ်မဟုတ်သည့် အခြားသစ်တောထွက်ပစ္စည်းများနှင့် သစ်တော
သယံဇာတများကို စုဆောင်းခြင်း၊ ပြုပြင်ပြောင်းလဲခြင်းနှင့် ဈေးကွက်တွင် ရောင်းဝယ်

Sustainability of Natural Resources Through NWFP-based Income Generation Activities in Paunglaung Watershed Area

ABSTRACT

Range of the Himalayan region also includes Paunglaung Watershed Area of Myanmar. Rural communities, particularly living in mountainous areas, primarily depend upon the forest for their livelihood and regularly utilize the forest resources to meet subsistence needs and sustainable income. Shifting cultivation is a major income generating activity of primary forest dependent communities. Apart from shifting cultivation, the communities traditionally earn their additional income from the collection of non-wood forest products (NWFPs). Besides, neighbouring communities of this area, so called secondary forest dependent communities regularly come to the forest and collect the seasonal and non-seasonal NWFPs for their employment and income generation.

In this study, six sample villages from the primary forest dependent communities and two sample villages from the secondary forest dependent communities were selected to determine their income generating activities related to the utilization and marketing of the NWFPs. Socio-economic status of sample villages was measured by their income, status of education and health, access to transport, information, knowledge on processing, marketing and level of environmental awareness, etc.

Within the given time frame, it was obviously observed that some of the forest resources are gradually depleted because of continuous and repeated exploitation within the area. However, status of income is generally low in their societies as a result of poor knowledge on collection, processing and marketing of the NWFPs. Moreover, in general, they have lack of sensitivity in environmental awareness due to less accessibility, poor knowledge, and lack of information and educational training, etc.

Based on these findings, suggestions and recommendations were made to promote future income-generating activities of the rural communities in relation to resource utilization. Emphasis is highlighted on activities relating to future research for human resource development, capacity building and policy implication so as to sustain the NWFP integrated Community Forestry (CF) and Participatory Forest Management (PFM) programmes within the area for future development.

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Sustainability of Natural Resources Through NWFP-Based Income Generation Activities In Paunglaung Watershed Area

1. Introduction

Paunglaung watershed area of Myanmar is a part of the Himalayan range with a forest cover of about over one million acres. It is located in the central part of the country, consisting of two townships, namely Pyinmana and Pinlaung. It encompasses many hills of Shan plateau and most of the area is undulated with some steep slopes ranging from 500 to 5500 feet above sea level. Majority of people living in the mountainous area are ethnic minorities, namely Kayin, Kayan and Shan tribes.

They inevitably depend on the forest resources for their livelihood. Shifting cultivation (Taungya) is their traditional way of major earning in most of the communities. Taungya paddy (upland rice) and some seasonal crops such as banana, groundnut, corn, maize, and vegetables are traditionally grown for their subsistence needs and income generation. Apart from shifting cultivation, the forest resources have also been providing for their sustainable livelihood to fulfilling requirements for food, fuel and fodder, household articles, agricultural and hunting implements and medicines, etc. and income generation as well. Hence, the natural resources in this area form an integral part of the life of the mountain communities.

1.1. Importance of Non-Wood Forest Products

It is now clearly recognized that collection, utilization and marketing of non-wood forest products (NWFPs) is one of the most critical functions of the forest dependent communities in this area. They essentially provide the rural communities their subsistence needs and an economic buffer during off-farm seasons. Moreover, some of them also provide potential income for the rural people. Food sources provided for the communities are the many edible products such as bamboo shoots, flowers, buds, tubers and rhizomes, mushrooms, fruits and vegetables, and wild animals etc. Their essential household needs and income are usually contributed by some forest products such as bamboo, rattan, fuelwood and charcoal, oleo-resins and gums, barks and tannins, various wild medicinal plants, honey, and orchids, etc.

1.2. Income Generating Activities

Although shifting cultivation is primarily a major income generating activity, most of the rural communities in this area also depend on collection of NWFPs to earn additional and extra income. They collect both seasonal and non-seasonal NWFPs from nearby forests and sell them for cash and in kinds to generate immediate and additional income to fulfil social and economic needs. More importantly, the majority of people from secondary forest dependent communities regularly come and collect the NWFPs for their daily and/or seasonal employment and income. Besides, almost all of the communities intensively collect particular kinds of NWFPs that provide considerable income because of popular demand for domestic and border trade. Thus, exploitation of the NWFPs has been recognized as an important component for enhancing rural employment and income in this area.

1.3. Status of NWFP Income

In the past, this area had been rich in floral and faunal biodiversity due to abundant natural resources. The rural communities have regularly exploited the natural resources but they are not in position to manage for the purpose of long-term resource sustainability and their sustainable livelihood.

Over the past two decades, due to growing population pressures and expanding demand of various forest resources, timber and many NWFPs were being over-exploited within the area. Consequently, noticeable changes such as deforestation, watershed degradation, reduction of biodiversity, soil erosion, etc. have been taking place in this area. As a result of environmental degradation, forest dependent communities have been facing difficulties in fuelwood collection, gathering of forest resources for their subsistence needs and income generation.

At present, many of the NWFPs could not provide potential income for the local communities due to scarcity of resources and poor management in storage, processing and marketing. Moreover, capital investment is not enough in the communities for storage of products for certain period in order to gain potential marketing. Thus, poor and low income generation is now a regular phenomenon in these communities.

1.4. Participatory Forest Management

Regarding sustainable rural and forestry development, 'Participatory Forest Management' (PFM) as a strategy has emerged from the recognition that the needs of communities dependent on forest resources must be linked to the conservation of these resources. In that sense, sustainable management of forests and sustainable rural development would be the mutual outcome of developing PFM. Therefore, Forest Department of Myanmar has been formulating the community forestry that are designed to address the interrelated problems of the environmental degradation and rural economy, promoting local communities as the agents and beneficiaries of the forest activities. As an outcome, the FD has promulgated the Community Forestry Instructions (CFI) since 1995. However, policy and implications for PFM and Community Forestry (CF) programmes are in the process of being developed in Myanmar.

1.5. Country Research Programme

With technical and financial support of the International Centre for Integrated Mountain Development (ICIMOD), Institute of Forestry (IOF) had conducted a country research programme in Paunglaung watershed area in year 2000-2001 in order to promote, to some extent, future PFM and CF programmes.

Five research teams were formed to observe mainly current economic status of the shifting cultivators and forest users concerned with availability of resources and their exploitation pattern existing in the area. Observations were also made to be familiar with their socio-cultural conditions related to the forestry activities by probing attitudes, education, knowledge, problems, constraints and opportunities of the forest dependent communities. In addition, their extension needs were determined to conduct future

community forestry programme. It was also attempted to the level of sensitivity on environmental awareness in relation to soil, tree and other forest resources management for the purpose of environmental conservation.

This paper principally emphasizes on the present income generation opportunities of the forest dependent communities mainly concerned with collection, utilization and marketing of the NWFPs. With these findings, the proper design and framework could be systematically formulated to implement NWFP integrated CF programmes through participatory ways and means in this area. As a result, socio-economic status of local communities can be promoted by providing environmentally sustainable income generation activities linked with systematic utilization of the natural resources within the area.

