

Market Research and Enterprise Development for Community Forestry (CF) in Myanmar

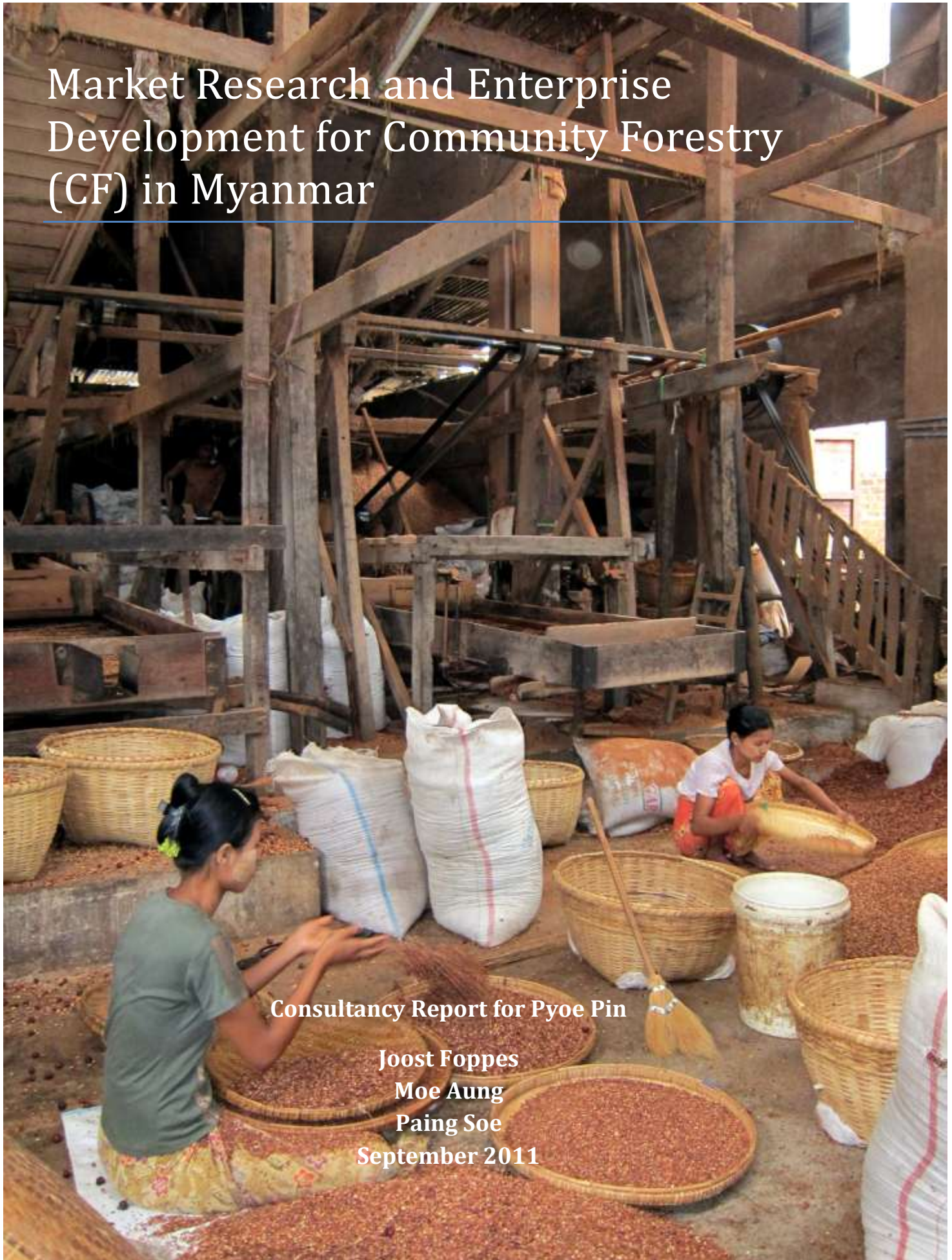
Consultancy Report for Pyoe Pin

Joost Foppes

Moe Aung

Paing Soe

September 2011



Contents

1	Introduction	6
1.1	Background	6
1.2	The present study	7
2	Methodology and Itinerary	8
2.1	Methodology.....	8
2.2	Itinerary.....	9
2.3	Maps of key Locations.....	9
3	Findings in the dry zone: Magwe, Kyaukadaung, Phakoku, Mandalay.....	10
3.1	Findings on forests, people, products and markets in the dry zone	10
3.1.1	Findings on community forests.....	10
3.1.2	Findings on forest use	11
3.2	Production data and market potential of key products in the dry zone	14
3.2.1	Key forest uses in the dry zone	14
3.2.2	Firewood	14
3.2.3	Livestock grazing	15
3.2.4	Forest Products used	16
3.2.5	Timber harvesting in dry zone community forests	17
3.2.6	Key Products identified for marketing and their income potential	18
3.2.7	Detailed cost-benefit studies for selected products.....	19
3.2.8	Production and market potential of plum seed production	20
3.2.9	Production and market potential of thanaka	20
3.2.10	Production and Market Potential/ Absorption for Aloe Vera.....	21
3.2.11	Potential Scenarios for CF Enterprise Development.....	21
4	Findings in Kachin State	23
4.1	Findings on forests and people, products and markets in Kachin state	23
4.1.1	Findings on forest user groups in Kachin state	23
4.1.2	Findings on forest use in Kachin state	24
4.2	Production data and market potential of key products identified in Kachin	25
4.2.1	Timber harvesting from community forests	26
4.2.2	Key products identified as having market and income generation potential	26

4.2.3	Detailed cost benefit studies for key products	27
4.2.4	Elephant Foot Yam	27
4.2.5	‘Kanyin’ dog fruits, jengkol	28
4.2.6	Rattan value chain development.....	28
4.2.7	Potential CF Enterprise Scenarios in Kachin State	29
5	Stakeholder Analysis: FUGs, business partners, authorities e.g. Forest Department, Agricultural Department.....	30
5.1	Private sector partners	30
5.2	Interest of FUGs and their capacity	31
5.3	Interest and capacity of NGOs	31
5.4	Support of Authorities for NTFP income generation pilots in CF areas.....	31
5.5	Recommendations on partnership and capacity building	32
5.5.1	Public-private partnerships.....	32
5.5.2	Partnerships with providers of capacity development services	32
5.5.3	Multi-stakeholder networks	32
5.5.4	Field level partnerships between NGOs.....	32
6	Business plans for income generation from Community Forests.....	33
5.1	Community Forestry Business Plan for the dry zone.....	33
5.2	Business Plan for Kachin State	39
	Appendices.....	40
1	List of persons consulted	40
2	Itinerary.....	43
3	Forest User Group Interviews.....	45
3.1	Pa Tee Kone, Magway township, Magway region	45
3.2	Kan Thar Lay, Khan Thar Magway township, Magway Region	47
3.3	Nyaung Pin Thar, Kyaukpadaung township, Mandalay region	49
3.4	Taung U, Kyaukpadaung Township. Mandalay Region	51
3.5	Wu Yang, Wain Maw Township, Kachin State	51
3.6	Lwe HKaw, Myintkyina Township, Kachin State	54
4	Interviews with NTFP Traders.....	55
4.1	Interview with Mr. Myint Swe, trader in "shaw piu" gum.....	55
4.2	Visit to Cutch factory in Seik Pyu township, 16 May 2011.	56

