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A THESIS FOR THE MASTER DEGREE OF FOREST SCIENCE

**Impacts of Community Forestry on Local Livelihood:  
A Case Study in Dry Zone, Myanmar**

**December 2014**

**by**

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# Impacts of Community Forestry on Local Livelihood

-A case study in Dry Zone, Myanmar-

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## **ABSTRACT**

In Myanmar, Community Forest Instructions (CFIs) issued by the Forest Department in 1995 is an innovation to decentralization in managing the forest and became as a route to more secure land tenure. The role of people's participation and public awareness is implicitly highlighted in the management of forest resources in view of sustainability. This study aimed to measure the socio-economic impacts of CF on the livelihood of Forest User Group (FUG) members and to examine the change in livelihood level of FUG members. Through the socio-economic survey based on questionnaires and field observations accessing the five capitals which are Natural Capital, Social Capital, Human Capital, Financial Capital and Physical Capital, the impacts on livelihood strategy of FUG members and the impacts of project-led approach and participatory approach were examined in the two cases of Dry Zone, Myanmar. After 10 years of CF implementation in both sites, two different approaches lead the two FUGs to different level of livelihood conditions according to the income generating activities, and the FUG members have found the alternative livelihood options and their livelihood strategies have been changed, accordingly their younger generations could access to better education within the regions.

Keywords: Community Forestry, people participation, livelihood strategy, socio-economic, Myanmar

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# CONTENT

<b>ABSTRACT</b> .....	i
<b>CONTENT</b> .....	ii
<b>LIST OF TABLE</b> .....	iv
<b>LIST OF FIGURE</b> .....	v
<b>LIST OF MAP</b> .....	v
<b>1 Introduction</b> .....	1
<b>1.1 Objectives of the Study</b> .....	6
<b>1.2 Research Questions</b> .....	6
<b>1.3 Hypothesis</b> .....	6
<b>2 Community Forestry Development in Myanmar</b> .....	7
<b>2.1 Definitions</b> .....	7
<b>2.2 A Brief Review of Community Forestry</b> .....	8
<b>2.2.1 Community Forestry in Global Context</b> .....	8
<b>2.2.2 Community Forestry in Myanmar</b> .....	9
<b>2.3. Characteristics of Dry Zone</b> .....	14
<b>2.4. Forest types in Dry Zone</b> .....	15
<b>2.5. Socioeconomic status in Dry Zone</b> .....	15
<b>3. Methodology</b> .....	18
<b>3.1. Theoretical Framework</b> .....	18

3.2. Livelihood Impact Model.....	23
3.3. The Sites Studied.....	24
3.3.1. Self-initiative Approach (Yoe Sone CF, study site A).....	25
3.3.2. Project-led Approach (Myay Thin Twin CF, study site B).....	26
3.4. Data Collection .....	31
4. Results and Discussion .....	33
4.1. Results of Surveys.....	33
4.2. Discussion .....	43
5 Conclusions .....	56
References.....	59
Appendix I: .....	64
Appendix II .....	72
Acknowledgement.....	82

## LIST OF TABLE

Table 1 Forest and other land use extent in Myanmar, 2010 .....	2
Table 2 Community Forestry of Myanmar Established from 1996 to March, 2014 .....	13
Table 3 Land Utilization of Myanmar Dry Zone in 2003 (Area in Ha) .....	17
Table 4 Comparative profiles of two CF sites .....	29
Table 5 FUGs Household land holding status .....	33
Table 6 Household's Expenditure for Forest Establishment of Site A .....	34
Table 7 Products collected by FUGs from CF .....	34
Table 8 Fuelwood Consumption and support of CF (site A) .....	35
Table 9 Fodder Consumption and support of CF (site A) .....	35
Table 10 Fodder Consumption and support of CF (site B) .....	35
Table 11 Communities' perspective on Environmental Conservation of CF .....	36
Table 12 Role of Decision Making .....	38
Table 13 Forest Department's Support on CF activities .....	39
Table 14 NGO's Support on CF activities .....	39
Table 15 Status of Access to Better Education of FUG members' children (site A) .....	40
Table 16 Indicators of Impacts of CF on Livelihoods: Capital Improve? .....	42
Table 17 CF Implementation Approach and FUG members' Livelihood Strategy .....	44
Table 18 ANOVA result for livelihood strategy change between two Approaches .....	44
Table 19 Regression analysis result for level of Income .....	44
Table 20 Regression analysis result for Access to Education .....	44

Table 21 Marketable products and Income from CF (n=60) .....	51
Table 22 Pearson Correlation Coefficient between Variables .....	52
Table 23 Data table .....	53

## **LIST OF FIGURE**

Figure 1 An Analytical Framework of Sustainable Livelihoods (DFID, 1999) .....	19
Figure 2 Livelihood System Model .....	22
Figure 3 Key Player for Formulation of Management Plan .....	37
Figure 4 Change of Livelihood Strategy Pattern Over Time (Site A) .....	46
Figure 5 Household Income from CF per Year (Kyats) .....	48

## **LIST OF MAP**

Map 1 Myanmar Forest Cover .....	5
Map 2 Location of the Study Sites .....	30

# **1 Introduction**

Myanmar is situated in South East Asia and rich in vast varieties of natural resources, both renewable and non-renewable. In 2005, the forest area in Myanmar was 46.96 percent of the total land area, of 317,739 square km and around two-third of this forest (197,899 km<sup>2</sup> or 30.73 percent of the country) is managed by Forest Department (FD), Ministry of Environmental Conservation and Forestry (MOECF), as permanent forest estate (PFE) (FD, 2012). The forests have been protected in accordance with the prevailing forest rules, regulations and laws. Though, the rate of deforestation and degradation in Myanmar is among the highest in the world, running at 0.9 percent per year between 2000 and 2010 (Central Statistical Organization (CSO), 2012). The main causes of deforestation in Myanmar are the overharvesting of timber; both poorly regulated commercial logging and illicit logging, and converting forest land into agricultural and horticultural plantations. A weak governance regime vulnerable to corruption and abuse of power has combined with a growing international demand for timber to aggravated these issues (Kyaw Tint, Springate-Baginski, O., Macqueen, D.J., and Mehm Ko Ko Gyi, 2014). The forest resource is also one of the most critical and principal suppliers for the livelihood of the people and the national economy as well (Myanmar Forestry Outlook Study 2009). About 75 percent of the total population are living in the rural area and primarily depend on the forests for their livelihoods.

The new approach of forest management considers the basic needs of the local

people relying on the forests. Community Forest Instructions (CFIs) issued by the FD in 1995 is an innovation to decentralization in managing the forest and became as a route to more secure land tenure.

**Table 1 Forest and other land use extent in Myanmar, 2010**

Category	Area (km <sup>2</sup> )	% of total
<b>Closed forest</b>	134,446	19.87
<b>Open forest</b>	183,286	27.09
<b>Forest affected by shifting cultivation</b>	201,125	29.73
<b>Water bodies</b>	19,031	2.81
<b>Other land use</b>	138,689	20.5
<b>Total</b>	<b>676,577</b>	<b>100</b>

*Source: Forest Resource Assessment (FAO, 2010)*

The role of people’s participation and public awareness is implicitly highlighted in the management of forest resources in view of sustainability (Myanmar Forest Policy, 1995). In this way, local people’ participation plays a vital role in the modern forest management. According to Tint (2011), community forests are practiced throughout the country especially in three different geographical regions; dry zone, delta, and the hill regions. In central part of Myanmar Called Dry Zone (DZ) conditions for CF are very challenging because much of agricultural lands are infertile and the rainfall is lower than other regions

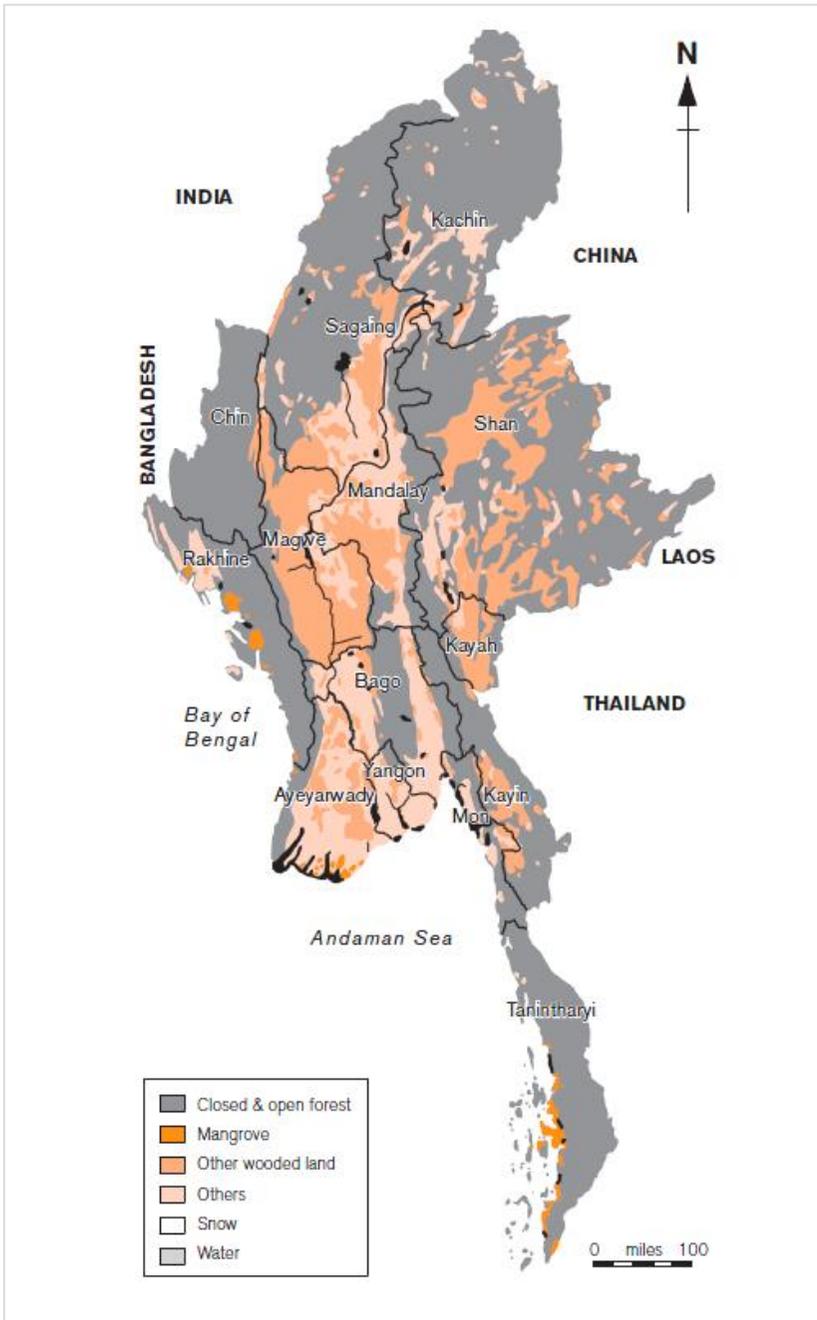
(Springate-Baginski, 2011). Dry Zone is one of the areas where the land is fast degraded in Myanmar and people are facing the environmental problems such as severe drought and flood. DZ covers an area of 67 sq km. As any other rural area, people in this area have to depend on forest for the fuel wood and livelihood activities.