2. Background Information on NWFP production

In considering forest resource management in the past, the Myanmar forestry sector did not emphasize on the NWFP production because these products were considered to be minor forest produce and subsequently the revenue from these products was considerably low. In the past, minor forest produce was defined as "all kinds of forest produce other than timber and firewood"; it comprises animals, vegetables, and mineral products. (Lwin, K.M., 1994)

Although the Forest Department of Myanmar has not completely ignored NWFPs, their management received only minor attention relative to timber management for decades. Thus, ecological impact of NWFP production on environment has not been seriously considered and consequently policy and implications for NWFP exploitation have not been systematically formulated in sustainable forest management. In fact, NWFPs are probably more important than timber or other forest products for Myanmar people especially in rural communities. However, in reality, the rural people have poor knowledge on collection and utilization of the natural resources, and also lack of awareness in sustainability of forest resources. Therefore, some of the NWFPs are being over exploited and that could not lead to sustainable rural economy or sustainable forest management.

At present, attentions to NWFPs are being increasingly paid as new alternatives to timber extraction, forest conservation, and more destructive forms of forest exploitation that led to forest degradation and environmental deterioration. Moreover, importance of NWFPs has been realized in many developing countries due to their potential income and employment opportunities for the rural poor. Policy and implications for participatory forest management have been developing in various countries to enhance people participation and human resource development programmes. NWFP production is now considered to be integrated into the PFM such as community forestry and agroforestry programmes for the sustainable livelihood and well being of the rural communities.

The Forest Department of Myanmar is also highlighting people-centered participatory resource management that must be promoted by encouraging people participation, institutional capacity building, strengthening human resource development

programmes, etc in the rural areas. In this context, efficient and systematic production of the NWFPs should be integrated into the PFM programmes, which would lead to promote socio-economic status of the forest dependent communities. However, the importance of NWFPs and their potential income generating opportunities on the rural communities has not been systematically investigated yet in our country.

At present, a big multi-purpose "Paunglaung dam" is being built in Paunglaung watershed area. Consequently, it becomes a critical watershed area in our country. The FD is thus responsible to promote watershed protection in the area. It is important that most of the communities living in this area entirely rely on the forests for their livelihood and income. Therefore, as one of the preliminary surveys, the IOF conducted the community research in the Paunglaung watershed area to investigate socio-economic status of rural communities in relation to forest resource utilization with social, economical and environmental dimensions. The research on NWFP use and income generating activities are also one of the essential portions in the programmes to formulate future PFM in Myanmar.

3. Aims and Objectives

The studies were carried out to meet the following objectives:

1. To study collection, utilization and marketing of NWFPs in forest dependent communities living in the Paunglaung watershed area from social, economic and environmental dimensions.
2. To enquire whether the NWFPs are sustainable for those communities in the area.
3. To suggest possible solutions for improving future income generating activities with limited resource exploitation.
4. To promote environmental awareness of rural communities for the purpose of reforestation, watershed protection, biodiversity maintenance, and ecosystem conservation.

4. Methodology

As a first step, preliminary survey was conducted in Sinthawt village in order to observe the general status of collection, utilization, and marketing of the NWFPs of the community. Within the area, six sample villages namely, Sinthawt, Kyaukthanbat, Taungkya, Hlwegii, Leinlee and Kyatkyi were then selected from the primary forest dependent communities and two sample villages, namely, Paukkone and Yezin were selected from the secondary forest dependent communities for this study. Field visits to the sample villages were made for primary data collection during October and November 2000.

The general information was collected from the people of the sample villages by applying participatory rural appraisal (PRA), rapid rural appraisal (RRA), and transects during field visits. But, to obtain detailed information, sample households were randomly selected and interviewed with family members to observe their socio-economic conditions in relation to NWFP exploitation and utilization.

The secondary data were also collected from village leaders, elderly men and women, and knowledgeable persons, key informants and some other records. Data analysis and then documentation were finally accomplished for this study.

5. Results and Data Analysis

5.1. Major Income Generating Activities

5.1.1. Shifting Cultivation

Since shifting cultivation (locally called "taungya") provides subsistence needs in most rural communities, *taungya* paddy (upland rice) and some seasonal crops such as groundnut, maize, and vegetables are seasonally grown for their daily food supply. Moreover, they grow banana and other cash crops for their major income. Every year, they extend new "taungya" for growing banana mixed with other seasonal cash crops such as chilli, maize, pineapple, Cardamom plant, *Elettaria cardamomum* (locally called Hpala) and tumeric (*Curcuma longa*), etc. In the banana growing communities like Sinthawt, Kyaukthanbat, common varieties of banana such as "Shweni", "Rhakine", and "Phigyān" plantations are being continuously established for their major income. In other communities such as Hlwegi, Taungya and Leinlee, the shifting cultivators usually grow upland rice mixed with tumeric and also establish Hpala plantations for their income.

Although these farm products are generally their main income, the market is quite limited because of considerable constraints and difficulties presently faced by the communities. Therefore, trades are mostly transacted inside the communities by dealing with middlemen or village traders who come and directly contact with them. Therefore, the shifting cultivators do not get satisfactory income from their products.

5.1.2. Collection of NWFPs

Apart from the shifting cultivation, the forest dependent communities also rely on the NWFPs for their seasonal and emergency income. The NWFPs inevitably play an important role in the rural household in this area. Some NWFPs could be collected throughout the year whereas some could only be collected seasonally.

5.2. Socio-economic conditions of rural communities

Based on this study, it could be regarded as two major types of forest users in this area. Primary forest users are living inside the forest and principally earn their livelihood by shifting cultivation and also some additional income through marketing the NWFPs. Secondary forest users living near the Paunglaung watershed area regularly utilize the forest resources from this area for their employment and income generation. The map of Paunglaung watershed and its neighbouring area is shown in Appendix 1.

Primary forest users are mostly the ethnic people who live in mountainous area, who usually follow traditional ways of site selection, site clearing and land preparation, planting and harvesting techniques, choice of crop varieties, and post harvesting and processing techniques, etc for their farming practices and managing their farm products. They used to fulfill their household needs by collecting various natural resources from the

forest. For instance, they harvest timber, bamboo and rattan, etc. from the nearby forests for construction and farm and household implements.

They are inherently simple, honest and humble in their way of living due to their culture and tradition. They enjoy their lives although they have to struggle day by day to meet their subsistence needs. They have their own cultural significances in each homogenous community regarding ethnicity, religion, belief, social and gender perspectives. Generally, they have low access to education, information, technology and credit and services, healthcare, and marketing.

In each and every community, people generally have access to primary education, and most of the children usually drop out of school after primary education due to financial difficulties and poor transport facility. Therefore, the majority of people in this area is poor in knowledge and consequently have poor sensitivity on environmental awareness. At present, the environment has become gradually degraded due to deforestation and reduction of biodiversity in this area. As a consequence, the people are now facing some problems and difficulties in their ways of earning.

On the other hand, the secondary forest users are living in villages about 6-10 miles outside the Paunglaung watershed area. The secondary forest dependent communities are usually landless and poor who usually depend upon the forests for their livelihoods. The forest is easily accessible for them to market the NWFPs except timber. Regular employment and income generation opportunities are mostly available for these people to earn daily wages as shifting cultivators, banana carriers, NWFP collectors, middlemen and village traders for NWFP market, etc. In general, these communities have better access in transport, education, and information than the primary dependent communities.