4.3	Interview with Mr. Maung Maung, medicinal plants trader, Mandalay.	57
5	Interviews with actors in the rattan value chain	58
5.1	Interview with Mr. Kyau Thu, rattan furniture company, Yangon.....	58
5.2	Interview with Mr. San Myint, Rattan Export Company, Mandalay.....	59
5.3	Interview with Rob Tizard, WCS rattan project, Kachin State	61
6	Interviews with local NGO's	63
6.1	Baptist Association MBA.....	63
6.2	Urban Rural Development (URM).....	64
6.3	KMSS Karuna Catholic Development Mission.....	65
6.4	Anglican Church Development Organization	65
7	Interviews with Government Officials	65
7.1	Interview with Forestry Officers in Magway Region, Monday 16 May 2011	65
8	Detailed product profiles	68
8.1	Thanakha (<i>Hesperathusa craenulata</i>).....	68
8.2	Plums/jujube (<i>Ziziphus mauretanica</i>).....	72
8.3	Aloe vera (shazaung let pup/Moke kha).....	75
8.4	Elephant Foot Yam	78
8.5	Dog fruit or Jengkol	81
9	References	82

List of acronyms

CF	Community Forestry
DFID	British Government Department for International Cooperation
FAO	Food and Agriculture Organization of the United Nations
FTA	Forest Traders Association
FUG	Forest User Group
INBAR	International Network for Bamboo and Rattan Research
ITTO	International Timber Trade Organisation
NGO	Non-Governmental Organisation
NTFP	Non-Timber Forest Product

Conversion table

Key conversions	Weights of various products per basket
1 US\$= 283 kyat in May 2011	1 basket of milled rice: 34 kg
1 ha= 2.471 acres, 1 acre=0.405 ha	1 basket of unmilled paddy rice: 20.86 kg
1 acre= 70x70 yards, 208.7x208.7 feet	1 basket of sesame: 24.5 kg
1 foot= 30.48 cm, yard= 91.40 cm, 1 yard=3 feet	1 basket of gram or pigeon peas: 32.6 kg
1 pound= 0.4536 kg	1 basket of peanuts: 11.34 kg
1 viss= 3.6 pounds=1.637 kg	
8 milk tins = 1 piy, 16 piy= 1 basket of rice	

1 Introduction

1.1 Background

Pyoe Pin is a programme aimed at strengthening civil society in Myanmar. The programme is supported by DFID, the British Department for International Cooperation and implemented through the British council in partnership with local NGOs. Community Forestry (CF) is a key element of the programme, as it is seen as pathway to increasing the participation of civil society in influencing policy and practice with regards to communities' access and sustainable use of forestry land. CF can also improve forestry conservation and enhance the livelihoods of communities.

CF has been a national development tool since 1995, when the Ministry of Forestry issued instructions for the issuing of Community Forest certificates. In Kachin state in northern Myanmar bordering China, Pyoe Pin has been working with two local NGOs (ECODEV and Shalom Foundation), who are in turn engaging with forest villages, to increase their awareness of appropriate forest usage and management, through assisting these communities to apply for community forest certificates.

These certificates provide community rights to forest products and tenure for 30 years. Working through 120 villages, 54 Forest User Groups (FUGs) consisting of about 40,000 people have been created, who are replanting degraded forest areas, and also balancing their livelihood needs with greater understanding of sustainability. So far, 31,445 acres have been prepared for CF, but aside from 3000 of these acres, the rest has not yet been granted the lease, largely a result of lack of institutional support for this process as government prioritizes commercial allocations of land over community allocations for CF.

As yet, CF has not shown significant direct economic impacts, but it is hoped that income from forest products, produced by and for the communities engaged, will have an impact on the incomes of the communities and households involved. One of the challenges has been how to increase the commercial viability and impact of CF by bringing greater alignment between commercial and community priorities.

Some parts of the CF Instruction have hindered the maximization of economic benefits that can be gained by CF as they limit community rights to harvesting and selling at minimal levels. In addition, both private sector and Government have not considered CF as a potential partner for sourcing raw materials. But the environment is ripe for undertaking analysis and piloting of alternative models. There is a new Minister of Forestry, formerly head of Myanmar Timber Enterprise, who has experience in extensive forest-based commercial ventures. In addition, a recent national CF workshop was the first of the kind to bring experts from around the region to discuss findings from a national-level appraisal of CF in Myanmar since inception 15 years ago.

In this context, Pyoe Pin envisages to develop a pilot project that will seek to demonstrate:

1. the value of CF as a real national development tool for the poorest communities, and to increase institutional support for its realization.
2. CF can be a commercially viable business partner for private sector

3. that it is important that communities who apply for CF status should be supported with the expedient granting of leases
4. that CF Instructions need to be revised to allow communities to commercialize their CF

Towards these objectives, Pyoe Pin started to identify CF products that could have the greatest market potential and feasibility of being taken up by community forestry, which can then supply the products to larger domestic and possibly even international markets. An initial brainstorming session with foresters from NGOs and research institutes and businessmen from the Timber Market Association in December 2010 identified a preliminary shortlist of forest products. This selection was mainly based on secondary sources of information on market potential to help narrow down a more appropriate list for additional value-chain analysis.

