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

Report on Assessment of Potential Production of Non Timber Forest Products (NTFPs) in the Taninthayi Nature Reserve

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The report on assessment of potential production of Non Timber Forest Products has been developed with generous support of the project team of TNRP and Forest Department staffs of Dawei and Yay Phy township.

Firstly, I would like to express my sincere thanks and respect to the Director General of Forest Department for his approval on assigning me to conduct this short term study on NTFP potential production rate. My sincere thanks also go to U Aung Thu, Project Director of Taninthayi Nature Reserve Project for his continuous support and valuable suggestion for accomplishing the tasks mentioned in the TOR.

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Executive Summary

This short term assignment for assessment of potential production of Non-Timber Forest Products in the Taninthayi Nature Reserve area was carried out during the period March-April of 2018 to fulfill the requirement of accomplishing the tasks mentioned in the Operational Management Plan 2017-2020 of TNRP. The main purpose of the study is to provide recommendation for alternative livelihood development through NTFPs products in the Taninthayi Nature Reserve area.

The study was designed to focus on more experience, opinion and interest of local community members in the production of NTFPs in 8 studied villages in the reserve. Secondary data of the Forest Department and traders of common NTFPs are also supportive for verification of NTFP production .70 Key Informant Interviews, 32 Focus Group Discussion with Participatory Rapid Appraisal tools are appropriately applied in order to achieve the expected outputs of this assignment. Community Forest User Group CFUG members, and non CFUG members, brokers and traders and Myanmar Rattan and Bamboo Entrepreneur Association MRBEA personals were participated at the KIIs. 99 of CFUG and non CFUG members also participated at the FGDs. And field observation on existing NTFPs production in the area is one of the methodologies for carrying out this field research.

The main findings of this study include 6 common NTFPs namely, bamboo, doggy-fruit, elephant foot yam, cardamom seeds, rattan and broom grass were basically harvested for household consumption and earning income in the studied villages. Many other lesser known NTFP species (63) are also harvested for food, medicines and beauty of homes. Production of most common NTFPs are gradually declined compared to the last 6 years, due to improper harvesting practices, forest fire and illegal timber logging especially in the reserve of KNU controlled area.

Rapid vulnerability assessment test for common NTFPs species in the studied villages of TNR observed that most species are moderately vulnerable to species loss or survival which includes bamboo, Xanthoid cardamom, dog-fruit, Taung-htan, Tha-byu and Lin-ngo. But rattan and elephant food yam are highly vulnerable to the species loss and only broom grass is at low vulnerability.. Elephant foot yam and rattan are already highly vulnerable to the species loss with existing harvesting and management practice resulted from poor law enforcement in the conflicted area, thereby decreasing production rate in future. Broom grass is the highest potentiality for maximizing production rate and the rest of common NTFPs are moderately potential for increasing products.

Current harvesting practice of local ethic communities are not well satisfactory for sustainable production and NTFPs. Appropriate harvesting methods for common NTFP species , namely bamboo, rattan, cardamom, elephant foot yam, doggy-fruit and broom grass are identified in order to produce them in a sustainable manner. Semi value or value added processing technique are still needed for ensuring more income of the local communities through provision of hands on training and materials required especially for processing of elephant foot yam. Elephant foot yam plantation with agroforestry practice should be introduced in the established community forests or home garden in order to effectively conserve the remained EFY plants in the reserve while ensuring more production of this tuber in future.

The project should facilitate in establishing small business groups (EFY producers group, Broom grass producer groups, Cardamom producers group, bamboo crafts producers groups, etc.) in the project villages for maximizing the earnings and benefits from the NTFPs. Each small NTFPs producer group can develop their own business plans based on their interest and capital in the long term through provision of required project supports such as trainings, capitals and marketing networks.

Abbreviations

CF	Community Forest
CFI	Community Forestry Instruction
CFUG	Community Forest User Group
CFMC	Community Forest Management Committee
EFY	Elephant Foot Yam
FAO	Food and Agriculture Organization
FD	Forest Department
FGD	Focus Group Discussion
KII	Key Informant Interview
LOU	Local Operating Unit
MRBEA	Myanmar Rattan and Bamboo Entrepreneur Association
NTFP	Non Timber Forest Products
NWFPs	Non Wood Forest Products
TNRP	Taninthayi Nature Reserve Project
RVA	Rapid Vulnerability Assessment
OMP	Operational Management Plan
PRA	Participatory Rapid Appraisal
TNRP	Taninthayi Nature Reserve Project

Contents

1. Introduction

1.1 Role of Non Timber Forest Products (NTFPs)

Non Timber Forest Products (NTFPs) has been widely used in all over the world for food security, medicines, aesthetics and for many different industrial products. 'Non Wood Forest Products consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests'. (FAO, 1999). NTFPs are very important to some local and national economy as well as being radical elements in sustainable forestry and for their "contribution to environmental objectives, including the biodiversity conservation" (FAO, 2003).

1.2 Background of the studied area

The Taninthayi Nature Reserve (TNR) was established and legally notified by the Ministry of Environmental Conservation and Forestry (now the Ministry of Natural Resources and Environmental Conservation, MONREC) on the 30thof March 2005 as a protected area under prevailing policies and laws with the aim of conserving tropical rainforest and their constituent biodiversity in the Taninthayi region of southern Myanmar. It is located in the Dawei District, Taninthayi Division, between the Dawei River and Myanmar-Thailand border, between latitudes 14^0 20' 50" and 14^0 57' 55" North and between longitudes 98^0 5' 10" and 98^0 31' 32" East. Administratively, its location is in the Yebyu and Dawei Townships of Dawei District in the northern part of Taninthayi Region in southern Myanmar. The northern border is connected with Mon State, and has some predominantly Mon populations in the area. The total area encompasses approximately 1,690 square kilometres (653 square miles) or 168,998 ha (420,077 acres). This area is a relatively large protected area compared to other protected areas in the region.

Thirty villages are located within four miles of the reserve boundary of TNRP. An additional 11 villages are located on the boundary or within the reserve (Figure 1). In 2011, the population in and around the reserve was approximately 3,200 households, of which around 430 (approximately 1,800 people) are within the reserve. The population comprises three main ethnic groups: Dawei, Karen and Mon. Ethnic Organisations are still actively in control of the northern and southern portions of the reserve: the New Mon State Party (Mon PyiThit Party) in the north, centred on around nine enclaved villages, and the Karen National Union (KNU) along the eastern border with Thailand, and in the south.

The Taninthayi Nature Reserve is located in the Eco-region 5d, Tenasserim South Evergreen Rainforest and consists mainly of evergreen rainforests of the southern portion of the Taninthayi range. A large number of threatened species of birds, mammals and trees have been recorded which gives an indication that TNR should be considered as an integral part of not only Myanmar's Protected Areas System but is also a global and regional conservation priority. During the first phase of the project, national consultants conducted research projects for mammals (Ye Htut et al., 2008), birds (Nay MyoShwe et al., 2008) and flora (HlaMaungThein, 2007). During the second phase of the project, research programs were conducted more specifically for individual flagship species such as Tiger, Tapir, and Elephant. During the second and third phases, studies on Trees and Bamboo, Orchids, Medicinal

plants and the Forest Dynamics of Dipterocarp species were also conducted, as well as a follow-up mammal survey in 2015-16.

Taninthayi Nature Reserve Project has been implementing to achieve the goal of effective conservation and maintain the biodiversity of the nature reserve, while contributing to the sustainable livelihood of local communities through involvement in conservation activities, and to contribute to Myanmar's Protected Areas network. The six management objectives have also been set up and slightly modified by the Forest Department. (OMP, 2017-2021).These objectives include: (1) Protect natural habitats and populations of important species through reducing threats and enforcing the law (2) Effectively engage local communities in sustainable land and resource use (3) Improve local livelihoods, and support appreciation and understanding of biodiversity amongst key stakeholders (4) Conduct targeted biological and social research to obtain relevant data that are essential for adaptive management (5) Effective administration, financial and logistical procedures to support management of the natural resources of TNR (6) Ensure that the reserve has long-term stability, and contributes to Myanmar's national Protected Area system.

To fulfil the above mentioned objectives and goal of TNRP, it is vital to meaningful participation of local communities while ensuring their sustainable livelihoods. The project team of TNRP has already convinced the local communities concerned of different ethnic groups (Kayin,Mon and Dawei people) to conserve the existing flora and fauna resources in their nearby villages and in the reserve. The local operating units (LOUs) are the key to operating planned activities such as patrolling, researching and extension to awareness on importance of effective conservation among the local residents.

To control the shifting cultivation, hunting and logging, the essential task for the local community is to develop and promote alternative livelihood strategies by creating income generation opportunities through production of value-added products with potential production rates of Non Timber Forest Products (NTFPs) such as bamboo, cane, betel nut shells, medicinal plants, Wa-U (round yam), and cardamom seeds, etc. TNRP have a plan to provide financial support to carry out small-scale economic activities through Micro Finance program. The aim of this cooperation is a kind of revolving fund with loans offer to the villagers to carry out two kinds of financial products attributed according to the kind of economical activity: short-term loans for the small-scale economic activity or long-term loan period of one year for the activities such as agricultural or breeding activities. Based on the finding of production rates of NTFPs, TNRP will conduct livelihood training / workshops for local people using NTFPs in2018-2019 and continue the microfinance program for the improvement of livelihood of communities through the promotion of alternative income generation activities.

In addition, the TNRP project had already supported for provision of small loan/revolving fund to the CFUGs concerned so they can earn more income or assets and capitals through those loan implementation scheme which provided 5,000,000 Kyats for each targeted project villages. The majorities of the livelihood depend on the horticulture farming and growing betel nut, cashew-nut, and rubber and collecting of non-timber forest products is only carried out in a few villages (Zaw,2017). Most CFUGs have now collected and saved more than 5,000,000 Kyats trough their revolving fund

scheme. But this loan money did not go to the CF related income generation activity such as value added product development and sales of the products.