All tables are respectively shown as following to measure socio-economic status of both primary and secondary forest dependent communities in terms of social, culture, education and economic dimensions.

Table 1. Ethnic and Religious Compositions

Villages	Total Households (number)	Ethnic Composition (household number)			Religious Composition (household number)	
		Bhama	Kayin	Others	Buddhist	Christian
Sinthawt	48	-	48	-	48	-
Kyaukthanbat	84	20	64	-	56	28
Hlwegyi	100	20	80	-	20	80
Taungkya	74	12	62	-	68	6
Lanelee	81	75	-	6	81	-
Kyetgyi	28	27	-	1	28	-
Paukkone	158	150	5	3	156	2
Yezin	345	334	11	-	334	11

Table 2. Demography of Sample villages

Villages	Length of settlement (year)	Household (number)	Family Size	Population (number)		
				Male	Female	Total
Sinthawt	36	48	4.1	91	109	200
Kyaukthanbat	53	84	5.3	209	237	446
Hlwegyi	14	100	5.0	221	279	500
Taungkya	32	74	4.6	155	183	338
Lanelee	50	81	4.4	160	192	352
Kyatgyi	10	28	3.6	48	52	100
Paukkone	103	158	5.5	561	312	873
Yezin	Unknown	345	5.2	923	867	1790

Table 3. The Status of Landholdings

Villages	Total Household (number)	Landless Household (number)	Land-owned Household (number)
Sinthawt	48	-	48
Kyaukthanbat	84	-	84
Hlwegyi	100	25	75
Taungkya	74	-	74
Lanelee	81	18	63
Kyatgyi	28	-	28
Paukkone	158	148	10
Yezin	345	313	32

Table 4. The Status of Education

Villages	No. of Students				No. of Schools		
	P	M	H	U	PS.	MS.	HS.
Sinthawt	31	9	3	2	1	-	-
Kyaukthanbat	96	3	-	-	1	-	-
Hlwegyi	128	17	5	-	-	1	-
Taungkya	37	11	-	-	1	-	-
Lanelee	72	6	1	-	1	-	-
Kyatgyi	40	-	-	-	1	-	-
Paukkone	63	26	15	8	-	-	-
Yezin ၆	211	41	52	7	1	-	1

P=Primary, M=Middle, H=High, U=University, PS=Primary School, MS=Middle School, HS=High School

Table 5 Accesses to Transport, Health, Market and Information

Villages	Transport		Health			Market & Information		
	Direct	Indirect	MW	HW	TD	Hlgh	Fair	Low
Sinthawt		✓			✓			✓
Kyaukthanbat	✓			✓	✓		✓	
Hlwegyi	✓				✓		✓	
Taungkya	✓				✓		✓	
Lanelee	✓			✓	✓			✓
Kyatgyi		✓			✓			✓
Paukkoe	✓		✓		✓	✓		
Yezin	✓			✓	✓			

MW=Midwife, HW=Heath Worker, TD=Traditional Doctor

Table 6. Community Organizations of Sample Villages

Villages	PO	UI	YM	YW	BS	CO	CR	FR	IG	RE
Sinthawt	✓	✓	✓	✓	-	-	-	-	-	✓
Kyaukthanbat	✓	✓	✓	✓	-	-	-	-	-	✓
Hlwegyi	✓	✓	✓	✓	-	-	-	-	-	✓
Taungkya	✓	✓	✓	✓	-	-	-	-	✓	✓
Lanelee	✓	✓	✓	✓	-	-	-	-	✓	✓
Kyetgyi	✓	✓	✓	✓	-	-	-	-	-	✓
Paukkone	✓	✓	✓	✓	-	-	-	-	-	✓
Yezin	✓	✓	✓	✓	-	-	-	-	-	✓

PO= political organization

UI = Union

YM= Young-men group

YW= Young-women group

BS= Burial societies

CO= Co-operative

CR= Credit societies

FR= Farmer group

IG= Income generating group

RE= Religious group

5.3. Gender and natural resource management

In almost all communities, population of women are greater than those of men. In general, both men and women have an equal access to utilization of natural resources. Concerning gender roles in the productive activities, both women and men actively participate in shifting cultivation practices and NWFP collection although men generally are more responsible for decision-making and control over natural resources.

However, women have more labour burden on reproductive activities or household chores such as cooking, washing, fetching water, feeding animals, children and elderly care, and family health care, etc. In addition, women usually spend some of their

time on collecting the NWFPs to meet household use and to generate certain income. Thus women are engaged throughout the day in household chores and farm activities as well as other income generating activities.

In this area, labour wages for women are equal to that of men; therefore, gender equity is seen in that sense. Nevertheless, women have less access to non-natural resources such as education, participation in local institution and organizations and development activities in these communities. Tables for labour divisions of men and women in shifting cultivation and for reproductive activities traditionally defined in most of the communities are described as follows.

Table 7. Labour Division of Men and Women in Shifting Cultivation

Activities	Men	Women
Site selection	√	
Slash and burning	√	
Site cleaning	√	
Land preparation	√	
Planting	√	√
Weeding		√
Harvesting	√	√
Transporting	√	√
Marketing		√

Table 8. Labour Division of Men and Women in Reproductive Activities

Activities	Men	Women
Cooking/Washing		√
Cleaning House		√
Feeding Animals	√	√
Collecting NWFPs	√	√
Fetching Water	√	√
Animal Care		√
Child Care		√
Health Care		√
Care to elders		√

5.4. Availability of NWFPs

It is now clearly apparent that the NWFPs are quite a promising forest resource because considerable items of NWFPs are capable of meeting their household needs and certain incomes for the forest dependent communities. Collection, utilization and marketing of the NWFPs in this area are always functioning particularly for the rural poor

in helping to fulfill subsistence needs and income. It is reportedly known that although certain forest resources like timber, rattan, honey, some orchids, and wild animals, etc. have become noticeably scarce as a result of environmental degradation and over exploitation, some of the NWFPs in this area are still available in a sustainable manner. For example, *Tamasaing* and *Thatching Grasses*", *"Round Yam"* and some other resources are abundantly available every year and peak harvesting does not adversely affect the rate of regeneration in the natural forests. Hence, collection of NWFPs still stands on significant roles for the rural poor.

However, because of the diversified nature of the NWFPs and lack of systematic investigations, it is difficult to assess their value and consequently the exact income in monetary term provided for the rural communities. Besides, the extent of the social and cultural value of the NWFPs is also not widely studied yet in Myanmar.

This paper only highlights the resource availability in relation to importance of household needs and particular NWFP trade in the local area. Based on the study, the NWFP could be principally grouped as (i) edible products for food security, (ii) household products for household and social needs, and (iii) income generating products for sustainable livelihoods of the local people living in the Paunglaung Watershed Area.

5.4.1. Edible Products

Many edible plant products are seasonally available in the natural forests to support food security of the local people in this area. Bamboo shoots, mushrooms and various kinds of vegetables are widely collected as edible products during rainy season that provide food security as well as seasonal income for all of the rural communities in this area.

(i) Bamboo shoots

Collection of bamboo shoots can be considered as one of the income generating activities in most of the communities. Nevertheless, due to seasonal availability of bamboo shoots in the rainy season, the communities usually have small amount of cash and kinds for household needs. They can also be preserved as various types in salted, soured and dried forms. The communities usually preserve them for household use and seldom for income generation.