1.2 The present study

A second more detailed field study was launched in May 2011. The aim of this study was to:

- A. *Provide an analysis of the framework dimensions along two to three levels of the value chain e.g. township, regional, and national:*
 1. Production data
 - a. growth rate, frequency of harvest
 - b. initial investment
 - c. difficulty to cultivate/ local knowledge available
 - d. ease of access to technologies and inputs needed
 - e. potential for jobs creation, especially for women's involvement
 2. Market potential
 - a. demand in domestic and international market
 - b. income & price trends/stability
 - i. recall by farmers for products only domestically traded
 - ii. international sources for products that are internationally traded, e.g. Chinese market research companies; INBAR, FOA, ITTO, etc)
 - c. policy restrictions
 - d. monopoly of the trade (risky to prices)
- B. *Provide a stakeholder analysis needed of FUGs, business partners, authorities e.g. Forest Department, Agricultural Department*
 1. Ascertain interest of private sector partners, and if possible, identify specific people for pilot
 2. Ascertain level of interest of FUGs and their capacity
 3. Ascertain support of Authorities for such undertaking
 4. Develop action plans for at least two locations
- C. *Develop two enterprise development plans: one for Kachin State CF and one for Dry Zone CF*
 1. Products that can be easily cultivated and/or processed for sale to existing markets, with well-established channels
 2. Products that can be cultivated and/or processed that may not yet be purchased locally (but sourced from abroad); a product may serve as an import substitution product should the quality/price of the product be competitive enough
 3. Products that can have value added to it e.g. eucalyptus oil, but that may not yet have a well-defined market channel here, but that may still have potential for marketing to more buyers.

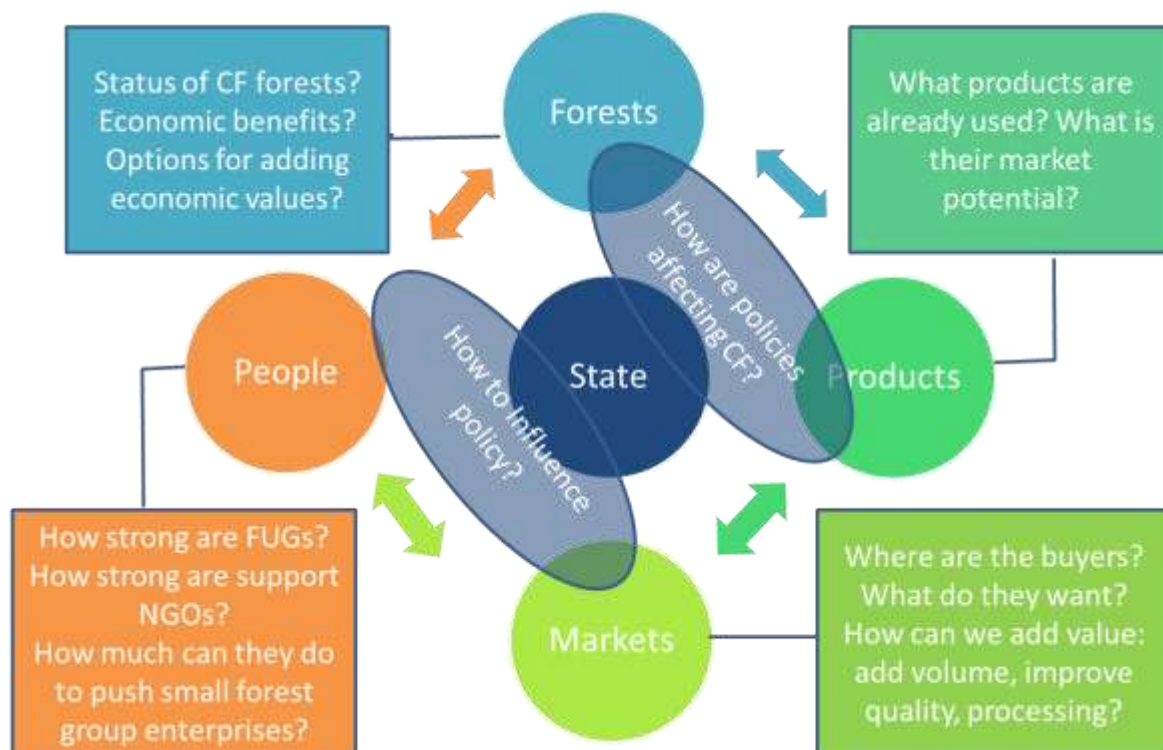
2 Methodology and Itinerary

2.1 Methodology

A team consisting of one international consultant and two national consultants held interviews with a range of stakeholders in Yangon, Nay Pyi Taw, the Dry Zone (Bagwai, Mandalay regions) and Kachin State from 9- 31 May 2011 (see Appendix 2). The team designed four checklists of questions for different types of value chain actors: Forest User Groups (FUGs), individual forest using households, traders and Government staff (see Appendices 3-6). For key products, a product data sheet was used to calculate costs and benefits, the results were recorded in project profile sheets (see Appendix 8).

With each FUG, a group interview was held. Where possible, men and women were asked to sit separately and interviewed separately, so as to encourage women's voices to be heard. They would be asked to rank forest products as to their suitability for market development using criteria such as: market prospects, ease of production and social impact (how many households would benefit). This tool is based on the FAO/RECOFTC Market Analysis and Development Approach for Non-Timber Forest Products.