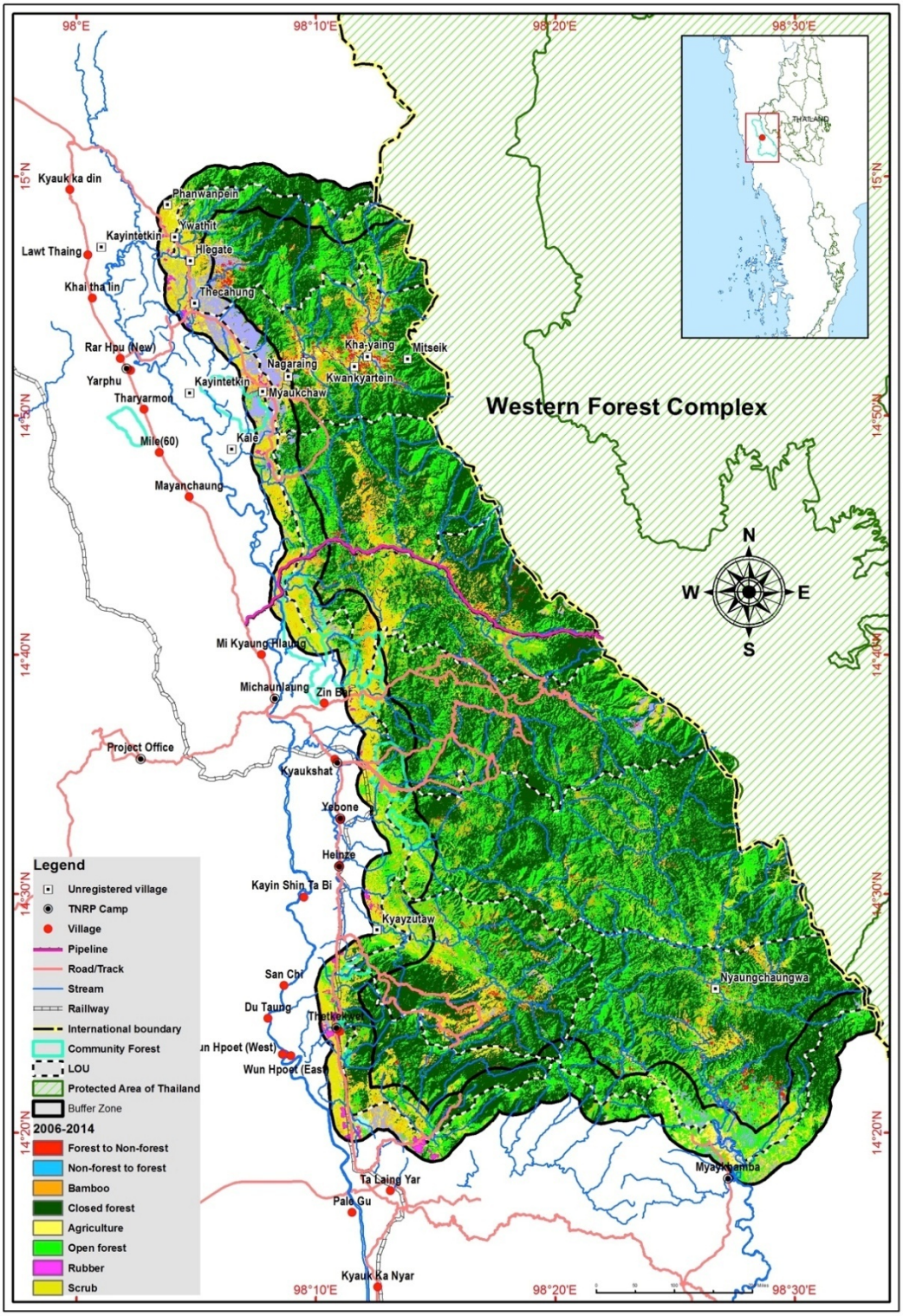


Figure 1: Map of the Taninthayi Nature Reserve and it's buffer zone

1.3. Objective of the Study

The objective of the consultancy for assessment of potential production rates of non-timber forest products is to give recommendation for alternative livelihood development through NTFPs products in the Taninthayi Nature Reserve area. The major tasks for accomplishing the assessment include: (1) To observe Non-Timber Forest Products (NTFPs) of Tainithayi Nature Reserve (TNR) area and their uses (2) To identify and describe the traditional harvesting method of Non-Timber Forest Products (NTFPs) in Tainithayi Nature Reserve (TNR)(3) To collect the data of Non-Timber Forest Products (NTFPs) production rates in the past and current periods (4) To identify the potential rate of Non-Timber Forest Products (NTFPs) production (5) To find out the appropriate harvesting methods for the purpose of market orientation.

1.4 Limitation of the study

This short-term (2 months) study on NTFP potential production in the TNR mainly emphasized on synthesis of collected project documents and secondary data provided by the Yay Phyu township and Dawe District Forest department and opinion and experience of community members involved in the studied villages of TNR. The full NTFPs assessment of a specific forest area would require sufficient time frame to measure, monitor and calculate the growth rate and yield of specific NTFP species periodically or continuously in a seasonal basis throughout the year. This assessment also did not include the biometric/biostatistics of a particular NTFP species due to limited time frame available. In addition, few limitations during the assessment were also found as the followings:

(a) Security: as some of the project areas are controlled by ethic armed groups (Kayin National Union-KNU and Mon Pyi Thit Party), the tasks (Key Informant Interviews, Focus Group Discussion FGDs) of planned activities of assessment were not able to fully carried out in 2 villages)

(b) Limited time: community members of some studied villages were not able to provide sufficient time for KII and due to poor or lack of willingness to answering questionnaire and participating at the FGDs.

2. Methodology

As the nature of assessment of potential production rate of Non Timber Forest Products (NTFPs) is needed to be carried out within the limited time frame available (February-April) and short term study on the existing NTFPs of the TNR, the consultant selected methodology that can provide most accurate data (quantitative and qualitative), which reflecting the tasks mentioned in the TOR of consultancy. Thus, the methodology for this short term assessment has been emphasized on utilizing opinion of indigenous people and their ethno-botanical knowledge through conducting Key Informant Interviews (KII) and Focus Group Discussions (FGDs) with 4 Participatory Rapid Appraisal tools, namely, Seasonal calendar, Matrix ranking for NTFP's preference, Rapid Vulnerability Assessment and Strength, Weak , Opportunity and Threats (SWOT). Before starting selection of methodology, desk review on existing NTFPs literature in Myanmar and the globe including project documents relevant to NTFPs is carried out.

Then, questionnaire for KIIs are developed to accomplish the outputs and the tasks mentioned in the TOR of the assignment. Rapid Vulnerability Assessment (RVA) test is applied for guessing potential production rate of NTFPs for a village based on the 5 main criteria such as ecology, life form, part used, harvesting method & management and economy. The vulnerability level is categorized into 3 group namely low, moderate and high based on the criteria mentioned above. As the vulnerability level increased, the potential production rate for a specific NTFP species decreased. RVA test is attached at the annexes. In addition, harvest of NTFPs species from a specific forest area can have not only the species' short term effect but also its' long term effect based on the parts of plant extracted and see the diagram below:

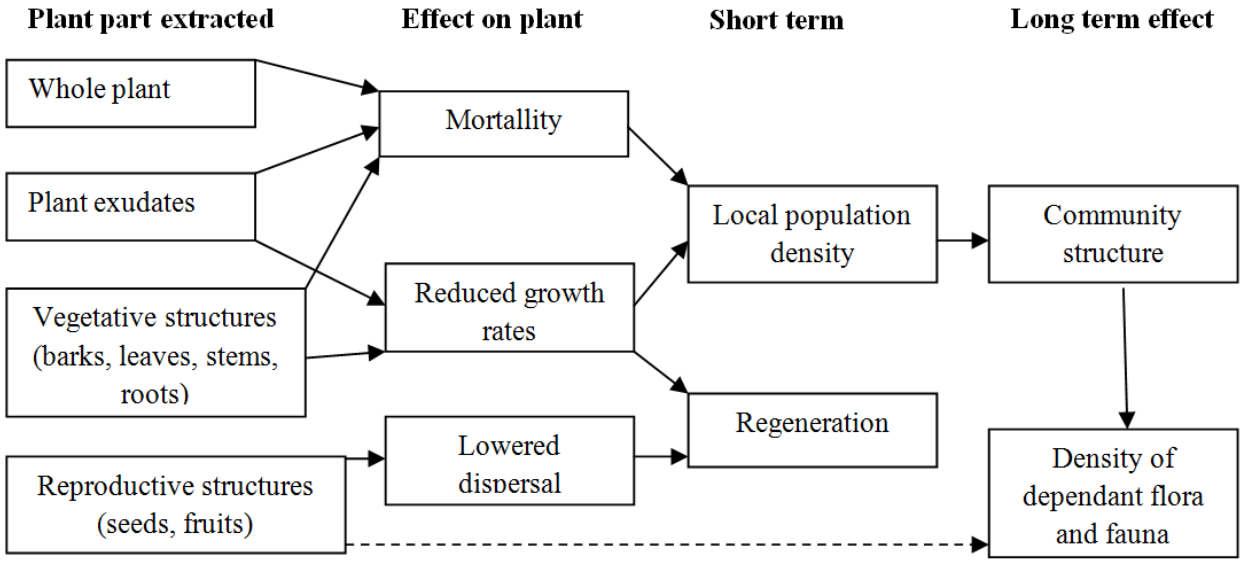


Figure (2) **Diagram showing possible Ecological Impacts of NTFP Extraction**

For representation of the studied project area, 8 sample villages out of 41 project villages (about 20 % sample size) were selected in consultation with key project staffs based on the criterion such as ethnicity, security, accessibility, common NTFPs production and usage and sales and trade. The selected villages for this assessment include as the following:

(a) Zinbar

(b) Mayan Chaung

(c) Thar Yar Mon

(d) Yay Pone

(e) Kalone Hta

(f) Myay Kan Paw

(g) Mi Chaung Laung (old village)

(h) Kywe Talin

A total of 66 KIIs and 32 FGDs with 99 participants were carried out in the selected project villages mentioned above. In addition, in order to perceive the trend of production of NTFP in the TNR area, 4 processors/traders of NTFP in Kan Pauk ,Dawei and Yangon were also interviewed and meeting with Forest Department Staffs of Yay Phyu township and Dawei District were also a part of collecting secondary data on NTFPs and their opinion on existing NTFP production and meeting with vice-president of Myanmar Rattan and Bamboo Entrepreneur Association (MRBEA) as well as being a rattan and bamboo handicrafts exporter in Yangon is a plus for estimating the exported volume/value of rattan and bamboo products.

The collected data were analyzed then through the Microsoft Excel data sheet and descriptive statistics and interpreted for findings.

3. Findings

From the quantitative and qualitative data analysis from the KIIs and FGDs conducted in all studied villages, the major findings of the assessment of potential production of NTFPs were presented below:

(a) Common NTFPs utilized by the communities in the studied villages and frequency of uses for each NTFP species

The common NTFPs utilized by the community members of all studied villages for household consumption and sales for income are mentioned in the table below for each village. Details of common NTFPs utilized by all studied village is attached at the annexes.

Sr.	Local name	Botanical name	Frequency of Uses			For Sale
			High	Moderate	Low	
1	Wa-ya	*Bambusa burmanica*	XXX			XX
2	Wa-bo	*Dendrocalamus brandisii*	XXX			
3	Wanet	*Dendrocalamus longispathus*			X	
4	Hmyin wa	*Dendrocalamus strictus*			X	
5	Menei wa				X	
6	Tapintaing wa	*Bambusa longispiculata*			X	
7	Rattan	*Calamus spps.*			X	X XX
8	Elephant food yam	*Amorphophallus campanulatus*			x	X XX
9	Xanthoid cardamom	*Amomum xanthioides*			x	XXX
10	Dog-fruit	*Abarema bigemina*	XXX			XXX
11	Broom grass	*Thysanolaena maxima*			X	X
12	Lin Ngo leaf		XXX			X
13	Honey				X	
14	Taung Htan	*Livistona speciosa*			X	
15	Orchids	*Dendrobium spps.*			X	

Table (1) list of common NTFPs species utilized in all studied villages

In all studied village, common NTFPs species utilized by the villagers are Wa-ya (*Bambusa burmanica*))and Wa-bo (*Dendrocalamus brandisii*) for home construction and these two species is highly used in the whole village and Wanet (*Dendrocalamus longispathus*), Hmyinwa (*Dendrocalamus strictus*), Meneiwa and Tapintaing wa (*Bambusa longispiculata*) are low used in the village. Bamboo shoots are consumed in boiled, fried or cooked in all villages. On the one hand, Elephant foot yam, Xanthoid cardamom seeds and dog-fruits are mainly harvested seasonally for sale and family income in their daily life and dog-fruit is also harvested for family consumption. Broom grass is also used by a few villagers for their home sweeping and also harvested for sales to the local processor. Lin Ngo leaf, a kind of edible leaf , very common known leaf in the TNR area has also been a major NTFP species among the villagers of all studied villages and all other project villages for home consumption . Honey, Taunghtan (*Livistona speciosa)* and orchids (*Dendrobium spps.)* are also some of the prominent NTFPs species harvested by the villagers of all studied villages.

