

**Ministry of Natural Resources and Environmental Conservation  
Forest Department  
Taninthayi Nature Reserve Project**



**MGTC**



**Local Communities' Well-being Assessment  
Taninthayi Nature Reserve Project -TNRP**



Submitted by  
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## Executive Summary

Taninthayi Nature Reserve Project (TNRP) is a conservation project being implemented by the Forest Department – FD under the Ministry of Natural Resources and Environmental Conservation - MONREC with the supports of three private companies, namely; the Mottama Gas Transportation Company Limited (MGTC), Taninthayi Pipeline Company (TPC) and Andaman Transportation Limited (ATL). To conserve sustainably the Taninthayi Nature Reserve – TNR area, community participation and their livelihood development are taken account as an integral part. In this regard, socio-economic conditions of the communities those who are living around TNR area are being assessed in each two years of the project phase since 2005-06.

With the support of the Taninthayi Nature Reserve Project (TNRP), the consultancy team conducted the following agreed tasks:

- i) Develop and implement a standardized survey method for systematically collecting key socio-economic data
- ii) Assessment of the existing socio-economic conditions of local communities and compare with the previous records
- iii) Enhance capacity of TNRP staff with regard to the collection of socio-economic information
- iv) Develop a set of recommendations for alternative development strategy based on socio-economic survey and livelihood monitoring

A total of nine study villages (three from each of three TNR parts; northern, middle and southern) were selected and 250 households (male – 107 and female – 143) were interviewed to have better understanding of existing livelihood strategies and to explore challenges/ opportunities of the current livelihood options. The key findings mentioned in this report are based on the analysis results of collected data/ information, related secondary data and self observation of study team.

Regarding the wealth status of study villages, it was found that the northern TRP part is better than others as most respondents are in the stage of rich and medium except 11% of poor. The main income sources were the horticultures and odd jobs which contributed over 80% of total household income. Odd job opportunities are not stable across the region and the prices of horticultural products are also fluctuated in every year, so that it was assumed that their existing livelihood activities are not enough to be able to sustain and resilient for shocks and vulnerability of livelihoods.

Looking back to farmland holding size which is main natural capital for the livelihoods of local communities, it was observed that the southern part of TNR occupied the better opportunities

rather than the remaining two parts of TNR. According to the results, 30% of respondents from the southern part hold the farmland size (greater than 20 acres), while 11% in middle and 8% of northern part of TNR. On the other hand, 20% of respondents from the northern part have no farmland, followed by 14% of the southern part and 11% of the middle part. Hence, these respondents made income by doing odd jobs and migration to outside.

Regarding the status of livelihood assets compared to the one of 2009 (Zin, M.T, 2009), livelihood assets of all three TNR zones are better off, but the scores are still under 4 out of 5. Although the middle zone had better livelihood assets in 2009, the southern zone has occupied the better livelihood assets in 2018. It was noticed that the status of natural capital in 2018 remains the same with the one of 2008, so that the natural capital how far the local communities could take has been reached to the climax.

The livelihood strategies of local communities in all parts of TNR were too simple and only enough for the subsistence level since they are still practicing the ways of traditional livelihood. To improve the products and increase their income, they simply thought to expand their horticultural land rather than considering of value added or looking for the new market opportunities. Most households have been relying on the single income source and no consideration for the livelihood diversification.

Based on the research and understanding of the consultancy team, the possible and practicable recommendations are provided as follows;

- Enhance the knowledge of local communities on livelihood diversification and intensification
- Build the knowledge of local communities to be able to more understanding on the value chain of farm products and non-farm products
- Following up coaching to implement the action plan after delivering the livelihood related training programs
- Capacity building “Market Analysis and Development – MA &D” to come up with the development of enterprise/ business plan based on the promised marketable products
- Establishment of pilot CFEs and CBTs so as to replicate across the TNR area
- Engaging private sectors with local producer groups for the sustainable livelihood development
- Should have specific task team for the livelihood development through continuously facilitating the local communities
- Should keep up close partnership with key stakeholders such as the General Administration Department (GAD), Agricultural Land Management and Statistics Department (ALMSD), Karen National Union (KNU), New Mon State Party (NMSP) and the Rural Development Department (RDD)

## Acknowledgement

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Last but not the least, our gratitude also goes out to local communities from nine selected study villages, those who shared their valuable time and socio-economic information during survey period. Without their active participation, this assessment report would not have been possible.

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## Acronyms and Abbreviations

ALMSD	Agricultural Land Management and Statistics Department
ATL	Andaman Transportation Limited
CBNRM	Community Based Natural Resource Management
CF	Community Forestry
CFUGs	Community Forest User Groups
CMZ	Conservation Multipurpose Zone
DFID	Department for International Development
FD	Forest Department
GAD	General Administration Department
KNU	Karen National Union
MA & D	Market Analysis and Development
MGTC	Mottama Gas Transportation Company
NGOs	Non-Governmental Organizations
NMSP	New Mon State Party
NTFPs	Non-Timber Forest Products
RDD	Rural Development Department
RECOFTC	Regional Community Forestry Training Center for Asia and the Pacific (also known as RECOFTC – The Center for People and Forests)
SLA	Sustainable Livelihood Approach
TNR	Taninthayi Nature Reserve
TNRP	Taninthayi Nature Reserve Project
ToR	Terms of Reference
TPC	Taninthayi Pipeline Company
USD	The United States Dollar
VUZ	Village Use Zone

# 1. Introduction

## 1.1 Background of consultancy for community wellbeing assessment

Being a conservation project implemented by Forest Department of Ministry of Natural Resources and Environmental Conservation – MONREC with the support of the Mottama Gas Transportation Company Limited (MGTC), Taninthayi Pipeline Company (TPC) and Andaman Transportation Limited (ATL), the Taninthayi Nature Reserve Project (TNRP) aims to protect and sustainably manage ecosystems and endangered wildlife systems, while also taking into consideration the improvement of livelihoods of local communities towards conservation-oriented community development. To reach this objective, community development has to be accounted into consideration as an important role in the conservation of TNR. With this, TNRP has been conducting socio-economic survey in each two year since the project phase of 2005-06 to 2008-09 through asking assistance of national consultants. Now it is entering into the project phase 4 that means this TNR project has passed for almost 12 years which is enough time to see the impact of the project on the livelihoods of local communities.

Hence the consultancy team was asked to undertake an “Assessment of the Communities’ Wellbeing” through assessing the existing socio-economic conditions and comparing with the previous assessment reports.

## 1.2 Consultancy objectives

The following three key objectives were agreed between TNRP and the Consultancy team within a period of 60 working days.

- To take all possible management measures based on scientific findings of socio-economic data in the study area of TNR
- To inform potential management measures and to monitor the ongoing success of the TNRP for community development
- To give some recommendations for alternative development strategy based on socio-economic survey and livelihood monitoring

## 1.3 Scope of work

To achieve the objectives mentioned in section 1.2, TNRP and the consultancy team agreed on four main tasks, namely:

- i) Develop and implement a standardized survey method for systematically collecting key socio-economic data

- ii) Assessment of the existing socio-economic conditions of local communities and compare with the previous records
- iii) Enhance capacity of TNRP staff with regard to the collection of socio-economic information
- iv) Develop a set of recommendations for alternative livelihood development strategy based on socio-economic survey and livelihood monitoring

Although mentioning 10 points in the ToR of this consultancy work, the team supposed that completing above mentioned four key tasks would surely cover the remaining points and also meet the objectives. In fact, the recommendations for the development of local communities' livelihoods would cover all villages located around the TNR area, but the consultant team visited nine villages; three in each of three zones (northern, middle and southern of TNR) and explored to know the existing livelihood conditions. In terms of socio-economic data collection, TNRP field staff earned the knowledge and capacity how to collect through using standardized socio-economic survey forms developed by the consultant team, so that TNRP field staff themselves can explore others in future.

## **1.4 Methodology**

Different methods and activities were applied in pursuit of consultancy objectives, including:

- i) Review of secondary documents conducted by previous consultants;
- ii) Develop standardized socio-economic survey forms
- iii) Enhancement of TNRP staff capacity in the field of socio-economic data collection and basic analyzing techniques
- iv) Field assessment and meeting with TNRP's staff and local communities; and
- v) Data analysis and preparation of reports.

### **1.4.1 Review of secondary documents**

A desk review of available documents and previous socio-economic assessment reports from TNRP was made so as to ascertain the changes of socio-economic conditions in each of project phase and to gain an overall picture of TNRP. In addition, community development-related papers and articles from different countries were also reviewed with the lens of finding possibilities to be referred in TNRP.

### **1.4.2 Develop standardized socio-economic survey forms**

Three types of socio-economic survey forms, namely; overall questionnaires (to know the overall condition of the village), household questionnaires (to know individual's socio-economic condition) and assessment form of existing overall livelihood condition that is quantitative based

on five livelihood assets, are developed through referring previous questionnaire forms used in TNRP and also others from international journals/articles. A set of this questionnaires for socio-economic assessment would be applicable for the TNRP staff or others those who will explore the livelihood conditions of TNR communities.