CF practice was beneficial to the household participating in the program and getting incomes from the sale of firewood, seeds and cuttings from tree propagation (Kyaw Tint, 2014). Studies on community forestry observed that forest protection and regeneration activities through CF are leading to a range of available livelihood benefits. There is undoubtedly much more rooms here for further enhancing the livelihood benefits through both livelihood oriented forest management and also value added processing and marketing of forest products (Kyaw Tint, 2011). Management strategies in CFs are different all over the country and the functions of CFs and benefits gained also varies in different geographical conditions and climates.

Since the issuance of the CFIs, community forestry programs have been implemented in various forms; FD implemented programs, FD and United Nations Development Programme/Food and Agriculture Organization, Japan International Cooperation Agency (JICA) jointly implemented program, DZGD CF plantations, and programs under the initiative of international non-governmental organizations and local non-governmental organization (Oo, 2004).

In CFs which are implemented with the aids of NGOs or by joint-program of government with some international organizations, the design and CF implementation process varies by projects and the profits which are gained from CFs do not have to be shared with the government. People participated as labor providers in most of the FD or DZGD donor jointly implemented programs (Aung and Thwin 2003; Oo 2004; Lin 2005; Moe 2006). In this study, one project-led implemented CF site and one self-initiated implemented CF site were selected. Both were implemented by FD and DZGD jointly with JICA. This study aimed to measure the socioeconomic impacts of CF on the livelihood strategy of local communities and examine the impacts of CF on local people's livelihood. Livelihood impacts were measured by means of five capitals; natural capital, physical capital, human capital, financial capital and social capital.

## Map 1 Myanmar Forest Cover



Source: Forest Department (2010)

## **1.1 Objectives of the Study**

The overall objective of the study is to figure out the socioeconomic impacts of CF on the livelihood of local communities.

The specific objectives are

- To figure out the livelihood strategy change of forest user group (FUG) members as consequences of different CF implementation approaches within a certain period of time.
- To measure the change in livelihood level in accordance with the livelihood strategy change.

## **1.2 Research Questions**

- i. What are the impacts of different CF implementation approaches on livelihood of FUG members?
- ii. Does the livelihood strategy of FUG members affect the outcome of livelihood activities?

## **1.3 Hypothesis**

If communities are given more power in decision making such as selection of CF site and tree species in CF implementation,

- 1) the communities' livelihood strategy will be changed and
- 2) the livelihood level will become improved.

## **2 Community Forestry Development in Myanmar**

### **2.1 Definitions**

There are numbers of definitions on community forestry but they have more or less common purposes. Myanmar Forest Department defined

Community forestry (CF) as forestry operations in which local community itself is involved: such as; establishment of woodlots where there is insufficient fuel wood and other products for community use; planting of trees and exploiting of forest products to obtain food supplies, consumer products and income at farmers level. (CFI. 1995)

According to Tint (2011),

Community forestry (CF) is a kind of agroforestry operation that is currently implemented in Myanmar. The CF practice involves planting and utilizing forest products.

There are other more definitions of CF. The Center for People and Forests (RECOFTC) defined CF as “Community Forestry covers social, economic, and conservation dimensions in a range of activities including indigenous management of sacred sites of cultural importance, small-scale forest-based enterprises, forestry outgrower schemes, company-community partnerships, and decentralized and devolved forest management.” (RECOFTC. 2008)

Food and Agriculture Organization (FAO) defined as “any situation which intimately involves local people in a forestry activity. It embraces a spectrum of

situations ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities” (FAO 1978).

Community Forestry (CF) is a forestry operation in which local community mainly plays in decision making process and managing the forestry operations in a sustainable manner in order to gain their basic needs of forest products and services, and livelihood benefits.

## **2.2 A Brief Review of Community Forestry**

### **2.2.1 Community Forestry in Global Context**

Community forestry had been developed in the mid-1970s and the concept was introduced to control deforestation and to provision forest products to forest dependent communities (Arnold, J. E. M, 2011; Gilmour and Applegate, 1985; Mahat et al. 1986; Hausler 1993). The availability of forest resources are often greatly reduced for use by the local people due to increasing pressures to cultivate the land, reliance on the forest resources and are also affected by economic and political changes (Arnold, J. E. M, 2011). The evolution of community forestry in Nepal dates back to the late 1970s and was first instilled as an attempt to improve the management of forest resources and address environmental issues that were of great concern with the countries failing with centralized forest policy (Ram P., Eddie B., 2010). In 1985, the Conference on

Common Property Resource Management organized by the US National Academy of Sciences (NAS) provided another major stimulus to the move towards a greater degree of local involvement in forest management. Collective management of forests (and other natural resources) by user groups was shown to be viable and appropriate in certain circumstances (NAS, 1986).

Over the past two decades, community forestry has been practiced in many developing countries and it has been successful in its aims of sustainable forest management, climate change adaptation and securing socio-economic benefits and land tenure for local communities (Nirmal Kumar Paul, 2011). In a global context, CF is seen as a forest management alternative that maximizes the provision of forest benefits by safe-guarding the environment, improving economic welfare and enriching the social fabric of the community (Sands, 2005). Many of international non-government organizations are also accelerating Community Forestry program in developing countries. It is evident that community forestry can take many different forms such as Community Based Forest Management (CBFM), Joint Forest Management (JFM), Collaborative Management, etc.

### **2.2.2 Community Forestry in Myanmar**

Since 1995, CF has been conducted in Myanmar in two types such as agroforestry (AF) and enrichment planting in Natural Forest (NF) with the objectives of fulfilling the basic needs of the local people including fuel wood, housing, and agricultural material, and stabilizing the environment (Hlaing,

2011). Myanmar Forest Policy 1995 implicitly highlights the role of people's participation and public awareness in the management of forest resources in view of sustainability in a way efficiency of the forest can bring basic needs of the community through protection of the soil, water catchments, ecosystems and biodiversity. Enlisting people's participation in forestry, wildlife and national parks activities so that community becomes actively involved in appropriate ways in national and local efforts towards forest conservation and development, and raising trees for meeting their needs and increasing non-farm incomes through adoption of community forestry/agro-forestry practice. There are three pronged objectives of community forestry instructions (CFIs); to support the economic development of the country, to regain environmental stability and to address basic needs of the local communities. But, Community Forest Instructions (CFIs, Appendix II) are just instructions and neither law nor rules. It is just for departmental use and lack of legal instruments.

Community forestry program was initially started to rehabilitate the barren land, to arrest deforestation caused mainly by household use and to support basic needs of the local populace. It was adopted later as a way to eradicate shifting cultivation practice. Recently, CF is integrated into rural development and poverty reduction schemes aiming towards the Climate Change and REDD+ era.

There are six zonation for different uses of forestland, also known as Working Circle (WC), such as; Production WC, Protection WC, Plantation WC,

Watershed WC, Local Supply WC and NTFP WC. CF belongs to the Local Supply WC with total area of 18,728,036 acres. As of March 2014, CF is being practiced in 119,918 acres by 753 FUGs with 30,594 households participating. CFs are established in plantations type which includes not only forest plantations but also plantations mean of Agroforestry and enrichment planting in natural forest type. According to the Planning and Statistics Division of FD, each of FUG member can access 3.99 acres of CF in average. The detail of community forestry establishment from 1996 to March, 2014 by States and Regions is described in Table 2.

The research conducted by Ecosystem Conservation and Community Development Initiative, ECCDI, which is a local NGO, tried to answer the question “Is CF socially participatory, beneficial and equitable for improving rural livelihood?”. The result varied from one place to another. In some locations where institution support especially financial and technical supports are available, and where FUGs are active, participatory and functioning (Tint, 2011). But they do not measured the impact on livelihood in terms of benefits of CF to the community.

In order to thoroughly understand livelihood change due to community forestry, more in-depth study is needed. My research study focus on the livelihood change of local people in the communities of Myanmar where CF projects were implemented, case-specifically and within a certain period of time. Yet, there is

no comparative study to highlight the livelihood benefits from the establishment of community forestry among people in a community.

**Table 2 Community Forestry of Myanmar Established from 1996 to March, 2014**

Sr.	States/ Regions	Reserved Forest/ PPF			Protected Forest/ Unclassed Forest			Total (Acres)	FUGs	No. of Member	Area per FUG member (Acres)
		Plantation (Acres)	Natural Forest (Acres)	Total (Acres)	Plantation (Acres)	Natural Forest (Acres)	Total (Acres)				
1	2	3	4	5	6	7	8	9	10	11	12
1	Kachin	4926	4971	9897	985	2061	3046	12943	18	1393	9.29
2	Kayar	90	0	90	100	414	514	604	5	232	2.60
3	Kayin	23	96	119	0	1103	1103	1223	7	313	3.91
4	Chin	0	1121	1121	0	2256	2256	3377	31	298	11.33
5	Sagaing	351	442	793	1250	1892	3142	3935	24	572	6.88
6	Tanintharyi	1825	6680	8505	0	200	200	8705	10	396	21.98
7	Bago	512	6	518	300	125	425	942	13	230	4.10
8	Naypyitaw	53	0	53	0	0	0	53	2	13	4.08
9	Mandalay	4430	1123	5553	475	65	540	6094	95	3410	1.79
10	Magwe	1331	922	2253	2464	1688	4151	6405	63	2803	2.29
11	Mon	165	0	165	0	0	0	165	4	59	2.80
12	Rakhine	1640	570	2210	2374	2186	4559	6770	102	4268	1.59
13	Yangon	356	41	397	0	0	0	397	6	120	3.31
14	Shan	491	24279	24770	30	33887	33917	58686	234	10992	5.34
15	Ayeyarwady	4992	4628	9619	0	0	0	9619	139	5495	1.75
<b>Total/Average</b>		<b>21185</b>	<b>44879</b>	<b>66064</b>	<b>7978</b>	<b>45875</b>	<b>53854</b>	<b>119918</b>	<b>753</b>	<b>30594</b>	<b>3.99</b>

Source: Planning and Statistics Division, FD (personal communication, July 2014)

**Plantations** include not only forest plantations but also plantations by mean of Agroforestry.

**Natural forest** means conservation of natural forests.

**FUGs** means forest user groups.

### **2.3. Characteristics of Dry Zone**

Dry Zone is situated in central Myanmar covering parts of Magwe, Mandalay and Sagaing Regions. Compared to other regions of the country, Dry Zone has very harsh climatic conditions having very low rainfall and extremely high temperature. Annual precipitation in the Dry Zone is on average less than 30 inches (750 mm), with marked variations occurring within the region. Over the last decade there has been more frequently less rainfalls occurring. The rainfall distribution over time and space is erratic with high rainfall intensities of up to 10 inches (250 mm) in a single day and with hourly intensities of over 4 inches (100 mm). It has a long dry season of six months from December to April with highest temperature rising over 42° C in day time and lowest temperature dropping to about 12° C during night time (FREDA, 2004).