(ii) Mushrooms and vegetables

As mushrooms are also one of the important foods, the rural communities serve as delicious vegetables for their meals. Mushrooms are generally found in the forest proximal to villages especially in the rainy season. Mostly women are mushroom collectors, as they can easily harvest them from the nearby forests. Women also manage surplus amount of collected mushrooms, selling it in the local market. Like bamboo shoots, its income is quite low and they could only purchase some necessary items for their household use.

Varieties of vegetables such as buds, shoots, flowers, tubers, rhizomes, stems and roots are seasonally available in the forest and contribute to food security for the rural communities.

(iii) Animal products

The rural communities traditionally rely on bush meat for their protein supplement but they rarely earn their livelihood as hunters in the area. But some ethnic people enjoy hunting when they are performing farm works in the shifting cultivations. According to their tradition and custom, whenever they hunt the wild animals, they share those bush meat with all of the households of the community. The excess is sold out to the neighbouring communities at very cheap price. In these days, however, due to deforestation and reduction of biodiversity, wild animals have become noticeably rare in the area.

5.4.2. Household Products

(i) Fuelwood

Fuelwood is one of the essential household items for all of the rural communities within the area. They usually collect the fuelwood from the natural forest. In the past, fuelwood collection was quite easy for the communities due to easy access to the resources. They could choose whatever tree species they liked and amount of the collection was also unlimited. Some communities used to collect the fuelwood for their whole year household use during off-farm seasons.

(ii) Bamboo and rattan

Bamboo could be regarded as an essential product of the rural poor in the area. It is mainly used for building materials such as roofing, walling, flooring, post, etc. in the poor communities. In addition, primary forest dependent communities usually utilize bamboo products by processing various kinds of finished products such as mats, various kinds of baskets, tables and chairs, etc for their household uses. Some finishing products are also essentially made for the post-harvesting processes and for marketing.

Rattan is also used for the same purpose; however, it is not much available within the area due to over-exploitation in the past.

(iii) Thatching grass (*Thekke*) and In-leaves

One of the local roofing materials is made by a kind of grass locally called "*Thekke*". It grows in large area of fallow lands and also particularly found in open forest edges. The collectors usually harvest them starting from October up to December. The communities process the finish products between February and April during their off-season after harvesting farm products from shifting cultivation. They usually collect thatching grass and process them for household use and seldom for income generation. As transport is a difficult task for them, its market is considerably low for the communities.

In some communities, "In" (*Dipterocarpus tuberculatus*) leaves are also used as roofing material, which has to be annually replaced with the new product, as it is usable only for a year. However, only poor people in some communities use it for roofing material, as it is easily available in the area.

(iv) Plants, herbs and shrubs

Various kinds of plants, herbs, and shrubs are regularly collected for the ethnobotanical aspects on health and social security of the local communities. Depending upon cultural significances and traditions, these resources are used in different ways and styles in different communities. It is obviously found that most of the herbal medicines are traditionally used in almost all of the communities.

5.4.3. Income Generating Products

The forest resources termed as "income generating products" in this paper mainly concerns either high or low income for the communities within the area. The communities used to collect these products and deal with various levels of market for their income generation. There are some income generating products available in the area and are mentioned as follows.

(i) Charcoal burning

Charcoal burning provides low investment, but workload is considerably heavy in the processing. Within the area, some of the communities make their main income by charcoal burning and marketing. In the past, they easily harvested the trees such as Pyinkado, Gyo, Ingyin and other available hard wood species, which produce good quality charcoal, from the natural forests for charcoal burning.

At present, good quality charcoal producing hardwoods are becoming rare and they have to use the inferior quality hardwood species for charcoal burning. The charcoal burners sell these products in the nearest local markets, which take place once every five days at the Yezin village and also at University campus market and try to earn their daily income for the household. Some communities are quite content with their present income and they do not exert themselves to look for other better income opportunities within the area. Chain of market prices of charcoal from the charcoal burner to the retailers can be listed as follow:

From burner to middlemen (16 kg per bag of charcoal)	300 Ks
From burner to local end users (Including transport cost)	400 Ks
From middlemen to wholesalers	600 Ks
From wholesalers to retailers	700-900 Ks

According to the interviewees, they had to collect a considerable amount of the good quality charcoal producing hardwood species that was still available in nearby forests for about a week to make 20 bags of charcoal. The process to make charcoal usually takes 12 days and then the products are sold in the local market. Most of the carriers are teenage school drop out girls whose parents can no longer send them to school.

(ii) Bamboo

Among NWFPs, bamboo is one of the most important products not only for household use but also for income generation. Bamboos are popularly well known as poorman's timber. It can be collected throughout the year. As the bamboos occupied almost all of the fallow lands and the remaining natural forests within the area, bamboos were considered as inexhaustible forest resources in the past.

However, due to population pressure and continuous exploitation, it is now becoming scarce and the collectors have to cover longer distance for collection. There were seven species of bamboos commonly found in the area and are as follows:

No.	Local Name	Scientific Name
1.	Hmyin Wa	<i>Dendrocalamus strictus</i>
2.	Wabo Wa	<i>Dendrocalamus brandisii</i>
3.	Kyathaung Wa	<i>Bambusa polymorpha</i>
4.	Tin Wa	<i>Cephalostachyum pergracile</i>
5.	Thaik Wa	<i>Bambusa tulda</i>
6.	Wanwe Wa	<i>Dinorchloa milellandi</i>
7.	Wathabut	<i>Neohouzeaus helferi</i>

Income from the bamboos usually depends upon the kind and quality of bamboos, capacity of the collectors and market accessibility. The local prices of raw bamboo are not much different among the communities. Most of the bamboo collectors sell produce either to the village traders or middlemen at current prices. However, the transport charges are added if the collectors or carriers send the bamboos to Yezin or other larger markets or to the end users. In this case, the middlemen usually transport the bamboos to larger markets of the neighbouring areas, but the forest dwellers have a little or no chance to deal with the larger markets due to poor accessibility of market information and lack of local organization.

According to this study, technologies and market feasibility for various bamboo finished products have provided higher income, particularly, for secondary forest users and small-scale processors of the neighbouring communities.

(iii) Bamboo shoots

Bamboo shoot is one of the popular items for income generation of the rural communities within the area. It can be annually collected from the natural forests during rainy season for local trade. Bamboo shoots of *Dendrocalamus brandisii* and *Bambusa polymorpha* are locally available and usually processed as sour bamboo shoots. Its market is very demandable in Pyinmana town and local traders and processors purchase the raw or already processed products. The traders usually store these products for the whole year. Processing for sour bamboo shoot is very simple by keeping in the containers or underground pits for a week before it becomes sour.

However, capital investment and market accessibility are the constraints, which the rural communities cannot overcome as they are poor. The price of sour bamboo shoots is 2-5 times higher than the raw one depending on the seasonal availability. During peak season, the local collectors could get this product at a very low price, as the supply is much greater than the demand required by the local traders.