(b) Uses of common NTFPs

Bamboo species**:** Bamboo species are used in many different ways based on the utility and need of community members. Wa-ya is widely used for housing, fencing, drying racks for betel nut and handicrafts such as hat and basket. Wa-bo and Wanet are mainly used for housing and fencing. Bamboo shoot is consumed in boiled, cooked and fried form. Some consume it by making of bamboo shoot pickle.

Rattan: Rattan is rarely used in the village and some rattan fruit (Kyein Yay Swun) were sold to the brokers and trader in Yay Phyu over 15 years ago. Rattan is mainly used for making handicrafts such as chair, settee, basket, lamp cover, kettle cover, tissue box, litter bin, etc.

Chinpaung Palar: Xanthoid cardamom is not used in the village and only harvested for selling to local brokers and traders. But, it is a kind of raw In Chinese and Vietnamese traditional medicine, fruits are used to treat in digestion, diarrhoea, flatulence, gastralgia, toothache, and as febrifuge and antiseptic. They are also used as a spice and condiment. Thai traditional doctors also apply the fruit to treat cough, against asthma and as an anti-emetic.

Doggy fruit: Danyin The is one of the appetizers in having rice in most families. It can be eaten roasted, boiled,fried, cooked with coconut oil or raw. Some eat it by making of pickled with salt. It is also one of the ingredients in cooking of with Hmyit-tar-lapot (bamboo shoot soup).

Wa-U : Elephant foot yam (round yam) is rarely used in the studied village as most villagers do not know how to prepare food with this yam. The villagers do not have the technique of removing itchiness in making of boiled yam. Some said that it can be easily removed by adding a little lime into the boiled yam. In nature, it is quite itchy and one can feel itchy in his mouth and throat on having it. Wa-U has many health benefits and nutritional values. Apart from all these health benefits, elephant foot yam can be used in curries and forms a major staple food in some parts of the world. It is used to make chips, fries, stews, soups, casseroles, and others just like sweet potatoes. It is also widely used in the form of flour to make slices of bread. It is a widely consumed crop in the tropical regions. It is usually consumed boiled or baked, and several recipes are available based on elephant foot yam. In the studied villages,

processors/small traders dried the yam chips with charcoal fire and bleached with sulfur and sold the products to whole sales/big traders in Dawei.

Broom grass: it is mainly used for making of sweeper in the village. But most villagers rarely used it for making sweepers as spending time and cost for making sweeper is higher than the cost for buying a readymade broom grass sweeper.

Linngo leaf: This vegetable leaf is consumed in boiled, cooked and fried with meat in the village.

Honey: honey is commonly used in making of traditional medicines and consumed for health especially for the olds.

Taung Htan: the leaf of Taung Htan is also used for making of roof in housing of villagers. The cambium of this branch can also be used in making of mat.

Orchids: Even though, many different kinds of orchid's varieties found in the forests and nearby villages, some rarely used it for medicinal purposes. Some used it for home decoration and aesthetic views.

In addition to the above mentioned NTFPs, many other NTFPs are also widely used for food, medicines and extra income in all studied villages. The list of all NTFP species found in the studied villages is presented at the annex.

(c) Community's preference value of common NTFPs

Based on the ranking of scores for different values of common NTFP species exercises conducted in the 8 studied villages, summary of community preference NTFPs species are described in the following table. This table showed that bamboo is the highest preference ranking 1 and rattan is the lowest rank.

NTFP species	Ranking identified by the participants of studied villages								Preference Rank
	Zinbar	Mayan Chaung	Thar Yar Mon	Yay Pone	Kalone Hta	Myaykan baw	Kywe Ta Lin	Michaung laung (Old)	
Bamboo	1	1	(-)	1	2	4	1	1	1
Cardamom	2	2	(-)	6	1	1	5	2	3
Dog-fruit	3	1	(-)	4	1	3	2	3	2
Elephant foot yam	6	4	(-)	6	2	2	3	4	4
Rattan	5	5	(-)	7	5	4	6	6	6
Broom grass	4	3	(-)	5	3	5	4	5	5

(-) indicate data is not available as lack of opportunity to collect this data through FGD exercise in Thar Yar Mon due to status of local situation at the time of visit

Table (2) community preference value of common NTFPs

(d) Traditional Harvesting Methods of NTFPs in the studied villages

The community members of studied project villages have already traditionally harvested NTFPs for their household consumption and for earning income in a seasonal manner for over years. Traditional harvesting method for some NTFPs are quite simple and it does not harm the survival rate and regeneration of those NTFPs but some methods are improper for specific NTFPs species for their sustainability. Harvesting methods for common NTFPs species found in the studied villages are described in the following.

Bamboo: Bamboo is selectively harvested in the studied villages based on the need of individual farmers. The average age of harvested bamboo is in the range between 1.5 year and 3 year based on the type of usage. Most harvesters cut the bamboo down at least 3 feet above ground and some cut it down even 4-5 feet above ground with axe or machete in their gardens or in the reserve. In Taungya cutting, farmers cut the clumps down 6 -8 inches above ground for ensuring free or control of weed competition. Most villagers harvest matured bamboos in late monsoon or beginning of open season, September-November especially for the use of housing and fencing. Bamboo harvesters for the sales to the collectors/traders have no specific time frame as it depends on the buyer's demand throughout the year.

Figure (3) : Improper Harvested bamboo in a garden

Rattan: The rattan is mostly harvested during the period September –March but some also harvested it in July and August for getting the fruit. The minimum harvestable age for the rattan is 10-15 years. The stem of rattan is usually cut at least 6 inches above the ground with machete. Rattan fruit is simply plucked by bamboo hook (crampon) .The harvester can pluck the fruit by holding the crampon from the base of the rattan and it does not harm the rattan.

Figure (4): Rattan clumps in a studied village

Dog-fruit: Dog-fruit is simply plucked with bamboo knife in home gardens of the community members at mature stage of the fruit. But, in reserved forests some harvesters cut down the whole tree of dog-fruit and pluck the fruits then. Some also cut the fruit bearing branches in reserved forest as no specific ownership for the fruits at the harvesting time and rules and regulations for harvesting methods are prescribed though for sustainability of the dog-fruit, only few villagers follow these rules.

Figure (5): Doggy-fruit bearing

Wa-U: The villagers mainly harvest wa-u during the period October –November. Normally the duration for harvesting size of Wa-U is minimally 3 years, from the beginning of planting time. The harvesters use hoe, knife and …. for harvesting. It is simple enough to harvest the tuber with hand and those tools but some harvested even young tubers carelessly in the reserve.

Figure (6) Wa-U harvested by a villager in Zinbar

Xanthoid Cardamom seeds: This Chin-Paung-Palar is simply harvested with hand and small knife . But most harvester used their own hand when harvesting in the reserve so as to attain it more and compete with others at the harvesting season and this can harm the young seedlings of herbs. Some also plucked all the fruits including immature ones resulting in depletion of the regeneration of the species in future.

Figure (7) Some Xanthoid Cardamoms in home garden of a villager in Zin Bar

Broom grass: The grass is simply harvested with small knife and hand in open season especially November and December.

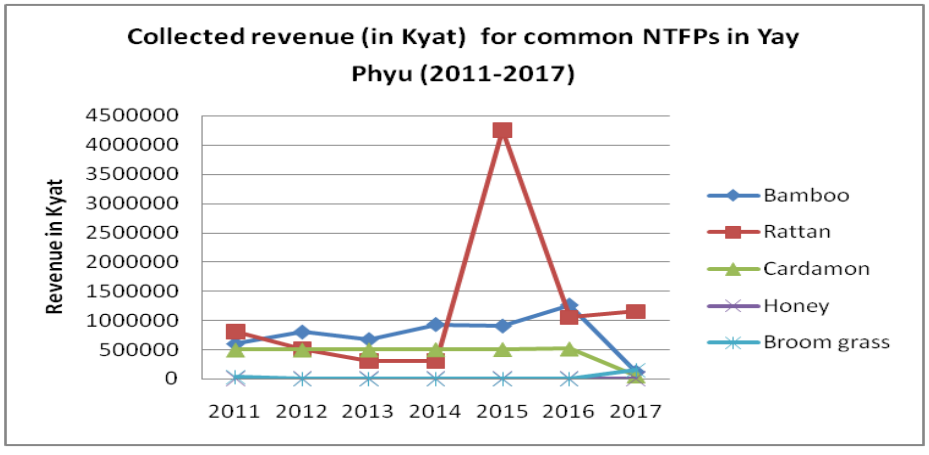
Taung Htan: the harvesters have to climb the palm up and cut down the leaf with machete for making thatch. The villagers usually start cutting it's leaf in open season –November and December. The harvesters cut down all matured leaves of Taung Htan and only young and immature leaves are left.

(d) Production of Common NTFPs in the studied villages

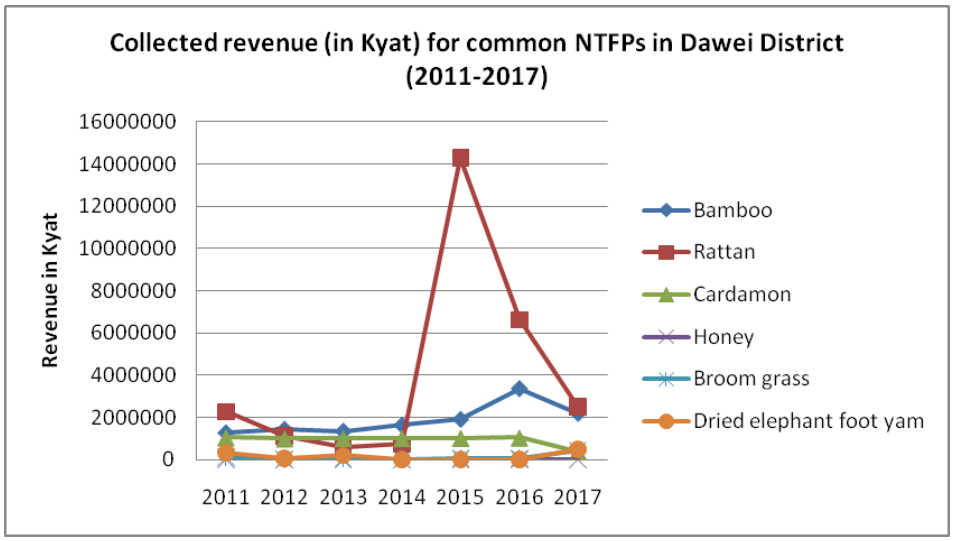
Almost households in the studied villages used common NTFPs for family consumption and for earning income annually. Bamboo, dog-fruit and Wa-U are prominent NTFPs of among the community members. The production rate for all these three NTFPs species varied accordingly with local market price fluctuation especially for dog fruit as it's fluctuation rate is very high sometimes and very low price make the villagers unwilling to harvest the dog-fruit and stopped harvesting the fruits on that year eventhough many fruits are harvestable.But, most families harvested the fruits for home consumption at every year. The harvested number of dog-fruits for a family depends on available manpower of a family at the harvesting time. A man can harvest at least 1 basket or 3 basket of dog-fruit at the harvesting season from his own garden or reserved forest for family consumption. For earning income of the family, a dog-fruit harvester get at least 5 basket of fruit in a year and some get up to 50 basket based on the availability of the higher yield and market price.