### 1.4.3 Sharing socio-economic data collection methods

Socio-economic data collection forms, the ways of collection required data and basic data analysis techniques are shared with TNRP field staff so as to continuously learn the conditions of local communities' livelihoods by themselves with the assistance of senior TNRP officers.

### 1.4.4 Field assessment

Field assessments on nine sample villages of three different zones (namely; Lot Thaing, Thayar Mon and Yar Phoo of Northern TNR, Mechaung Hlaung (old), Zinbar and Ye Pone of middle part of TNR, and Hein Ze, Kalone Htar and Myae Khan Baw of southern TNR) suggested by TNRP's staff during the preparation meeting were implemented in order to understand the conditions of existing livelihood, potential and alternative livelihood options, possibilities of livelihood diversification, local people's perspectives on TNR, and opportunities for livelihood development.

#### 1.4.4.1 Sample Size

In considering sample size to cover all parts of the TNR (Northern, Middle and Southern), the team calculated total households of each part. After that, calculated the sample size for each part by using the Taro Yamane formula and divided by 3 in order to figure out the sample size for each village. The margin of error is at 10%.

$$n = N / (1 + Ne^2)$$

Where;            n = sample size  
                       N = total population of household  
                       e = level of precision or acceptable sampling error

According to the formula, it indicates sample sizes 85, 81 and 84 for northern part, middle and southern part of TNR as mentioned in the following Table. In addition, wealth ranking tool has been used in selecting the calculated sample size so as to cover all well-being conditions of the village.

Table 1 Population and sample size

Regions/Zones	Population (HHs)	Sample size (HHs)
Northern	585	86
Middle	421	81
Southern	521	83

#### **1.4.4.2 Data collection methods**

Based on the review of secondary documents and developed standardized socio-economic questionnaires, effective and efficient data collection methods were identified to the knowledge of research team. Most data collection methods are qualitative rather than quantitative survey, to know the overall information of study villages, individual household information and the existing livelihood conditions.

#### **1.4.4.3 Resources Mapping**

Resources mapping was applied for visual representation of resources, historical background of village, the socioeconomic status, natural resource conditions, land use pattern, and perceived socioeconomic condition of the village. The resources map could help in facilitating and asking required information with the knowledgeable and experienced persons who involved in developing the resources map.

#### **1.4.4.4 Focus Group Discussion**

Focus Group Discussion helps to capture the local resident's feelings and responses about the specific topic. In this session, most of the important persons in the village especially village head, elder villager, CF chairman in some village, some women leader and the youth including men or women are gathered in one place, and discussed overall village conditions. There was only including at least five and not more than twelve people in discussion.

#### **1.4.4.5 Assessing Livelihood Assets**

To access the livelihood assets namely; natural, physical, financial, human and social capitals, relevant scales against different variables have identified based on the one used in previous socio-economic assessment of TNR and in others secondary documents. By using this tool, the situation of different livelihood assets can be visually observed.

#### **1.4.4.6 Individual Household interview**

In addition to doing focus group discussion and livelihood assets assessment, individual interview was made through meeting the selected individual households based on regions, sample size calculation and wealth ranking (poor, medium and rich).

### **1.4.5 Data Analysis and Preparation of Report**

Based on the findings from interviews of local communities' representatives, meetings with TNRP field staff, and review of secondary documents, the final overall report with a set of recommendation for alternative livelihood development strategy would be documented, then share it with TNRP.

## **2. Literature Review**

### **2.1 Livelihood**

A Livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Carney, 1998).

Livelihood assets (capital assets) refer to human and non-human resources (natural, physical, human, social and financial) upon which livelihoods are built and to which people need access. The assets constitute a stock of capital that can be stored, accumulated, exchanged or allocated to activities to generate a flow of income or means of livelihoods or other benefits (Rakodi, 1999).

Livelihood strategy is a way of combining and using assets in order to achieve their livelihood goals (DFID, 1999).

### **2.2 Sustainable livelihood**

Sustainable livelihood was defined as a livelihood comprises people, their capabilities and their means of living including food income and assets. Tangible assets are resources stores, and intangible assets are claims and access. A livelihood is environmentally sustainable when it maintains or enhances the local and global assets in which livelihoods depend, and has net beneficial effects on other livelihoods. A livelihood is socially sustainable which can cope with and recover from stress and shocks, and provide for future generation (Chambers and Conway, 1991; Samontry, 2007).

### **2.3 Sustainable livelihood framework**

The sustainable livelihoods framework shown in (figure 2.1) is very useful in analyzing livelihoods and applied by the Department for International Development (DFID) and other development organizations (DFID 1997; Carney et al., 1999; Adato and Meinzen-Dick, 2002). The conceptual framework analyzes causes of poverty, people's access to resources, livelihood activities, and their relationships (Adato and Meinzen-Dick, 2002)).

The framework can be applied for different scales; from individual, to household, to household cluster, to village, region or even nation with sustainable livelihood outcomes assessed at different levels (Scoones, 1998). For the households' livelihoods analysis, this framework examines the economic, ecological, and social factors which determine their ability to construct sustainable livelihood strategies (Rakodi, 1999; Landry, 2009).

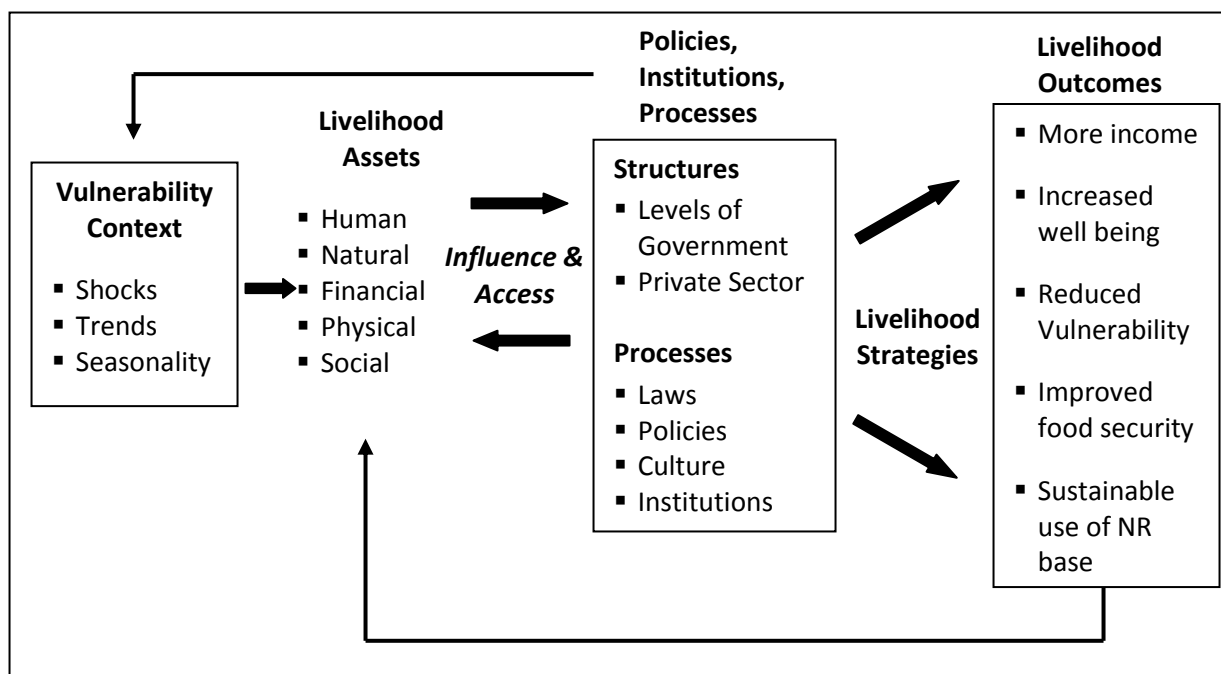


Figure 1: DFID's Sustainable livelihood framework (adapted from DFID 2001: Adapted from Adato and Meinzen-Dick 2002)

## 2.4 Protected areas and community development

Nowadays, people living in or near protected areas continue to use resources from these areas, including cultivable land, timber, food, fodder, fiber, medicines and other NTFPs. Therefore, nature reserves and protected areas in many countries will only be sustainable if local communities are involved as an integral part of conservation efforts and benefit economically from those efforts (Mackinnon 2001).

In Vietnam, most protected areas are in ethnic minority areas where their poverty mainly results from living in remote areas and lack of access to markets and arable land. Hence, ethnic minority communities are often dependent upon natural resources in protected areas for their wellbeing. Protected areas provide a number of important benefits, such as foods, medicines, clean water and serving ethnic minority culture (i.e. "spirit or sacred forests"), that help mitigate the impacts of poverty.

Although there are some key issues regarding protected area and community development in Viet Nam, two approaches – namely; *land-use rights for buffer zone households* and *forest protection contracts for buffer zone households* – could bring some achievements (International Centre for Environmental Management, 2003). Regarding the first approach, land-use rights have been allocated to households in the buffer zones of several protected areas and these households have received land-use certificates before neighboring communities – a clear benefit

to living near a protected area. Giving land-use certificates helps stabilize land tenure in the buffer zones of protected areas. In terms of the second approach, government financial support for forest protection to households living near protected areas, through which a number of households have benefited financially from these protection contracts and forest cover in some areas, has increased (National Report on Protected Areas and Development, Vietnam, 2003).