(iv) Rattan (local name *Kyein*)

Although rattan is one of the valuable NWFPs in this area, its growing stock has greatly declined due to over exploitation in the last five years for domestic and export trade. At present, collection of rattan could not provide potential income for the communities because only immature and young re-growths are available within the area. About 5 common species were found particularly in the hilly parts of Paunglaung watershed area. They were as follows:

No.	Local Name	Scientific Name
1.	Kyet Oo Kyain	<i>Calamus platyspathus</i> Mart.
2.	Kyain Kha	<i>C. robinsonianus</i> Becc.
3.	La me Kyain	<i>C. palustris</i> Griff.
4.	Kyain Pan	<i>Plectocomia macrostachya</i> Kurz
5.	Wa Po Kyain	<i>Korthalsia laciniosa</i> Hart.

(v) Medicinal plants and spices

In this area, a variety of medicinal plants and spices are locally available and collected by the rural communities both for traditional medicines and income generation. Ethnobotanical research team of the IOF recently reported that about 58 known species of plants were collected for the medicinal uses within the area. In addition, some of the resources are now popular in domestic market and border trade, which provide high income for the communities. The forest dwellers seasonally collect them, and sometimes process them to the dried state and wait for the middlemen to come and buy them. Occasionally, the village traders purchase these resources and then transport them to larger markets or to the wholesalers who in turn deal with retailers or even border trade.

At present, the most popular medicinal plants, collected from this area are *Rauwolfia serpentina* (Bonmayaza), *Nervila fordii* (Tabin-shwe-hti) and *Curcuma longa* (tumeric) as their market prices are very attractive for the communities. *Elettaria cardamomum* (Hpala), also one of the popular spices in Myanmar, is a wild perennial herb. It is mainly found in the hilly parts of the Paunglaung watershed area such as Hlwegyi, Taungkya, and Lanelle. Over many decades, the rural communities had regarded it as a wild natural plant but at about 1970s, local people came to know of its uses and potential market and they started to collect them from the forests. Due to continuous exploitation and timber extraction in the area, the densities of Hpala and other natural plants have declined in the forest. However, they have now come to realize that it can be cultivated under certain circumstances for their regular income generation.

The communities are now extensively establishing Hpala plantations as regular income can be realized in three years after cultivation. Its market is also very demandable

both in domestic and export trade particularly at the Chinese and Indian borders. Nevertheless, local cultivators lack planting technology and limited market information to earn high income, and consequently the greater profit goes to the wholesalers. However, income from even raw material is quite high for the cultivators.

(vi) Round Yam (Local name 'Wa U')

Round Yam, *Amorphophallus campanulatus*, (locally called "Wa U") is a kind of edible tubers, being modified underground storage stem. It is mostly available in hilly portions of the Paunglaung watershed area such as Kyaukthanbat, Hlwegyi, Taungkya, and Lanelle, etc. Wa U is mostly available during September and a collector can at maximum harvest 50 viss (800 kg) per day. Nowadays, the collection of round yam is very popular in this area because it is mainly used for the artificial meat production. Either raw material or the already processed could easily be sold out to the village traders or middlemen.

The 'Wa U' collectors could only get 15-25 Ks. per viss of raw form for their sale in the communities and then the local traders or middlemen earn higher price by transporting them to the small-scale processors. A viss of dried Wa U is usually left after 7-8 viss (average 7.5viss) of raw product has been dried and fetches 550-650Ks in the larger markets. After the cost of labour for peeling and drying process are counted, the net profit from sale of the dried products is still very great.

Although the technology of the processing is not very difficult, the traditional collectors rarely process the raw ones due to lack of technology and capital investment. However, technology for the making of artificial meat is still not available in the country and only dried products are transported to the Chinese border trade. The market chain from middlemen to border trade is not available in this study due to lack of information.

(vii) Honey

Collection and marketing of honey has been a very attractive income generating activity for the communities. Honey collection is annually carried out in the area from March to May. Colonies of honeybee were mostly found in the big trees of Dipterocarps species such as *Dalbergia kurzii*, *Salmelia malabarica*, *S. insignis*, etc. In the past, very huge beehives were found in the closed forests and a collector could even harvest a maximum of 10 gallons (60 bottles) of honey per beehive. However, due to consequences of deforestation, beehives are not readily available in the forests now.

Current price of honey is quite high (200 Ks per bottle) even in the local market. Thus, honey collection is a source of good income for the collectors within a short period.

(viii) Orchids

The forests of Paunglaung watershed area also produce a number of wild orchid species, some of which are presently quite popular in illegal border trade. The forest dwellers usually collect the orchids and immediately sell to the middlemen who visit the communities regularly to buy them. Pertaining to its market flow, the orchids were

successively sent to border trade through a number of intermediaries. However, market information and flow is not generally transparent between forest users and intermediaries.

(ix) Broom grass (Tabyetsi or Tamasaing grass)

Tamasaing grass, *Thysandeno maxima*, is also a kind of wild grass species. It is ubiquitously available at the forest edges and fallow lands. It could be harvested from the base of the stem to include the flowering portions used for making brooms. Duration of collection is about three months, starting from December and ends in March, but the best time is February when the grasses ripen. However, leaving these mature plants in the lands until or after February is very conducive to forest fire.

This product is very demandable in the local market every year and middlemen usually visit and purchase large amount of it and then transport it to the towns for cottage industries and small-scale producers. The secondary forest users usually maximize this product to earn considerable amount of immediate income. As a standard size, a dried bundle of three feet diameter of tamasaing grass is bought at local price from the local collectors. Such a bundle gives approximately 50 numbers of brooms at a commercial status. In this case, the small-scale processors make brooms by hiring skilled labours and the finished products are sold out to various markets throughout the country. Excluding costs of labour and other necessary items for making brooms, the value of finished products become at least three times higher than the raw product.

In addition, some of the local traders commonly store this product for about three months and sell them to cottage industries and small-scale processors at much higher prices. However, the primary forest users rarely collect this product because of poor market information and lack of technology for the finished products. Almost all of the collectors are from the secondary forest dependent communities and they intensively collect this product during peak season.

(x) Thitsi (Gum Oleo-resin)

Gum oleo-resin (crude black oil) can be tapped from living thitsi trees (*Mecanorrhoea usitata*). It is mostly available in the Indaing forests. The local traders buy this product for use as varnishing materials in lacquer-ware and bamboo-ware cottage industries. According to this study, some varieties or strains can exude resin only during rainy season whereas other can be tapped throughout the year. The method of tapping is by folk method. However, at present, the populations of *Mecanorrhoea usitata* are becoming scarce in the forests due to fuelwood over-exploitation. As a result, the price of even crude thitsi product is quite high in the markets.

(xi) Barks

Barks are sources of tannin and natural dye. A number of tree species such as *Cassia fistula*, *Terminalia chebula*, are debarked by the local communities in order to meet local market demand. Due to debarking without prevention of fungal attacks, most of the debarked trees have died in the natural forest. Incomes from these products are

relatively lower than other popular items but this is also one of the opportunities to earn additional income for the local collectors.

(xii) Food wrapping leaves

Since lower part of the Paunglaung watershed area is dominantly covered by deciduous Indaing forest (*Dipterocarpus tuberculatus*), in-leaves can be collected most of the time during the year for selling them as food wrappers. Particularly, women from the secondary forest dependent communities come and collect those leaves for their daily income. Although this gives very low income, it can however support their daily needs to some extent especially for the poorest families. In this case, widows and female-headed households usually have to do such pattern of earning as no investment and technology is needed.