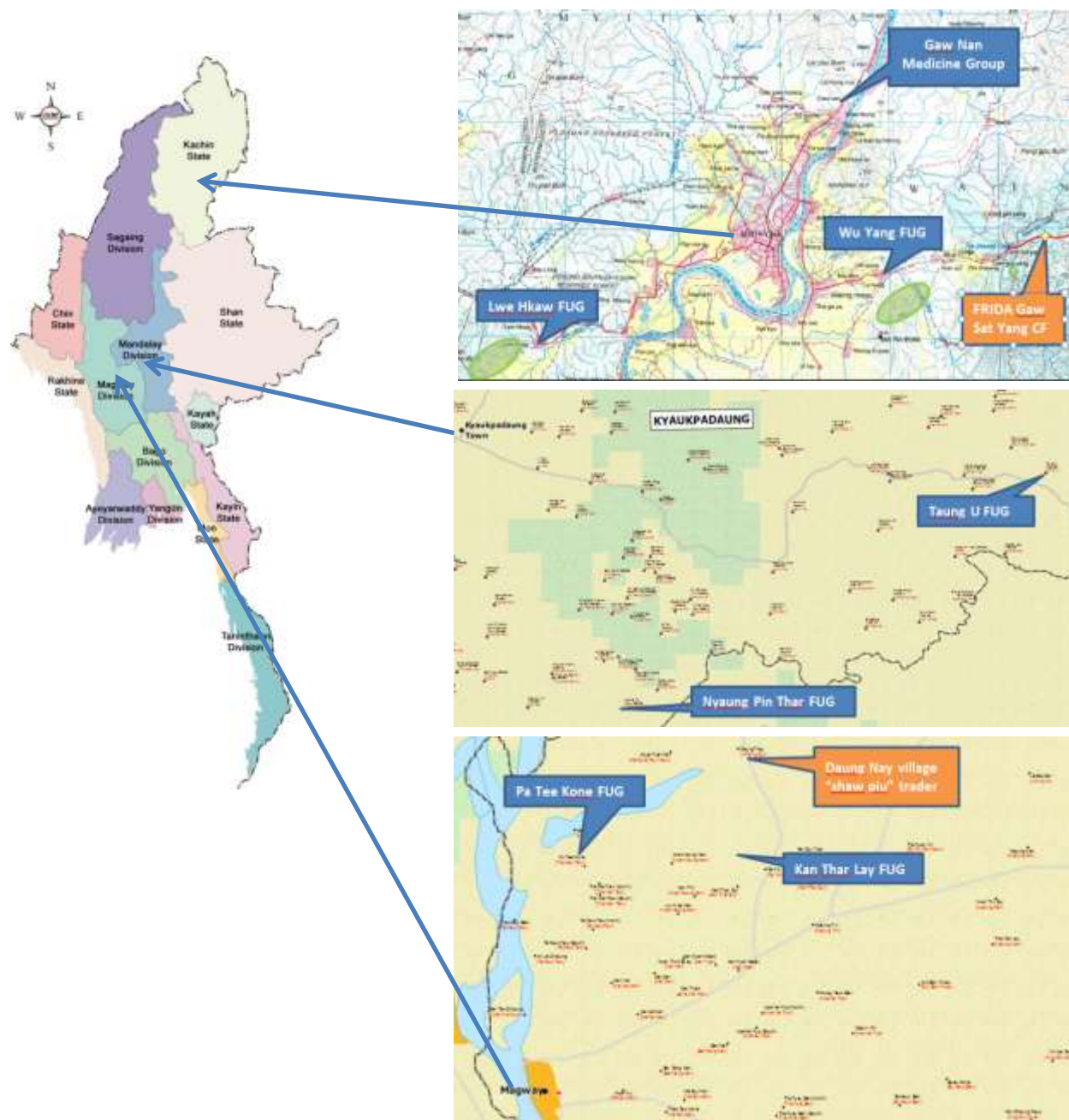
In all the interviews and discussions, as well as in the design of business plans, the team applied a basic analytical framework based on four dimensions: forest, people, products and markets (see diagram).



2.2 Itinerary

The team spend three days in Yangon to interview NGO actors and traders (9-11 May). The next ten days were spent visiting Forest User Groups and traders in the dry zone, traveling by car (12-21 May). The team flew from Mandalay to Myitkyina in Kachin state on 22 May and visited FUGs, NGOs and traders there until 26 May. The team flew back to Yangon on 27 May and worked on the report. A short trip to the capital Nay Phyi Taw was made 30-31 May. The draft report was presented on 03 June, the international consultant left Myanmar on 04 June. The report was finalized a few months later . Annex 3 provides a detailed schedule of the team's itinerary.

2.3 Maps of key Locations



3 Findings in the dry zone: Magwe, Kyaukadaung, Phakoku, Mandalay

3.1 Findings on forests, people, products and markets in the dry zone

In the dry zone, the following forest user groups were visited:

1. Pa Tee Kone, Magway township, Magway region
2. Kan Thar Lay, Khan Thar Magway township, Magway Region
3. Nyaung Pin Thar, Kyaukpadaung township, Mandalay Region
4. Taung U, Kyaukpadaung Township, Mandalay Region

Additional places and people visited include:

1. Village trader of gum karaya in Daung Nay village, Magway township, Magway Region
2. Bagway township forestry office, Magway Region
3. Jujube plum seed trader, Kyaukpadaung township, Mandalay Region
4. Phopa national park and botanical gardens, Kyaukpadaung township, Mandalay region
5. Catechu cutch factory in Seik Phyu township, Magway Region
6. Thanaka producers in Panyin village, Yesagyu township, Magway Region
7. Aloe vera producers in Sitha village, Yesagyu township, Magway Region
8. Medicinal plants trader in Pakoku township, Magway Region
9. Medicinal plants and jujube plum traders in Mandalay town, Mandalay region

3.1.1 Findings on community forests

In all four villages visited, the community forests stand out as a green oasis among the mostly brown and open upland bean fields and scrubland. The size of the community forests varied from 50 to 500 acres per community (see Table 1).

The CF groups apparently started in 2001 with groups of 70-80 households. In most cases, at present the entire village community is considered to be member of the Forest User Group and entitled to use the forests. This could be interpreted as saying that poor, landless households do not have any specific priority rights to use the community forest. On the other hand, most of the people who actually go to the forest to collect firewood and animal fodder are the members of the landless households.

The number of trees planted varied from 40-220 trees per acre. Most of these trees were planted with support from a UNDP programme, which took place around 1997-1999 in Mandalay and 2001-2002 in Magway. The trees are now and are now 9-14 years old, the circumference ranged from 12 inches to 9 feet which corresponds to a diameter at breast height (DBH) of 12-90 cm. This is by all means an impressive achievement.

FUGs here have been granted CF certificates already and “everyone in the village owns the land”, but in reality, nobody really harvests from the CF, except for landless who gather firewood & fodder. This makes it difficult to introduce NTFP cash crops, unless the land-use rights are amended e.g. divided up for each household to manage.

From field visits it became clear that the CF forests usually consist of several components:

- 1) Timber forest plantations, planted to Eucalyptus and a range of other species

- 2) Natural forests reserved for watershed protection, usually on hills, with larger trees
- 3) Scrublands dominated by small trees, mainly harvested for firewood and animal fodder
- 4) Bad lands, degraded land with severe gully erosions and sparse vegetation
- 5) Apart from the CF itself, some villages also have access to adjacent areas of watershed protection forests, which are managed by the Forest Department. These areas are usually covered with scrubland and used to collect firewood and animal fodder.