Thailand stands on the threshold of significant reform to the ways in which rural communities are involved in natural resource management in areas adjacent to and within protected areas. A range of ongoing activities regarding joint management of protected areas has demonstrated that the participation of local communities in the management of natural resources can both assist efforts to conserve protected areas and promote rural development (RECOFTC 2000).

In Myanmar, the government allows local communities to establish community forests and collect NTFPs within/from buffer zone areas, but totally prohibits the establishment of community-based resource management modalities and collecting NTFPs from the core zone of protected areas.

## 2.5 Management Zone of Taninthayi Nature Reserve

TNR is categorized into different zones each with its management options as shown in Table 2. Within the core zone, the TNR management plan mentions permission for conducting research, gas pipelines, rehabilitation of native species, hiking and rafting with minimal human interference, and protecting habitats and biodiversity. TNR buffer zones are additionally divided into village use zones (VUZ) which allow subsistence agriculture, fishing, logging, controlled burning, grazing, NTFP harvesting, planting local tree species, forest conservation, overnight camping, and agro-forestry and CF activities; and conservation multipurpose zones (CMZ) where biodiversity conservation and habitat preservation for wildlife are the main purposes. Another TNR zone is transportation zone with the purpose of servicing gas pipelines and roads for transporting gas at low impact through forest areas. The detailed information prescribed in the following Table 2.

Table 2: Taninthayi Nature Reserve management zones

Make-up of the Reserve	Core zone	Buffer zone		Transportation zone
	Ecological processes can take place with minimal human interference, protecting habitats and biodiversity	<ul style="list-style-type: none"> <li>1 mile from boundary;</li> <li>To the north there is both an inner and outer buffer zone, bordering with a forest department reserved forest area</li> <li>To the south there is only an inner buffer zone with unclassified land on the outside the reserve</li> </ul>	<div>Village use zone (VUZ)</div> <div>Conservation multipurpose zone</div>	
				From Dawei river to Thai/Myanmar border, 600 feet (180 m) wide road and service area

			(CMZ)	
<b>Area</b>	336,912 acres (136,346 ha)	60,988 acres (24,682 ha)	19,055 acres (7,711 ha)	3,213 acres (1,300 ha)
<b>Allowed activities (as per TNR management plan)</b>	Research, rehabilitation with local species, hiking, rafting	Subsistence agriculture, fishing, logging; controlled burning, grazing, NTFP harvesting, planting local tree species, forest conservation, overnight camping, agroforestry, CF	Biodiversity conservation, habitat preservation for wildlife	For companies servicing gas pipelines and roads. Companies can transport gas at low impact through forest areas; reforest areas cleared for construction with native tree species, and can only develop limited number of access roads. Research

Source: Operational Management Plan 2013

## 2.6 Livelihoods supported by TNRP

In terms of livelihoods issues the communities face in and around TNR, the project has found it challenging to develop productive livelihoods with local communities and to enhance their capacity to manage funds. This is particularly an issue for people who have not finalized primary education. Also, the TNR is faced with resettled refugees who have no choice but to enter the forest to survive due to land scarcity. Since conflicts only ceased 5 years ago and little has been done to remove unexploded ordinance (UXO), it is still dangerous to enter the forest with landmines still not cleared. A lack of employment in the area sees migration to Thailand mainly and some goes to other countries.

Demographically, the project area can be divided roughly into three zones: northern Mon covering the area from Law Thaing to Mayan Chaung villages; central Kayin area composing of Mechaung Laung, Zimba and Kyauk Shut villages; and southern Dawei stretching over Yebone, Heinze, Hnan Kyal and Wun Po villages. Area is demarcated on the majority of ethnic residents, although mixes/overlaps occur (Zin, 2009). In terms of livelihoods status, based on research from Zin (2009), the middle zone provides communities with good opportunities in choosing livelihood options. Road access and available service are better organized here. In terms of benefitting from available resources such as arable land and forest, communities in the southern part of the reserve lack opportunities to develop livelihood activities due to lack of land to develop orchards to the same extent as the middle part and thus depend more on NTFPs and timber. Communities in the north have less dependence on the reserve and have more land available for planting cash crop orchards (Figure 2).

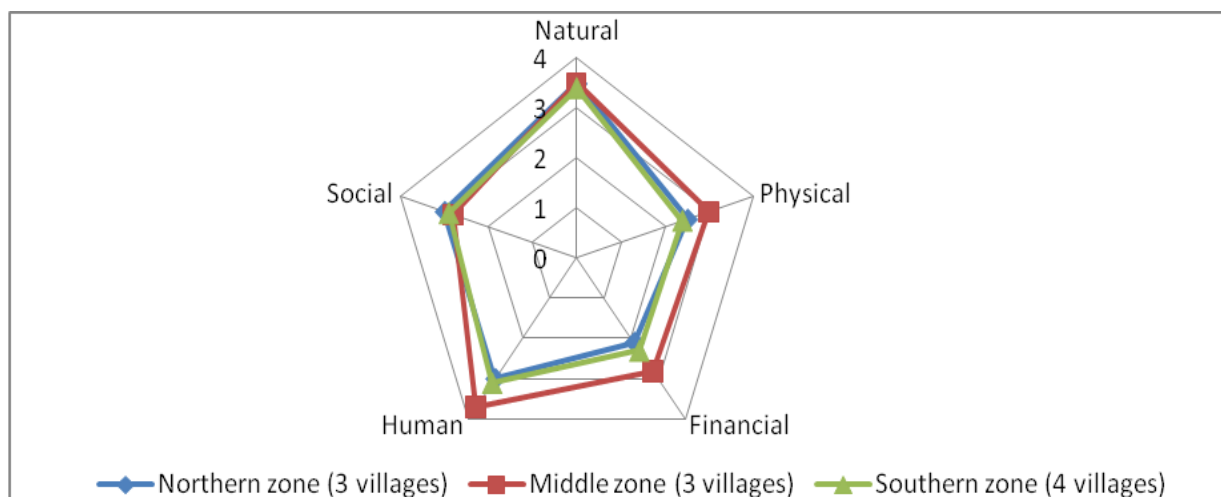


Figure 2: Livelihood analysis of selected villages in the northern, middle and southern zone of TNR (Based on Zin, M.T. 2009)

Village loans obtained from the TNRP installed revolving funds for CFUG are well received. To date, 10 registered CFUGs each received a fund of 5,000,000 kyat (5,000 USD) from which loans of 100,000 - 500,000 kyat (1,00 - 5,00 USD) are provided to its members. Loans need to be approved by the fund committee; borrowers need to explain what the funds are used for and find 1-2 guarantors who are willing to co-sign the loan application. No collateral is required. In Yebone, the committee also checks if the applicant borrower already has a loan with the micro-finance fund operational there. Proposals are often for small enterprise activities, such as pig raising or setting up a village shop. Monthly interest (2%) has to be paid and returned in full after the agreed upon period of 3 months, 6 months, or 1 year. The committee monitors if loans are used as promised. The success rate in Yebone is best known as it operates since 2013 and members are paying interest and are returning their loans, explaining its growth (see Figure 2). The leader of the revolving fund is now receiving an annual stipend of 110,000 kyat (110 USD) for her labors. The link to CF development is still weak, but some fire break establishment, weeding and natural regeneration is supported from the fund.

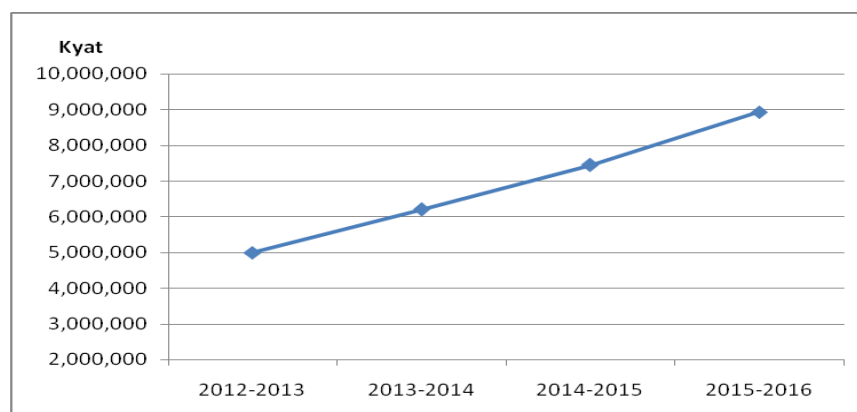


Figure 3: Revolving fund growth in Yebone village (Source: TNRP presentation 2015)

The communities occupying the middle ranges outside of the reserve have had a long and profitable history with Thailand during the conflict era when illegal trade and smuggling were rampant. With peace in the area, many villagers from this area still migrate to Thailand to find employment and important remittances. Orchards and home gardens consist of cashew nut, rubber and betel nut. With slumping rubber prices and cashew becoming less productive, interest currently lies mainly in managing betel nut palms. Due to a scarcity of flat land arable for diversified crops for villagers dwelling around TNR area, *taungya* (shifting cultivation) is practiced. Land tenure/titles are not secured for local communities even though orchards in the Reserved Forest have been traditionally being managed by them and their ancestors for decades.