5.5. Resource Exploitation Pattern

Based on the information from sample villages, it is apparent that the rural communities regularly and seasonally utilize the NWFP from the forests. Resources like bamboo, fuelwood and charcoal, and some household products are being exploited for their daily use and also as income, resulting in some of the growing stock becoming exhausted, which may lead to scarcity in the near future. For example, the charcoal burners intensively harvest the trees, including the small sized regenerated trees for their daily income. Consequently, it affects the regeneration of valuable tree species in the natural forests.

Besides, some particular NWFPs have high commercial value and the collectors intensively harvest those popular items. Uncontrolled collection and inappropriate technique will lead to reduction of natural regeneration and thus these resources are now becoming scarce within the area. For example, medicinal plants such as, "Tabin shwehti, Bonmayarzar" and some of the native orchid species are being over-exploited which may lead to extinction in the near future.

On the other hand, some of the NWFP resources are seasonally available and hence the collection is also limited for the gatherers. Nevertheless, the rate of regeneration and sustainability of these products mainly depends on the rate of harvesting and their techniques of collection.

Generally, the communities' landless people maximize short-term income by harvesting the resources as much as possible. They could not avoid resource damaging harvesting technology that affect the sustainability and product quality as well. In general, most of the communities lack knowledge on environmental conservation. They do not realize that excessive or careless NWFP collection can have negative impacts on forest ecosystem and sustainability. This may adversely affect the long-term security for their livelihoods.

According to the analysis of the study, however, very few local forest users and forest dwellers have indigenous technical knowledge on resource utilization and harvesting so that they can exploit the forest resources wisely and systematically for sustainability.

Table 5.1. Seasonal Calendar of NWFP Collection in Paunglaung Watershed Area

Items of NWFPs	J	F	M	A	M	J	J	A	S	O	N	D
Animal products												
Bamboo												
Bamboo shoots												
Barks												
Charcoal												
Honey												
Inn leaves												
Medicinal & Species												
Mushrooms												
Orchids												
Resin												
Tamasaing												
Thekke												
Wa U												

5.6. Problems, Constraints and Opportunities

Suggestion should be made based on constraints, problems, and opportunities of the communities to consider the ways of long-term resource sustainability and upgrading market opportunities. Therefore, constraints, problems and opportunities for promoting potential markets and high income generating opportunities for the rural communities are studied and mentioned as follows:

5.6.1. Poor (or) lack of Processing Technology

Many NWFPs need to be pre-processed or processed through relatively simple and available technologies. But most of the rural people do not know how to process them for higher income value-added products. Processing includes storage and preparation of a collected product for sale to end users or intermediaries. Lack of processing or poor knowledge in processing reduces the incomes of the traditional gatherers. For instance, the rural communities cannot properly process the 'Wa U' in dried forms as middlemen do in order to transport it to the larger market. They can only collect considerably large amount of raw products from the forest, and market them at low income.

Another example is also that relatively greater exploitation of tamasaing grass for making brooms provides much lower amount of income when compared with income of even small-scale processors earning with this product. In addition, better storage techniques can improve product quality by reducing damage or deterioration of raw materials. In this case, capital investment plays an important role to store large amount of

the products for certain period. For example, net profit of the bundles of tamasaing grass after 3 to 6 month storage is double that of those in harvesting season.

The interviewees from Sinthawt and Kyaukthanbat communities said that their products could not often be kept for longer period so as to get a better price, as they are liable to degenerate. For example, after harvesting, such products as round yams, tamasaing grass and bamboo shoots, etc., have to be immediately sold out at low price to the village traders or middlemen due to lack of technologies for storage and processing.

NWFP gatherers are mostly low-income people in the rural communities and thus any amount of additional income earned from NWFPs is very important for their livelihood. However, whatever NWFP is collected, the market is limited, to a large extent, due to many constraints and difficulties.

5.6.2. Status of Market Information

Within the area, most of the villages have no direct access to the road and facilities to transport their products easily to larger market. Poor information due to lack of media like newspaper, and commercial journals fail to provide any current market information for their NWFP trade. Although the middlemen usually come and collect their products, they keep market information from the forest users who may improve their bargaining power if the information is available. Sometimes, even if the information is available, most of the local collectors cannot fully utilize it to deal with larger markets because of their poor knowledge on marketing and low accessibility to transport.

5.6.3. Levels of intermediaries

Individual NWFP collectors usually sell the collected products to various levels of intermediaries since they have poor transportation and market information. Observing the market chain, the NWFP trade involves a large number of intermediaries who could add the value of products in the respective markets. Needless to say, the local communities can achieve only the lowest income from the products.

There is a number of levels of intermediaries such as village traders, brokers, and middlemen, who directly deal with communities and who can transport them to local traders, processors, small-scale producers, and wholesalers, with quite satisfactory prices. If proper processing can be done in the middle steps, the values of these products are considerably higher at the user's end. Thus, the roles of communities in the NWFP market could be promoted by reducing the number of intermediaries involving in the market chain.

5.6.4. Poor transport infrastructure

As mentioned above, transport infrastructure in some areas is also one of the most important factors for potential marketing, which would provide higher income generation. Some villages located in off-road areas (e.g. Sinthawt, Leinlee, and Kyatkyi villages) have no direct access to the road and facilities to transport the products to larger markets.

However, some communities (Kyaukthanbat, Hlwegyi, and Taungkya) with access to transport facilities have only a few knowledgeable persons who individually trade in the larger markets.

5.6.5. Lack of credit and local organization

In all communities, there is still lack of credit and local organization for production, processing and marketing of their collected products. According to social and cultural situations of this area, women and children dominantly play a major role in collecting, processing and marketing NWFPs. The majority of NWFP collectors could not store their products for a certain period because they cannot invest time and capital for their survival. Thus, most of the collectors individually deal with local traders and middlemen to sell their collected products for immediate income. They have no other alternative.

As far as this study is concerned, they have no knowledge and experience on forming local organizations so as to market their products in larger towns and cities for higher income. This study also revealed that no micro-credit function was provided in each community within the area. Therefore, during the time of seasonal abundance, the forest users had no other opportunities to avoid peak collecting of the seasonal products for marginal income of the households. As a result, these products rarely provided satisfactory income for most of the communities.

Since no community development project has been initiated by either Forest Department or other agencies, they have no opportunity for credit and local organizations such as micro-credit and market co-operatives, etc. in this area.

5.6.6. Poor sensitivity in environmental awareness

In general, the rural communities are familiar with availability and pattern of the natural resources existing in the forests for their livelihoods. They assume that as nature's gift, the forests would always provide almost all the materials for their subsistence needs as food, fodder, fuelwood, materials for construction and farming, healthcare and also contribute to social and cultural needs for the society. They thought that the forest resources were inexhaustible in the environment. Now, they have come to realize that many of the resources in their neighbouring forest are becoming scarce for their subsistence needs and income generation.

However, they ignore the changes taking place in the environment due to negative ecological impact by over-exploitation of forest resources. Since they have low access to education, information, technology, services and training, they lack sensitivity on environmental conservation and sustainability. As a result, they do not realize the consequences of deforestation, watershed degradation, reduction of biodiversity. Results from household interviews in each sample village show that they are often concerned and concentrated their attention on the potential income from the forest resources while ignoring the resource sustainability for the long-term security.

