

Government of the Union of Myanmar
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Forest Department

**Socio-economic and Environmental Conditions of
Forest Dependent Local Communities
A Case Study: Sinthe Dam Watershed Area in Tatkon Township**

BY

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တပ်ကုန်းမြို့နယ်၊ ဆင်သေဆည်ရေဝေရေလဲဧရိယာရှိ သစ်တောအပေါ်မှီခိုနေသော
ဒေသခံပြည်သူများ၏လူမှု၊ စီးပွားရေးနှင့် ပတ်ဝန်းကျင်အခြေအနေကို လေ့လာခြင်း

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ဦးဘီလီနေဝင်း(သုတေသနလက်ထောက်-၂)
ဒေါ်ခင်နှင်း (သုတေသနလက်ထောက်-၃)

စာတမ်းအကျဉ်းချုပ်

မြန်မာနိုင်ငံအပူပိုင်းဒေသများတွင် ရေရှားပါးမှုသည် အမြဲတမ်းကြုံတွေ့နေရသည့်ပြဿနာတစ်ရပ် ဖြစ်ပါသည်။ ဆည်တည်ဆောက်ခြင်းသည် ငွေကုန်ကျမှုများသော်လည်း၊ သီးနှံပင်များစိုက်ပျိုးရန်၊ သစ်တောများ ပြန်လည်တည်ထောင်ခြင်းဖြင့် ပတ်ဝန်းကျင်စိမ်းလန်းစိုပြည်လာစေရန်၊ မြေဆီလွှာ ထိန်းသိမ်းကာကွယ်ရန်အတွက် များစွာအကျိုးကျေးဇူးရှိပါသည်။ ဆည်တည်ဆောက်ပြီးနောက် ရေကို ရေရှည်အသုံးပြုနိုင်ရန်အတွက် ရေဝေရေလဲဧရိယာများတွင် သစ်တောဧရိယာလုံလောက်စွာ ရှိရန်လိုအပ်ပါသည်။ သစ်တောများပြုန်းတီးခြင်း နှင့် တောအဆင့်အတန်း ကျဆင်းခြင်းသည် ဒေသခံပြည်သူများ၏ လူမှုစီးပွားရေးအခြေအနေနှင့် ပတ်သက်ဆက်စပ်လျက်ရှိပါသည်။ အပူပိုင်းဒေသ ရေဝေရေလဲစီမံအုပ်ချုပ်မှုလုပ်ငန်းများ လုပ်ကိုင်ရာတွင် ဆည်ပတ်ဝန်းကျင်ရှိ ဒေသခံပြည်သူများ၏လူမှုစီးပွားရေး အခြေအနေများကို ထည့်သွင်းစဉ်းစားရန်လိုအပ်သည့် အတွက် သုတေသနပြုဆောင်ရွက်ခဲ့ခြင်းဖြစ်ပါသည်။ ဤသုတေသနလုပ်ငန်းကို တပ်ကုန်းမြို့နယ်၊ ဆင်သေဆည်ရေဝေရေလဲဧရိယာတွင် ဆောင်ရွက်ခဲ့ပါသည်။ ရေဝေရေလဲဧရိယာရှိ သစ်တောများ ပျက်စီးပြုန်းတီးခြင်းသည် အနီးအနားရှိဒေသခံပြည်သူများ၏ စားဝတ်နေရေးအခြေအနေအပေါ် သက်ရောက်မှုရှိကြောင်း လေ့လာတွေ့ရှိရပါသည်။

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Abstract

Shortage of water is a common problem of arid and semiarid areas of central dry zone of Myanmar. Construction of dams and reservoirs is to overcome the water shortage problem. Agricultural, Forestry, soil conservation and dry zone greening activities are implemented using water from dams and reservoirs. At the same time establishment of sufficient watershed plantations is a necessity for the sustainable utilization of irrigated water. The extent of deforestation and forest degradation depends on the situation of the livelihood of the people living around the dams. The paper deals with the points to be taken into consideration in management of watershed areas, socio-economic aspects and sustainable utilization of forest production in dry zone greening areas. The study area is Sinthe dam in Tatkon Township. The researcher find out that degradation of forests in the watershed area is attributed to the very poor livelihood of the local population.

Keywords: dry zone, Myanmar, socio-economic, watershed, forest degradation

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1. Introduction

Agriculture-sector, a basis in the national economy of Myanmar, is the main occupation of about 75% of the population. Myanmar's economy highly depends on agriculture. To boost the agricultural production, the government has been constructing new reservoirs and dams throughout the country. Although the Irrigation Department has constructed dams mainly for agriculture, water is also made available for the people and animals of their needs in the irrigated area. The central dry zone needs more water because of the poor rainfall and hydrological pattern of the area. Although the cost of dam construction is relatively high, it can be compensated by agricultural, forestry and soil conservation activities.