Conditions surrounding the reserve are favorable for rubber and oil-palm and the local government has promoted crop growth at commercial scales, with private sector investments receiving exclusive land property rights even moving into established horticultural farms of local residents. Many local residents lost their lands previously held under traditional/customary regimes and several land disputes emerged. Socioeconomic research in the area shows that major issues and threats include: infrastructure development, illegal logging, shifting cultivations, commercial plantations, dam construction and large-scale mining activities.

### **3. Key findings**

#### **3.1 Characteristics of respondents**

About 42 villages are located around Taninthayi Nature Reserve and getting income through mainly doing horticulture, swidden agriculture (also known as shifting cultivation), and odd jobs, but here in this study a total of nine villages were selected to evaluate the socio-economic conditions and explore alternative livelihood options for better life. Based on the previous study done for TNR and geographical conditions, three ecological zones namely; northern (mostly Mon ethnicity), middle (mostly Kayin ethnicity) and southern zones (mostly Dawei ethnicity) are divided and three villages from each of different zones were selected for this study. As of calculation by using Taro Yamane formula at the 10% acceptable sampling error, 86 respondents from northern, 81 of middle and 83 for southern TNR were selected. Out of a total sample respondent 250, 107 are male while female respondents are at 143. Most respondents are at the level of primary education and about 88% are the under of age 60.

In terms of farm land holding size, about 46% occupied the farm land between 5 to 20 acres while 14% owned the land more than 20 acres. Most earn income monthly at the amount of 1-5 million kyats mainly from horticulture and odd jobs. The detail characteristics of respondents are described in the following Table 3.

Table 3: Respondents' characteristics of three different zones

Descriptors	Attributes	Frequency	Percentage	Code
<b>Location</b>	Northern	86	34.4	1
	Middle	81	32.4	2
	Southern	83	33.2	3
<b>Gender</b>	Male	107	42.8	1
	Female	143	57.2	2
<b>Occupation</b>	Shifting cultivation	4	1.6	1
	Permanent farming	2	0.8	2
	Staff	1	0.4	3
	Odd job	78	31.2	4
	Shop keeper	22	8.8	5
	Horticulture	132	52.8	6
	Others	11	4.4	7
<b>Age</b>	≤ 40 years	111	44.4	1
	41-60 years	112	44.8	2
	> 60 years	27	10.8	3
<b>Education</b>	≤ Primary (grade 1-4)	176	70.4	1
	Middle (grade 5-8)	42	16.8	2
	≥ Higher (grade 9-10 and above)	32	12.8	3
<b>Farm size</b>	< 5 acres	60	24	1
	5-20 acres	117	46.8	2
	> 20 acres	35	14	3
<b>Total income in month</b>	< 1 lakh	70	28	1
	1-5 lakhs	145	58	2
	> 5 lakhs	35	14	3

### 3.2 Wealth status of study area

Figure 4 showed wealth ranking status of three different TNR zones and these data are collected in consultation with village representatives who are well knowledgeable. It was observed that northern zone is more advance in livelihood development compared to other two zones. About 11% of respondents are at the level of rich in northern TNR, followed by 9% of middle TNR and 6% of southern TNR. When looking at the level of poor, 64% of respondents from southern TNR are supposed as poor, while 52% and 46% in middle and northern TNR respectively. All three zones of TNR are needed to develop the local communities' livelihood, but northern part is better than others and there will be some reasons such as more odd job opportunities and migration to others. However the livelihood activities which contribute into the households' income are not stable and can be collapsed anytime. The detail information can be seen in the following figure.

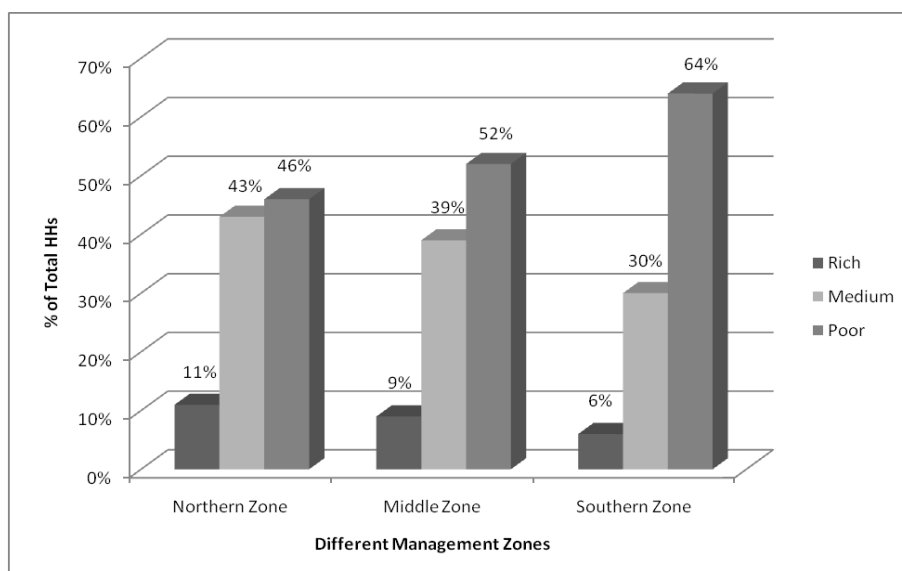


Figure 4: Wealth status of three different zones

### 3.3 Income contribution of different livelihood activities

As shown in the figure 5, there are different livelihood activities in all parts of TNR, and hence it can be regarded that local communities diversified their income activities and not solely rely on the one livelihood option. The most outstanding income is coming from doing of horticulture and odd jobs. In the wealth status, northern part is better off, but most incomes are driving from odd jobs and horticulture. Hence it was noticed that the livelihood condition of northern part is more fragile compared to others which have more livelihood diversification.

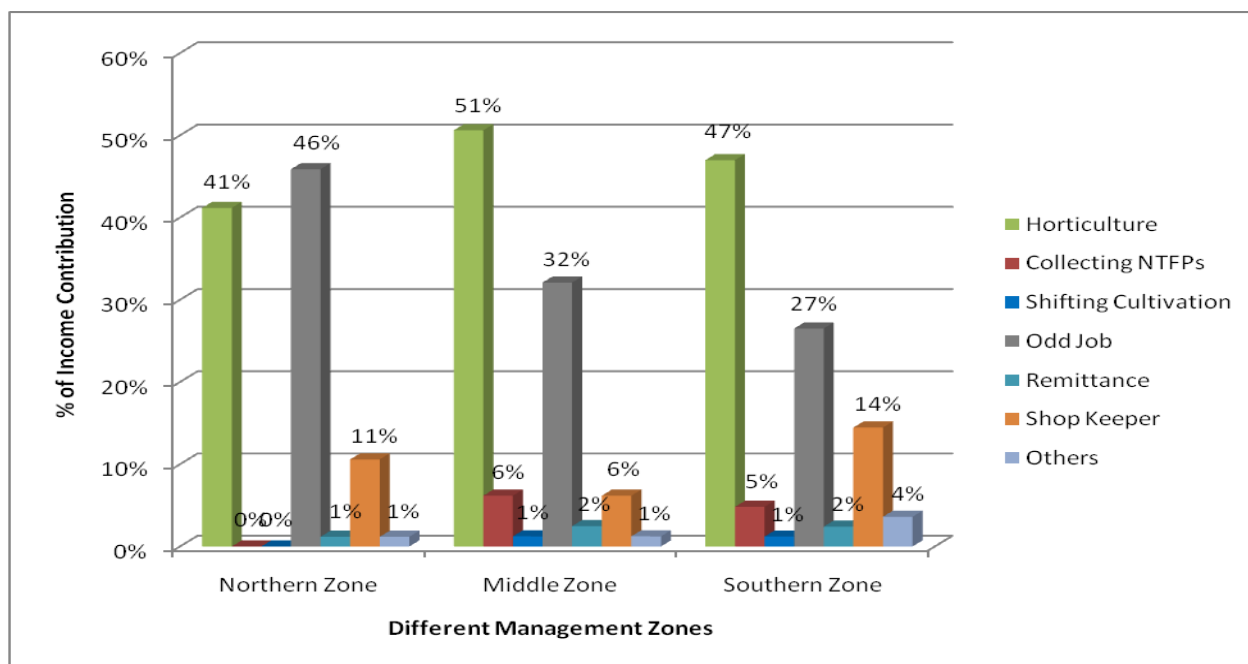


Figure 5: Income contribution of different livelihood options across three TNR zones

In the northern part, no respondents have been earning income from collecting NTFPs and doing shifting cultivation while about 5-6% and 1% of respondents from middle and southern parts are making income by collecting NTFPs and doing shifting cultivation – meaning that local communities extended their horticulture into the forested area outside of TNR. Although the accessibility to the town is pretty good as most villages are located along the road side of Yale-Dawei, the shopkeepers can make income through buying goods from the town and sell in their villages – from this point it was noticed most local people rarely goes to the town and sell their products in their villages as well.