Not many of these areas would lend themselves to planting NTFPs easily. The timber plantations have been planted at such densities that it would be difficult to plant anything else in between. It is especially difficult to plant any other plants in Eucalyptus forests as the trees exude chemicals from their roots that kill other trees. The natural forest is already full of trees as well. The scrubland, especially outside the CF area inside watershed protection forests, might be suitable for agroforestry plantations. This is in fact proposed by the forestry department and this potential should be explored as an option for poor, landless households (see also section 5.4 below)

Table 1: Key figures on Community Forests in four villages visited in the dry zone, May 2011

Village	Pa Tee Go	Khan Thar Lay	Nyaung Pin Tar	Taung U
Township	Magway	Magway	Kyaukpadaung	Kyaukpadaung
year of CF establishment	2002	2002	1997	1999
CF area (acres)	500	50	105	30
upland agriculture	500	1200	400	2000
lowland paddy	500	0	300	400
waste land outside CF	-	20	50	0
total land	1,500	1,270	855	2,430
CF %	33%	4%	12%	1%
state forest land (acres)	-	2,000	1,000	1,000
no landless households	58	140	35	70
no land owning households	80	110	75	480
total no households	138	250	105	550
area CF in acres per hh	3.62	0.20	1.00	0.05
upland area (acres per hh)	6	11	5	4
lowland paddy (acres per hh)	6	-	4	4
no trees planted	20,000	11000	10000	n.a.
density trees per acre	40	220	95	n.a.
no trees harvested	4000	500	0	n.a.
% harvested	20%	5%	0	n.a.
price per tree (kyat)	11000	6000	n.a.	n.a.
value harvest (kyat)	44,000,000	3,000,000	n.a.	n.a.
tree size (DBH in cm)	12-28	42-90	21-42	n.a.

3.1.2 Findings on forest use

So far, only a few of the planted timber trees have been harvested and used to build community schools or training centers in 2006-2007. None of these buildings has survived, they all broke down already. It is difficult for the community to sell these timber trees, either because of

limitations in the regulations or because the income would not be attractive to share with so many users.

The other uses are collection of firewood and animal fodder as well as a range of Non Timber Forest Products (NTFPs). Table 2 gives an example of the main NTFPs harvested in Kantalay village, Magway township.

Table 2: Villager's estimate of NTFPs sold per year from Kan Thar Lay village, Magway township, May 2011

NTFP	Price kyat/viss	Quantity viss/year	Value whole village kyat/year	Value per landless HH kyat/year	Value over all HH kyat/year
Firewood*	4000	6000	24,000,000	171,429	96,000
Mushrooms	3500	5000	17,500,000	125,000	70,000
Bamboo shoots	700	3000	2,100,000	15,000	8,400
Jujube plums	700	4500	3,150,000	22,500	12,600
Gum karaya	8500	100	850,000	6,071	3,400
Palm roots	3500	100	350,000	2,500	1,400
Animal fodder	n.a. but estimated to be equal or higher than firewood				
TOTAL (kyat)			47,950,000	342,500	191,800
TOTAL (\$)			\$ 58,262	\$ 416	\$ 233

These are rough estimates of forest-based income, made just on income estimates for the most important forest products only. Remittances from family members who went away to work in the jade mines, on rubber plantations or abroad were also not included in the estimates of household income. In one village, Nyaung Pin Tar, some 25 persons were estimated to send home on average 60,000-70,000 kyat per month. That would provide an additional income to the village of 18 million kyat per year, which is almost the same as the total income gained from agricultural labor within the village.

The main question here is: to what extent are these communities “forest-dependent”? Asked directly during focus group discussions, villagers estimated that over all households, on average 11% of their income was derived from the forest (see Table 3).

Table 3: Villager's estimate of main income sources in four villages in the dry zone, May 2011

Village	Pa Tee Go	Khan Thar Lay	Nyaung Pin Tar	Taung U	AVERAGE
Township	Magway	Magway	Kyaukpadaung	Kyaukpadaung	
Main forest product	firewood	firewood	bamboo shoots	jujube plums	
Forest products	2%	14%	8%	8%	8%
Beans and pulses	35%	59%	40%	68%	56%
Rice	50%	0%	41%	17%	30%
Labor*	13%	26%	11%	7%	13%
Total	100%	100%	100%	100%	100%

On first sight, it would seem that forest dependency is low. However the picture changes if we take into account the differences between wealthy, landowning households and poor, landless households.

In order to do so, we first estimate the relative importance of forest income is to compare forest income to income derived from crop farming. Based on farmers estimates, income derived from beans (sesame, green gram, black gram, pigeon pea etc.) and rice varied from 1 to 2 million kyat (US\$1,333-3,526) per land owning household (see Table 4).

Table 4: Rough calculation of crop income per household in four villages visited in the dry zone, May 2011.

Village	Pa Tee Go	Khan Thar Lay	Nyaung Pin Tar	Taung U	AVERAGE
Township	Magway	Magway	Kyaukpadaung	Kyaukpadaung	
Upland area (acres)	500	1200	400	2000	
Paddy area (acres)	500	0	300	400	
Bean yield (baskets/acre)	5	5	5	5	5
Bean price	22,000	22,000	22,000	22,000	22,000
Rice yield (baskets/acre)	60	60	60	60	60
Rice price	5,000	5,000	5,000	5,000	5,000
Beans Income (2 crops)	110,000,000	264,000,000	88,000,000	440,000,000	225,500,000
Rice Income	150,000,000	-	90,000,000	120,000,000	90,000,000
Beans minus labor	96,080,000	196,800,000	79,600,000	423,200,000	198,920,000
Rice minus labor	136,080,000		81,600,000	103,200,000	106,960,000
Total Net Crop Income	232,160,000	196,800,000	161,200,000	526,400,000	279,140,000
No landowning HH	80	110	70	480	185
crop income per owning HH	2,902,000	1,789,091	2,302,857	1,096,667	2,022,654
crop income per owning HH	\$ 3,526	\$ 2,174	\$ 2,798	\$ 1,333	\$ 2,458
Total no of all HH	138	250	105	550	261
crop income per HH (all)	1,682,319	787,200	1,535,238	957,091	1,070,527
crop income per HH (\$)	\$ 2,044	\$ 957	\$ 1,865	\$ 1,163	\$ 1,301

Landless households are the main group deriving income from forest, both in terms of selling forest products or being paid for labor collecting fodder and firewood for others. This income ranges from 223,310 to 858,286 kyat (US\$271-1,043), see Table 5.

The percentage of income derived by landless households from the forest ranged from 32-50%. They are quite dependent on forests for their income.

Land owning households are much less dependent on the forest: their main income comes from crops. The overall share of forest based income of total crops and forest income in the entire village ranged from 15-41%, averaging 22%. This is figure is twice as high as the percentage estimated by villagers of 11% presented in Table 3 above. Both figures should be seen as approximations.

The overall conclusion is that forests, in the four villages visited, contribute 10-20% of household income over all households, however landless households depend for up to 30-50% on forest based income, from a combination of firewood, timber, and labor wages.

Table 5: Rough estimates of forest-based income of landless households in four villages visited in the dry zone, May 2011.