It is an important agriculture area of the country, producing major cash crops like sesame, bean, pea and ground nut. Traditional toddy farming is also common in the region supporting regular and major income for rural families (Ba Kaung, 2006). It is also supporting about half of the national cattle population (7,356,000 in 2000) (Ministry of Information, 2002). Consequently, despite relatively low land productivity, most of arable lands in dry zone including more than 50 percent of originally forest lands have already been occupied by local residents for agriculture, toddy farming and grazing (Ba Kaung, 2006).

#### **2.4. Forest types in Dry Zone**

Forests in the study sites are mostly dry and thorn forests and the trees are mainly xerophyte which is a species of plant that has adapted to survive in an environment with little water, because of dry and poor soil. Due to low rainfall and poor soil fertility in this area, the growth rate is very slow and the existing forests are also very sparsely distributed.

There prominent tree species that can be found in the study areas are Sha (*Acacia catechu*), Tanaung (*Acacia leucophloea*), Gandasein (*Prosopis juliflora*), Zi (*Aiayphus jujube*), Magyi (*Tamarindus indica*), Tamar (*Azadirachta indica*), Subyu (*Acacia Arabica*) and Koko (*Albizzia lebbek*). Economic tree species is Htan (Toddy Palm) (*Borassus flabellifera*) that grows rampantly (Tin Tin Moe, 2006).

#### **2.5. Socioeconomic status in Dry Zone**

Local people, particularly living in rural areas of dry zone are extremely poor and facing great hardships (Ba Kaung, 2006). Most villages have no electricity and poor access to roads connecting to towns. They have to spend nearly half of day time just to fetch enough fuel wood, fodder and water (Ba Kaung, 2006). Local people have to depend on forest resources for their daily use and for selling fuelwood. This situation leads to the degradation of natural forest resource. Many of the rural people are also heavily depending on livestock farming. More than 25% of households practice livestock farming. They usually practice free grazing that is not in a specific area for grazing and it is free to graze everywhere in dry period,

when there is no agriculture. There are always conflicts among livestock, agriculture and forestry (including CFs). Damage of planted trees/seedlings by goats and cows is quite usual and sometimes the plants are destroyed on purpose.

The main purpose of establishing CF in Dry Zone is to rehabilitate the degraded forest land and to support local basic needs with the secure land tenure of 30 years.

The duration of land lease for the establishment of Community Forest is set initially for 30 years in CFIs.

Table 3 Land Utilization of Myanmar Dry Zone in 2003 (Area in Ha)

Sr	Districts	Total Land (million ha)	Agri_Land	Non-Agri Land	Reserve Forest	Woods Land	Waste Land
1	Monywa	1.7 (8%)	1.0	0.3	0.2	0.1	0.1
2	Shwebo	3.0 (14%)	1.4	0.4	0.7	0.4	0.1
3	Sagaing	0.6 (3%)	0.5	0.2	0.0	0.0	0.0
4	Pakokku	2.1 (10%)	0.7	0.8	0.2	0.2	0.1
5	Gangaw	1.4 (6%)	0.1	0.3	0.6	0.3	0.0
6	Magway	2.4 (11%)	1.1	0.8	0.4	0.1	0.1
7	Minbu	1.6 (7%)	0.4	0.4	0.5	0.3	0.0
8	Thayet	3.0 (14%)	0.4	0.2	0.6	1.7	0.1
9	Kyaukse	0.9 (4%)	0.4	0.2	0.3	0.0	0.0
10	Meiktila	1.4 (7%)	0.7	0.4	0.3	0.0	0.0
11	Myingyan	1.6 (7%)	1.0	0.3	0.1	0.1	0.0
12	Nyaung_U	0.4 (2%)	0.2	0.1	0.0	0.1	0.0
13	Yamethin	1.6 (7%)	0.5	0.3	0.4	0.2	0.0
<b>Total</b>		21.5 (100%)	8.6 (40%)	4.7 (22%)	4.1 (19%)	3.7 (17%)	0.5 (2%)

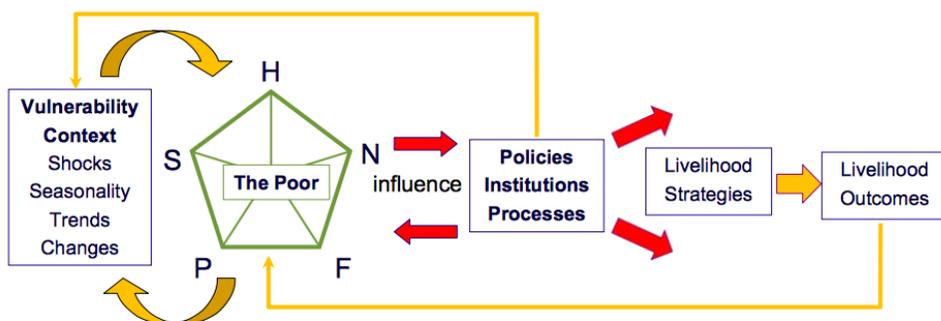
Source: Settlement and Land Records Department, Myanmar 2003

### **3. Methodology**

#### **3.1. Theoretical Framework**

A livelihood is a means of making living that encompasses people's capabilities, assets, income and activities required to secure their basic needs. Department for International Development (DFID, 1999) of UK developed a sustainable livelihoods framework. The livelihoods framework provides a tool for analysing people's livelihoods and the impact of specific threats or shocks on livelihood vulnerability. A key feature of livelihoods analysis is that it includes an analysis of household assets, strategies, priorities and goals at micro-level, and the policies, institutions and processes that affect livelihoods at national and international level (macro-level).

A second key feature is that it is participatory. The focus is on the needs and priorities as identified by the affected populations themselves. Assessments use participatory methods, such as PRA (participatory rural appraisal) or RRA (rapid rural appraisal) to find out what people's problems and priorities are (Carney et al, 1999).



**Figure 1 An Analytical Framework of Sustainable Livelihoods (DFID, 1999)**

Common participatory methods include key informant interviews, focus group interviews, wealth ranking, proportional piling, seasonal calendars, and timelines.

The core principles of livelihood analysis are people-centered, holistic (implemented in partnership), dynamic, building on the strength of the poor, linking the “micro” with the “macro” and sustainability-focused. (FAO, 2008)

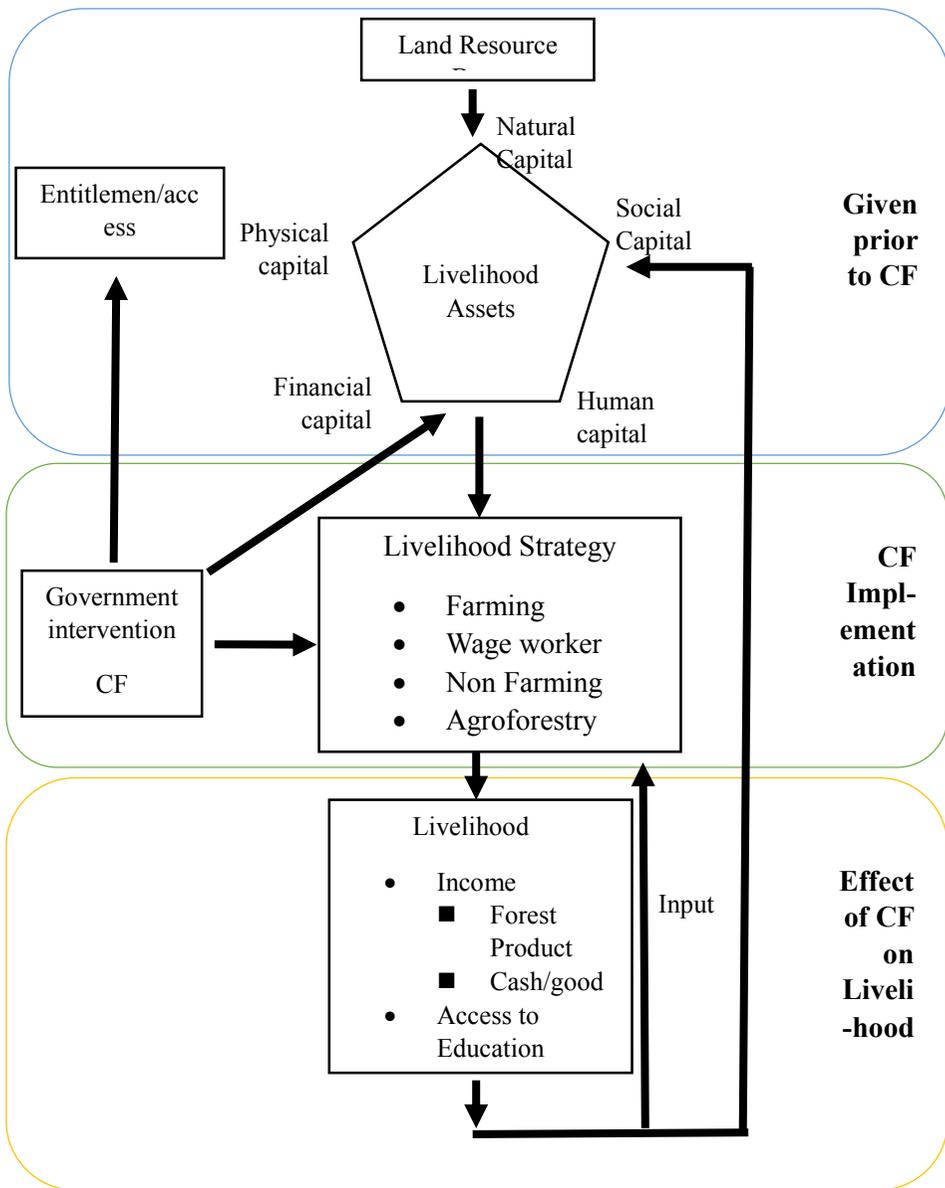
This study is initially based on the livelihood system model (Soussan et al. 2001) and focused on livelihood assets. According to FAO (2008), people’s ability to escape poverty depends on access to assets which help to determine livelihood options and are transformed into livelihood outcomes. So, I focused on assets at a local level in Dry Zone, Myanmar.

The five capitals used in this study are;

- Natural Capital
  - Land
  - Access to common property resources
    - Fuel wood, fodder, timber, NTFPs
- Physical Capital
  - Water supply
  - Housing/School/Hospital
  - Communications
- Human Capital
  - Household member
  - Education/Skills
- Financial Capital
  - Income
    - Wages
    - Forest products
    - Cash crop
- Social Capital
  - Level of participation in CF

The livelihood system model (Figure 2) has three phases and it helps identify the important assets in livelihood in the first phase. It is assumed that there is only land resource prior to the CF project. Basically, land resource has influence on five capitals because natural capital and rural populations' livelihood

opportunities also depend on land resource. In the second phase, there are government interventions such as the CF program which affects the local community livelihood strategy. It is postulated that the external intervention can influence the local people to change their livelihood strategy and also contribute to the improvement of assets. It is hypothesised that the local community adopt different livelihood strategies which could lead to changes in their livelihood. The third model can explain the impacts of the intervention on livelihood level, in terms of income level and chance to access better education. The output gained from the intervention becomes as an input to the livelihood strategy as well as to the livelihood assets.