According to the results from KIIs with local traders, the average trade value of dog-fruit in a year in Yay Phu township is about 120 million Kyat and it equal to 24,000 basket and estimate trade volume for Xanthoid Cardamom seeds in Dawe is in the range between 100,000 viss and 200,000 viss in a year. The production rate also depends on the frequency of forest fire in the dog-fruit grown area and climate. In addition, if local market price for buying fruit is very low, the trade volume considerably decreases due to poor of lack of interest in harvesting by the villagers. But, the forest department does not collect revenue for dog-fruit and so it is quite difficult to estimate production value of this edible fruit. The total collected revenue for Yay Phyu township and Dawei district from 2010-2017 is described in the following tables.

Figure (8) Total collected revenue (In Kyat) for NTFPs in Yay Phyu Township (2011-2017)



Source: FD, Yay Phyu Township (2018 Mar)



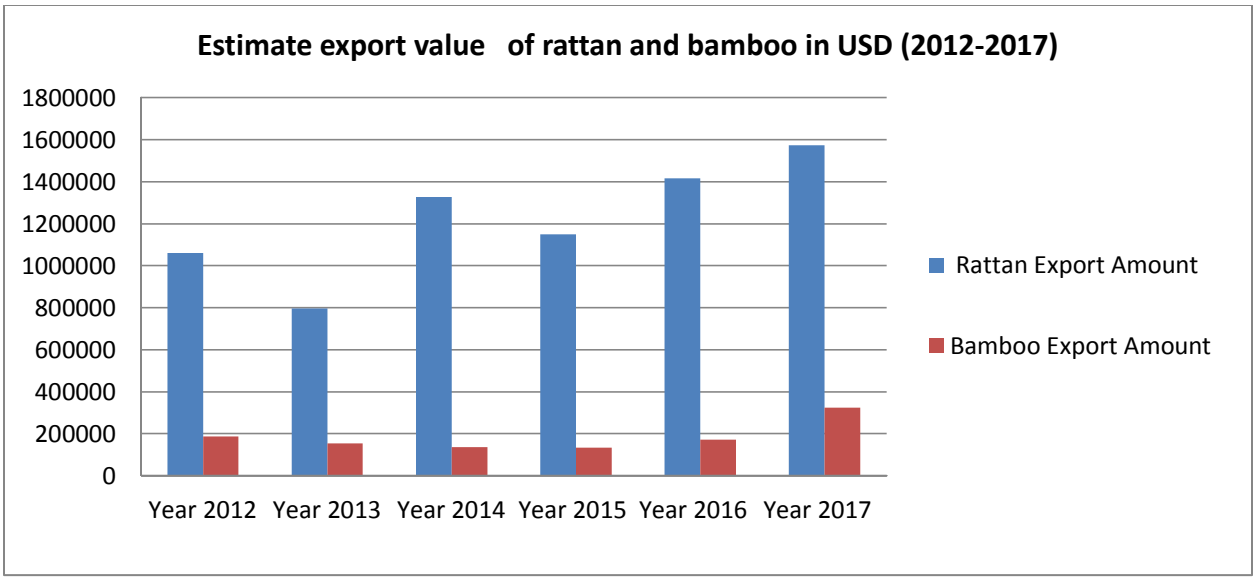
Source: FD, Dawei District (2018)

Figure (9) Total collected revenue of NTFPS in Dawei District (2011-2017)

According to the statistics of Yay Phyu Forest Department and Dawei District Forest Department, almost collected NTFPs revenue for 2017 are gradually declined compared to last 6 years ago. Only revenue for rattan is sharply increased in 2015 as it increased for the whole Dawei district. Yay Phyu Forest Department did not receive any revenue for dried elephant foot yam since 2011 though very few compared to other NTFPs, Dawei District Forest Department attained the revenue considerably for dried yam in 2017. Revenue for bamboo is gradually increased from 2011 to 2016 in both of Yay Phyu township as well as across the district but it is decreased again in 2017. Similarly, revenue for cardamom seeds is also slightly declined compared to recent years in the whole district. Revenue for honey and broom grass is the least compared to all other NTFPs and revenue for honey is also decreased compared to recent years although collected revenue for broom grass is quite risen compared to the past in both of Yay Phyu and Dawei district.

The statistics of revenue for those NTFPS is quite different with estimated trade value said by the local traders in Dawei and Yay Phyu. The estimate trade volume for dried elephant foot yam in Dawei is between 500,000 viss and 800,000 viss and for Xanthoid Cardamom seeds between 100,000 viss and 200,000 viss in a year according to interview results with local traders.

In addition, Estimate export value for bamboo and rattan has gradually increased compared to 2012 according to statistics of Myanmar Rattan and Bamboo Entrepreneur Association-MRBEA shown in the chart below.



Source: Statistics of MRBEA (2018)

Figure (10) Estimate export value of rattan and bamboo in USD

(e) Estimate for Potential production of NTFPs

Regarding the rapid vulnerability assessment test for common NTFPs species in all studied (8) villages, level of vulnerability for those NTFPs species are summarized in the following table. As the vulnerability level increased, the potential production rate for each NTFPs species would decreased.

Table (3) Vulnerability Level for common NTFPs in the studied villages of TNR

Sr	Common name	Botanical name	Vulnerability Level		
			High	Moderate	Low
1	Bamboo	Bamboo spps.		*Moderate*	
2	Xanthoid Cardamon	*Amomum xanthioides*		*Moderate*	
3	Doggy fruit	*Archidendron pauciflorum*		*Moderate*	
4	Elephant foot yam	*Amorphophallus campanulatus*	*High*		
5	Rattan	*Calamus spps.*	*High*		
6	Taung Htan	*Livistona speciosa*		*Moderate*	
7	Broom grass	*Thysanolaena maxima*			*Low*
8	Tha –byu	*Dillinia indica*		*Moderate*	
9	Lin-ngo leaf			*Moderate*	

Rapid vulnerability assessment test for common NTFPs species in the studied villages of TNR observed that most species are moderately vulnerable to species loss or survival which includes bamboo, Xanthoid cardamom, dog-fruit, Taung-htan, Tha-byu and Lin-ngo. But rattan and elephant food yam are highly vulnerable to the species loss and only broom grass is at low vulnerability.. Elephant foot yam and rattan are already highly vulnerable to the species loss with existing harvesting and management practice resulted from poor law enforcement in the conflicted area, thereby decreasing production rate

in future. Broom grass is the highest potentiality for maximizing production rate and the rest of common NTFPs shown in the chart below are moderately potential for increasing products.

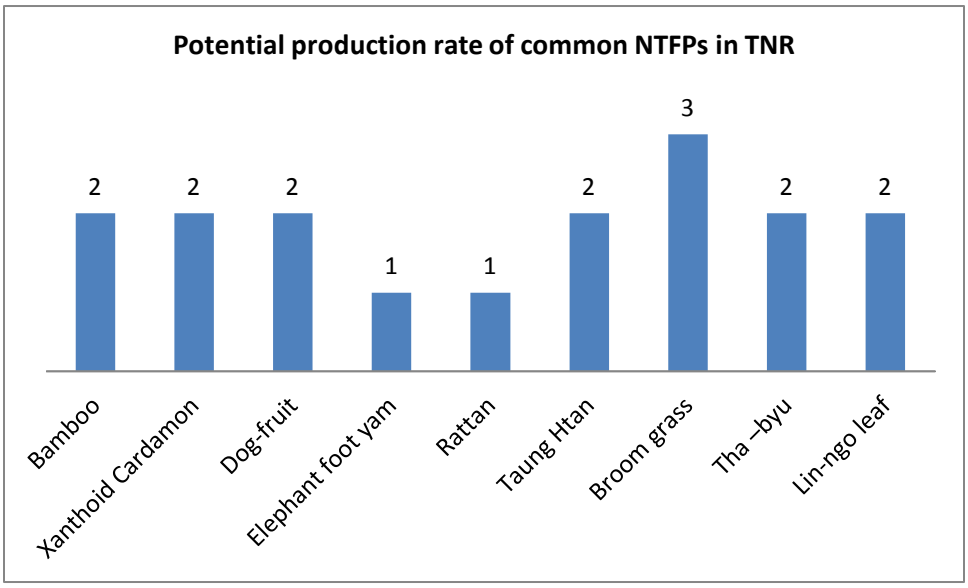


Figure (11) Potential production rate of common NTFPs in the TNR

4. Strength, Weakness, Opportunities and Threats-SWOT Analysis

In order to conceptualize the bottlenecks and opportunities for maximizing the benefit from harvest of NTFPs, SWOT exercises were conducted together with community members concerned in each studied village. The summary of findings from SWOT exercises are presented in the table below.

Strength	Weakness
➢ **Institutional:** Established CFUGs have formal rules, regulations and plan for continuation of implementing tasks mentioned in the CF management plan including conservation of remained natural resources while ensuring support to sustainable livelihoods for local communities. ➢ **Physical:** Many of NTFPs such as bamboo, dog-fruit, elephant foot yam, cardamom, etc. are still remained in the reserve and home gardens. Easy transportation and communication access for starting any business.	➢ **Attitude:** Too much dependency on project support and poor of lack of willingness ➢ **Leadership:** poor in organizing any group works related to CF and lack of trust among the members for some CFUGs ➢ **Financial:** low capital for start up of new products ➢ **Technology:** poor processing and no value added technique is developed yet ➢ **Marketing:** rely on middlemen for the sales of raw NTFPs

Opportunities	**Threats**
➢ **Enabling policy:** New CFI encourage start up of CF enterprise ➢ Revolving fund can continue support for startup of new products regarding NTFPs	➢ Competitive with existing market share holders ➢

Table (4) Strength, Weakness, Opportunities, Threats

The strength for development of NTFPs based livelihood in the TNR area is established community forests and performance of CFUG committee and members following rules and regulations mentioned in the CF management plan for conservation of forests and biodiversity. CFUGs can initiate any kind of small business related to NTFPs for enhancing benefit and incomes for their members. Furthermore, many NTFPs resources such as bamboo, rattan, broom grass, cardamom seeds are largely found as raw material and potential for starting production of new value added products. On the one hand, many of weakness in the process of doing NTFPs based business are still remained to be addressed. Poor or lack of real interest to do something intensively and intentionally among the CFUGs members and villagers is prominent and this could happen nothing and the community members of target villages are also heavily relying on project support. Marketing of raw NTFPs is still relied on middlemen inside and outside village.