### 3.4 Monthly gross income

As of the figure 6 mentioning the monthly gross income of respondents across three parts of TNR, about 58% of respondents from three parts of TNR earn monthly income between 1-5 lakhs, followed by 20%, 27% and 36% of respondents from northern, middle and southern parts respectively. According to the figure, herewith again northern can be regarded as well advanced part of TNR compared to the remaining two parts. However, it is necessary to carefully observe whether their income sources are sustainable and environmental friendly. Anyway, less than 22% of local communities of all TNR zones are getting income less than 5 lakhs in a month.

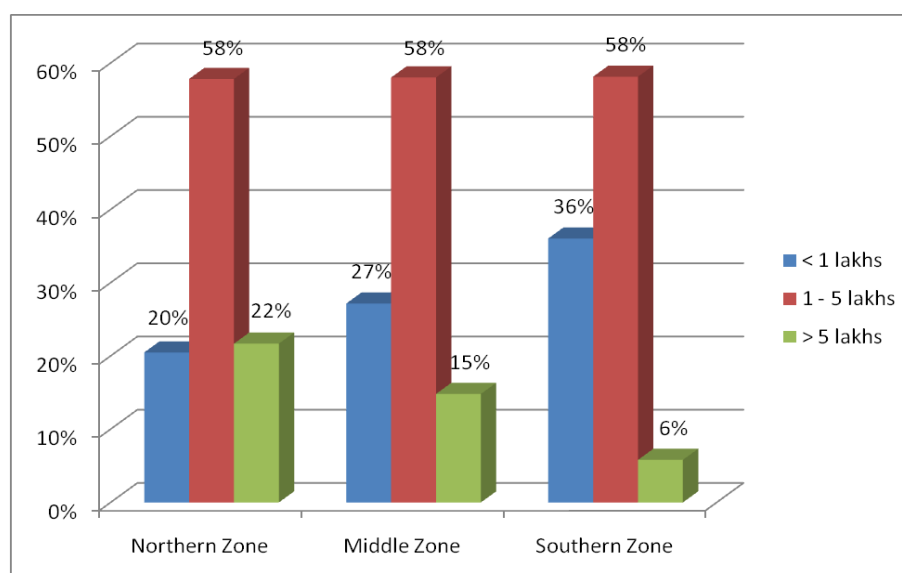


Figure 6: Monthly gross income of respondents

### 3.5 Relationship between livelihood activities and income across three zones

In the all parts of TNR, it was observed that there are five main income sources, out of which horticulture and odd jobs contribute more income to the households compared to other income sources. However, about 80% of respondents could make the monthly income less than 5 millions kyats, while 7% in northern part, 15% in middle part and 22% in southern part made income of over 5 millions kyats. It can be assumed that income from horticulture is more secure than others, particularly from odd jobs. Over 50% of respondents earned income from the

horticulture and need to seek the ways/approaches to get more income from this source without considering expansion of horticultural land into the forested area.

Table 4: Relationship between income sources and income

Regions/Zones	Occupation	< 1 lakh	1 – 5 lakhs	> 5 lakhs	Total
Northern	Permanent farming	0%	1%	1%	2%
	Odd job	17%	21%	1%	39%
	Shop keeper	0%	6%	0%	6%
	Horticulture	15%	28%	5%	48%
	Others	3%	2%	0%	5%
	<b>Total</b>	<b>35%</b>	<b>58%</b>	<b>7%</b>	<b>100%</b>
Middle	Shifting cultivation	1%	4%	0%	5%
	Odd job	6%	20%	1%	27
	Shop keeper	2%	1%	1%	4%
	Horticulture	17%	31%	11%	59%
	Others	1%	2%	2%	5%
	<b>Total</b>	<b>27%</b>	<b>58%</b>	<b>15%</b>	<b>100%</b>
Southern	Staff	0%	1%	0%	1%
	Odd job	4%	23%	0%	27%
	Shop keeper	1%	6%	4%	11%
	Horticulture	13%	26%	16%	55%
	Others	2%	2%	2%	6%
	<b>Total</b>	<b>20%</b>	<b>58%</b>	<b>22%</b>	<b>100%</b>

### 3.6 Farm land holding size

Farm land size is the key natural capital for the livelihood of local communities living around TNR area since their main income is contributed by horticulture such as rubber, cashew nut and betel nut. When exploring the land holding size of respondents, Figure 7 indicated three categories namely; less than 5 acres which is only for subsistence, between 5 and 20 acres which can help saving surplus income, and greater than 20 acres which can be rich. According to the collected data, the southern part of TNR occupied the better opportunities rather than the remaining two which are not significantly different. While 30% of respondents from southern part holds the farmland size (greater than 20 acres), 11% in middle and 8% of northern part of TNR. Unlikely over 60% of respondents from middle and northern parts occupied the land size (5-20 acres), while about 38% of southern part.

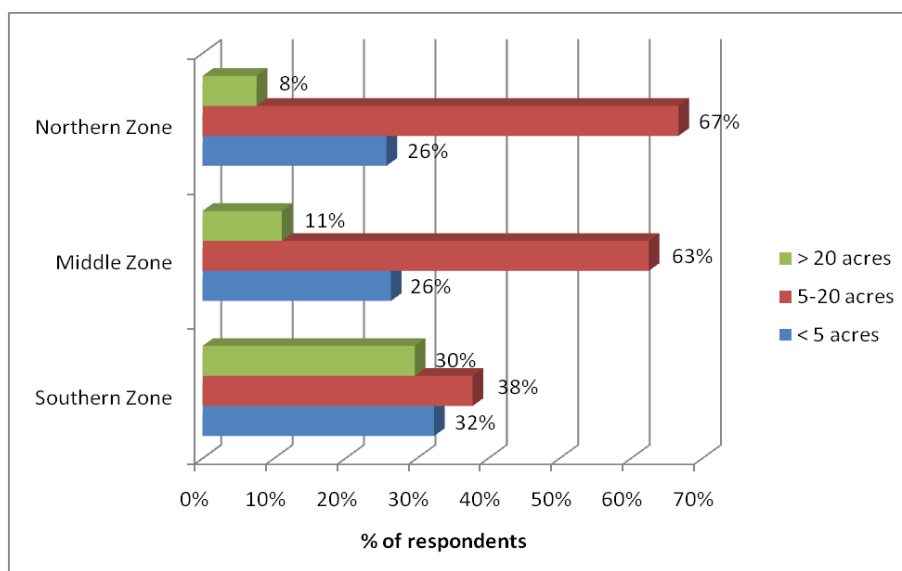


Figure 7: Landholding size of respondents

When looking at the percentage of landless households, Table 5 showed that 20% of the northern respondents have no land for cultivation, followed by 14% of the southern and 11% of middle zone – meaning that local communities of middle part have land availability for cultivation rather than the remaining two.

Table 5: Landless households across three regions

Regions/ Zones	Landless HHs	% of respondents
Northern	17	20%
Middle	9	11%
Southern	12	14%

### 3.7 Livelihood analysis on the different zones of TNR area

#### 3.7.1 Status of livelihood assets in 2009 and 2018

To evaluate the existing situation of livelihood assets, reliable variables and scales are identified for five livelihood assets; natural, financial, physical, human and social, and tested in the ground before going deeply and widely. The assessment scales used in this study (see in the annex – 3) are more or less the same with the one of using in the previous TNR socio-economic studies. Hence the existing livelihood assets' status can be compared with the one in 2009.

Zin, M. T (2009) analyzed that middle zone has better livelihood assets, particularly financial, physical and human, while comparing of the northern and southern zones as shown in the figure 8. After 10 years in 2018, livelihood assets of all three zones are better off, but the scores are still under 4 out of 5 – meaning that there is still space to grow up. In 2018, the southern zone has occupied the better livelihood assets rather than other two zones.

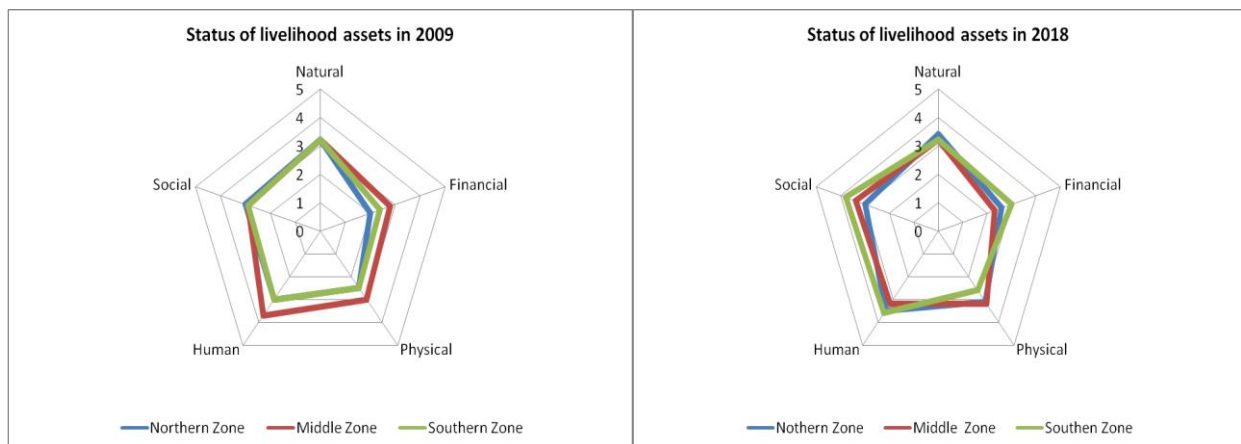


Figure 8: Status of livelihood assets in 2009 and 2018

### 3.7.2 Comparison of livelihood assets in 2009 and 2008

Figure 9 clearly indicated that the status of livelihood assets in 2018 is bigger than the one in 2009, except social asset which remains the same. To be a sustainable livelihood, social asset which is regard to knowledge, skills, attitudes and social network is also playing a key role because social asset can help in facing external shocks which destroy the existing livelihood options. Improvement of natural asset is also slow, so that the local communities should seek opportunities for land availability for cultivation.