To ensure the long-term water supply as well as ecological balance management of upper catchment areas is essential. In the management of catchment area, forest sector plays an important role to regulate water flows and to prevent soil erosion and silting up of dam, thereby extending the life of dams and reservoirs. At least, half of the production should be left on the watershed to maintain plant vigor, favorable microclimate, and an adequate ground cover to protect the soil surface and to return organic matter to the soil (Thamaes J. L., 1991).

Rural people depend directly or indirectly on forests for the household requirements such as firewood, building poles, forage and food, etc. They are also heavily depended on forests in order to fulfill their social and economic needs, if the size of arable land is a problem. In the management of the watershed area, the socio-economic conditions of rural people must be favourable and sufficient. So, human factors will be taken into account for the effective watershed management.

Presently, dry zone area is the priority area in watershed management, where the construction of irrigation dams has been concentrated, and where siltation from degraded watersheds is a serious problem. So this paper is intended to provide information on socio-economic and environmental conditions considered for sustainable management of watershed area in dry zone.

2. Objectives of the Study

- (1) to identify socio-economic conditions of forest dependent local people living around the constructed dam in dry zone area.
- (2) to investigate the status of forest cover and landuse changes in the watershed area
- (3) to find out the needs of local people from the existing forests
- (4) to assess the benefits of dam construction for local communities

3. Material and Methods

3.1 Background information of Study Area

The dam is near Mazelikyin village, Tatkon Township, Mandalay Division. Construction of dam has started in 1996 and finished in 1999. The dam is 109 feet high and 1350 feet long. It can store 110000 acre-ft of water. It is to irrigate 12400 acres of cultivated land. The maximum annual rainfall recorded is 1151 mm. The minimum rainfall occurs in October with 10 mm, and the maximum in July with 270 mm.

Forest type of the study area is low Indaing. Erosion was found in the upland area of dam. The soil conditions are poor for normal plant growth. A hardpan layer occurs 6 -12 inches below the surface.

Populations of the watershed area are predominantly Bamar and Kayin. The main forms of employment are rainfed agriculture, woodcutting, charcoal burner and nomadic livestock production. In the survey area landless and some communities who have a few acreage of farm practise the selling of wood, fuelwood and charcoal as a source of income. Traditionally women work cottage weaving to supplement their households' income. Unconfined livestock grazing has been widespread in this region. The number of livestock can be a measure of one's wealth and status. Infrastructure development, road and transportation and communication are very poor.

3.2 Methods of Study

The study area was selected based on following criteria;

The area must be

- around newly constructed dam
- located in the dry zone
- vicinity of degraded forest

(1) Socio-economic survey was conducted using questionnaires and interview. The first part is attributed to agriculture and livestock breeding. The second part is concerned in the uses of forest products. Out of seventeen, five villages were selected to analyze the socio-economic condition. Two villages were selected in down-stream area, namely Alekyun and Myaungmyeik and three villages in up-stream area, namely Mazelikyin, Kyiain and Lezapin. 20% villagers in each village were interviewed for general information and 32 household were interviewed for specific information. The interviews were divided into two types: land owned farmers and landless farmers. These interviewees encompassed a wide range of people including village headmen, farmers, shop owners, fishermen and others. The areas of coverage for social and economic aspects of living conditions included in the households are:

- Demographic factors
- Poverty level
- Conditions of housing

- Health care
- Education
- Labour and Employment
- Communication facilities
- Household agricultural production and vulnerability
- Household non-agricultural production.

(2) Environmental changes, particularly, landuse changes, were carried out by using the satellite image. The conditions of forest and species composition were surveyed by the random sampling method. The size of sample plot is 400 m² (20 m x 20 m) and five sample plots were laid down in each study site.

3.3 Data Collection, Processing and Analysis

Socio-economic data were analyzed by using Chi square test in MS-excel program. For assessment of forest condition, tree species name, number of trees, girth at breast height (GBH) were recorded. Mapping of landuse changes in watershed area was done with assistance from the Remote Sensing and GIS Section of Forest Department. Data source included landsat 5 TM digital imageries, landsat 5 TM hardcopies, Aerial photographs, Topographic Base Maps and 1:500,000 scale GIS database of Myanmar provided by Forest Department.