Village	Pa Tee Go	Khan Thar Lay	Nyaung Pin Tar	Taung U	AVERAGE
Township	Magway	Magway	Kyaukpadaung	Kyaukpadaung	
forest income	4,600,000	47,950,000	15,750,000	50,000,000	29,575,000
forest labor	8,352,000	20,160,000	5,040,000	10,080,000	10,908,000
total forest income	12,952,000	68,110,000	20,790,000	60,080,000	40,483,000
ag labor	27,840,000	67,200,000	16,800,000	33,600,000	36,360,000
subtotal labor income	36,192,000	135,310,000	37,590,000	93,680,000	75,693,000
GRAND Total HH income	272,952,000	332,110,000	198,790,000	620,080,000	355,983,000
No Landless HH	58	140	35	70	76
forest income/landless HH	223,310	486,500	594,000	858,286	540,524
forest income/landless HH (\$)	\$ 271	\$ 591	\$ 722	\$ 1,043	\$ 657
total income/landless HH	624,000	966,500	1,074,000	1,338,286	1,000,696
% forest income landless HH	36%	50%	55%	64%	51%
Total no of all HH	138	250	105	550	261
forest income/HH (all)	262,261	541,240	358,000	170,327	290,290
forest income/HH (all) (\$)	\$ 319	\$ 658	\$ 435	\$ 207	\$ 353
% of forest income all HH	13%	41%	19%	15%	21%
remarks		firewood sales		plum sales	

Another observation seems to be that while CF households with farming land do not rely much on the CFs for income, all members value the CF as it serves as a watershed, providing them with much valuable and clean access to water.

3.2 Production data and market potential of key products in the dry zone

3.2.1 Key forest uses in the dry zone

Collection of firewood and fodder for animals were estimated to be the most important benefits from forests by villagers. Other NTFPs come in third place. Timber harvesting is a minor activity. This section provides an overview of the relative importance of each of these four categories of forest products.

3.2.2 Firewood

Firewood is the main source of energy used in the villages. Collection of firewood is an important source of income for poor households. The main source seems to be a shrub called “Gan Da Ma Sein”, *Prosopis juliflora*, also known as mesquite or Mexican thorn. This thorny shrub, originally from the meso-american region, is extremely tolerant of drought and salinity. This species was once broadcasted by air in the late 1990’s, in an attempt of the Government to ‘regreen’ the dry zone (Tun Tun 2000) . It has spread naturally since and is the predominant species in much of the dryer forest patches and ‘bad lands’. Despite the difficulty of harvesting this very thorny plant, it has become a key source of firewood.

Among the natural vegetation, other species mentioned by villagers as used for firewood include ‘Than’, *Terminalia olivieri*, ‘Dahat’, *Tectona hamiltonia*, ‘Koko’, *Albizia lebeck* and ‘Sha’, *Acacia catechu*.

Among the trees planted in community forests, villagers mentioned most as frequently being harvested for firewood: “Ying Ma”, *Chukrasia tabularis*, ‘Mesali’, *Cassia siamea*, ‘Po Sa Gain’, *Leucaena leucocephala*.

Villagers of Pa Tee Go sold 15 truckloads of firewood to traders from outside in 2010. With five tons per truck, that is an amount of 575 cubic tons. It takes 10 oxcarts to fill a truck, so one oxcart can carry half a cubic ton. The price of firewood sold was 40,000 kyat per oxcart. The price of firewood in 2011 can be estimated to be around 20,000 kyat per cubic ton. The value of these sales would amount to 11.5 million kyat (US\$14,000). With 138 households in the village, that amounts to kyat 83,000 (\$100) per household. As it is unlikely that all households participated, the actual income per household that was involved is likely to be higher.

An FAO study on wood fuel use in Myanmar estimated that an average household in the dry zone uses 6.27 cu tons of firewood per year (Bhattaraya 1996). There are no reasons to assume that household consumption of firewood would have significantly changed since then. With a price of 20,000 kyat per ton, the value of firewood used in an average household of five persons in 2011 is around 125,400 kyat (US\$152).

In the case of Pa Tee Go, the total off-take of firewood in 2010 would be 1,440 tons: 867 tons for household use (6.27 tons times 138 households), plus 575 tons sold firewood. It is difficult to assess how much came from the community forest, which covers 500 acres only. Most of the firewood seems to have been collected from wild *Prosopis* stands in the shrub land around the village. The size of this waste land area is not known, it would seem to cover thousands of acres.

3.2.3 Livestock grazing

In all villages, bulls or oxen are the main source of traction for ploughing and transport. Villagers also raise goats and pigs. Forest reserves and Community Forests are main source areas for grazing animals and for collecting fodder. In the cropping season, weeds from bean fields are also collected and used as animal feed.

In the village of Nyaung Pin Thar, a total of 105 households were herding 600 cattle, 400 sheep and about 60 goats. This livestock herd is worth 196 million kyat or \$238,000, on average 1.86 million per or \$2,268 per household. Assuming 10% of all livestock is sold per year, the average income from livestock sales could be 186,667 kyat (\$227) per household per year.

Table 6: Value of livestock herd in Nyaung Pin Thar village, over 105 households, May 2011.

Type	No	Price	Total herd value		Value per household	
	pieces	kyat/piece	kyat	\$	kyat	\$
Cattle	600	300,000	180,000,000	\$ 218,712	1,714,286	\$ 2,083
Sheep	400	35,000	14,000,000	\$ 17,011	133,333	\$ 162
Goats	100	20,000	2,000,000	\$ 2,430	19,048	\$ 23
		Total	196,000,000	\$ 238,153	1,866,667	\$ 2,268

One individual household interviewed in the same village estimated that they collect about 35 oxcart loads per year of fodder from the forest to feed their animals in the dry season. They owned 6 cows, of which 2 working oxen. That gives an average off-take of fodder per animal of 6 cart loads. One cart load of fodder is estimated to weigh anything between 150-250 kg.

The off-take of the entire village would be around 3,600 cart loads of fodder per year or for the cattle alone, not counting the sheep and goats. In the wet season, animals are allowed to graze in the forest, and this grazing off-take is likely to be higher than the dry season fodder off-take. Over a whole year, all the livestock in the village could easily be consuming 2,650 tons of grass and dry fodder from forests (see Table 7). This is derived from 1,105 acres (428 ha) of forest all together, so forest fodder yield could be 2.4 tons per acre (6 tons per ha).

Table 7: Rough estimate for the annual off-take of fodder from forests in Nyaung Pin Tar village¹

Type	Dry season fodder consumption			Wet Season Grazing		Overall
	off-take per animal		whole herd	per animal	whole herd	off-take
	cart loads	weight (kg)	metric tons	weight (kg)	metric tons	metric tons
Cattle	6	1,200	720	1,800	1,080	1,800
Goats	4	800	320	1,200	480	800
Sheep	1	200	20	300	30	50
		Total:	1,060		1,590	2,650

It was not possible to make more detailed estimates of the value of the **use of forests for livestock grazing, but villagers mentioned they believed its value to be higher than that of NTFPs collected, but less than firewood**. It would be interesting to explore the potential for enriching community forests with fodder species (trees, shrubs and leguminous herbs) for household use.