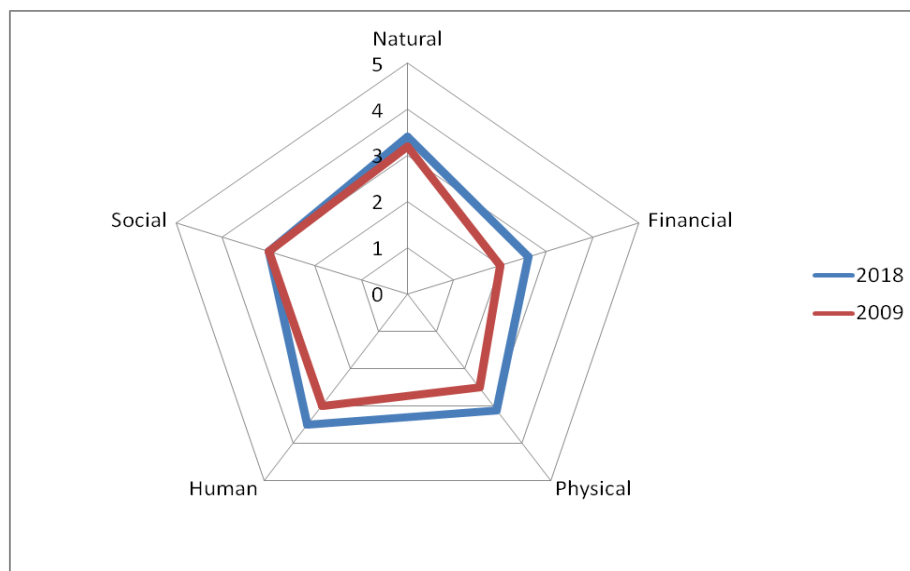


Figure 9: Status of livelihood assets in the northern zone (2009 & 2018)

In the middle zone of TNR area, natural asset remains the same, but social and physical assets are increased while it was shock that financial and human assets are decreased in 2018. Their livelihood income mainly relied on horticulture, but the prices of products such as rubber, bettel nut and cashew nut are not stable during these years, and labor cost is too high because youth people migrates to Thailand and other in-country regions. Hence financial and human assets are

getting decreasing. The reason why social asset is getting increased is that TNR provides many capacity building and awareness raising event in this middle zone. The detail comparison is described in the following figure 10.

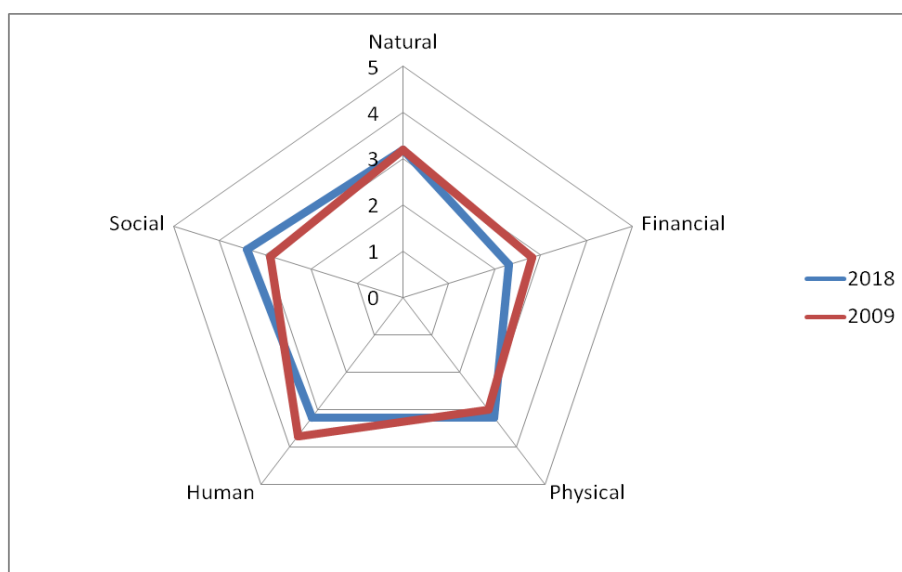


Figure 10: Status of livelihood assets in the middle zone (2009 & 2018)

The southern zone of TNR area is well developed in 2018 as three main livelihood assets (financial, human and social) are enlarged compared to the situation of 2009. Natural and physical assets are more or less the same since these two assets have been already developed in 2009, but still have the rooms for increasing. Relying on the horticulture, the local communities of southern zone should explore the ways how to manage their cultivated land in a sustainable manner and should seek the technology how to add the value of the existing raw or semi-finished products. The detail status of livelihood assets is mentioned in the following figure 11.

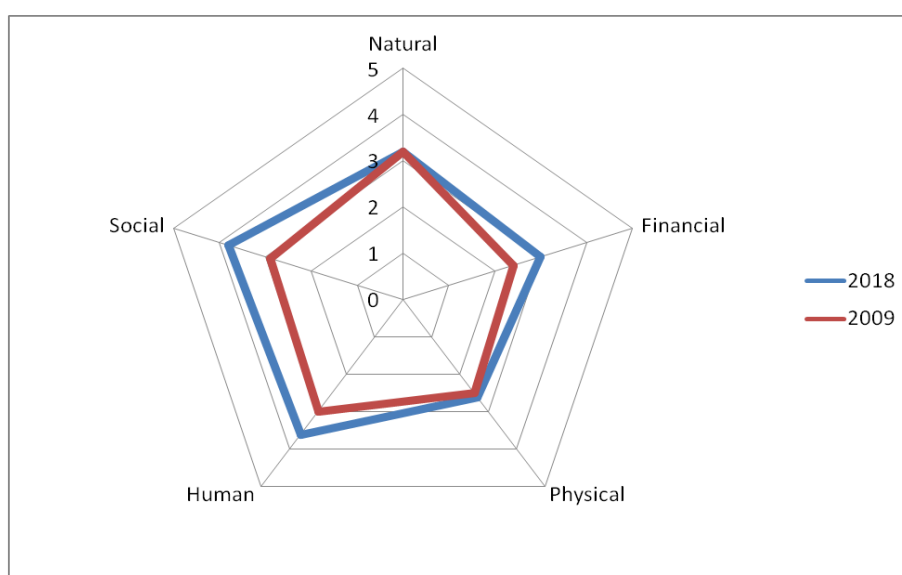


Figure 11: Status of livelihood assets in the southern zone (2009 & 2018)

### 3.8 Existing livelihood strategies

#### 3.8.1 Traditional livelihood

The livelihood activities being currently practiced by local communities of TNR are very simple based on their traditional knowledge rather than using advance technology and skills. Local communities do not want to take risk in investing for mordenized macheniery, infrastructure and skill labors. Some communities do not know how to add the value of existing products, instead they are always trying to expand their cultivation land so as to increase production rate. For example of rubber processing, they are still using traditional processing techniques which produce poor quality of rubber sheets. In addition, they need technology in cleaning rubber resin before processing. They seldom care about the quality so that the price can not be bergained and can not be exported to other demanded countries as well. Likewise, drying betel nut is very simple way that take the time to get dry. They just spread betel nuts with husk on the ground and seldom use the shelf to have good quality and clean products.



#### 3.8.2 Less consideration on livelihood diversification

As mentioned earlier in section 4.3 several income sources contribute into the main income of households, but most households soly rely on one or two main income sources. In recent year, the price of rubber was gone down, while the bettel nuts' price was gone up. In this regard, most communities tried to clear their rubber plantation, then subsitute with betel nut or other.

Regarding the definition of livelihood diversification, Ellis (1997) defined livelihood diversification as “the process by which local communities establish a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their living standards”. To diversify their livelihood options, they are needed to build their capacities and also change their attitudes.

### **3.8.3 Extensification and intensification**

The agricultural products can be improved either by extensification (more input – mainly land) or by intensification (advanced technology for cropping pattern). Which one is better is still debating and depending on the specific situation. Here in TNR region, most communities have been considering the way of extensification rather than intensification because of two reasons; limited knowledge on intensification and land availability. In the case of TNR region, it was observed that some communities extend their horticulture into the forested area to improve the production level. To stop or reduce expansion into the forested area, they are needed to build capacity on the knowledge of intensification.

### **3.8.4 Limited market access**

Most community members sold their products individually to the local traders who came to the communities. Even though there is good accessibility of road and internet/mobile, they rarely try to explore the new markets. It was noticed that they prefer doing individual, using simple techniques for product processing and selling within their communities – resulted that producing poor quality products, no bargaining power (need to form producer group to have this power), and low price.