4. Results

The total watershed area is 68402 ha, out of which about 40.44% are forest, 22.31% crop land, 34.27% scrub land and 2.99% other uses in 1999. Forest decreases to 32.42%, where as crop land, scrub land and waterbody increase to 23.32%, 39.21% and 2.47% respectively in 2005.

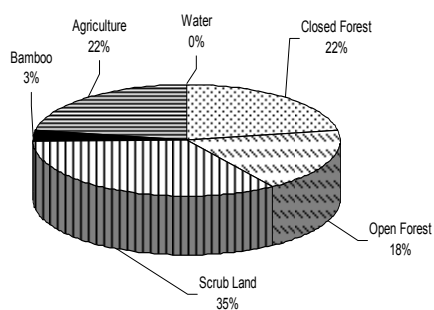


Figure 1 : Land cover of Sinthe dam watershed area in 1999

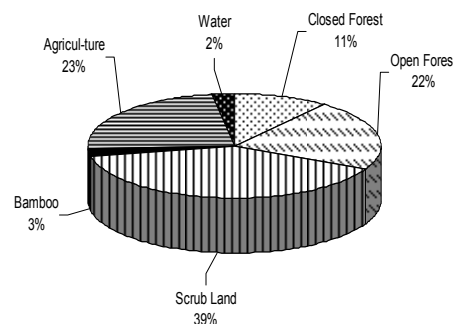


Figure 2 : Land cover of Sinthe dam watershed area in 2005

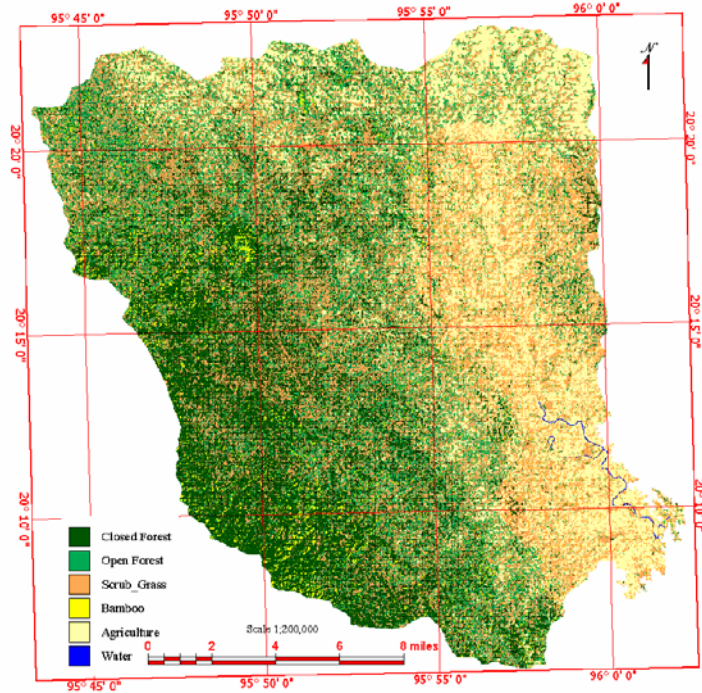


Figure3 : Landcover status of Sinthe watershed area in 1999

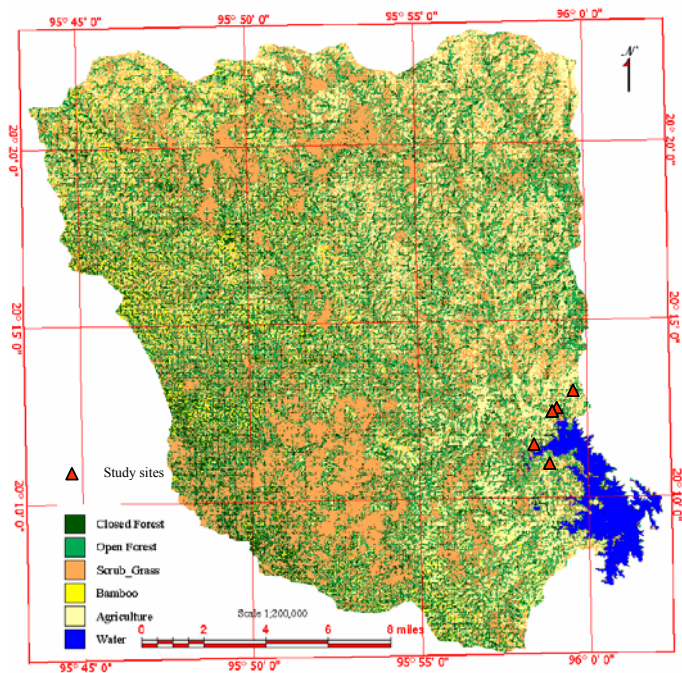


Figure 4 : Landcover status of Sinthe watershed area in 2005

To study forest cover changes between 1999 and 2005, GIS applications were used. Landuse changes were monitored and presented in table 1. Forest area decreased from 27659.44 to 22183.53 ha in the past 6 years. It was not concerned with commercial timber extraction in the study area. Forest degradation is mainly due to shifting cultivation, fuelwood cutting and charcoal burning and conversion to permanent agricultural land.