**Figure 2 Livelihood System Model**

### 3.2. Livelihood Impact Model

There are 7 variables used in correlation coefficient analysis and also for regression analysis; **INCOME**, **EDU\_LVL**, **DEC\_MAKIN**, **APPR\_DUM**, **WORK\_HR**, **TRAIN\_TIME**, **LIVST\_CH**.

Where,

**INCOME** = income from CF i.e., all access to fodder, fuel wood and income from NTFPs are turned into monetary value (average income per month is calculated)

**EDU\_LVL** = access to better education of one's child supported with income gained from CF (total year of accessing better education is measured)

**DEC\_MAKIN** = with 6 categories of decision making level (0 = very poor; do not involve in any decision made in CF activities, 1 = poor, 2 = under moderate, 3 = moderate, 4 = above moderate, 5 = high, 6 = very high; involved in every decision making for CF activities) (6 supporting questions on site selection, species selection, formulation of management plan, Management Committee election, CFUG members regular meeting, tree planting)

**APPR\_DUM** = CF implementation approach (0 = project oriented approach, 1 = self-initiative approach)

**WORK\_HR** = working hour in CF activities (total working hour per month is calculated)

**TRAIN\_TIME** = number of time participated in training related to CF (0 = not participated, 1 = participated one time, 2 = participated two times) (there were two times of training before CF implementation and after CF implementation)

**LIVST\_CH** = change of livelihood strategy after CF implementation (0 = no change; same as before CF implementation, 1 = Community Forestry (agroforestry) + farming + yar farm + livestock, 2 = only Community Forestry (agroforestry))

The ANOVA test was run to figure out the difference of the two communities' livelihood strategies which are influenced by the CF implementation approach. Change in livelihood level in terms of income from CF and better education access of the children in the household are determined by decision making level.

The specification of the regression models follow

$$Y_{INCOME} = \beta_0 + \beta_{DEC\_MAKIN}X_{DEC\_MAKIN} + u_i$$

$$Y_{EDU\_LVL} = \beta_0 + \beta_{DEC\_MAKIN}X_{DEC\_MAKIN} + u_i$$

### **3.3. The Sites Studied**

To fulfill the research objectives, the study focus on already established CFs from two dry zone villages namely Yoe Sone and Myay Thin Twin. These two villages are situated in two townships of Mandalay Region namely Wundwin Township and Nyaung U Township respectively. The two case study sites were selected because of similarities in terms of temperature, rainfall, soil type, topography, and

socioeconomic and geographic conditions, and differences in implementation approach. The selected CFs are also project based and implemented since ten years ago (age of 10 years). The profiles of two CFs are mentioned in Table (4), and its location with Map 2 (Location of the Study Sites).

Both of the study sites are situated in Central Dry Zone of Myanmar. The two CFs have similar topography, climatic con and geographic conditions.

### **3.3.1. Self-initiative Approach (Yoe Sone CF, study site A)**

Yoe Sone CF is located in Wundwin Township of Mandalay Region. It is established in 2004 and the area is 550 acres.

Before establishment of CF, it was a degraded natural forest. CF is the output of Community Forestry Training and Extension (COMFORT) Project jointly organized by DZGD assisted by JICA technically. The Japanese Government, based on the request for assistance from the Government of Myanmar, extended its cooperation fro the implementation of the Central Forestry Development Training Center (CFDTC) Project from 1990 to 1995, and its follow-up program for 2 years from 1995. In addition, due to the increasing demand in the training of extension staff to promote participatory forest management, the Japanese government conducted and aftercare program for 2 years from 1999 to 2001. The aftercare program was focused on training for community forestry extension. A “Field Level Extension Method” training course had been conducted six times during 1999/00 – 2000/01. The overall goal of the project was to help Forest

Department (FD) promotes participatory forest management in Dry Zone based on the Community Forestry Instructions (CFIs) so that people with voluntary participation are able to enjoy benefits from the Community Forests. The training program included lectures on basic concepts to the participatory approach, gender consideration, extension methods, social forestry and community forestry. The Participatory Rural Appraisal (PRA) workshop, with villagers' participation, helped the local people to identify real needs for the community.

CF was implemented in 2004 as agro-forestry CF types. The main tree specie planted in this CF, Shaw Phyu (*Sterculia versicolor* Wall), is planted mixed with agri-crops such as Green Gram, Sesame, Lab Lab Bean, Cotton and Ground nut.

With the effective protection and actively participation of user group members, CF gained vegetation cover with commercial benefits.

Forest user group is composed of 84 households. FUG members were initiated by the COMFORT project and CF was established by themselves. Project only supported technical needs and trainings but not funding nor daily wages. Now, CF becomes the primary source of household income.

### **3.3.2. Project-led Approach (Myay Thin Twin CF, study site B)**

Myay Thin Twin CF is located in Nyuang U Township of Mandalay Region. It is established in 2003 and the area is 36.6 acres.

This CF is originally a plantation contributed by JICA. The dry zone greening department (DZGD) was cooperating with international organizations in Nyuang-

U area such as JICA Afforestation Project, which has been started from 2003-2004. The basic design was formulate from that project by Kokusai Kogyo Co., Ltd under a contract to JICA.

The main objectives of the project are soil conservation and fuelwood supply to the local people. The project includes four main components in the implementation process.

1. planting of trees
2. construction of facilities
3. procurement of equipment, and
4. technical assistant.

This project is also a result of agreement between Myanmar Government and Japanese Government, which was signed on 30<sup>th</sup> September 2002. Part of the agreement is to establish forest plantations including CF (242.5 ha) (Thein Win, 2004).

The forest was dry deciduous type and planted species in CF plantations are Sha (*Acacia catechu*), Tama (*Azadirachta indica*), Zi (*Ziziphus jujube*) and Koko (*Albizzia lebbak*). The tree species were decided by DZDG and JICA.

With effective protection against outside interferences, the natural regeneration of native species had come up profusely. The trees are now so congested. With this CF, the whole CF process seemed to be misunderstood and misinterpreted. CFC was granted to the Chairman of the Village Tract Peace and Development Council

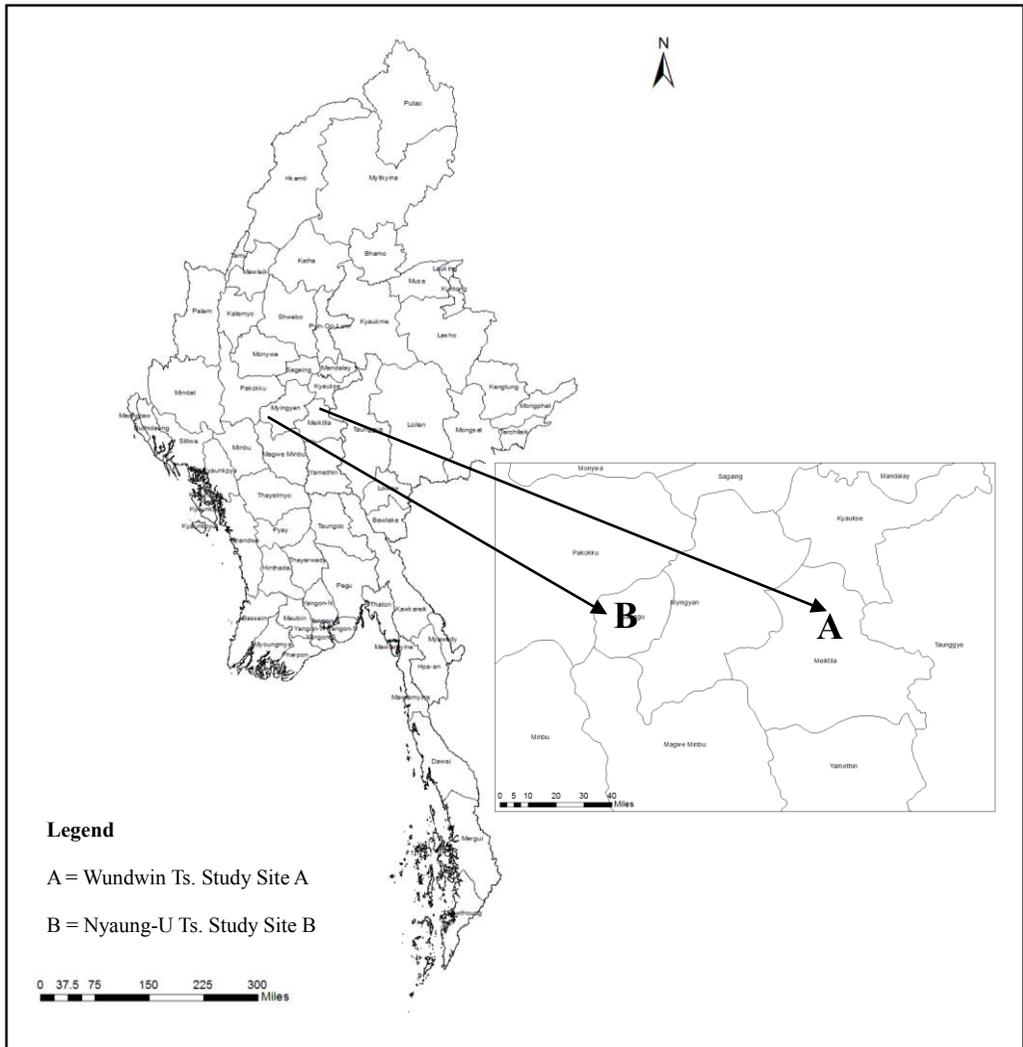
(VTPDC) instead of the Chairman of the Management Committee (MC), and the Chairman and the MC of the CF had changed with the change of the Chairman of the VTPDC. Illegal cutting from outsiders for firewood is a frequent problem. Due to improved ground cover, soil has improved and erosion reduced.

Forest user group is composed of 143 households (the whole village). CF was established not because they knew the benefits of community forestry, but because they earned daily wages. Most of the villagers call the CF as Japanese Plantation. The MC was formed with the members of VTPDC. Fodder and firewood are now available from CF.