## **3.9 Perceptions of local communities on existing livelihood options**

The main livelihood options of local communities living around the TNRP area are horticultures such as cashew nut, rubber and betel nut, and somewhat shifting cultivation. With slumping rubber prices and cashew becoming less productive, local people's interests currently lies mainly in managing betel nut palms. Due to a scarcity of flat arable land for diversified crops for villagers dwelling around TNR, *taungya* (shifting cultivation) and encroaching betel nut orchards are still being practiced. Land tenure/titles are not secured for local communities even though orchards in the Reserved Forest have traditionally been managed by their ancestors for decades.

Currently, local communities' willingness is high in managing betel nut orchards rather than cashew nut and rubber plantations. More than half of the local communities surveyed want to extend betel nut orchards into existing cashew nut and rubber plantations, and to encroach reserve forest area, because of limited land availability. The majority of local communities shape their livelihood options based on current market trends, with less consideration for the potential resilience of livelihood diversification in the face of unforeseen difficulties and risks such as disasters, market and policy changes.

In terms of external support, it was noted that financial, technical and legal support are still needed for enhance local people's livelihoods. While cultivating horticultures, local communities need financial inputs and usually take loans with high interest rates, which become a significant burden for them. In addition, they do not have access to tools and techniques to gain more productivity and benefits from their land, and how to process their products to increase their value and prices; hence they need technical support in this regard. Regarding legal support, local communities have to pay taxes on collecting NTFPs from reserve forests not only to the FD, but also to the Karen National Union (KNU); legal support in this matter could help lessen these taxes.

#### 4. Conclusion and Recommendations

The recommendations provided in this section are based on the research and understanding of the consultancy team. It would be best if the findings and consultant's recommendations are shared in a follow-up workshop with community and TNR stakeholders, through discussions focusing on the feasibility and appropriateness for both communities and TNR.

- 1. Enhance the knowledge of local communities on livelihood diversification and intensification.** As of the findings, local communities living around TNR area are mainly relying on one or two main income sources and some are cultivating only one crop plantation such as rubber or betel nut or cashew nut. This way is not easy for resilience when existing livelihood options are encountered by shocks or external disturbances. They are needed to enhance the capacity/knowledge on livelihood diversification so as to sustain their livelihood.

To increase crop production rate, local communities considered to expand their farm land instead of investing more inputs such as advance technology and multi-cropping pattern for sustainable land management. The northern and southern parts of TNR have limited land to expand, but middle part has opportunities to enlarge their farm land. In this case, the knowledge of intensification should be transferred to the local people so as to reduce deforestation.

- 2. Understanding on the value chain of products.** Almost all local products such as rubber sheet, betel nut, cashew nut and other NTFPs are sold to the village traders, so that local communities stay as primary producer (very beginning step) along the value chain. If they themselves can in place of village trader, they would have more benefit, but need more capacity to be village trader. Given that local communities understand well on the concept of the value chain, they can decide which actor they would like to be based on their existing capacity/ knowledge/ skills. Hence the understanding on the concept of value chain is important for the local people to have more benefits.

3. **Implement the action plan.** Livelihood concept is composed of three elements; namely, **capability, assets and action**. It was observed that TNRP delivered a series of vocational trainings regarding bamboo and rattan product makings, and also livelihood related awareness raising events. In addition, TNRP support a certain amount of revolving fund for livelihood development. It can be assumed that local communities are equipped the required capability and provided livelihood assets, to some extent, but no action is seen in the ground. Hence the following up activities should be continuously provided to be able to implement the action plan.
4. **Capacity building “Market Analysis and Development – MA&D”.** Stepping over the traditional livelihood to enterprise development has to be taken a risk and should have a enterprise development plan based on which products would like to be commercialized. To reduce the unforeseen risks and develop enterprise/ business development plan, Market Analysis and Development – MA&D (its manual was documented by FAO) training should be organized for the interested local communities.
5. **Establishment of pilot CFEs and CBTs.** TNRP supported in establishing community forestry for 11 communities who have been living around TNR and others 8 communities also established community forestry with the support of Forest Department and RECOFTC – The Center for People and Forests. Hoping that there will be many potential commercialized NTFPs in the community forest area, one or two CFEs should be piloted with the local entrepreneurs group for the people who like to learn for replication in future.

In meeting with local communities and TNRP staff, there is opportunity to materialize CBTs around TNR area. Although developing CBTs is not easy, organizing capacity building training on CBTs development and piloting should be tested.
6. **Engaging private sectors with local producer groups.** Every projects/programs will be ended at the sometimes, but the local communities have to be continuing their livelihood/ enterprises for a long time. In the regard, engagement of private sector is a key for the sustainable CFEs, CBTs and livelihood development. There will be two options in engaging with private sectors, namely; local communities themselves find the suitable private sector and facilitator invite potential private sectors to be engaged with local communities. For either two ways, local communities should be built/enhanced their capacity to be able to effectively and efficiently engage with interested private sectors. Hence private sectors mapping and facilitating in engaging private sector with local producer groups should be provided.
7. **Specific task team for livelihood development.** Being a long process, need a certain interval of time and endeavors, livelihood development cannot be achieved within one year

or two years. Regular monitoring and evaluation should be in place to know the situation of local communities' livelihood and support needs. So TNRP is suggested to form specific task team for livelihood development and the team is trained in the field of livelihood related knowledge/ skills and participatory approaches.

- 8. Keep up close partnership with key stakeholders.** Sustainable livelihood development is based on five assets; natural, financial, physical, human and social. To develop these five assets equally, a single project or organization or department cannot implement and assist to the local people. Hence TNRP should keep close partnership with concerned key stakeholders such as the General Administration Department (GAD), Agricultural Land Management and Statistics Department (ALMSD), Karen National Union (KNU), and New Mon State Party (NMSP) and the Rural Development Department (RDD) which is financially supporting local communities through the Mya Sein Yaung microcredit program.

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## Overall Questionnaire (Key Informants and Focus Group Discussion - FGD)

<b>Date :</b>	<b>Village name :</b>
<b>Location: Adjacent TNR</b> <input type="checkbox"/>	<b>Buffer Zone of TNR</b> <input type="checkbox"/> <b>Core Zone of TNR</b> <input type="checkbox"/>
<b>Interviewer :</b>	<b>Interviewee :</b>

### 1. Households and Population

Total HHs		Population	
Male Headed	Women Headed	Male	Female

### 2. Ethnic Groups

Ethnicity	Buddhism	Christian	Other (Specify)	Total
Bamar				
Dawei				
Kayin				
Mon				
Other (Specify)				

### 3. Education Status

	% of total population
Illiterate	
Primary (Grade 1-5)	
Middle (Grade 6-9)	
High (Grade 10-11)	
College/ University	

### 4. Livelihood Strategies

Livelihood options	No. of HHs
Lowland agriculture	
Upland agriculture	
Shifting cultivation	
Horticulture	
Collecting NTFPs	
Odd jobs	
Others (Specify)	

#### 5. Land Resources

Land types	Acreages
Shifting cultivation land	
Permanent farm land (Lowland & Upland)	
Horticulture land	
Community forest	
Private plantation	
Pasture land	

#### 6. Mode of Transportation

Types of transportation	Tick off
Line bus	
Motorbike	
Trawlergi	
Cart	
Railway	
Others (Pls specify)	

#### 7. Coordination with Organizations

List organizations	What work for?

#### 8. Sources of Water and Energy

Source of water	Tick off	Source of energy	Tick off
River/ Stream		Firewood	
Natural springs		Charcoal	
Tube wells		Electricity	
Service wells		Gas	
Pipeline network			
Rain water			

#### 9. Main Income Sources

Income sources	% of total income


#### 10. Wealth Ranking

<b>Wealth ranking</b>	<b>No. of HHs</b>
Rich	
Medium	
Poor	

Note: Need to discuss with FGD's participants, about criteria. Suggested criteria are as follows;

- i) Land holding size
- ii) Type of house
- iii) Household assets
- iv) Income
- v) Others

#### 11. Other description, if any

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***Thanks for your contributions!***

## Household Survey Questionnaires

<b>Date :</b>	<b>Village name :</b>		
<b>Location: Adjacent TNR</b> <input type="checkbox"/>	<b>Buffer Zone of TNR</b> <input type="checkbox"/>	<b>Core Zone of TNR</b> <input type="checkbox"/>	
<b>Interviewer :</b>		<b>Interviewee :</b>	

### 1. Household Information

Name	Gender		Age (yr)	Education 1 = Illiterate 2 = Primary (Grade 1-5) 3 = Middle (Grade 6-9) 4 = High (Grade 10-11) 5 = College/ University	Occupation 1 = Shifting cultivation 2 = Permanent farming 3 = Staff/migrant 4 = Odd jobs 5 = Student 6 = Shopkeeper 7 = Others	Ethnicity 1 = Bamar 2 = Kayin 3 = Mon 4 = Dawei 3 = Others (Pls specify)	Religion 1 = Buddhism 2 = Christian 3 = Others (Pls specify)
	M	F					

### 2. Type of House. Pls use codes;

- 1 = Bamboo house
- 2 = Wooden house
- 3 = Brick/ Concrete house
- 4 = Others (Pls specify)