Table 1 : Landuse classes in Sinthe dam watershed area, 1999 and 2005

	(ha)							
2005	Closed Forest	Open Forest	Scrub Land	Bamboo	Agriculture	Water	Grand Total	Percentage
Closed Forest	2383.94	3321.47	6530.71	650.43	2266.13	10.62	15163.30	22.17
Open Forest	1321.21	2818.64	5064.51	363.60	3185.58	23.04	12496.14	18.27
Scrub Land	2293.22	5252.71	9152.07	538.02	5725.84	481.32	23443.18	34.27
Bamboo	298.80	431.55	835.83	94.14	354.60	1.26	2016.19	2.95
Agriculture	935.83	3123.29	5236.51	103.41	4700.19	1159.21	15258.43	22.31
Water	0.72	2.16	4.14	-	1.79	16.83	25.65	0.04
Total	7233.71	14949.82	26823.78	1749.61	15953.69	1692.28	68402.89	
percentage	10.57	21.85	39.21	2.50	23.32	2.47	-	

Forest vegetation found in the study area includes grasses, shrubs and trees. Altogether 29 plant species are recorded and the size of trees is found smaller than 10 cm DBH except Dahat, Lettok, Pyinkado, Seikkyi, Tamalan, Tapauk, Thityingyi and Thipagan are found in bigger size (see Figure 5).