**Table 4 Comparative profiles of two CF sites**

<b>Attribute</b>	<b>Yoesone CF (study site A)</b>	<b>Myay Thin Twin CF (study site B)</b>
Forest area (Ac)	550	36.5
Size of forest user group (hh)	84	143
Forest type	Degraded dry forest	Degraded dry forest
CF management activities	Intercropping	Enrichment planting
Characteristics of management	Individually	Collectively
Participation in management activities	Good	Poor
Approach	Community oriented /self-initiative approach	Projected oriented /centralized approach
Year of establishment	2004	2004
Funding source	JICA (COMFORT project)	JICA

**Map 2 Location of the Study Sites**



### **3.4. Data Collection**

Preliminary assessment was done in February, 2014 in order to assess the information about the study sites and to evaluate the questionnaire and research hypothesis. Second field survey was done in July and August, 2014. The questionnaire was developed to assess the five capitals (natural capital, social capital, human capital, financial capital, physical capital) in order to measure the impacts on livelihood of local community. Based on the livelihood system model, fifteen indicators for the capitals were set to assess the livelihood impacts. The indicators included in the questionnaire are access to fuel wood, access to timber, access to fodder, access to NTFPs, improvement in water supply, school infrastructure, accessibility to nearby towns (road), access to training for capacity building, access to better education, improvement in housing, vehicle for transportation, livestock own, regular employment, labor and participation in CF activities. For comparison, 60 forest user group members of the two study sites are randomly selected. In both sites, capitals improvement were measured with questionnaire survey at the household level (30 households from each study sites, 36% in study site A and 21% in study site B).

For the primary data collection, firstly, the key informant interviews were done to assess the CF background information, overall socio-economic status of forest user group members and CF management status. In this step, discussion with village elders, CF management committee and some members of forest users was

done. After that, household level questionnaire survey was conducted. Direct observations in the CF sites were followed after interviewing. And some necessary information and confirmation of missing information were accessed by telephone. Secondary data was collected from line ministries, library online search, and NGOs by direct access before and after visiting the study sites. Most of the secondary data were collected from Forest Department, Department of Statistics and Planning and Dry Zone Greening Department from the Government side and Ecosystem Conservation and Community Development Initiative (ECCDI) from NGO side. District Forest offices also provided some regional background data on the study sites.

The communities were comparatively studied to know how different in socioeconomic status between them and how the difference in implementation approach shaped the change of community livelihood strategy pattern.

## 4. Results and Discussion

### 4.1. Results of Surveys

The two Forest User Groups (FUGs) have different background conditions in terms of land ownership and different experiences in CF implementation. Table 5 shows the land ownership of FUGs. In site A, none of the respondents own land because they were daily-wage labours before the CF project and some are migrants. In site B, most households own land for cultivation.

**Table 5 FUGs Household land holding status**

Land holding		Site A		Site B	
No.	Particular	Quantity	%	Quantity	%
1	Household (HH) by status of land holding				
	HH without land holding	30	100%	1	3%
	HH with land holding	0	0%	29	97%
2	Average land holding (acre)			15.17	

FUGs from site A had to spend their own money for CF establishment which is participatory approach. Most of them spend their time for site preparing, seedlings, digging hole and planting out for agroforestry in CF site and some hire labours for land preparation (Table 6). Land preparation usually took two years for 10 acres. FUGs from site B did not need to contribute as it was project-led approach and the community was hired as labour.

**Table 6 Household's Expenditure for Forest Establishment of Site A**

Variable	Mean	Std Dev	Minimum	Maximum	N
Land preparation cost	23000	24120.39	0	96000	30
Seedling cost	268640	370033.66	0	1470000	30
Total Expenditure	291640	392527.75	0	1560000	30

FUG members mainly collect products such as fuelwood, NTFPs and fodder for livestock. FUG members of site A gain most benefits from resin tapping as they chose a commercial tree species to plant in CF and they made their living by cultivating agricultural crops before they can harvest resin from the tree. Fodder for livestock is also available from agricultural byproducts. 90 percent of FUG members from site B collect fodder from CF. They collected tree leaves and small branches for animal food for four to six months a year. (Table 7)

**Table 7 Products collected by FUGs from CF**

Products from CF		Site A		Site B	
No.	Particular	Respondent HH	%	Respondent HH	%
1	HH getting NTFPs from CF	1	3%	0	0%
2	HH getting fodder from CF	0	0%	27	90%
3	HH getting fuelwood, NTFPs and Fodder from CF	27	90%	0	0%
4	HH getting NO product	2	7%	3	10%

Table 8, 9 and 10 shows the fuelwood and fodder consumption and support from CF. All respondents from site A use fuel for cooking and mostly collected from CF. They usually grazed the cattles before CF establishment and majority of them collect fodder from CF after CF establishment. Respondent from site B use

fuelwood and agricultural residue for cooking and support from CF is insufficient because the tree growth is slow. They collect fuelwood only two times within ten years and the income is around eighty dollars which was used for village school building. Fodder for livestock is mainly collected from CF.

**Table 8 Fuelwood Consumption and support of CF (site A)**

Variable	Mean	Std Dev	Minimum	Maximum	N
Fuelwood consumption per month (cart)	0.92	1.07	0	3	30
Income from Fuelwood per month (kyats)	3666.67	4269.65	0	12000	30

**Table 9 Fodder Consumption and support of CF (site A)**

Variable	Mean	Std Dev	Minimum	Maximum	N
Fodder consumption per month (cart)	119	71.98	0	300	30
Income from Fodder per month (kyats)	59500	35992.10	0	150000	30

**Table 10 Fodder Consumption and support of CF (site B)**

Variable	Mean	Std Dev	Minimum	Maximum	N
Fodder consumption per month (cart)	56.54	59.87	0	216	30
Income from Fodder per month (kyats)	28270.00	29932.75	0	108000	30

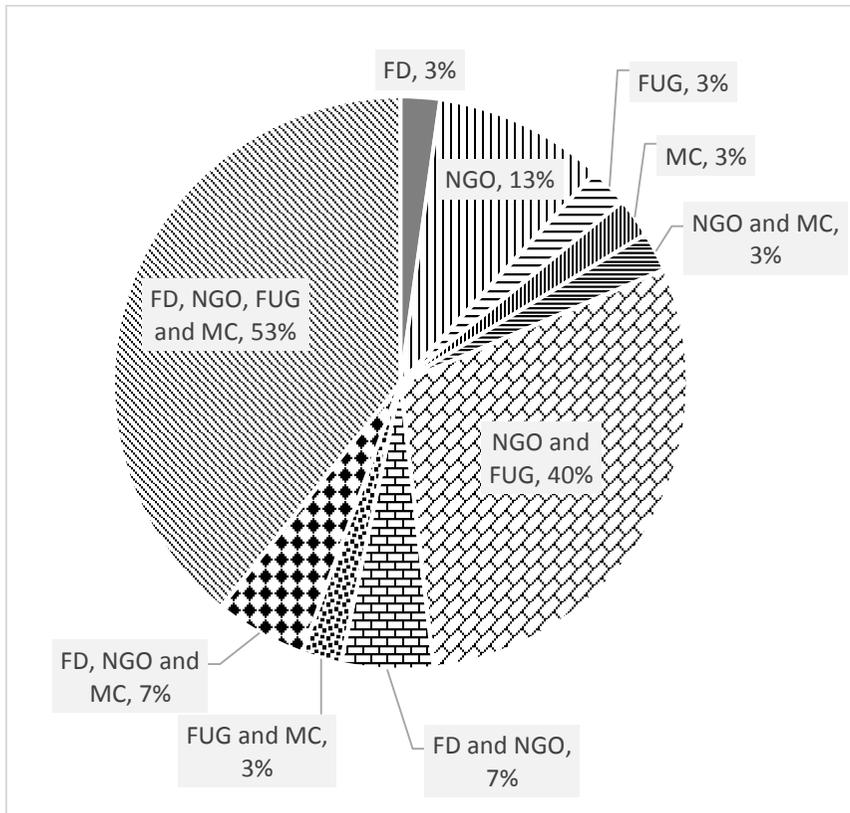
Both communities responded that forest condition and soil fertility are improved after CF implementation and soil erosion is also reduced. (Table 11)

**Table 11 Communities' perspective on Environmental Conservation of CF**

Environmental Conservation		Site A		Site B	
No.	Environmental Conservation	Respondent HH	%	Respondent HH	%
1	Forest condition after CF				
	Improved	28	93%	29	97%
	No change	0	0%	0	0%
	Become Worse	2	7%	1	3%
2	Improvement of soil fertility after CF				
	Improved	27	90%	28	93%
	No change	0	0%	1	3%
	No Judgment	3	10%	1	3%
3	Reduction of soil erosion after CF				
	Yes	22	73%	19	63%
	No	0	0%	10	33%
	No Judgment	8	27%	1	3%

Table 12 shows the FUGs role in decision making process and their chance to participate. In formulating the management plan of CF, all respondents of site A see that Forest Department (FD), NGOs, FUGs and MC management committee (MC) of CF are key persons for the formulation. In site B, the majority of respondents think that NGOs and FUGs are the key players of designing the CF project (Figure 3). 93 percent of respondents from site A got chance to participate in decision making processes and only 10 percent of respondents from site B got the chance to participate. Majority of respondents from site A participated in formulating the CF management plan and most of respondents from site B did not participate. In site A, regular meetings were held through after CF implementation and regular meetings were held only in project period in site B.

The progress report is submitted to Forest Department regularly in site A and most of respondents in site B do not know whether the report is submitted or not. 73 percent of respondents from site A think there is equity in benefit sharing. 27 percent of respondents do not think the benefits are equal. 97 percent of respondents from site B do not think that there is equity in benefit sharing but, in fact, the trees planted in CF site do not grow enough to collect the benefits from it.



**Figure 3 Key Player for Formulation of Management Plan**

**Table 12 Role of Decision Making**

Practice on		Stie A		Site B	
No.	Practice	Respondent HH	%	Respondent HH	%
1	<u>Participation on site selection</u>				
	Can not participate	0	0%	25	83%
	A few	2	7%	2	7%
	A lot	28	93%	3	10%
2	<u>Participation on formulation of MP</u>				
	participated	22	73%	10	33%
	Not participated	0	0%	19	63%
	Do not know	8	27%	1	3%
3	<u>Holding regular meeting of FUG</u>				
	Yes (through after CF implementation)	28	93%	1	3%
	No (through after CF implementation)	0	0%	0	0%
	No Judgment	2	7%	3	10%
	Yes but only in project period	0	0%	26	87%
4	<u>Frequency of meeting</u>				
	twice a month	22	73%	0	0%
	1 to 50 times in project period	28	93%	26	87%
	No Judgment	0	0%	4	13%
5	<u>Submitting progress report to FD</u>				
	Yes	22	73%	5	17%
	No	0	0%	2	7%
	Do not know	8	27%	23	77%
6	<u>Equity on benefit sharing</u>				
	Yes	22	73%	1	3%
	No	8	27%	29	97%
7	<u>Reasons for inequity</u>				
	individual management	8	27%	0	0%
	not enough grown	0	0%	29	100%

Forest Department's supports in two sites are different. Technical support was given in site A and seedlings and technical support are given in site B. NGOs also gave technical supports in site A and gave technical supports and seedling supports in site B. (Table 13 & 14)

**Table 13 Forest Department's Support on CF activities**

Support to CF activities		Site A		Site B	
No.	FD's support on CF activities	Respondent HH	%	respondent HH	%
1	<u>Supporting things</u>				
	seedlings	0	0%	21	70%
	Technical support	30	100%	1	3%
	seedlings and technical support	0	0%	7	23%
	Don't know	0	0%	1	3%
2	<u>Giving technical training to FUG</u>				
	once a year (after project period)	7	23%	0	0%
	1 to 20 times (project period)	30	100%	18	60%
	No	0	0%	1	3%
	No Judgment	0	0%	11	36%

**Table 14 NGO's Support on CF activities**

		Site A		Site B	
No.	NGO's support on CF activities	Respondent HH	%	Respondent HH	%
1	<u>Getting NGO's support</u>				
	Yes	22	73%	30	100%
	No	0	0%	0	0%
	Do not know	8	27%	0	0%
2	<u>Supporting things</u>				
	In kind	0	0%	13	26%
	In cash	0	0%	4	80%
	Technical support	22	73%	1	20%
	In kind and technical support	0	0%	8	16%
	All support	0	0%	3	60%
	In kind and in cash	0	0%	1	20%

Twenty out of thirty (67%) respondent FUG members' children of site A get access to better education after CF implementation and thirty three percent of them do not get this opportunity because they do have school-aged children. (Table 15) In site B, it remains the same as before CF implementation.