### 3. Land Holding Size

Types of land	Tick off	Area (acre)
Residential land		
Lowland		
Upland		
Horticulture land		
Shifting cultivation		
CF or customarily owned forest		

### 4. Livestock Rearing

Livestock	No. of head
Cattle	
Pig	
Goat	

Poultry	
Others	

#### 5. Household Assets

Name of assets	Yes = 1, No = 2
Television	
Bicycle	
Motorbike	
Radio	
Mobile phone	
Plough machine	
Sewing machine	
Generator	
Trawlergi	
Others (Pls specify)	

#### 6. Income

Incomes from farming				
Crops	Per acre income	Acreage	Total income	Remark
Incomes from other sources				
Sources	Monthly income	Month a year	Total income	Remark

#### 7. Main Income Source

Income source	Give priorities (1, 2 & 3)
Shifting cultivation	
Permanent farming (Lowland & Upland)	
Horticulture	
Collecting NTFPs	
Remittance	
Odd jobs	
Others (Pls specify)	

### 8. Expenditure (Monthly)

Commodity	Unit	Quantity	Unit price (Kyats)	Total amount (Kyats)
Rice				
Oil				
Chilli				
Onion				
Garlic				
Vegetable				
Meat				
Fishes				
Dry fishes				
Others				

### 9. General Expenditure

Particulars	Monthly (Kyats)	Yearly (Kyats)	Remark
Clothing			
House repair			
Medical cares			
Education fees			
Transportation			
Welfare			
Others			

### 10. Balance of Household Economy

Economic condition	Tick off	If surplus, how much for saving (Kyats)?	If deficit, how to address? 1 = Sell household assets 2 = Borrow money 3 = Others (Pls specify)
Surplus			
Balanced			
Deficit			

## Perceptions Towards Taninthayi Nature Reserve - TNR

### 11. Knowledge about TNR

Questions	Yes = 1, No = 2	If yes, please mention.
Do you know the objectives of the TNR?		
Have you noticed the boundary makers of the TNR?		

Do you know the TNR is protected by the laws?		
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#### 12. Perceptions and attitudes towards TNR

Questions	Yes = 1, No = 2	If yes or no, please elaborate.
Does the establishment of the TNR bring you benefits?		
Does the establishment of the TNR bring you losses?		
Do you agree with the TNR establishment?		
Do you think that it is good the land and forests are protected?		
Do you think that there are more wild animals now than 10-years ago?		
Do you think that the restrictions of TNR is too many and rigid?		
Do you agree that TNRP makes enhancement of local communities' the livelihoods of local communities?		

#### 13. Other comments, if any

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**Thank you for your cooperation!**

## Assessment of Existing Livelihood Condition

**Table 1 Natural capital assessment scales**

Variables	Assessment scales				
	1	2	3	4	5
<b>Resource base</b>					
Per capital land area	< 25 ac	25 - 49 ac	50 - 74 ac	75 - 99 ac	> 100 ac
Per capital farm land	< 0.25 ac	0.25 - 0.49 ac	0.5 - 0.74 ac	0.75 - 0.99 ac	> 1 ac
Per capital horticulture land	< 1 ac	1 - 1.99 ac	2 - 2.99 ac	3 - 3.99 ac	> 4 ac
CF area (communal owned)	< 50 ac	51 - 100 ac	101 - 150 ac	151 - 200 ac	> 200 ac
Pasture land	None	Homesteads	Farmlands	Communal	Specified
Timber resource	7 miles	5 miles	3 miles	1 miles	Within village
NTFP resource	7 miles	5 miles	3 miles	1 miles	Within village
Water resource	7 miles	5 miles	3 miles	1 miles	Within village
Bush meat	None	Rare	Sometime	Seasonal	All seasons
<b>Environment services</b>					
Forest fires	Very frequent	Frequent	Sometime	Rare	None
Landslide erosion	Very frequent	Frequent	Sometime	Rare	None

**Table 2 Financial capital assessment scales**

Variables	Assessment scales				
	1	2	3	4	5
<b>Stock of cash</b>					
Formal employment	None	25 %	50 %	75 %	100 % of Working Force
Average household income	< 5 Lakh	7 Lakh	10 Lakh	13 Lakh	> 15 Lakh
Local saving	None	Low	Moderate	High	Very high
Debt	70 % of HH	60 %	50 %	40 %	< 25 %
<b>Flow of cash</b>					
Soft loan access	None	Difficult	Passable	Easy	Very easy
Credit repayment	Problematic	Insecure	Steadfast	Secure	Very secure
Remittance	None	Sometime	Often	Regular	Very regular
Basic products price	Very expensive	Expensive	Reasonable	Cheap	Very cheap

**Table 3 Physical capital assessment scales**

Variables	Assessment scales				
	1	2	3	4	5
<b>Basic infrastructure</b>					
Post office	7 miles	5 miles	3 miles	1 miles	Within village
Primary school	7 miles	5 miles	3 miles	1 miles	Within village
Middle school	7 miles	5 miles	3 miles	1 miles	Within village
High school	7 miles	5 miles	3 miles	1 miles	Within village
Library	7 miles	5 miles	3 miles	1 miles	Within village
Hospital	7 miles	5 miles	3 miles	1 miles	Within village
Clinic	7 miles	5 miles	3 miles	1 miles	Within village
Electricity	No nearby	Nearby town	Nearby village	Some home	Every home
Groceries shop	7 miles	5 miles	3 miles	1 miles	Within village
Market	7 miles	5 miles	3 miles	1 miles	Within village
Railway station	7 miles	5 miles	3 miles	1 miles	Within village
Road network	7 miles	5 miles	3 miles	1 miles	Zero village
<b>Consumer goods</b>					
Bamboo house (%)	> 40 %	30 %	20 %	15 %	< 10 %
Cattle	No	1/HH	2/HH	3/HH	> 4/HH
Poultry	No	5/HH	10/HH	15/HH	> 20/HH
Domestic water	6 months/yr	7 months/yr	8 months/yr	10 months/yr	All seasons
<b>Producer goods</b>					
Trawlergi	1 per 60 HH	1 per 50 HH	1 per 40 HH	1 per 30 HH	1 per 20 HH
Motorbike	1 per 20 HH	1 per 15 HH	1 per 10 HH	1 per 5 HH	1 per 1 HH
Motorboat	1 per 60 HH	1 per 50 HH	1 per 40 HH	1 per 30 HH	1 per 20 HH
Boat	1 per 50 HH	1 per 40 HH	1 per 30 HH	1 per 20 HH	1 per 10 HH
Bullock cart	1 per 20 HH	1 per 15 HH	1 per 10 HH	1 per 5 HH	1 per 1 HH
Farm implements	Very simple	Simple	Machine	Tractor	Machinery
Grinding machine	7 miles	5 miles	3 miles	1 miles	Within village

**Table 4 Human capital assessment scales**

Variables	Assessment scales				
	1	2	3	4	5
<b>Quantity</b>					
Working force	< 25 % of Pop.	40 %	50 %	60 %	> 75 %
<b>Quality of education</b>					
Illiteracy rate (%)	50 % of Pop.	40 %	30 %	20 %	> 10 %
Drop-out rate (%)	> 50 %	40 %	25 %	10 %	Nil
<b>Quality of health</b>					
Access to doctor	> 7 miles	5 miles	3 miles	1 mile	At village
Access to nurse	> 7 miles	5 miles	3 miles	1 mile	At village
Access to midwife	> 7 miles	5 miles	3 miles	1 mile	At village
Water quality	Stream	Common well	Private well	Tube well	Pipe network
<b>Knowledge and Skill</b>					
Local knowledge	25 % of Working Force	40 %	50 %	60 %	> 75 %
Specialized knowledge	25 % of Working Force	40 %	50 %	60 %	> 75 %

**Table 5 Social capital assessment scales**

Variables	Assessment scales				
	1	2	3	4	5
<b>Structural</b>					
Organizations	None	Limited	Moderate	Diverse	Very diverse
Membership	None	Little	Few	Many	Most people
Participation mode	Forced	Induced	Co-opted	Facilitated	Initiated
Leadership	Forced	Appointed	Selected	Elected	Accorded
<b>Cognitive</b>					
Trust	No	Low	Moderate	High	Very high
Perception	Very negative	Negative	Neutral	Positive	Highly positive
<b>Collective actions</b>					
Water supply problem	No	Low	Moderate	High	Very high
Welfare	No	Low	Moderate	High	Very high
Natural disasters	No	Low	Moderate	High	Very high

Labor contribution	No	Low	Moderate	High	Very high
Cash contribution	No	Low	Moderate	High	Very high
<b>Social cohesion</b>					
Landlessness	> 25 % of HH	20 % of HH	15 % of HH	10 % of HH	< 5 % of HH
Poorness	> 25 % of HH	20 % of HH	15 % of HH	10 % of HH	< 5 % of HH
Religious composition	20:80	30:70	40-60	50:50	100:100
Recent immigration	> 25 % of HH	20 % of HH	15 % of HH	10 % of HH	< 5 % of HH
<b>Empowerment</b>					
Sense of happiness	Very unhappy	Unhappy	Impartial	Happy	Very happy
Influence to local events	Very low	Low	Moderate	High	Very high
Influence to general event	Very low	Low	Moderate	High	Very high