5. Discussions

(a) Uses of Common NTFPs for the TNR and potentiality for value added products

NTFPs has been important not only for food security but also extra income for most families of three different ethic people Kayin, Dawei and Mon residing in the TNR for over years. A various kinds of wild vegetables such as Tha-byu thee, Zin –pyun-thee and Lin-ngo-ywet are very popular and largely consumed in boiled, cooked and fried on a seasonal basis. Nutritional values of those wild vegetables are not underestimated. Some wild fruit trees such as Taw-kyet-mauk,Tha-pan-cho-thee, wild jack fruit are also delicious and major food for wildlife and snack for local people. Tha-pan-cho-thee is also medicinal and used in making traditional medicines for curing heart disease. O-boak pin, a kind of tropical shrub, can remedy the pain of anus bleeding. Not many benefits of medicinal values of NTFPs are studied yet and should be further researched for potentiality of manufacturing new valued added products.

Bamboo is still and mainly used in constructional works such as housing and fencing and small handicrafts in most of the studied villages. it is also used in making of drying rack for betel nut. Poor or lack of willingness to start producing handicrafts locally marketable has been a hindrance for business growth in the TNR. Rattan is rarely used in the studied villages even though a few villagers who make

handicrafts such as basket for their home use. Almost raw rattan reached to Yangon based handicrafts factory in Dawei and Yangon.

Elephant foot yam EFY is rarely consumed in the studied villages as no one knows how to make it snack or curry without itchy taste and sold it to the local traders in fresh. Quality dried yam give higher price compared to poorly processed yam in the market. Almost harvesters of yam do not have knowledge for processing and existing products are dried with charcoal fire and bleached with sulfur and thus these dried EFY chips are not clearly favorable for some traders. Processing technique for quality EFY products is needed for more income of the harvesters and villagers.

Doggy fruit: doggy fruit is eaten in boiled, fried, cooked, roasted or raw in most parts of the country including TNR area. No other value added products or snack were found in local market. It has some medicinal values but side effects are still remained.

Xanthoid Cardamom seeds: The seeds are rarely used in the families of community members. It has also medicinal values and should be investigated for better use of it.

(b) Issues of current harvesting method and appropriate harvesting guide for common NTFPs

Bamboo: Most people living in the TNR area harvested different kinds of bamboo species annually for home use and some harvested for earning income. They cut the bamboos in both of home gardens and the reserve. The bamboos are usually cut down at least 2-3 feet above ground with machete. Some also cut it 4-5 feet above ground and these cutting practices disturb the new shoot and culms survival and retard the growth of bamboo clumps. In order to reach better growth and regeneration of existing culms and clumps, the bamboos should be harvested with the method mentioned below:

- ✓ Selective harvesting should be applied and only mature culms which are 3 years old at least should be harvested.
- ✓ Harvest culms on in the dry/open season (October-December). The starch (carbohydrates) content is lower during period of dryness than in other months. Lower starch content in the culms will make them less susceptible to borer attacks.
- ✓ Harvesting of culms should be from the centre and not at the periphery of the clump. This makes it necessary to maintain clump in 'U' shape (horseshoe), keeping the apex towards the sides where the new culms are emerging. The open end of the horseshoe facilitates entry inside the clumps for harvesting mature culms.
- ✓ Plan the cutting operation to avoid harming young culms. New culms that attain an average height within the first few months are soft and may collapse unless supported by mature erect culms. A few older culms should be left in the clump after cutting, seeing to it however that congestion is under control.
- ✓ Use very sharp tools such as apex/machete. It is highly advisable to disinfect harvesting tools using bleach. This lower the risk of infecting the plants.
- ✓ Do not cut young culms unless congestion in the clump prevent the cutting of mature culms

- ✓ Cut each culms between 6 – 12 inches from the ground or just above the first node from the ground level. This is necessary so that water does not accumulate in the protruding internode. The accumulation of water may result in rotting and invites insects to lay their eggs.
- ✓ Never clear-cut an entire clump unless it has been verified to be seriously infected by a disease.
- ✓ Never harvest culms during the rainy season.
- ✓ Mulch each clump after harvesting using branches and leaves of harvested clumps. These should be neatly piled around the clump to provide organic materials to enrich the soil around the clump.
- ✓ If the harvest area is near a river, the culms may be allowed to soak in water for a few weeks to aid in the removal of starch and protect them from beetle attack. Otherwise they should be hauled to an area where they are sorted and air dried. Good practices to enable drying will help minimize losses due to biodegradation of the culms.
- ✓ The large culms should be stacked horizontally on parapets where there is good air circulation. Smaller culms may be piled horizontally at a 60 □angle to form a 'tepee shape' allowing air to circulate around them to aid the drying process. After drying, the whole culms or culm segments are sold in local markets.

Rattan: The local people harvested many of rattan for earning income in the dry season. They usually cut the cane 6 inches from the ground and some cut it 1 feet from the ground as there is no specific harvesting rules in the reserve. The harvesters cut all the plants they found in an area where there is many of rattan available, based on the local market demand. Forest fires seriously harm the survival of naturally growing rattan species in the reserve. In order to produce rattan products sustainably, the following harvesting method should be applied.

(A) Right time for rattan harvesting

- ➢ It is the right time for harvesting of rattan if the rattan's thorn become black and its leaves are fallen down. Also its leaves in the roots are dried and fallen.
- ➢ Rattan is changed color from light yellow to dark green
- ➢ It has both flowers and fruits.
- ➢ If the length of rattan is over 15 feet.

(B) Best season for harvesting

- ➢ Dry season/open season is the best for easy drying and it avoids mould, wet and insects.
- ➢ Easy for transportation and no effect to the rattan growing

(C) Suitable harvesting rattan tools

- ➢ Bush-whacker, special scissors and crampon, jungle knife and glove

(D)Harvesting technique

- ➢ Step 1 : Identify the right species to avoid the wrong cutting, harvested areas to areas

- Step 2: Cut the mature cane above root 4 inches and the nutrient after that support to young cane. Avoid clashing to hurt the young cane and shoot. No digging to the root
- Step 3: Take the cane out by pulling from the root. Remove the outer layer from the root and pull after that. Remove the handle of cane before pulling
- Step 4: Classify cane and bundle of canes
- Step 5: Pile up the rattan waste to the bush for fertilizing to avoid for fire and chopping the rattan leaves for composting

Xanthoid cardamom : Chin-Paung-Palar is harvested by all ethnic people living in the TNR for getting their seasonal income annually for over years. Most people plucked it mainly in the reserve and a few also harvested it in their home gardens near the villages. it is usually harvested with hands of many villagers at the harvesting month August. As no specific rules for harvesting methods identified, people freely and quickly plucked the fruits for getting more fruits than the others, thereby disturbing or harming the young cardamom shoots. During fruit/seed collection, harvesters often injure seedlings or plants due to inappropriate use of harvesting tools. Unripe fruit is frequently plucked by some harvesters. Some also harvested all fruits from each plant, leaving no sources of future natural regeneration.

In order to produce cardamom seeds in a sustainable manner, the following appropriate harvesting methods should be applied.

- Choose the plant to harvest over one year
- Use a knife to lightly clear around the base of each plant and expose the rhizome
- Only harvest large ripe red fruit containing many seeds with a knife or other small bladed tools (eg.scissors) to collect seed to minimize damage to each plant
- Harvest fruit (seeds) from July to August
- Leave immature plants for harvesting the following year
- Leave 30 % of the fruit on each plant so that seeds can be dispersed naturally for regeneration
- Minimize clearance of surrounding plants so that the dark conditions are maintained
- Take care to minimize damage caused by trampling seedlings and young plants

Elephant foot yam: Many people of the studied villages have been harvesting this round yam for earning seasonal income for over years in the reserve forest. Even though some village authority identified rules for harvest of this yam, very few people follow but the most did not. The people who harvest in their home gardens carefully harvest for sustainable production. Harvest of immature tuber can harm the regeneration of yam. For ensuring sustainable production of elephant foot yam, the following harvesting method should be utilized.

- Only harvest mature tuber of yam when its leaves is yellow and fallen to the ground.
- While digging out the tuber, take care not to puncture the exterior as this can lead to rotting
- Carefully dig the tuber so not to harm the immature tuber and young plants with knife or hoe iron hand implement
- Leave 30 % of mature fruits bearing plants for dispersion of seeds and regeneration

Doggy-fruit: Many people also harvested doggy-fruits for household consumption and earning seasonal income from the TNR reserve and their home gardens. In the past, most people cut down the whole tree for collecting it's fruits with machete or apex from the base of the tree and this can seriously reduce number of population of the species for natural regeneration. Some also cut down the fruit bearing branches and this could be vulnerable to species survival. These days, most of harvesters rarely cut down the whole tree as they are already aware of conservation for remained species and proper harvesting method. But some are still practicing those improper practice due to poor or lack of law enforcement in some area. Some harvesters used bamboo with small sharp knife for plucking the fruits in their home gardens. For ensuring sustainable production of doggy-fruits, the proper harvesting methods mentioned below should be applied.

- Use ash for protection from the disturbance of ants and Kar-Chin ( ) or proper insecticide but insecticide spraying should be done with care and not to harm harvester and fruits.
- Harvest only the mature fruits by checking the hardness of seed inside the fruit.
- Harvest the fruits with bamboo hook attached small knife at the top and this would not harm the tree
- Leave at least 10 % of mature fruit for dispersion of seeds and natural regeneration
- Cut down all mistletoe (Kyi-paung) bearing branches that can disturb the growth and harm the survival of the tree.
- Never cut down the whole tree except the ones seriously disease infected.

Broom grass: Broom grass harvesters used their hands for collecting panicles for making grass sweeper and earning seasonal income and they usually harvest in February and March. No specific issues are observed in harvesting of this grass in the studied villages. Anyway, for ensuring the sustainability of these brooms, the following appropriate rules should be followed.

- Harvest only mature panicles of grass if the panicles turn light green or red
- The timing of harvest is important as if the plant is harvested prematurely, their production declines, while if it is late harvest, it will begin to wilt.
- The panicles are harvested by cutting above the soil separating the panicle for stem or pulling the panicle out by hands
- While harvesting, make sure not to harm the young sprouts or the plants uprooted

One of major contributing things to reduction of NTFPs production in the reserve is frequent forest fire and this caused loss of many young seedlings and mature plants and mother trees, resulting in depletion of common NTFP species such as doggy-fruit, Xanthoid Cardamom, elephant foot yam and bamboo. Once the forest fire happened, the yield of doggy –fruit and cardamom seeds is dramatically declined. In addition, illegal timber logging and over harvest of timber harm the survival of existing NTFP species and this also reduced the production of NTFPs in the reserve. Thus, protection of forest fire is essential for all harvesters of common NTFPs species before harvesting season and effective law enforcement for conservation of biodiversity in the southern forest complex, TNR has been crucial to sustainable production of NTFPs and livelihoods of local ethnic people in the reserve.