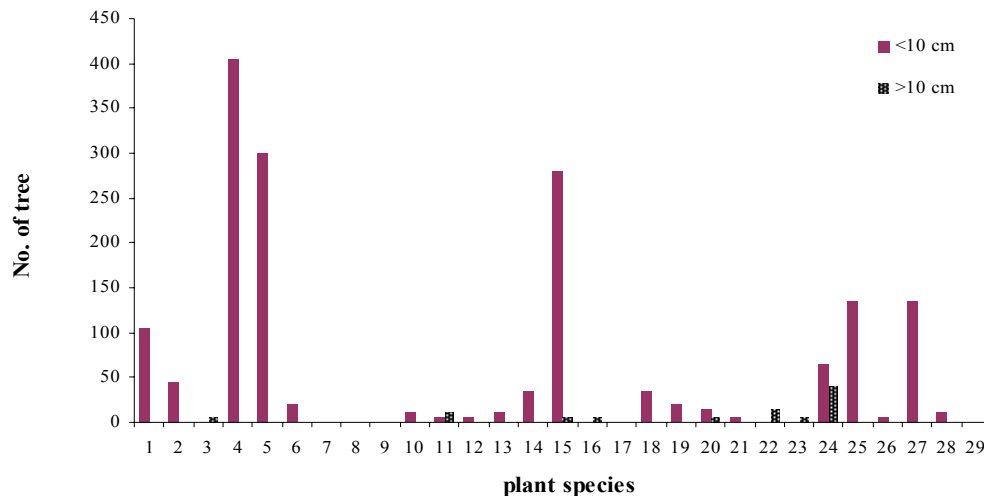


Figure 5 : Species composition in study area

Table 2 : A list of the species in study area

No.	Common name	Scientific name
1	Bain-nwe	<i>Hiptage benghalensis</i>
2	Chinbyit	<i>Bauhinia malabarica</i>
3	Dahat	<i>Tectona haniltoniana</i>
4	Htaukkyan	<i>Terminalia crenulata</i>
5	In	<i>Dipteocarpus tuberculatus</i>
6	Ingyin	<i>Shorea siamensis</i>
7	Thidi	<i>Protium serratum</i>
8	Kha-aung	<i>Ficus hispida</i>
9	Khwechyishyaw	Unidentified
10	Kyetyo	<i>Vitex pubescens</i>
11	Lettok	<i>Holarrhena pubescens</i>
12	Nabe	<i>Lannea coromandelica</i>
13	Petthan	<i>Heterophragma adenophyla</i>
14	Pha-ga	<i>Terminalia chebula</i>
15	Pyinkado	<i>Xylia sylocarpa</i>
16	Seik-chi	<i>Bridelia retusa</i>
17	Bezatz	<i>Chromolaena odorata</i>
18	Thitsi	<i>Malanorrhoea usitata</i>
19	Te	<i>Diospyros burmanica</i>
20	Tamalan	<i>Dalbergia oliveri</i>
21	Than	<i>Terminalia oliveri</i>
22	Tapauk	<i>Dalbergia paniculata</i>
23	Thetyin-gyi	<i>Croton roxburghiams</i>
24	Thit-pagan	<i>Milletia brandisiana</i>
25	Thitya	<i>Shorea obtuse</i>
26	Yindaik	<i>Dalbergia cultrate</i>
27	Zibyu	<i>Emblica officinalis</i>
28	Lin-yaw	<i>Dillenia parviflorea</i>
29	Sugauk	<i>Ziziphus incurva</i>

The demographic characteristics of the village are shown in table 3 and arable land area is presented in table 4. The arable land is decreasing rapidly due to land degradation and dam area occupation although the total agricultural land increases. The combination of population growth and loss of farmland resulted in a reduction of yield. Decrease in crop yields makes it more difficult to meet basic needs. Extreme poverty occurs in upstream population and some of downstream population. Their daily incomes from agriculture are less than US\$1 per day, international poverty line (FAO, 1991). Their

income from agriculture is not enough even for their daily subsistence, thus the demand for livelihood is greatly challenging.

Table 3: Assessment of socio-economic conditions of the local people

Village	Alekyun	Mazelikyin	Kyiain	Lezapin	Myaungmyeik
Education	Middle	Primary	Middle	Primary	Primary
Income distribution	high	low	medium	low	low
Health	health center	health center	health center	-	-
Forestry	low	low	low	low	low
Trade and cooperation	medium	low	low	low	medium
Livestock breeding	medium	medium	medium	medium	medium
Public relation	medium	low	medium	low	low
Agriculture	high	low	low	low	low
Poverty	medium	low	low	low	low

Note: Poverty - People who are unable to purchase sufficient food to meet the household requirements are defined as 'low'.

Forestry - the condition of trees and shrub coverage

Table 4: Land capacity in study area

(ha)

No.	Villages	Arable land				waste & fallow land	Other land	Total
		Le	Ya & Kaing	total	%			
1	Alekyun	68.80	862.39	931.19	50	522.45	405.1	1858.74
2	Mazelikyin	201.94	597.73	799.67	51	389.31	367.46	1556.44
3	Kyiain	100.36	208.42	106.43	4	1106.42	1041.45	2614.3
4	Lezapin	-	-	-	-	621.20	964.78	1585.98
5	Myaungmyeik	42.09	57.06	99.15	6	571.83	883.84	1554.82
	Total			1936.44	21			9170.28

Source: Immigration and Manpower Department, 2005

Population density in each village is shown in table 5. Population density in Kyiain is higher than the national average (47 person/sqkm). Alekyun and Myaungmyeik are higher than population density in dry zone area (99 person/sqkm) according to a case study on land degradation of dry zone of Myanmar in 2000. When population pressure is low (less than 30 people /sqkm), deforested area is relatively small (FAO, 2001). Therefore, the combination of higher population pressure and limited agricultural land is negative impact on forest in the study area.

Table 5 : Population density in the study area

Province	Population					Density (person/ sq km)
	above 18 years		under 18 years		Total	
	Male	Female	Male	Female		
Alekyun					2430	131
Mazelikyin	95	67	144	161	467	30
Kyiain	285	258	511	542	1592	61
Lezapin	83	107	205	223	618	39
Myaungmyeik	1082	1164	1212	1428	4884	314

Source: Immigration and Manpower Department, 2005

The availability of cultivated land and their income are not uniform in all households. Most of the households possess nearly 1 hectare of land, which is less than that the bare minimum required to support a household above the poverty line. Table 6 shows the cultivated land area possessed by household in each village and table 7 presents the landless holder percentage. The maximum farm size was 9 acres and the minimum size of farm was 0.75 acres. The average size of farm was 2.5 acres. The major cash crops grown in the study area are paddy, cotton, sesame, kyetsu and beans. Seasonal vegetables as onion, chilies, tomatoes, potato, and others vegetables are also grown on some alluvial soils. Their average yield of beans (green pea) per acre is 22 viss. If calculated at 9000 Kyats per basket in 2005, total income is 198000 Kyats. With cotton the average yield of 200 viss per acre sold at 550 Kyats per viss, the expected income will be only 110000 Kyats. They have income per acre from 132000 Kyats in Shweyinmar (beans), 154000 Kyats in Sesame, 66000 Kyats in ground nut, 160000 Kyats in kyetsu and paddy. Some villagers grow vegetables along the stream bank. They obtained 100000 Kyats from the selling of vegetable. The present income of the landless families gets from livestock breeding, trading, daily labour and fuelwood cutting and charcoal selling. In the study, it was clearly observed that the income of household got from the agriculture, off-agriculture and non-agriculture activities that shown in Appendix.