5.6.7. Easy Access to the forests

As an opportunity, the rural communities have easy access to the forests to collect the NWFPs within the area. The government allows the public to utilize the forest products from the unclass forests except protected plants and wildlife species. In addition, although the FD emphasizes on some items of the NWFPs for the collection of revenue, the rural communities are usually free from it for their household use and marginal income.

5.7. General Perception of the Rural Communities

Viewing the discussions with the shifting cultivators from the sample villages, they expressed that it had become a problem in selecting lands for shifting cultivation due to unavailability of fertile lands. As a consequence, crop yields are declining as the young aged fallow lands are now being selected by the villagers for shifting cultivation. They have also some other problems such as soil erosion, occurrence of pests and diseases, poor transport and lack of information on marketing, etc.

Regarding the collection of the NWFPs, the household interviewees from Sinthawt and Kyauthanbat villages expressed that although they practiced the collection of the NWFPs, they usually exploited the limited amount of the products only for their food security and household use, sometimes for their marginal income. In addition, they were not much interested in exploiting the NWFPs for major income since they had poor knowledge on processing and marketing of the collected products. Moreover, what they generally perceived was that most of the forest resources were readily available for their subsistence needs and would naturally regenerate and be sustainable if they did not over exploit the resources.

Some interviewees from Sinthawt village complained that in these days many people from secondary dependent communities regularly came up and over exploited timber and the NWFPs for their major income. Thus some of the resources such as rattan, some orchids, honey and valuable medicinal plants had become noticeably scarce in their nearby forests and would become extinct if not properly conserved.

Concerning resource sustainability, most communities, except Taungkya and Sinthawt communities, have less interest in long-term activities such as agroforestry and community forestry projects. They are more interested in the short-term activities for maximum income. However, it is reportedly known that some knowledgeable people from the primary forest dependent communities have come to realize the consequences of deforestation and environmental degradation with regard to the sustainability of the resources and their livelihood.

In case of the secondary dependent forest communities, the information indicates that the landless people consist mostly of the NWFP collectors. According to the discussions with the village headman and an elderly man from Paukkone village secondary forest community, the number of forest users have increased in the present situation due to abandonment of their own paddy farms for the development projects. About half of all households now regularly depend on the forest for their livelihood.

In the course of household interviews in Yezin village, the interviewees said that it was difficult to estimate their exact income from the NWFPs because they had only marginal income from the NWFP collection. Amount of cash income depended on how frequently they visited the forests and how much available the products were at each time of collection. Moreover, some of the interviewees were reluctant to express their income from the forest resources. Perhaps they are earning more, from the NWFPs, than they admitted to express.

However, low-income community people expressed that they earned additional income from the forest because they had to fulfil subsistence needs and supplement income for their households although they could not calculate the exact amount of such income. They said that the resources were also readily available for the communities since they had access to forest without difficulties. The communities generally considered that the NWFPs were their common properties. Therefore, their expression proved that they had poor sensitivity on environment.

According to the analysis of the study, both forest dependent communities believe that the exploitation of the NWFPs have less ecological impact on environment than timber production. Elderly men and some of the forest dwellers from the primary forest dependent communities mentioned that once they had good forests in the neighbouring area and they utilized the timber only for their household use. They also expressed that deforestation noticeably occurred in the area due to over exploitation of timber by outside agencies. They were not engaged in commercial timber production either legally or illegally.

Generally many interviewees from the primary forest dependent communities except Sinthawt community have little knowledge on forestry development activities including community forestry programmes.

6. Recommendations

This study concentrates on the collection, utilization and marketing of the NWFP of the rural communities living in the Paunglaung watershed area. In this area, collection and utilization of NWFPs is one of the most critical functions of the forest dependent communities by providing certain income as an economic buffer of the rural poor in hard times. In addition, some NWFPs have a high commercial value for the rural communities to fulfil their income significantly.

It was generally accepted that commercial exploitation of NWFP was less ecologically destructive than timber harvesting and thus has greater potential for sustainable forest management. However, as the Paunglaung watershed is an environmentally sensitive and ecologically fragile area, excessive or careless resource utilization has exerted negative impacts on forest ecosystem. As a consequence, environmental degradation is markedly noticeable in the area during these days. Based on the results, many NWFPs are being exhausted to a large extent within the area because local people have maximized the utilization of the products for short-term income and consequently, the rate of harvestings were uncontrollable. Moreover, they are poor in the

correct technology of harvesting, thereby damaging the natural resources and thus not sustainable.

It is now realized that participatory forest management is an effective strategy for sustainable rural and forestry development particularly in the developing countries. Therefore, the Forest Department of Myanmar is also highlighting people-centered participatory resource management that must be promoted by encouraging people's participation, institutional capacity building, strengthening human resource development programmes, etc in the rural areas.

To implement CF and PFM programmes efficiently and effectively, socio-economic development of the local people must be fully considered as an essential aspect for their sustainable livelihood. Based on this study, NWFP production should be considered to become integrated into the CF programmes in order to promote income-generating activities of the rural communities without affecting the sustainability of the natural resources. However, development of the CF and PFM in Myanmar is still in its infancy. Moreover, NWFP integrated forestry development programmes are not yet incorporated into the participatory forest management.

Thus, NWFP production should better be integrated into the PFM programmes for sustainability of both communities' income and the environment. Nonetheless, there are still some constraints and lack of the technology know-how in managing NWFP production among the local communities. Based on the present findings, proper collection methods, storage and processing technologies have not been developed in the rural communities. As a result, the collectors could not process better or value added products to gain higher market prices. Marketing of processed Wa U and bamboo shoot is a good example for upgrading income of the local people for this area. A key to achieving successful NWFP programme would be the introduction of technologies provided for proper methods and techniques of collection, storage and processing to gain potential markets. Hence, progress should be made in building up the awareness among the communities about sustainable production of NWFPs in relation to sustainable income offered by the natural forests.

In addition, they should ensure usufruct rights on the benefits of long-term CF programmes by developing agroforestry plantations, establishing medicinal plantations, fuelwood and multi-purposed tree plantations and proper utilization of NWFPs etc. for the sustainability of the forest resources and income as well. Ensuring active participation of the local people and various level staff, community forestry extension trainings should be frequently provided by the Forest Department. Finally, it is most important to increase sensitivity on environment conservation through awareness creation and motivation to the local communities. In this way, they will come to understand the wisdom of actively participating in the development activities both for raising their socio-economic status and conserving the environment in a sustainable manner.

In this context, the FD should undertake action for research, field demonstration, and policy and programme implication. For example, market oriented researches should be extensively conducted to understand the broader context of NWFP trade throughout the country. Accordingly, market information could also be transparent among the communities to efficiently perform the better trade and marketing practices both for

sustainable income and long-term security. However, with its limited human and financial resources, the FD could not provide all of the necessary information and technology for the local communities within a short time frame. Therefore, the FD needs to collaborate with other stakeholders such as government agencies like Myanmar Agricultural Service (MAS), Land Use Department, and other international agencies such as UNDP, and other non-governmental organizations to obtain the technical and financial assistances for the project implementation.