6. Recommendations for livelihood support program through NTFPs

Many people living in the TNR reserve have already extracted a number of NTFPs available in the reserve for their subsistence and income for over years. As poor or lack of law enforcement in the studied area, complexity of issues related to conservation of remained natural forest and biodiversity including valuable NTFPs species have been there. Depletion of forest resources including common NTFPs species are still happened in the area. Some of the current harvesting practices of local ethic communities are not well satisfactory for sustainable production and NTFPs. Value added processing technique are still needed for ensuring more income of the local communities through provision of hands on training and materials required especially for processing of elephant foot yam. Throughout the field survey, key informant interviews and focus group discussions in the studied villages, most respondents asked to provide hands on training on establishment of systematic EFY plantation with better seed variety and processing for dried EFY. In this regards, for effective conservation of remained forest and biodiversity of the TNR while ensuring sustainable livelihoods of local communities through development of some prominent NTFPs, the following livelihood support program should be launched in the near future.

(A) Provision of hands on training on EFY agroforestry plantation for CFUGs

For ensuring sustainable production of elephant foot yam and more income, EFY planting with agroforestry practice in the established community forests CFs is essential. Selection of better yielded variety (quality seeds) is important and the project should support to the interested community members by providing practical training on EFY plantation with agroforesty practice and quality seeds (tuber). To start this provision, the project should do the following details of activities in advance.

- Select the target villages for provision of this EFY planting training
- Invite only interested participants (20-25) who are actively involved in the project and who are also committed to share his training experience and knowledge to the others.
- Recruit or assign a training consultant/trainer with experience of successful EFY plantation with agroforestry practice and conduct the training
- The training design should be focused on delivery of theory and practical of EFY planting plus study tour on successful EFY plantation with agroforesty practice
- The project should support for establishing a demonstration plot (at least one acre) on EFY planting with agroforesty practice in a one or two target villages.
- Regular monitoring and supervision on established trial plot of EFY should be assigned by a specific project staff for effectiveness of the inputs and accomplishing the outputs.
- Weekly/monthly meeting on progress of EFY demonstration plot should be held together with all interested participants/CFUGs/Non CFUGs members for reviewing the demonstration and sharing and updating the results of the demonstration.
- Keep the daily/weekly/monthly/yearly record of EFY demonstration and update all information regarding progress of established plot.

After delivery of hands-on training on EFY plantation with agroforestry practice, the project can continue support in the following activities as short term and long term livelihood support program.

- Establish EFY plantation with agroforestry practice in established CFs of TNR based on the proposal of interested CFUGs.
- Provide all necessary assistances (seeds of better/appropriate species, fertilizers (chemicals/organic/manure, etc,) to those who want to establish EFY plantation with agroforestry practice in the established CFs or homegardens
- Regularly Supervise and monitor on established EFY plantations with agroforestry practice in the project area for effectiveness of the project support and achieving the expected outputs and results

(B) Establishment of small NTFPs producers groups

- The project should facilitate in establishing small business groups (EFY producers group, Broom grass producer groups, Cardamom producers group, bamboo crafts producers groups, etc.) in the project villages for maximizing the earnings and benefits from the NTFPs. Each small NTFPs producer group can develop their own business plans based on their interest and capital in the long term through provision of required project supports such as trainings, capitals and marketing networks).
- One important thing is to set up a memorandum of understanding (MOU) between the TNRP and beneficiaries of each small NTFPs producer group regarding this livelihood support program.
- Thus, to set up this MOU, TNRP and interested groups should discuss comprehensively and get an agreement on all items mentioned in the MOU.

(C) Development of small business plans by the NTFPs producer groups

- In addition, the interested NTFPs producer groups should also develop their own TORs, charter, rules and regulations, duties and responsibilities, rights and benefits, fund, etc. The project should also facilitate and support in developing those items for establishing a comprehensive charter.
- Thus the project should also deliver business planning training to them for startup of their own business plans based on their interest and NTFPs resources they have.
- Once interested NTFPs producer groups prepare their own business plan, the project staffs concerned need to facilitate and support for producing sound business plans from the beginning to the end.
- Based on the small business proposals of NTFPs producer groups concerned submitted to the project, the TNRP should provide necessary support (capacity building training : technical, financial, managerial, and capitals (loan with low or without interest rate) and marketing linkages to them based on the project budget allocated to this program.

(D) Provision of EFY processing Hands-On Training

As most harvesters of EFY in the studied villages directly sold their EFY tuber in fresh as raw product, they did get only a few amount of income at the end. In order to increase their sale of EFY tuber, semi value added or value added technique is needed for them. During the field research, most respondents participated at KIIs and FGDs also asked the project to provide proper EFY drying process training. So,

the project should provide hands-on training on EFY drying process for the communities of TNR. As mentioned in previous section of hands-on training for EFY plantation with agroforesty practice, the processing (Dried EFY chips) hands-on training should also be done in line with the following procedure.

- Select the target villages for provision of this EFY processing (Dried EFY chips) training
- Invite only interested participants –men and women (20-25) who are actively involved in the project and who are also committed to share his training experience and knowledge to the others.
- Recruit or assign a training consultant/trainer with experience of successful EFY processing (dried chips, powder.etc,) and conduct the training
- The training design should be focused on delivery of theory and practical of EFY planting plus study tour on successful EFY processing sites
- The project should support for establishing EFY processing workstation with in a one or two target villages.
- Regular monitoring and supervision on established EFY processing should be assigned by a specific project staff for effectiveness of the inputs and accomplishing the outputs.
- Weekly/monthly meeting on progress of EFY processing should be held together with all interested participants/CFUGs/Non CFUGs members for reviewing the processing and products of EFY and sharing and updating the information on EFY processing and products.
- Keep the daily/weekly/monthly/yearly record of EFY processing and production and update all information regarding progress of production.

Annex (1)

List of Participants at the Key Informant Interviews –KII in the studied villages

No.	Name	Interviewees' Village	Resignation
1	Saw Ler Kei	Zin Bar	CFUG (1) member
2	U Win Zaw	Zin Bar	CFUG (3) Secretary
3	Saw Thein Thein	Zin Bar	CFUG (1) member
4	Saw Htoo Htoo	Zin Bar	CFUG (1) Treasurer
5	Saw Glad	Zin Bar	CFUG (1) member
6	U Nge Nge	Zin Bar	CFUG (1) Secretary
7	U Tin Myint	Zin Bar	CFUG (2) Chairman
8	Saw Sei Khoo	Zin Bar	CFUG (1) member
9	U Htwe Win	Mayan Chaung	CF Network Coordinator
10	U Win Kyaw Oo	Mayan Chaung	CFUG member
11	U Myint	Mayan Chaung	CFUG member
12	U Hein Min Ko	Mayan Chaung	Non CFUG member/garden
13	U Soe Thet Oo	Mayan Chaung	Non CFUG member/garden
14	U Zar Ni Nyein	Mayan Chaung	Non CFUG member/garden

15	U Hnin Oo	Mayan Chaung	CFMC member
16	U Win Htay	Mayan Chaung	Non CFUG member/garden
17	U Maung Kyan	Tha Yar Mon	Village Administrator
18	U Soe Than	Tha Yar Mon	Non CFUG member/garden
19	U Maung Han	Tha Yar Mon	Non CFUG member/garden
20	Daw San Yi	Tha Yar Mon	Non CFUG member/garden
21	U Thin Nyan	Tha Yar Mon	Non CFUG member/garden
22	U Lin Lin Soe	Tha Yar Mon	CFUG member
23	Daw Hlaing New Soe	Tha Yar Mon	CFUG member
24	U Kyaw Min	Tha Yar Mon	Non CFUG member/garden
25	U Pho Sey	Yay Pone	CFUG member
26	Daw Nyo Nyo San	Yay Pone	CFUG member
27	Naw Khoo Aye	Yay Pone	CFUG member
28	U Chit Htun	Yay Pone	CFUG member
29	U Shwe Mi	Yay Pone	Non CFUG member/garden
30	U Ye Win	Yay Pone	CFUG member
31	U Than Htun Oo	Yay Pone	CFMC member
32	U Lwin Zaw Myo	Yay Pone	CFUG member
33	U Than Win	Ka Lone Hta	Non CFUG member/garden
34	U Tin Htwe	Ka Lone Hta	Non CFUG member/garden
35	U Soe Myint	Ka Lone Hta	Non CFUG member/garden
36	Daw Htwe Yi	Ka Lone Hta	Non CFUG member/garden
37	Daw Tin Win	Ka Lone Hta	Non CFUG member/garden
38	U Nge Tha	Ka Lone Hta	Non CFUG member/garden
39	U Myo Lwin	Ka Lone Hta	CFUG secretary
40	Min Kyaw Thu	Ka Lone Hta	Non CFUG member/garden
41	Daw Than Than Htay	Ka Lone Hta	NTFP small trader
42	Saw El Htee Wah	Myay Kan Paw	Non CFUG member/garden
43	Saw Paw Tha Paw	Myay Kan Paw	Non CFUG member/garden
44	Saw Ni Mu	Myay Kan Paw	Non CFUG member/garden
45	Saw Htoo Wi	Myay Kan Paw	Non CFUG member/garden
46	Saw Htoo De Gey	Myay Kan Paw	Non CFUG member/garden
47	Saw Pi Te Dei	Myay Kan Paw	Non CFUG member/garden
48	Saw Aye Lar	Myay Kan Paw	Non CFUG member/garden
49	Saw Po Bi	Myay Kan Paw	Non CFUG member/garden
50	Naw Paw Di	Myay Kan Paw	Non CFUG member/garden
51	U Yan Naing Soe	Kywe Ta Lin	Non CFUG member/garden
52	U Myo Lwin	Kywe Ta Lin	Non CFUG member/garden
53	U Hla Myint	Kywe Ta Lin	Non CFUG member/garden
54	U Tin Moe Win	Kywe Ta Lin	Non CFUG member/garden
55	Daw Yin Kyway	Kywe Ta Lin	Non CFUG member/garden
56	Daw Win	Kywe Ta Lin	Non CFUG member/EFY broker
57	U Kyaw Myo Thu	Kywe Ta Lin	Non CFUG member/garden
58	U Myo Zaw Latt	Kywe Ta Lin	Non CFUG member/garden
59	Saw Si Lar Way	Mi Chaung Laung (old)	CFUG member

60	Saw Aeroplane	Mi Chaung Laung (old)	CFUG member
61	Saw Thu Pi	Mi Chaung Laung (old)	CFUG member
62	U Aung Hlaing	Mi Chaung Laung (old)	CFUG member
63	U Myint Soe	Mi Chaung Laung (old)	CFUG member
64	Naw Pe Skilar	Mi Chaung Laung (old)	CFUG member
65	Saw Paw War	Mi Chaung Laung (old)	CFUG member
66	Saw Mei Tha	Mi Chaung Laung (old)	CFUG member
67	U Aung Naing	Gankaw Taung	NTFP Trader
68	Daw Cho Mar	Gankaw Taung	NTFP Trader
69	Daw Ohnmar Thaung	Dawei	NTFP Trader
70	U Tin Oo	Yangon	Bamboo&Rattan Exporter

Annex (2) List of Participants at the Focus Group Discussion –FGD in the studied villages