**Table 15 Status of Access to Better Education of FUG members' children (site A)**

Variable	Mean	Std Dev	Minimum	Maximum	N
Number of Primary School Student	0.30	0.84	0	4	30
Number of Middle School Student	0.57	0.82	0	3	30
Number of High School Student	0.60	0.93	0	3	30
Number of University Student	0.13	0.43	0	2	30
Total year of access to education (year)	6.83	6.63	0	21	30

Table 16 shows the summary of impacts of CF on livelihoods in terms of capitals. Natural capital is improving in both sites. In site A, FUG members can collect forest products such as fuelwood, timber, fodder and NTFPs for their basic needs and resin tapping for their living. They can fulfill their needs year after year. In site B, FUG members can only collect fodder for their livestock and fuelwood collection was done only times within ten years. Physical capital is improving in both sites. Both FUGs gain benefits such as water supply, road access to towns and in site B, village school buildings were improved as one of the outputs from the CF project. For human capital, there were trainings concerning CF management and agroforestry technique training for site A. Their younger

generations can access to better education and they do not need to work as daily labours since they participated in CF activities. In site B, the FUG members got employment only in CF implementation period as working labours for digging holes and planting trees. Financial capital is improving significantly in site A. The FUG members got better housing, could buy motor cycles, possessed livestock and got regular employment for agroforestry. Some of them also work as labour for farm ploughing. In site B, employment was only in CF implementation stage for digging holes and planting trees. Social capital improvement is also different in two sites. In site A, participation in managing CF activities is high. They have regular meeting and sharing knowledge and experiences within the community even though they individually manage their own agroforestry plot. They spend most of their time in the field because resin tapping needs a lot of time for treatment and harvesting. In site B, time investment was only in CF implementation period.

**Table 16 Indicators of Impacts of CF on Livelihoods: Capital Improve?**

Type of Capital	Indicator	YoeSone (Study site A)	Myaythintwin (Study site B)
Natural Capital	Improving?	Yes	Yes
	Improvement in forest product flows	Fuel wood Timber Fodder NTFPs	Fodder
	Other benefit flows from forest	Resin tapping	
Physical Capital	Improving?	Yes	Yes
		Water supply Road	Water supply School Road
Human Capital	Improving?	Yes	Yes
	Training	Yes	No
	Education	Yes	No
	Employment	Yes	Yes
Financial Capital	Improving?	Yes	Yes
	Housing	Yes	No
	Transport vehicle	Yes	No
	Livestock ownership	Yes	No
	Regular Employment	Yes	No
	Labour	Farm ploughing	Only in implementation stage
Social Capital	Improving?	Yes	Yes
	Participation in managing activities	Yes	Only in implementation stage
	Networking	Yes	No

## **4.2. Discussion**

The impacts on livelihood are organized on the basis of the livelihood model. The main indicator of impact is capital improvement and other indicators used are according to the individual household's access to the capital, livelihood opportunities, accessibility and improvements of the local assets (Table 16). Some of the indicators' values such as fuel wood, fodder and NTFPs in natural capital are changed into monetary value to calculate the incomes from CF. The Pearson Correlation Coefficients between the variables are calculated. (Table 22)

In this study, one ANOVA test and two regression models were formulated. The analysis were done to figure out the difference of two communities' approach and the influence on the change of livelihood strategy of communities, and the find out the influence of the level of community participation in decision making process on level of income and on the access to better education of local communities' children. According to the ANOVA test, it is significant that there is difference in two communities' livelihood strategy as influenced by the CF implementation approaches. (Table 17 & 18)

**Table 17 CF Implementation Approach and FUG members' Livelihood Strategy**

Livelihood Strategy	Approach A	Approach B
0	0	30
1	12	0
2	18	0
Total	30	30

**Table 18 ANOVA result for livelihood strategy change between two Approaches**

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	38.40	38.40	309.33	<.0001
Error	58	7.20	0.12		
Corrected Total	59	45.600			

**Table 19 Regression analysis result for level of Income**

Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	Intercept	1	-156392	57096	-2.74	0.0082
DEC_MAKIN	DEC-MAKIN	1	126672	17523	7.23	<.0001

**Table 20 Regression analysis result for Access to Education**

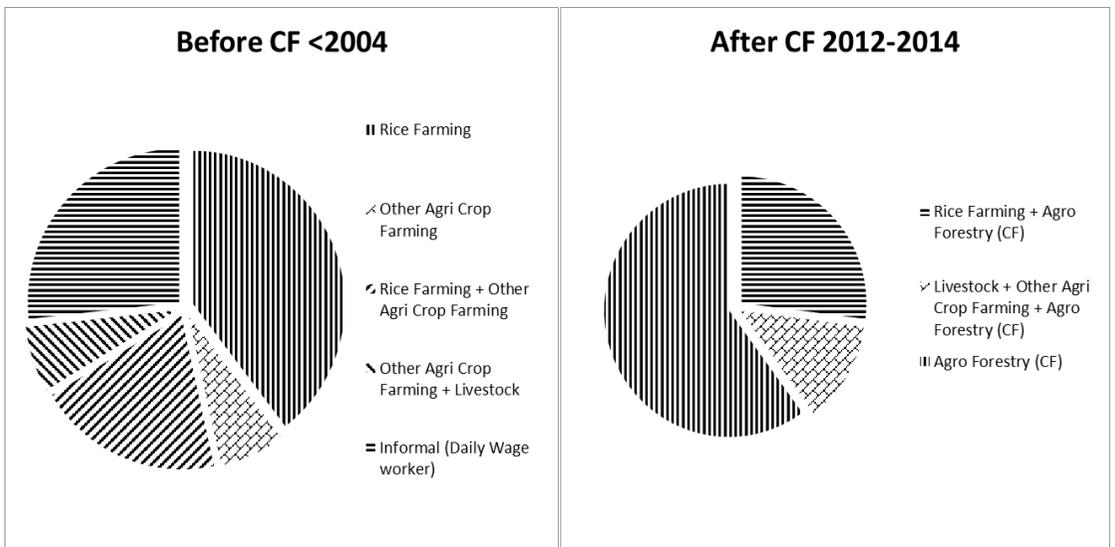
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr >  t
Intercept	Intercept	1	-2.83	0.88	-3.21	0.0022
DEC_MAKIN	DEC-MAKIN	1	2.33	0.27	8.62	<.0001

As in the regression analysis results, it is significant that level of participation in decision making process have significant influence on household income which allowed the household's access to better Education (Table 19 & 20). Impact on livelihood level is measured in terms of income level and access to better education. Om Prakash Dev et al. (2003) also found that changes in management of the forest resource have often led to changes in livelihood strategies of individuals and households, which are cumulative and mutually reinforcing.

In correlation analysis (Table 22), there is strong positive correlation between implementation approach and livelihood strategy change, working hour and decision making. And also, there is strong positive correlation between decision making and livelihood strategy change, as well as working hour which means that when communities are given more change in decision making process, they invest their time in CF implementation and change in livelihood strategy of the FUG members were occurred. This view is supported by Wittayapak and Dearden (1999) and Sudtongkong and Webb (2008), who found that community participation in the decision-making process is one of the factors in the success of CFs if the majority of members are allowed to participate in crafting and modifying the operational rules. Sekher (2001), Gautam and Shivakoti (2005) also supported that if FUG members are not part of the decision-making process which involves regular interaction between leaders and group members, it is very possible that there will be little cooperation. Pagdee et al. (2006) also showed that CF management programs seem to be more successful when most members

participate in a management program.

It is also significant that community forestry implementation approach and decision making level have influence on changing of livelihood strategy of local communities. The members who practice only community forestry (agroforestry) is 60 % of FUG members, the members who practice community forestry (agroforestry) and farming is 27 % of FUG members and the members who practice combination of livestock, community forestry (agroforestry) and other agri-farming is 13 % of FUG members in study site A (Figure 4) but there is no change in Site B.

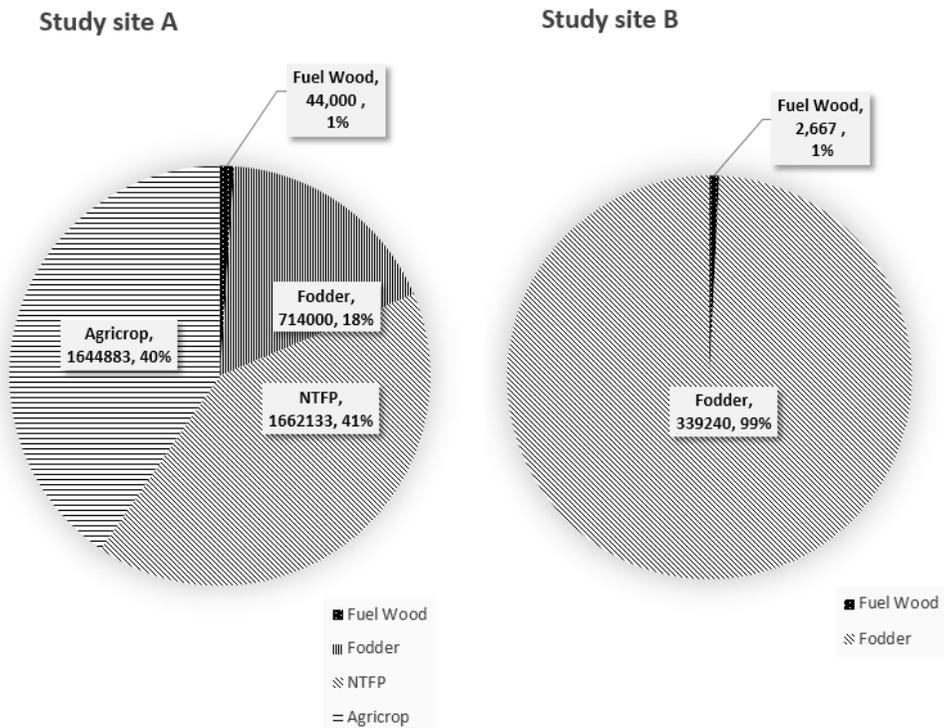


**Figure 4 Change of Livelihood Strategy Pattern (Site A)**

The two CF types are also different as agroforestry (AF) CF (study site A) and plantation CF (study site B). In study site A, FUG members can raise seasonal crops and there are also another income sources such as fuel wood, fodder, Shaw Phyu (*Sterculia versicolor* Wall) Resin and its seeds while FUG members of study site B gain a few benefits only from fuel wood and fodder collection as the growth rate of trees species planted in site B are slow and not able to collect much fuel wood and fodder either. In site A, FUG members choose a species, Shaw Phyu (*Sterculia versicolor* Wall), its resin is used in fiber glass production and highly demanded in market. The trees are tolerant to the severe weather condition and it is the most appropriate option for the FUG members to plant mixed with agricultural crop so that they can make small income during initial period of plantation. Dry Zone communities had been suffering from the loss of agricultural crops due to the very low rainfall within a decade. But income from resin tapping is significantly high and those who invested their time in CF can get the better income now. The estimated total income from CF per year is much different between two study sites. The average income from CF in site A is 4,070,177 Kyats (USD 4,111) and the average income from CF in site B is 341,907 Kyats (USD 345) per year. As a result, the average incomes are significantly different between the members of two user groups. Balooni et al. (2008) and Nath et al. (2005) found that the AF interventions in community-based forest management have increased farmers' income and their participation under the favorable market situation. The correlation between income and the