3.2.4 Forest Products used

Community members mentioned 17 types of trees harvested for timber or firewood (Table 8).

Table 8: List of main species of trees used for firewood and timber. Four villages in the dry zone: 1= Pa Tee Go, 2= Khan Tar Lay, 3= Nyaung Pin Tar, 4= Taung U.

Firewood is the most often mentioned forest product in the four villages visited. Some 13 other NTFPs were identified as regular sources of income as well (see Table 9).

Table 9: List of main Non-Timber Forest Products used in four communities in the dry zone. 1= Pa Tee Go, 2= Khan Tar Lay, 3= Nyaung Pin Tar, 4= Taung U.

No	Product Name			Part used	Main uses	Villages				No
	Product	Burmese name	Scientific name			1	2	3	4	
1	Plums (jujube)	Zee	Sizigum mauretania	seeds, fruits	medicine, food	x	x	x	x	9
2	Palm shoots	Tot than nyit	Livistonia sp.	stem shoot	food		x	x	x	6
3	Bamboo shoots	Myin wa	Dendrocalamus strictus	stem shoot	food		x	x		2
4	Thanaka	Thanaka	Hesperathusa	bark, wood	cosmetics	x			x	3
5	Gum karaya	Shaw piu	Sterculia lanceolata	gum	food additive	x	x			4
6	Mushrooms		many spp.	flower	food		x	x		5
7	Sandalwood	Santagu	Santalum album	wood	perfumed wood		x		x	8
8	Thatch	Thetke	Imperata cylindrica	leaves	roofing material		x	x		10
9	Mango	Thayet	Mangifera indica	fruits		x			x	11
10	Sugarpalm	Tan	Borassus flabilifer	sugar, leaves	food, roofing			x	x	12
11	Tamarind		Tamarindus indicus	fruits	food				x	13
12	Honey		Apis spp.	honey	food			x		14
13	Aloe vera	Mok kha	Aloe vera	leaves	cosmetics, food				x	7

¹ Assuming a weight of 200 kg per cartload and wet season intake to be 1.5 times higher than dry season intake.

3.2.5 Timber harvesting in dry zone community forests

Villagers mentioned the main reason they do not sell the timber from community forests is because they are not allowed by the Government to sell timber to other villages, they can only use it in their own village. This represents a big “missed opportunity” for raising community income from community forests.

In Pa Tee Go village, villagers estimated the local price of timber comparable to 10 year old Eucalyptus stems with a diameter of 6 inches to be 10,000 kyat (US\$12.50) per piece. Within the time frame of this study, detailed data on Eucalyptus in Myanmar could not be traced. Using reference data from California (Hartsough and Nakamura 1990), such trees can be expected to be 24 feet high, have a volume of 4.5 ft³ per stem and a stem weight of 222 lb (see Table 10).

It would take roughly 10 stems to make up a metric ton (1000 kg), so the equivalent price is 99,000 kyat or US\$120 per m³. That would be a very good price, compared to world market prices of Eucalyptus offered free on board in Bangkok, Thailand of US\$90 per ton (see for example: http://www.tradeim.com/product_192227_Eucalyptus-wood-Log-for-paper-and-plywood.htm)

Table 10: Rough calculations on village level Eucalyptus price, Pa Tee Go village, May 2011.

diameter (inches)	6	no stems per m3	7.85
tree height (feet)	24	no stems per ton (1000 kg)	9.93
stem volume (ft ³)	4.5	price in kyat per m3	78,477
stem weight (lb)	222	price per kyat per ton	99,306
price per stem (kyat)	10,000	price per US\$ per m3	\$ 95.35
rate ft ³ to m3	35.3145	price per US\$ per ton	\$ 120.66
rate lb to kg	0.4536	* source: (Hartsough and Nakamura 1990)	
rate UAS\$ to kyat, May 2011	823	**see: http://en.wikipedia.org/wiki/Burmese_kyat	

In the case of Pa Tee Go, so far 4,000 trees out of the total of 20,000 trees planted were cut and used to build a community hall. The equivalent value of this wood is 40 million kyat (US\$48,603). Even if this would be shared by all 138 households in the village, the average income per household would be 290,000 kyat or US\$352.

Table 11: Potential value of Eucalyptus timber in the community forest of Pa Tee Go village, May 2011.

Harvested so far		Potential harvest	
no trees harvested	4,000	total number of trees	20,000
price per tree in kyat	10,000	price per tree in kyat	10,000
value	40,000,000	value every 10 years in kyat	200,000,000
value \$	\$ 48,603	value every 10 years in \$	\$ 243,013
total no households	138	no households	138
value per household in kyat	289,855.07	value /HH/year in kyat	144,928
value per household in \$	\$ 352.19	value /HH/year in US\$	\$ 176

The entire community forest could yield trees with a diameter of 6 inches perhaps every 10 years if well managed. This would provide an average annual income per household of 145,000 kyat or \$176 to each of the 138 households in the community.

For poor households, this would be a potential added value of 26% compared to the present income derived from forests of 540,425 kyat or \$657 per year (see Table 5 above).

For the richer, land owning households, the added value would only be 7% compared to their total crop income of 2 million kyat (\$2,458) per year (see Table 4). Maybe richer households are less interested in pursuing additional income from selling timber from community forests.

In short, it would be mainly interesting for the poor, landless households if communities could obtain more freedom to sell timber from community forests. NGOs interested in supporting poor households may need to address the potential issue of the more powerful richer households having perhaps less interest in such an effort.

Another option for generating income from Eucalyptus plantations might be the production of Eucalyptus oil. Consultants were not able to explore this option due to time constraints, but there may be some market opportunity here that could be explored further.

3.2.6 Key Products identified for marketing and their income potential

Communities were asked to rank products they believed would have the best potential for generating income from community forest areas. Over four villages, sixteen products were proposed (see Table 12). The five most popular products are: Thanaka, Plums, Lemon, Jinma and Coconut. Out of the sixteen products, six are fruit trees, three are other food products and two are firewood trees. The others were a timber tree, an aromatic wood, a cosmetic powder, a stimulant and a medicinal product.

Table 12: Key products selected by four villagers in the dry zone as most promising for raising forest based income. (1 is most important rank, 9 is least important rank).