No.	Name	Interviewees' Village	Resignation
1	Saw Glad	Zin Bar	CFUG (1) member
2	U Win Zaw	Zin Bar	CFUG (3) Secretary
3	Naw Sun No	Zin Bar	CFUG (1) member
4	Saw Htoo Htoo	Zin Bar	CFUG (1) Treasurer
5	Naw Juu Nar	Zin Bar	CFUG (1) CFMC member
6	Saw Sa To Her	Zin Bar	CFUG (3) member
7	Naw Mu Ko Paw	Zin Bar	CFUG (1) member
8	Saw Lei Sey	Zin Bar	CFUG (1) member
9	U Kyaw Zin Oo	Zin Bar	CFUG (2) member
10	U Kyaw Oo	Zin Bar	CFUG (2) CFMC member
11	Naw Sandar	Zin Bar	CFUG (2) member
12	U San Aye	Zin Bar	CFUG (2) member
13	Saw Lar Le	Zin Bar	CFUG (2) CFMC member
14	Daw Khin Win	Zin Bar	CFUG (3) Member
15	Daw Hla Yi	Zin Bar	CFUG (3) Member
16	Naw Lay Shwe	Zin Bar	CFUG (1) Member

17	U Soe Naing	Mayan Chaung	CFUG chairman
18	U Kyaw Lin Khaing	Mayan Chaung	CFUG secretary
19	U Min Khaing	Mayan Chaung	CFUG member
20	U Htwe Win	Mayan Chaung	CFUG member
21	U Pha	Mayan Chaung	CFUG member
22	U Aung Myint	Mayan Chaung	CFUG member
23	U Maung Lone	Mayan Chaung	CFUG member
24	U Chaw	Mayan Chaung	CFUG member
25	U Hla Khaing	Mayan Chaung	CFMC member
26	U Mier Tin	Mayan Chaung	CFUG member
27	U Mier Myint	Mayan Chaung	CFUG member
28	Daw Tin Mya	Mayan Chaung	Non CFUG member/garden
29	U Lin Lin Soe	Tha Yar Mon	Non CFUG member/garden
30	Daw Hlaing Nwe Soe	Tha Yar Mon	CFUG member
31	U Alon	Tha Yar Mon	Non CFUG member/garden
32	U Maung Kyan	Tha Yar Mon	CFUG chairman/Village Administrator
33	U Kar Pe	Tha Yar Mon	CFMC member
34	U Soe Than	Tha Yar Mon	CFUG secretary
35	U Nyein	Tha Yar Mon	CFUG member
36	U Thin Nyan	Tha Yar Mon	CFUG member
37	U Thar Nge	Tha Yar Mon	CFUG member
38	U Han	Tha Yar Mon	Non CFUG member/garden
39	U Chan Kyi	Tha Yar Mon	CFUG member
40	U Lan	Tha Yar Mon	CFUG member
41	Daw Maw	Tha Yar Mon	Non CFUG member/garden
42	Saw Tha War	Yay Pone	CFUG member
43	Naw Thathi Paw	Yay Pone	CFUG member
44	U Than Kyaw Zaw	Yay Pone	CFUG member
45	U Min Aung	Yay Pone	CFUG member
46	U Aung Myint	Yay Pone	CFUG member
47	U Thein Myint	Yay Pone	CFUG member
48	U Thein Win	Yay Pone	CFMC member
49	Naw Ar Paw	Yay Pone	CFUG Treasurer
50	Naw May Soe	Yay Pone	CFMC member
51	Daw Myint San	Yay Pone	CFUG Treasurer
52	Daw Sein	Ka Lone Hta	Non CFUG member/garden
53	Daw San Cho	Ka Lone Hta	Non CFUG member/garden
54	U Soe Myint	Ka Lone Hta	Non CFUG member/garden
55	Daw Pu Wine	Ka Lone Hta	Non CFUG member/garden
56	U Hla Myint	Ka Lone Hta	Non CFUG member/garden
57	U Nge Tha	Ka Lone Hta	Non CFUG member/garden
58	U Saw Nyan	Ka Lone Hta	Village Patron
59	U The Zan	Ka Lone Hta	Village Patron
60	Daw Than Than Htay	Ka Lone Hta	NTFP small trader
61	U Aung Kyaw Thet	Ka Lone Hta	Non CFUG member/garden

62	Saw El Htee Wah	Myay Kan Paw	Non CFUG member/garden
63	Saw Paw Tha Paw	Myay Kan Paw	Non CFUG member/garden
64	Saw Pi U	Myay Kan Paw	Non CFUG member/garden
65	Saw Htoo Thaw	Myay Kan Paw	Non CFUG member/garden
66	Saw Khin Htoo	Myay Kan Paw	Non CFUG member/garden
67	Saw He Wai	Myay Kan Paw	Non CFUG member/garden
68	Saw Pe Pe	Myay Kan Paw	Non CFUG member/garden
69	Saw Pa Nar	Myay Kan Paw	Non CFUG member/garden
70	Saw El Paw	Myay Kan Paw	Non CFUG member/garden
71	Naw Say Say	Myay Kan Paw	Non CFUG member/garden
72	Saw El Khoo Paw	Myay Kan Paw	Non CFUG member/garden
73	Naw Dar Do	Myay Kan Paw	Non CFUG member/garden
74	U San Nyunt	Kywe Ta Lin	Non CFUG member/garden
75	U Kyaw Naing	Kywe Ta Lin	Non CFUG member/garden
76	U Aung Nyunt	Kywe Ta Lin	Non CFUG member/garden
77	U Soe Win	Kywe Ta Lin	Non CFUG member/garden
78	U Win Aung	Kywe Ta Lin	Non CFUG member/garden
79	U Kyaw Lwin	Kywe Ta Lin	Non CFUG member
80	U Myo Lwin	Kywe Ta Lin	Village Administrator
81	U Myo Zaw Latt	Kywe Ta Lin	Secretary
82	Daw Aye Kyway	Kywe Ta Lin	Non CFUG member/garden
83	Daw Win	Kywe Ta Lin	Non CFUG member/garden
84	U Chin	Kywe Ta Lin	Non CFUG member/garden
85	U Yoe	Kywe Ta Lin	Non CFUG member/garden
86	U Aung Myaing	Kywe Ta Lin	Non CFUG member/garden
87	Saw Li War Say	Mi Chaung Laung (old)	CFUG member
88	Saw Aeroplane	Mi Chaung Laung (old)	CFUG member
89	Saw Thu Pi	Mi Chaung Laung (old)	CFUG member
90	Saw Thant Zin Htoo	Mi Chaung Laung (old)	CFUG member
91	U Myint Soe	Mi Chaung Laung (old)	CFUG member
92	Saw Aye Pe	Mi Chaung Laung (old)	CFUG member
93	Saw Aye Bar	Mi Chaung Laung (old)	CFUG member
94	Saw Wah	Mi Chaung Laung (old)	CFUG member
95	U Myint Swe	Mi Chaung Laung (old)	CFUG Treasurer/secretary
96	Saw Paw El	Mi Chaung Laung (old)	CFUG member
97	U Yay Nan	Mi Chaung Laung (old)	CFUG member
98	Saw Lay Wah	Mi Chaung Laung (old)	CFUG member
99	Saw Aung Hlaing	Mi Chaung Laung (old)	CFUG member

Annex (3) Ranking of scores for different attributes of NTFP species

Species	Market demand	Margin/profit	Availability	Survival of specie after harvest	Time duration for harvesting	Regenerative potential	Contribution to income	Potential for employment	Processing technology	Interest	Accessibility	Uses	Total score	Rank

Annex (4) Rapid Vulnerability Assessment

Criteria	Level of Vulnerability		
	Low =1	**Moderate=2**	**High=3**
Ecology	High abundance	Moderate abundance	Low abundance
	Fast growth	Mode growth	Slow growth
	Fast reproduction	Moderate reproduction	Slow reproduction
	Sexual & vegetative reproduction		Sexual reproduction only
	Habitat non-specificity		Habitat specificity
	High distribution range	Moderate distribution range	Low distribution range
	Response to harvesting: fast re-growth, recovery	Response to harvesting: moderate re-growth, recovery	Response to harvesting: slow re-growth, recovery

Life form	Herb, grass		Tree, shrub and epiphyte
Part used	Leaf, flower, fruit	Gum, bark, stem	Root, rhizome & bulb
Harvesting methods & management	Particular size/age classes selected for harvesting		Particular size/age classes not selected for harvesting
	Seasonal harvesting		No time restriction
	Traditional conservation practices		No traditional conservation practices
	Domesticated animal-human-collector etc. pressure on habitat- No		Domesticated animal-human-collector etc pressure on habitat- Yes
Economy	Subsistence use / less commercialization		Collection mainly for sale
	Demand (quantity harvested + frequency of harvest) low		Demand (quantity harvested + frequency of harvest) high
	Substitute species- Yes		Substitute species- No
	Access to resources not easy		Access to resources easy
	Law enforcement capacity- Yes		Law enforcement capacity- No

Annex (5) List of NTFPs species found in the studied villages

Sr.	Local name	Botanical name	Frequency of Uses			For Sale
			High	Moderate	Low	
1	Wa-ya	*Bambusa burmanica*	XXX			
2	Wa-bo	*Dendrocalamus brandisii*	XXX			
3	Wanet	*Dendrocalamus longispathus*			X	
4	Hmyin wa	*Dendrocalamus strictus*			X	
5	Menei wa				X	
6	Tapintaing wa	*Bambusa longispiculata*			X	
7	Rattan	*Calamus spps.*			X	X XX
8	Elephant food yam	*Amorphophallus campanulatus*	X XX			X XX
9	Xanthoid cardamom	*Amomum xanthioides*	XXX			XXX
10	Dog-fruit		XXX			XXX
11	Broom grass	*Thysanolaena maxima*			X	

12	Lin Ngo leaf		XXX			
13	Honey				X	
14	Taung Htan	*Livistona speciosa*			X	
15	Orchids	*Dendrobium spps.*			X	
16	Cinnamon	*Cinnamomum tamala*			X	
17	Kara-way	*Cinnamomum inunctum*			X	
18	Taw Nga Pyaw	*Musa bakeri*			X	
19	Elephant apple	*Dillinia indica*	XXX			
20	Zin Pyun	*Dillenia pentagyna*	XXX			
21	Sein-na-baw	Smilax macrophylla		XX		
22	Fig	*Ficus glomerata*		XX		
23	Fig tree (Ka-tut)	*Ficus cunia*		XX		
24	Taw Kyet Mauk	*Euphorbia longana*			X	
25	Na-ywe	*Flacourtia inermis*			X	
26	Hman-gu	*Elacagnus latifolia*		XX		
27	Taung Tale	*Garcinia cowa*		XX		
28	Thit Seint	*Cleidion speciflorum*			X	
29	Thit-Cha	*Quercus spp.*		XX		
30	Taw Chin Paung	*Hibiscus furcatus*		XX		
31	Wild jujube	*Zizyphus rugosa*			X	
32	Wild jasmine	*Jasminum pubescens*			X	
33	Wild mangosteen	*Garcinia heterandra*			X	
34	Taw Na-nwin	*Curcuma aromatica*			X	
35	Wild mango	*Mangifera caloneura*			X	
36	Taw Oshit	*Rinorea bengalensis*			X	
37	Taung Laphet	*Eurya japonica*			X	
38	Wild mango	*Swintonia floribunda*			X	
39	Nyaung-chin	*Ficus infectoria*		XX		
40	Kin-pa-lin	*Antidesma velutinum*			X	
41	Kin-pon-chin	*Acacia concinna*	XXX			
42	Ta-pin-tai-mya-nan	*Vitis repens*			X	
43	Lauk-thay	*Tadehagi triquetrum*			X	
44	Seik-phoo	*Kaempferia pandurata*		XX		
45	Sin-tone-ma-new (Heart-leaved moon seed)	*Tinospora nudiflora*			X	
46	San-sey-pin	*Linociera terniflora*		XX		
47	Ka-na-soe (Burmese grape)	*Baccaurea sapida*		XX		
48	Zi-phyu	*Emblica officinalis*		XX		
49	Hpan-ka	*Terminalia chebula*		XX		
50	Wild asparagus	*Asparagus racemosus*			X	
51	Sey-O-boak	*Melastoma clarkenum*			X	
52	Khway-ei-pauk	*Padelia fotida*			X	
53	Palan-taung-wey	*Costus speciosus*			X	