Furthermore, strengthening local and institutional organizations for collection, processing and marketing of NWFPs would ensure equitable distribution of resources as well as their sustainable income. For instance, more income should be generated so as to establish co-operatives for credit and marketing functions, to deal with larger and commercial markets. Assessing information, technology, education and training through organizations might enhance the capacity building of the local communities. Finally, it is most important to increase sensitivity on environment issues through awareness creation and motivation to the local communities. Consequently, they will come to actively participate in the development activities both for raising their socio-economic status and conserving the environment in a sustainable manner.

Besides, gender consideration needs to be developed in the CF and PFM programmes since the labour division among women and men could also be a starting point for developing strategies for the NWFP productions. In the rural societies, women need to have equal access to information, technology, educational training and other possible opportunities in order to conduct gender integrated PFM programme that would lead to sustainability. Gender analysis training should also be conducted for various level extension staffs to understand the different needs, skill and knowledge of women and men in diverse communities (Montes, C.S., 1999). Based on the findings, the staffs could identify gaps, strengths and weakness of all of the forest participants so as to sustain the CF and PFM in each community.

Policies should also be undertaken for NWFP integrated PFM programmes; the Forest Department needs a better understanding of the uses and users of the forest to gain fully the co-operation and capacities of the forest dependent communities. Policy decision concerning NWFP use, development and management should also be made at different levels, community, regional, state, national and international. Moreover, the FD should properly formulate the NWFP utilization linked with long-term resource sustainability for the rural communities. Therefore, the following actions should be urgently undertaken before formulating the long-term plans for the sustainable forest management and rural economy.

1. Market oriented researches should be conducted to understand the broad context of NWFP utilization throughout the country.
2. Field level researches should be conducted as much as possible to develop NWFP management plans at community level efficiently and systematically.
3. Inter-country and intra-country experiences for management and implementation strategies should comparatively be synthesized to develop proper management

strategies that would provide a conceptual framework through which local users undertake a more active part in sustaining the natural resources.

4. Policies related to participatory natural resources' management should be laid down to ensure that rural communities have better access to the state managed NWFP resources.

7. Conclusion

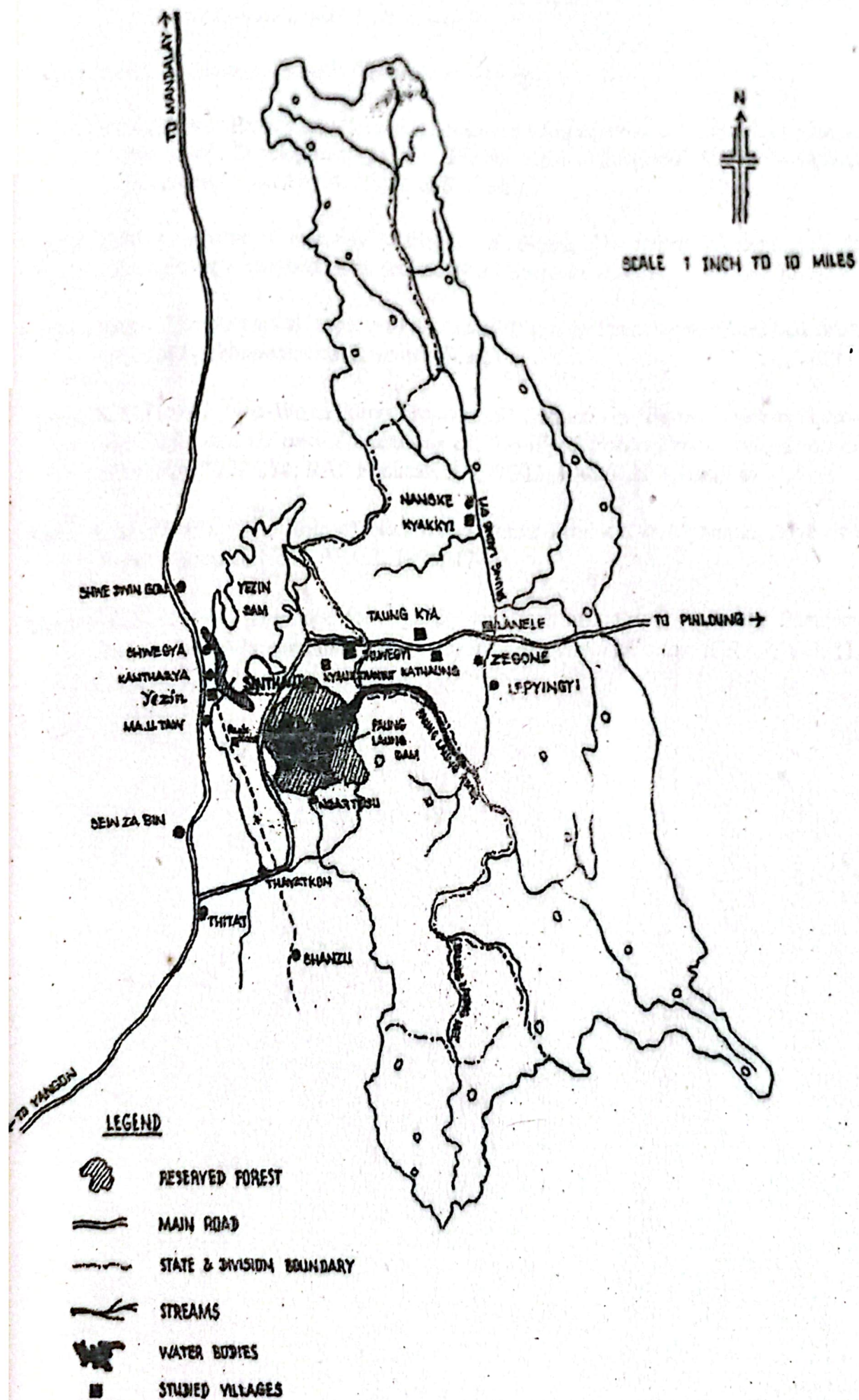
As a whole, environmental conservation programme should be urgently introduced to the area to restore the environment and to promote the socio-economic status of rural people. In order to maintain and sustain the forest resources and their uses, the community forestry through participatory approach might be the best way to enhance the active participation of the local people who will practise the sustainable forest management.

Recognizing keys to the success, activities for human resource development are surely the first priority and at the same time unconventional approach like empowerment of the local communities is also equally important in participatory forest management. Building institutional capacities both for local forest user groups and the staff of the FD through conceptualizing policy must also be the second priority to make their functioning conducive to people oriented sustainable natural resource management. In addition, environmental awareness should also be essentially created through contribution of educational knowledge by the extension services of the Forest Department.

Regarding the sustainable livelihood of the rural communities in the area, the FD should better plan to integrate the potential role of the NWFPs into the development of community forestry and participatory forest management programmes. Moreover, possible effective ways and means of income generating opportunities will certainly come out if management strategies and policy concerned with NWFP production are properly framed in the CF and PFM programmes. Therefore, considering successful ways and means of sustainable NWFP production, systematic collection, harvesting, and processing technologies could develop through extension services of the FD.

In pursuit of these objectives, substantial contributions of the ICIMOD and the IOF have potentially provided some extent of necessary information to formulate the long-term strategic plans for the participatory forest management. As a result, the PFM should better be emphasized the sustainable rural economy and its environment.

In conclusion, NWFP integrated CF and PFM programmes should begin with the people who use the forest, by examining their different needs, skills and knowledge and the functions of the forests, which serve them.



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