Table 6: The average size of cultivated land possessed by household

Villages	Size of farm (acre)	percentage
Alekyun	< 4	75
	> 4	25
Mazelikyin	< 4	100
	> 4	-
Kyiain	< 4	100
	> 4	-
Lezapin	< 4	50
	> 4	-
Myaungmyeik	< 4	100
	> 4	-

Table 7 : Percentage of landownership by household

Villages	owned farm %	landless %
Alekyun	79	21
Mazelikyin	88	12
Kyiain	86	14
Lezapin	90	10
Myaungmyeik	82	18

The livestock breeding is one of the income generation activities in the study areas. Most of the rich villagers possess cattle and goat breeding is seemed to be getting extra income. Poultry raising and pig breeding are served as a source of their food. Grazing animals are free teeth in the forest. The livelihood of livestock breeder is significantly improved compared to the non-livestock breeder as shown in figure 6.



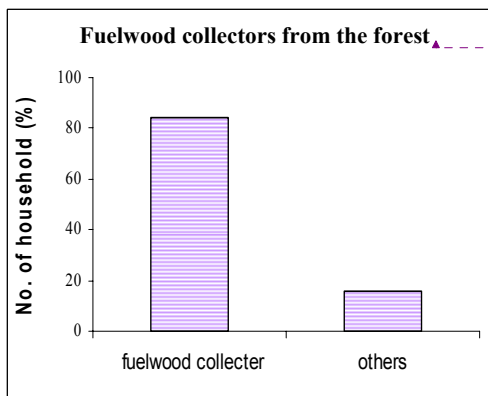
	cattle rearing household	others
Observed freq.	27	5
Expect freq.	16	16
Calculated value		15.125*

df .05 - 3.84 , df .01 - 6.63

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Figure 6: Livestock breeding conditions in study area

Fuelwood is the main energy source in this region. Some villagers used agricultural residues for fuelwood and the rest of villagers collected from the forest as shown in figure 7. The continuous practice of fuelwood collection resulted in deforestation.



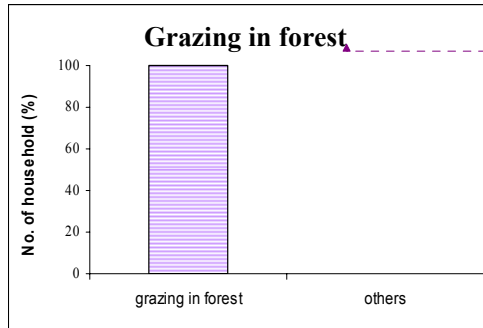
	fuelwood user	others
Observed freq.	27	5
Expect freq.	16	16
Calculated value		15.125**

df .05 - 3.84 , df .01 - 6.63

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Figure 7 : Fuelwood consumption from the forest

Grazing is generally carried out in the forest and sometimes in the cultivated land after annual crops have been harvested. In the study area, there was a significantly difference between grazing in forest and in agriculture, as shown in figure 8.



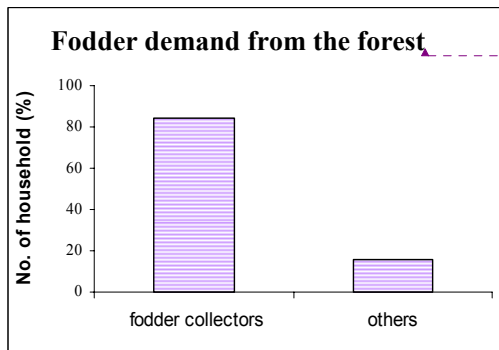
	forest	others
Observed freq.	27	5
Expect freq.	16	16
Calculated Value		15.125**

df .05 - 3.84 , df .01 - 6.63

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Figure 8: Dependent on forest for Grazing

Recently, only 2% of the households were growing fodder crops on agricultural land and others got from the forest. As the decreasing of farmland, villagers are more reliant on forests for their cattle. Villagers collected fodder from the forest more than agriculture as shown in figure 9.