54	Wild betel nut	*Areca triandra*			X	
55	Wild marian	*Bouea burmanica*			X	
56	Star apple(Tha-kyar thee)	*Chrysophyllum roxburghii*		XX		
57	Kyein-kar	*Calamus viminalis*		XX		
58	Cycad (Mon-dai)	*Cycas siamensis*			X	
59	Taung pein-hnge	*Artocarpus calophyla*			X	
60	Kyet-paung-thee	*Urceola esculenta*	XXX			
61	Trumpet flower	*Oroxylum indicum*	XXX			
62	Suu-pok	*Acacia pennata*	XXX			
63	Thit-to	*Sandoricum hoetjape*	XXX			
64	Thit phyu	*Wendlandia glabrata*		XX		
65	Myauk-loke	*Artocarpus lakoocha*			X	
66	Za-yit	*Lasia heterophylla*	XXX			
67	Zaung-lya (Carambola)	*Averrhoa carambola*		XX		
68	Morinda	*Morinda angustifolia*			X	
69	Glangal	*Alpinia spp*			X	

Annex (6) Questionnaire for Key Informant Interview KII

Questionnaire for Key Informant Interviews KII (For Assessment for potential production of NTFPs in TNRP)

I. Ethno-botanical knowledge on NTFP of Community members

District: Township: Village: CFUG:

Name of Informant: Date:

M/F: Age: Education: Ethnicity: Religion:

1. Which NTFPs are available in your village and name of the products commonly found and their uses?

Sr	Name of NTFP species		Mode of use						Frequency of use			Remark
	Botanical	Local	Medicine	Incense	Fruit	Vegetable	Fiber	Other	High	Moderate	Low	

II. Harvest, production and utilization of NTFPs

2. Which NTFP of above mentioned did you harvest in the past ? (Say within last 5 year)

3. How much volume of each NTFPs did you harvest within last 5 years?

4. How much volume of each NTFPs did you consume for your family within last 5 years?

5. How much volume of each NTFPs were sold and how much did you get from the sales of those products within last 5 years?

6. How much volume of your NTFPs was stored within last 5 years?

7. How much volume of your NTFPs was damaged within last 5 years?

8. How much volume of each NTFPs was processed within last 5 years?

9. Which parts of each NTFPs were harvested?

Name of NTFP:

	2013	2014	2015	2016	2017
Harvested volume					
Family consumption					
Sold					
Stored					
Damaged					
Processed					
Price					
Parts harvested					

10. When do you harvest the NTFPs?

11. How many times did you harvest each NTFPs in a year?

12. How do you harvest the NTFPs?

13. Where did you harvest NTFPs?

14. What is your harvesting size or age limit for each NTFP?

15. How do you decide the harvesting period and time for each NTFPs?

16. Do you have any rules and regulations/management systems/practices for NTFP harvesting ? if yes please explain it in detail?

17. Which practices are most suitable for harvesting each NTFPs?

18. Would you like to continue to apply the existing harvesting practice? Why?

19. Do you plant any NTFP species in your own land or home garden/backyard ? If yes, what species and how much do you plant? For what purpose? (household consumption/income/….. /)

20. What do you think of NTFPs in your forest area? The available NTFPs are increasing or decreasing compared with previous years? Can you think why?

21. Which of the following barriers did you encounter in harvesting of NTFPs.

	NTFPs				
Accessibility					
Abundance					
Price					
Low demand					
Irregular yield					
labor					
Harvesting method					
Others					

22. What kind of impacts do you see on survival of NTFPs species upon harvesting?

23. Which NTFPs will you harvest in coming year? And how munch volume ?

24. Where are you harvesting? the same place or other ?

25. Do you have any idea to plant NTFPs species in coming year? If yes, what are the species you want to plant?

26. Do you think your harvesting technique is sustainable? Why?

27. Do you know any measures for sustainability of NTFPs? If yes, please explain me?

III. Market and Income Generation

28. Where were your NTFPs sold during last 5 years? Who did buy your products there?

29. Which of the following barriers/constraints did you encounter in marketing? Please tick all that apply

- o Inconvenient transport
- o Higher transport cost
- o Higher tax
- o Higher sale commission
- o Grading loss
- o Low price
- o Higher price fluctuation
- o Packing constraints
- o Storage constraints
- o Limited permit/license
- o Measurement loss
- o Risk of thief
- o Lack of information
- o Lack of product knowledge
- o Lack of bargaining
- o Low/irregular yield
- o Forest fire
- o Drought/flood
- o Other

30. Do you think you had a good price for selling your products ? Why ?

31. What are the highest demanded NTFPs in the market?

32. Which NTFPs mainly contribute to your annual income? How much ?

Sr.	NTFP	Income (Kyat)	% of annual income

33. Where did you get marketing information on NTFPs in your area?

34. What kind of NTFPs species do you want to harvest or plant in future?

35. Can you think of any NTFPs species potential for income generation and job opportunity?

IV. Support for NTFPs

36. Did you receive any NTFPs training during last 5 years? If, how many? From whom?

37. Where did you get knowledge and information on NTFPs ?

38. What kind of training is necessary for more production of NTFPs ?

39. Have you applied any processing technique or value added measures for quality NTFP production ? if yes, please specify them-----

40. What kind of support do you need for improving NTFP production and for more income and benefit? (method, processing, marketing, credit, etc.,)

41. Can you describe the most abundant NTFPs species in your forest?

42. Do you know potential NTFPs species naturally regenerated in your forest?

43. What kind of habitats is preferred by NTFPs species?

44. Do you know the form of growth of NTFPs species?

45. Which NTFP species are rare and endangered? Why ?

46. Do you have any idea for sustainable production of NTFPs ensuring your food, income and livelihood ?

47. Do you have any comments and suggestions for improving NTFP production in your area?

Thank you for answering questions!

Annex (7) Terms of Reference for Consultancy for Assessment of Potential Production of Non-Timber Forest Products

Title of Job	National Consultant of Assessment of Potential Production for Non-Timber Forest Products (NTFPs)
Nature of the Job	Socio-economic Research
Duration of the work	Two months
Duty Station	Project Director Office, Taninthayi Nature Reserve Project, Yangon, Myanmar and TNRP project site, Yephyu Township, Dawei District upon necessary of the work
Objective of the work	To give recommendation for alternative livelihood development through NTFPs products
Responsibility	1. To observe Non-Timber Forest Products (NTFPs) of Tainithayi Nature Reserve (TNR) area and their uses. 2. To identify and describe the traditional harvesting method of Non-Timber Forest Products (NTFPs) in Tainithayi Nature Reserve (TNR). 3. To collect the data of Non-Timber Forest Products (NTFPs) production rates in the past and current periods. 4. To identify the potential rate of Non-Timber Forest Products (NTFPs) production. 5. To find out the appropriate harvesting methods for the purpose of market

	orientation
Benefit and Remuneration	1. Honorarium Fee 6000 USD 2. Consent payment will be two installments. First payment (3000 USD) will be after contract agreement and final payment (3000 USD) after submission of final report to Project Director 3. Transportation by Project (Yangon - Kanbauk and within Project area)

Annex (8) Itinerary

Schedule of Consultancy service for Assessment of Potential Production of Non-Timber Forest Products (NTFPs) in the Taninthayi Nature Reserve

Date	Activities	Location	Remark
26.2.2018	Preparation for field survey schedule with Project officer Preparing formats and paperworks for field survey	Michaunglaung camp	Accomplished
27.2.2018	Collection of secondary data on NTFPs and KII with FD staffs concerned	Yay Phyu and Dawe Forest Department	Accomplished
28.2.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Zin Bar	Accomplished
1.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members,	Zin Bar	Accomplished

	processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations		
2.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Tharyamon	Accomplished
3.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Tharyarmon	Accomplished
4.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Mayan Chaung	Accomplished
5.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Mayan Chaung	Accomplished
6.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Yay Pone	Accomplished
7.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Yay Pone	Accomplished
8.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Ka Lone Hta	Accomplished
9.3.2018	Key Informant Interview-KIIs (8-10)	Ka Lone Hta	Accomplished

	with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations		
10.3.2018	Key Informant Interview-KIIs processors, brokers, traders, field observations	Ka Leing Aung	Accomplished
11.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Myay Kan Paw	Accomplished
12.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Myay Kan Paw	Accomplished
13.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Myay Kan Paw	Accomplished
15.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Kywe Ta Lin	Accomplished
16.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Kywe Ta Lin	Accomplished
17.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations	Michaung Laung (old)	Accomplished
18.3.2018	Key Informant Interview-KIIs (8-10) with CFUGs/Non CFUGs members, processors, brokers, traders, Focus	Michaung Laung (old)	Accomplished

	Group Discussion FGDs with CFUGs/Non CFUGs (3-4 RRA tools), field observations		
20.3.2018	Key Informant Interview-KIIs processors, brokers, traders, field observations	Kan Pauk	Accomplished
22.3.2018	Key Informant Interview-KIIs processors, traders, field observations	Yay Phyu , Dawe	Accomplished
26.3.2018 31.3.2018	Key Informant Interview-KIIs processors, brokers, traders	Yangon	Accomplished
1.4.2018-4.5.2018	Data entry, analysis and report writing	Home based	Accomplished
5.5.2018	Submission of draft report		Accomplished
15.5.2018-25.5.2018	Receive feedbacks from Forest Department and finalize the report reflecting FD's feedbacks	TNRP Yangon and Home	Accomplished
26.5.2018	Submission of Final Report		Accomplished

Annex (9) Field photos

Focus Group Discussion with CFUG members

Key Informant Interview with a participant

Cardamom plants conserved in a home garden

Naturally grown Sin-tone-ma-nwe

Doggy-fruit bearing branch

bamboo rafting

Annex (10) List of Figure

(9) Figure 9 : Total collected revenue of NTFPS in Dawei District (2011-2017)

(10) Figure10: Estimate export value of rattan and bamboo in USD

(11) Figure 11 : Potential production rate of common NTFPs in the TNR

Annex (11) List of Tables

(1) Table 1: List of common NTFPs species utilized in all studied villages

(2) Table 2: community preference value of common NTFPs

(3) Table 3: Vulnerability Level for common NTFPs in the studied villages of TNR

(4) Table 4 :Strength, Weakness, Opportunities, Threats

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