implementation approach is positively significant at 0.45647 ( $p=0.0002$ ), meaning that when community is given power to manage the resource, they gained higher income.

In this study, the interaction between income and working hour, and decision making found positively significant that Pearson correlation coefficient is 0.8642 ( $p<.0001$ ) and 0.6884 ( $p<.0001$ ) each. It makes clear the point of mutually reinforcing that people took part in decision making and then, invested much time in order to gain benefits (income) from CF and when they made benefits from CF, they keep their participation (Figure 5).



**Figure 5 Household Income from CF**  
*(Kyats per Year)*



Ostrom (1999) proposed that if users do not obtain a major part of their income from a resource, their effort to take part in organizing and maintaining the institution may not be worth the cost to invest. In this study, the interaction between income and the working hour and, the interaction between income and decision making found positively significant that Pearson correlation coefficient is 0.86427 ( $p < .0001$ ) and 0.68844 ( $p < .0001$ ) respectively. In this correlation, it makes clear the point of mutually reinforcing that when people get more chance to participate in decision making process and invest their time order to gain benefits (income) from CF and when they make benefits from CF, they keep their participation. Pearson correlation coefficients for different variables can be seen in Table 22 and the data used for the analysis is expressed in Table 23.

**Table 21 Marketable products and Income from CF (n=60)**

Products from CF	Total Products <sup>a</sup>		Market Value <sup>b</sup> (Kyat) <sup>c</sup>	Total Income per year (Kyat)		Total Income per year per HH (Kyat)	
	Site A	Site B		Site A	Site B	Site A	Site B
Fuel Wood	330	20	4000	1320000	80000	44000	10177200
Fodder	21420	10177	1000	21420000	10177200	714000	339240
Shaw Phyu Resin	3816	0	10000	38160000	0	1272000	0
Shaw Phyu Seeds	532	0	22000	11704000	0	390133	0
Zi	86	0	1800	154800	0	5160	0
Green Gram	604	0	38000	22952000	0	765067	0
Sesame	355.5	0	38000	13509000	0	450300	0
Lab lab bean	301	0	38000	11438000	0	381267	0
Cotton	330	0	500	165000	0	5500	0
Ground nut	285	0	4500	1282500	0	427500	0
Total Income						4070177	341907

**Unit measurement**<sup>1</sup> Basket load, Viss, Cow cart

<sup>a</sup>**Basket load** basis is used for the amount of total products for Fodder, Shaw Phyu Seeds, Zi, Green Gram, Sesame, Lab lab bean, Ground nut

**Viss** is used for Shaw Phyu Resin and Cotton, and

**Cow cart** is used for Fuel Wood

<sup>b</sup> Market value (from local market) was derived as per respondent's responses during the field survey

<sup>c</sup> 1 \$ = 990 Kyats

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<sup>1</sup> The traditional **Myanmar units of measurement** are still in everyday use in Myanmar. One basket load is approximately equal to 2.6 L. One viss is equal to 1.6 kg. One cow cart is equal to 0.2 ton.

**Table 22 Pearson Correlation Coefficient between Variables**

PEARSON CORRELATION COEFFICIENTS, N = 60  
 PROB > |R| UNDER H0: RHO=0

	LIVST_CH	WORK_HR	TRAIN_TIME	DEC_MAKIN	APPR_DUM	INCOME	EDU_LVL
LIVST_CH	1.00000	0.77928 <.0001	0.87589 <.0001	0.94331 <.0001	0.91766 <.0001	0.58349 <.0001	0.61288 <.0001
WORK_HR	0.77928 <.0001	1.00000	0.74196 <.0001	0.87014 <.0001	0.67735 <.0001	0.86427 <.0001	0.76818 <.0001
TRAIN_TIME	0.87589 <.0001	0.74196 <.0001	1.00000	0.89092 <.0001	0.89977 <.0001	0.56235 <.0001	0.65919 <.0001
DEC_MAKIN	0.94331 <.0001	0.87014 <.0001	0.89092 <.0001	1.00000	0.91072 <.0001	0.68844 <.0001	0.74925 <.0001
APPR_DUM	0.91766 <.0001	0.67735 <.0001	0.89977 <.0001	0.91072 <.0001	1.00000	0.45647 0.0002	0.59528 <.0001
INCOME	0.58349 <.0001	0.86427 <.0001	0.56235 <.0001	0.68844 <.0001	0.45647 0.0002	1.00000	0.75255 <.0001
EDU_LVL	0.61288 <.0001	0.76818 <.0001	0.65919 <.0001	0.74925 <.0001	0.59528 <.0001	0.75255 <.0001	1.00000

**Table 23 Data table**

Obs	INCOME (Kyats)	EDU_L VL	LIVST _CH	WORK_ HR	TRAIN_ TIME	DEC_ MAKIN	APPR_ DUM	STUDY SITE
1	133583.33	0	2	40	2	4	1	A
2	205666.67	0	2	40	1	4	1	A
3	140833.33	0	2	40	1	4	1	A
4	350833.33	0	2	40	2	4	1	A
5	380000.00	14	2	40	2	5	1	A
6	128750.00	0	1	30	1	4	1	A
7	108333.33	6	1	30	1	4	1	A
8	15000.00	0	1	20	1	3	1	A
9	120000.00	12	1	30	1	4	1	A
10	169666.67	0	2	30	1	4	1	A
11	136000.00	7	2	30	1	4	1	A
12	0.00	6	1	20	1	3	1	A
13	61833.33	6	1	20	1	3	1	A
14	736333.33	17	2	80	1	6	1	A
15	1715333.33	20	2	120	1	6	1	A
16	1094833.33	14	2	120	2	6	1	A
17	271541.67	4	2	120	1	6	1	A
18	465666.67	5	2	40	1	6	1	A
19	1585833.33	16	2	120	2	6	1	A
20	823583.33	21	2	120	2	6	1	A
21	123333.33	12	1	30	2	5	1	A
22	46666.67	2	1	20	1	3	1	A
23	84000.00	12	2	30	1	4	1	A
24	189875.00	0	2	30	1	4	1	A
25	336333.33	7	2	40	1	5	1	A
26	114666.67	0	1	20	1	3	1	A

27	237166.67	6	1	30	1	4	1	A
28	205833.33	6	2	40	1	5	1	A
29	81375.00	0	1	20	1	3	1	A
30	99666.67	12	1	20	1	3	1	A
31	0.00	0	0	2	0	1	0	B
32	0.00	0	0	2	0	1	0	B
33	0.00	0	0	2	0	1	0	B
34	0.00	0	0	2	0	1	0	B
35	0.00	0	0	2	0	1	0	B
36	0.00	0	0	2	0	1	0	B
37	0.00	0	0	2	0	1	0	B
38	9000.00	0	0	2	0	1	0	B
39	9000.00	0	0	2	0	1	0	B
40	13500.00	0	0	2	0	1	0	B
41	18000.00	0	0	2	0	1	0	B
42	108000.00	0	0	2	0	1	0	B
43	9000.00	0	0	2	0	1	0	B
44	18000.00	0	0	2	0	1	0	B
45	36000.00	0	0	2	0	1	0	B
46	27000.00	0	0	2	0	1	0	B
47	54000.00	0	0	2	0	1	0	B
48	54000.00	0	0	2	0	1	0	B
49	36000.00	0	0	2	0	1	0	B
50	4500.00	0	0	2	0	1	0	B
51	45000.00	0	0	2	0	1	0	B
52	30000.00	0	0	2	0	1	0	B
53	72000.00	0	0	2	0	1	0	B
54	108000.00	0	0	2	0	1	0	B
55	54000.00	0	0	2	0	1	0	B

56	27000.00	0	0	2	0	1	0	B
57	2100.00	0	0	2	0	1	0	B
58	45000.00	0	0	2	0	1	0	B
59	24000.00	0	0	2	0	1	0	B
60	45000.00	0	0	2	0	1	0	B

## **5 Conclusions**

This study tried to find out the socioeconomic impacts of CFs, which practiced different implementation approaches; self-initiative/participatory approach and projected-led/centralized approach, on livelihood strategy of FUG members and also focused on the impacts on livelihood level of FUG members. There are main findings in this study.

The impact of CF implementation approach on livelihood strategy change is found. In study site A, Yoesone CF, the livelihood strategy pattern of FUG members were gradually changed when comparing before and after implementation of community forestry program while there is no sign of change on livelihood strategy of FUG members in study site B, Myay Thin Twin CF.

In study site A, implementation process was self-initiative and community participation degree is high and they have full interest in CF implementation. In study site B, implementation process was projected oriented and FUG members were hired as labors to plant in CF site. FUG members of site B did not aware about their CF and also did not get chance to participate in decision making process as well. As a result, even though forest cover became better and community gained the ecosystem services such as clean water, clean air and wind break, a few amount of the tangible benefits such as fuel wood and fodder from CF can be collected. Some members had to sell out their livestock due to the

continuous loss in agricultural products within a decade.

As consequences, FUG members of study site A gained better income. Accordingly, their children got access to better education which is they never got before the establishment of CF. It can be said that resin tapping became alternative livelihood options and intercropping practice in some extent. So, the benefits are cumulative and mutually reinforcing. On the other hand, the benefits gained in study site B are not significant even though there are some intangible benefits.

The study confirmed that when communities are given more power in decision making process in CF implementation stage, the communities participate more actively, gain more benefits from alternative livelihood activities and their level of livelihood become higher. Thus, if the resource users are given more power to control the resource, their capitals become improved cumulatively. These findings can be helpful in considering the future policy regarding to CF implementation and be a provision of knowledge to local people and further research in Myanmar as well as to other developing countries.