	collector	others
Observed freq.	27	5
Expect freq.	16	16
Calculated Value		32**

df .05 - 3.84 , df .01 - 6.63

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Figure 9: Folder uses from the forest

5. Discussion

Total area of Sinthe dam watershed in this study is 68403 ha. In 1999, forest cover is 27659 ha (40 percent of total area), of which 15163 ha is closed forest, cultivated land is 15258 ha (22 percent) and the rest consists of scrub land and waterbody. Based on the study, although construction of dam had contributed to the loss of forest cover, its impact is less than that of illicit cutting and encroachment for permanent agricultural land. Between 1999 and 2005, area of forest converted to other landuse is 5476 ha. Illegal cutting and land encroachment are main cause of forest degradation which will affect to

the environmental condition of local communities. After the construction of dam, improved access to the forest areas makes more difficult to control illegal cutting.

Before constructing the dam, the wild flora and fauna are used for food and traditional medicines to rural communities. Although agriculture is the major income earning, rural households rely on forests for their social and economic needs by collecting non-timber forest products (NTFPs). Overexploitation of forest resources contributed to deforestation. In the present time the importance of NTFPs has diminished and some forested areas are scattered. Poorer farm families and agricultural labourers supplement their incomes by collecting fuelwood which causes deforestation.

In the surveyed area, there were three types of household based on the use of housing materials for their buildings that will be one of the estimations of their earnings. The houses built by highest incomer used corrugated iron-sheets, bricks and wooden floor. The medium used corrugated iron-sheet, bamboo, and wood as roof, shield and floor, while the poorer owned the lowest valued house made of thekke for roof, bamboo for shelter and floor. The villagers who earn low income from agriculture and fishery built medium and low valued houses with NTFPs like bamboos and thekke.

More than 70% of local communities are educated in monastery at primary level. Those who are at age of between 13 and 16 years, achieved secondary education in middle school. They had 3.7% high school educational attainment and 7.4% undergraduate in the study area. Low educated people work as farmers and landless poor as daily labourer in agriculture sector. Due to increasing population and limited productive land resources, villagers are getting hard to improve their livelihood year by year. As since they are uneducated, there is no other job opportunity for them. Therefore, one and only way for those people is exploiting forest resources.

Agriculture has been accorded a priority status for socio-economic development. Land fertility of the area is getting lower and lower since the soil is shallow and low fertile, crop production drops year by year. This hampers to raise their living standards based on agricultural production. According to the current land use, a total of about 15953.69 ha are suitable for agricultural purposes. Every household needs at least 2 hectares of land for their living based on agricultural production (FAO, 2001). However, if multiple cropping system is used, it will need a farm of 1.2 hectares (Thamaes J. L., 1995). According to above estimation, 13140 of households will satisfy with their living standard from the agriculture if they use the multiple cropping systems. Villagers in this area have been aware of the effects of soil erosion and decline in soil fertility as the removal of forest. The local people convinced that the sustainability of forest products is important for their livelihood.

Livestock production is an important component of most farmers. In study area, the villagers usually raise the animals; cattle, goat, poultry and pig. Although crop residues should be used for soil fertility to the next crops their crop residues demand for animals in the upper area because the cost of fodder is too high and their arable land do

not enough to grow the animal crops. Forests provide important feed resources for grazing animals in the study area. At average, 36 sq-ft of grazing area in the forest is need for each cattle calculated by local farmers. Grazing in the forest is traditional practice in the study area. It is suggested that the systematic pasture management should be initiated. It is also needed to introduce suitable land use system and to find out the economically feasible practices and approaches adaptable for the development of both upstream and downstream areas.

Fuelwood is the main source of energy especially for cooking. Households using fuelwood are about 87% and used 45 cu-ft/ household/ month at least. 8% of this household collects fuelwood both for their own use and for selling to get extra income. A bundle of fuelwood costs (5 rods x 18 inches length) 50 Kyats at the time of data collection in 2005. 13% of total households used 3-10 bags of charcoal/ month for cooking and other uses. In Sinthe dam watershed area, the scrub land area increases from 23440 ha in 1999 to 26823 ha in 2005. It is due to illegal cutting of trees with the gbh of bigger than 10 cm.

Fishery is one of the important income generation activities in the area. Fish breeding in reservoir makes good profit with high yield. Fishing, transportation, processing and marketing for fishery products are important to enhance rural employment and income generation in this area. Besides, development of accessibility and communication is to be considered as important factor in expediting socio-economic development for rural communities.