There are some limitations in the study. The information on pre CF implementation stage could not be accessed and that might affect the analysis result some how and make limitations to the comparison. The detail forest cover and stock in CFs were also not able to assess due to the human resource and time

limitation. The conditions of the forest cover of CFs are just assessed by eye observation. Further research on the impacts of the two different practices on ecosystem services and biomass calculation should also be done so that CF can be taken into account to claim payment for its ecosystem services.

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## Appendix I:

### Individual questionnaire (for household head)

1. Name:
2. Village/ Township:
3. Family members-

S N	Nam e	Relatio n to family head	Age (yrs )	Rac e	Religio n	Educatio n	Occupatio n	Remar k

4. Assets
  - (a) Agriculture/animal husbandry

Paddy land (acre)	Size/No.	Remark
Pulses/bean land(acre)		
Plantation (acre)		
Buffalo		
Cattle		
Sheep		
Goats		

Chicken		
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5. Income source

6. Occupation (income source) before and after participating in CF

Starting Yr. (CF)	Before	After

(b) Machineries/ household assets

Tractor	Generator	Motorcycle	Others

7. Type of fuel wood for cooking

8. The place where fuel wood is collected.

9. Amount of fuel wood used per month

Amount	Price

10. Utilization of timber and non-timber forest products per year

Timber & NTFP	Source	Amount	Unit	Estimated cost (MKK)
1. poles			no.	
2. posts			no.	
3. firewood			ton	
4.				

11. The place to collect timber and non-timber forest products.

Kind	Place		
	CF	Natural forest	others

Pole, post			
roofing			
wall			
fence			

## 12. Livestock ownership

kind	Number	price
Chicken		
Cow		
Goat		

## 13. The place to collect fodder for livestock

No.	Place		
	CF	Natural Forest	Others

--	--	--	--

14. Amount of fodder to collect per day. (local price per unit)

15. Grazing site

16. Total working hour at CF site per month.

17. Household income (annual) in MKK

Agriculture	Animal farming	Trade	Salary	Others	Total

18. Agro-forestry status in CF site and production of the products

Total AC	Planted AC	Age	Collectable AC	Number

19. Commercial growing/ potential for future market of trees/ fruit crops

- (1) .....
- (2) .....
- (3) .....
- (4) .....
- (5) .....

20. Cash-crop planting status in CF

Kind	Production Amount per season	Price

21. Land-ownership

Total AC	Irrigated AC	Rain Fed AC

22. Participation in Training concerning CF

Type	Time	Remark
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23. Conditions of houses

Type: brick-  wood-  hut -  other

Roof: thatch-  zinc-  *dani*  other

Walls: bamboo-  wood-  brick -  other -

Floor: bamboo-  wood-  brick  other -

Remarks;

24. Types of transportation (not necessary here)

- (a) Bullock cart
- (b) Cars
- (c) Others

25. Weather and climatic conditions

- (a) Rainfall
- (b) Agricultural use water
- (c) General conditions

26. Distribution /Marketing channels (not necessary here)

- (a) Traders/wholesalers from villages
- (b) Traders/wholesalers from towns
- (c) Others

## **Appendix II:**

### **COMMUNITY FORESTRY INSTRUCTION 1995**

#### **Introduction**

1. For the purposes of regaining environmental stability and addressing basic needs of local communities, active participation by the rural population is urgently needed to plant trees in barren lands and to reforest degraded areas. To achieve these goals Community Forestry Instructions are issued by the Forest Department prior to the formal enactment of the Community Forestry Rules.

#### **Definition**

2. Community Forestry means:

- Afforestation of areas where there is not sufficient fuelwood or other forest products for community use
- Planting of trees and exploiting of forest products to obtain food supplies, consumer products and incomes.

3. Community Forestry is neither a regional development forestry nor an industrial enterprise based on forest products.

#### **Suitable Areas for the Establishment of Community Forest**

4. Community forests can be established in the following areas:

a. Reserved and non reserved forests authorized by the government and the lands which could be managed by the government

b. Village owned firewood plantations established with the permission of the Director General of the Forest Department.

c. Private lands permitted by their owners and lands which are owned by governmental or non- governmental organizations

### **Areas permitted for the Establishment of Community Forests**

5. Community Forests will be permitted to be established in the following:

a. In deforested areas where natural regeneration is difficult.

b. In areas where it is possible to meet the local demand of forest products

c. Areas Suitable for the Establishment of Community Forest due to the need for Conservation Activities

d. Natural forests which for various reasons should be managed by the community

e. Forest lands traditionally managed by the community

### **Application for the Establishment of Community Forestry**

6. Households who would like to establish the community forestry shall form the users' group.

7. By consensus a management committee will be formed from the users' group.

This committee will consist of a chairman, a secretary, and 3 members.

8. On behalf of the users' group the Chairman has to apply to the District Forestry Officer through the Township Staff Officer for the establishment of a community forest.

9. If the application is accepted, the district forestry officer has to identify the place and issue the paper of permission. He will submit the detailed data and a map of the area to the State/Regional Forestry Officer. Copies should be forwarded to the Director General and Director of the Planning and Statistics section of the Forest Department. If the land is not under the management of Forest Department, the District Forest Officer has to undertake instructions from the district forest conservation committee.

10. The Director General of the Forest Department will give authority to the district forest officers according to the Section 15 of the Forest Law.

#### **Allotment of Lands for the Establishment of Community Forests**

11. In the allotment of land to members of the users' group, the District Forest Officer has to determine the size of the land according to the climate, the type of soil, trees to be planted and the degree of conservation that could be accorded.

#### **Duration of Land Lease for Community Forest**

12. The duration of land lease for the establishment of Community Forest is set initially for 30 years.

13. After the period of 30 years, the District Forestry Officer will, with the approval of the Director General of the Forest Department, determine whether or not to extend the lease depending on the performance and the desire of the users' group.

#### **Preparation of the Management Plan**

14. Upon receiving the permission to establish a Community Forest, the users' group has to draw a management plan according to the form (annex 2) presented by the Forest Department, with the advice of responsible Forest Department personnel and forwarded to the District Forestry Officer for confirmation.

#### **Community Forest Establishment Certificate**

15. After confirmation of the management plan, the District Forestry Officer will issue the Community Forest Establishment Certificate (Annex 3). Forest rules, instructions, and restrictions relevant to the Community Forest will be attached.

16. If the users' group is found to neglect or to violate the existing laws and acts of the Forest Department, the directives, regulations and prescriptions of the management plans, the District Forestry Officer has the right to revoke the issue of the certificate.

#### **Assistance from the Forest Department**

17. The Forest Department has to provide the users' group:

a. Seeds and seedlings necessary for the first period of extraction from the Community Forest

b. Technical assistance and expertise necessary for the establishment, management, conservation and development of Community Forest

**Responsibilities and Duties of the Users' Group**

18. The responsibilities and duties of the users' group are as follows: \_

a. Establishment of tree plantations in barren areas

b. Using natural methods of conservation rehabilitation in forested areas

c. Protection against fire hazards

d. Development of forest plantation, and natural forests

e. Protection against indiscriminate cutting, felling, girdling, pruning, removal of barks etc.

f. Protection against extraction of stones, sands, earth and metals in the designated area

g. Prevention of illegal land use activities

h. Methodical utilization to avoid undue losses of forest products

i. Protection against soil erosion and environmental deterioration

j. After the primary extraction period, the users' group shall, under the supervision of the Department of Forest, engaged in collecting seeds, establishing nurseries planting seedlings and conserving the soil

k. Implementing activities as described in the management plan

### **Prohibitions**

19. No members of the users' group will engage in the following:

a. Activities not prescribed in the management plan

b. Selling and renting of the community forest

c. Metal extraction and other activities that would cause forest degradation

d. Construction of houses or sheds not meant for the conservation of the community forest

e. Land allotted for community forest development should not be used for gardening or shifting cultivation purposes, with the exception of agroforestry

### **Exploitation of Forest Products from Community Forest**

20. Users' group can exploit the forest products of the community forest in accordance with the prescription of the management plan

21. No tax shall be levied on the users' group or members of the users' group concerning the forest products exploited from the community forest

22. Surplus forest products can be sold to non members of the village at reasonable prices. Taxation shall be exempted from the sale of these products
23. The users'' group can market the surplus forest products to areas outside the village
24. For marketing, for marketing of the forest products to areas outside the village, tax shall be conferred to the Forest Department at specified rates
25. The users'' group will use the incomes mainly for the implementation of the management plan and for the development of the community forest
26. Surplus incomes can only be used for social welfare and economic development of members of the users'' group with the wish of the members.
27. The users'' group can utilize forest products of the community forest and surplus cash to develop business enterprises that produce high quality products

### **Funds**

28. The fund of the users'' group will be managed as follows:
  - a. The Secretary of the management committee will keep a detailed account on particulars pertaining to the funds
  - b. The Secretary can, with the approval of the management committee, keep a certain amount of money. Funds excess of that amount shall be kept in the bank or in a secure place.

c. The bank account must be opened jointly by the chairman and the secretary.

d. The Secretary must submit the particulars of the financial accounts at least once a year to the users' group.

### **Price Setting**

29. The users' group can sell the products of the community forests at current market prices

### **Receipts**

30. For all the products sold from the community forest, the users' group shall issue receipts. For the products that are to be transported to areas outside the township a set of three receipts would have to be prepared. The buyer will retain one, another will be submitted to the Township Forest Department and the last one be kept with the management committee. For forest products that are to be transported within the township, a set of two receipts must be prepared. One will be issued to the buyer and the other be retained by the management committee.

### **Transportation of forest products from the Community Forests**

31. Forest products from the community forest can be transported within the township with the receipt of the users' group.

32. Forest products of the community forest that are to be transported to areas outside the township, need a pass in accordance with forest law section 23. They must not be transported together with forest products obtained from other sources.

### **Offenses and Penalties**

33. Users' group must adhere to the directives and instructions issued for the community forest, forest laws, regulations and instructions periodically issued by the forest department.

34. Violation of the above mentioned laws, directives, regulations and instructions can lead to legal actions which include the termination of the community forestry enterprises.

35. Any violation of the above mentioned laws and regulation will result in punishment in accordance to the terms mentioned in them.

### **Records**

36. The secretary of the management committee will keep a detailed record concerning tree planting, pruning and production activities in forms attached to the management plan.

37. The Township Forest Officer, and the District Forest Officer will inspect the community forest and its records as conditions permit. Instructions and corrections are to be provided when they are deemed to be necessary.

### **Report**

38. By the end of the budget year the management committee must submit the progress report to the District Forest Officer through the Township Officer within the period of one month.

39. The District Forest Officer shall submit the progress report of the users' group together with his comments and recommendations to the Regional/Divisional director of Forest. A true copy will be forwarded to the Director of the Planning and Statistics section of the Forest Department.

Director General

Forest Department