6. Conclusions

1. Based on the present land potential, the watershed area should be totally protected. And some areas need to be replanted with forest trees. All of the villagers are willing to support and actively participate in the rehabilitation and protection of the forests land if they get a chance to grow agricultural crop and/or get extra income. To restore or conserve the forest cover around the watershed area, community forestry approach can be applied in this study area.
2. In several places, the disappearance of forest has led to a shortage of fuelwood. The existing scrub land should be protected collecting of fuelwood. Community owned fuelwood plantation should be established. It should not be located in critical areas of watershed such as buffer zone, prone to erosion.
3. Grazing animals in the forest should be allowed where no obvious damage of vegetation and soil occurs. However, some aspect for grazing will be avoided as repeated trampling on the same plot for long time and in rainy season that can cause soil compaction and reduce forest trees.
4. Cultivable land in the upland area should not be used only for agricultural crop because of low soil fertility and shallow soil depth. Where agriculture land is limited, sustainable animal husbandry practices will give way as a good economic return of

landuse. Fodder crops should be planted in irrigated farmland after removal of first grains in downstream area.

7. Recommendations

1. Integration of agroforestry application in terms of community forestry should be encouraged to achieve sustainable development of local people
2. When livestock breeding is introduced or used, pasture management should be put under the management of dry zone watershed area.
3. More research is needed for appropriate and sufficient production of forage for livestock production.

Appendix

Total income of rural people in study area

no.	household family	Labours			le & Ya & kaing			off-farm income	daily wages	Total income	income / M
		Male	Femal	Total	land area	income / Y	net ncome*				
1	5	2	1	3	5	894500	715600	0	144000	859600	14327
2	8	3	2	5	9	941500	753200	0	0	753200	7846
3	5	1	1	2	1.5	99000	79200	100000	144000	323200	5387
4	5	1	1	2	5	755000	604000	50000	0	654000	10900
5	8	3	3	6	0.6	342000	273600	0	144000	417600	4350
6	6	2	2	4	4	197500	158000	0	0	158000	2194
7	2	1	1	2	5	261000	208800	0	0	208800	8700
8	7	3	3	6	0	0	0	182500	144000	326500	3887
9	5	1	1	2	0	0	0	1000000	0	1000000	16667
10	3	1	1	2	0	0	0	300000	0	300000	8333
11	5	2	1	3	0	0	0	1000000	0	1000000	16667
12	3	1	1	2	2	15000	12000	0	144000	156000	4333
13	4	3	1	4	4	102000	81600	0	0	81600	1700
14	6	1	1	2	0	0	0	0	144000	144000	2000
15	4	1	3	4	0	0	0	100000	0	100000	2083
16	4	2	1	3	1.5	36000	28800	100000	0	128800	2683

Total income of rural people in study area , cont'd

no.	household family	Labours			le & Ya & kaing			off-farm income	daily wages	Total income	income / M
		Male	Femal	Total	land area	income / Y	net ncome*				
17	7	1	1	2	0	0	0	50000	144000	194000	2310
18	4	3	1	4	3	75000	60000	0	0	60000	1250
19	5	2	1	3	2	153000	122400	50000	0	172400	2873
20	4	2	2	4	4.5	45000	36000	0	0	36000	750
21	6	2	1	3	0.75	48000	38400	50000	216000	304400	4228
22	5	1	1	2	0	0	0	300000	0	300000	5000
23	6	1	1	2	0	0	0	0	144000	144000	2000
24	5	1	1	2	6.25	150000	120000	0	0	120000	2000
25	4	3	1	4	7	181000	144800	210000	0	354800	7392
26	6	2	2	4	2.5	42000	33600	0	0	33600	467
27	7	3	1	4	3	105000	84000	0	0	84000	1000
28	5	2	2	4	2.5	75000	60000	100000	288000	448000	7467
29	7	3	2	5	3	455000	364000	0	0	364000	4333
30	5	2	1	3	3	330000	264000	0	0	264000	4400
31	4	1	3	4	2	392000	313600	0	216000	529600	11033
32	5	2	1	3	2	331000	264800	50000	144000	458800	7647

* 20 % cost for buying of source seeds and pesticide and fertilizer



Plate 1 : Forest type in the study area



Plate 2 : Degraded forest in the study area



Plate 3 : Fodder from the forest area



Plate 4: Soil condition in the study area



Plate 5 : Agriculture land in the study area



Plate 6 : Transportations in the study



Plate 7 : socio-economic survey

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