Product	Key Use	Village				Overall
		Pa Tee Go	Khan Tar lay	Nyaung Pin tar	Taung U	
Thanaka	Burmese cosmetic	2	2	1	3	1
Plums, jujube	Chinese medicine	1	1	9	1	2
Lemon	Fruit			2	5	3
Jinma	Firewood	3	3			4
Coconut	Fruit, oil			3		4
Teak	Timber	3	4			5
Lime	Fruit			4	5	5
Guava	Fruit			5		6
Sugar palm	Sugar			6		7
Dahat	Firewood	4				8
Banana	Fruit			7		8
Mango	Fruit			7	2	8
Betel palms	Stimulant	5				9
Sandalwood	Aromatic wood	6	5		4	9
Bamboo shoots	Food			8		9
Tamarind	Food			8		9

Out of these products, only bamboo shoots can be expected to generate income within a year after planting. There is one more product, not mentioned by villagers but observed by the consultants in another part of the dry zone that can also produce income within a year after planting: “Moke kha” or Aloe vera.

Most of the products like the fruit trees can start generating income after three years. Other products like thanaka, jinma, dahat will need at least five years. Some products are really long term, like teak and sugar palm.

An issue that came up repeatedly in village discussions was whether all these products can be managed as a common pool resource such as a community forest, or whether some are better managed in individual gardens managed by individual households. For many of the more valuable products which take several years to grow, it may be difficult to manage them under a common pool system. For most of the fruit trees, also thanaka and others, it may be more suitable to allocate small plots in the community forest to individual households to cultivate these products.

There may be a good opportunity here to provide landless households with some access to land they would otherwise not be able to use. This has become the standard practice in countries like Nepal. In Magway township, the forestry officer mentioned that he would welcome proposals from communities to start new community forest areas in existing forest reserves. Some of this land could be allocated to landless households for tree plantations. To develop income generation in the community forests of the dry zone of Myanmar, this issue will need much more discussion and negotiations within each community.

3.2.7 Detailed cost-benefit studies for selected products

Based on these initial preferences of the communities visited, the consultants compared costs and benefits of four products: plums, thanaka, aloe vera and bamboo (see Table 13). These were chosen on the basis of: 1) Market potential 2) Land suitability and 3) Widest potential benefits to people.

Table 13: Comparative annual income of several NTFPs that could be planted in community forests in the dry zone.

Product	Price	Yield		Gross Benefit	Annual Costs	Net Income		Other considerations
	kyat/viss	per acre	unit	kyat/acre/yr	kyat/acre/yr	kyat/acre/yr	\$/acre/yr	
Plum seeds	15,000	190	viss	2,853,653	343,650	2,510,003	\$ 3,050	trees only produce well after 10 years
Thanaka	4,000	346	stems	1,382,857	170,995	1,211,862	\$ 1,472	trees take 7 years to grow
Aloe vera	30,000	50	viss	1,500,000	278,000	1,222,000	\$ 1,485	can be harvested after one year
Bamboo shoots	1,000	1,000	viss	1,000,000	18,000	982,000	\$ 1,193	can be harvested after one year
Bamboo culms	2,000	300	stems	600,000	18,000	582,000	\$ 707	culms and shoots can both be sold
Bamboo total						1,564,000	\$ 1,900	easy to manage as common resource

Just comparing average annual net income per year, plum (jujube) seeds are the clear winner. Bamboo and bamboo shoots combined are second, followed by aloe vera and thanaka. Detailed information on these products is presented below.

There was no time to analyse all the other fruit and timber tree species proposed by communities (see Table 12 above). It would be better to calculate the specific costs and benefits

of each of these options together with the forest user groups, so they can make their own informed decisions on what they see as their best option for income generation.

3.2.8 Production and market potential of plum seed production

Plum trees can start producing fruits from three years after planting. They reach full productive capacity after 10 years. One acre of mature trees (older than 10 years) can yield 232 viss . At a future price of 15,0000 kyat per viss, 1 acre would yield an income of 4.6 million kyat or \$5,633 per year. For younger trees aged 3-10 years, the average yield is estimated to be about one third of that of the mature trees.

Over the first three years, the owner will only have investment and maintenance costs. Over the early production years (years 4-10), the average net profit is 1.5 million kyat (\$1,943) per acre per year. Over the last ten years when the trees are mature, net profits would be 4 million kyat (\$4,959) per acre per year. The net profit over twenty years is on average 2.5 million kyat (US\$ 3,050) per acre per year. With labor wages of 3,000 kyat per day, the average return per labor-day is 21,960 kyat (\$27).

Plum trees are always individually owned, so they need to be planted in individual households plots or gardens. They are less suitable for planting in community forests under common pool management.

Over the last few years, demand for this product has been strong. Exports from Myanmar are estimated to be around 1000 tons (740,740 viss) per year, worth 13,000,000,000 Kyat or 16,250,000 US dollars per year. All of the produce is exported to China, where it is used as medicine against insomnia, “suan zao ren”. It is difficult to predict the long term prospects of any medicinal plants exported to China, and this is the main uncertainty of this product.

If Ecodev would succeed in establishing 50 acres per village in 12 villages, this would add 600 acres or 139,200 viss. At current prices, that represents an added value of 640,320 million kyat or \$778,000 per year (after establishment) which is less than 5% increase in export volume. This is unlikely to affect prices much, so there is little risk of overproduction.

3.2.9 Production and market potential of thanaka

Thanaka (*Hesperathusa craenulata*) is a product used by almost all women in Myanmar as a cosmetic, applied daily as a yellow powder applied to the face. Plantations of thanaka trees take around seven years to grow to harvestable size. The whole tree is cut and sold; it takes another seven years or more to replace the harvested trees.

Around the key production area in Yesagyo township, the trees are planted in rows 3x6 feet, that means 2,420 trees per acre (5.979 trees/ha). So 1 acre can yield a value of 7.26 to 14.5 million kyat on average per seven years; that is 1.30-2.7 million kyat (\$1.579-3,281) per year.

In the annex on thanaka below, several scenarios were calculated. The net profit ranges from 0.769 million kyat per acre per year (with fencing, counting labor costs, low selling price of 6,000 kyat per stem) to 2,015 million kyat per acre per year (no fencing, not counting labor costs and with a high price of 15,000 kyat per stem).

The main market for thanaka is domestic. With a population of 28 million women, 90% or 25.2 million women are estimated to be using the product daily. Annual domestic consumption would be between 201.6 to 403.2 billion kyat or \$252-504 million per year. This is a much bigger market than the plum seed market. The question is, how much added production could the market absorb?

If Ecodev would succeed in planting 50 acres in each of 12 villages, this would add 600 acres, or 1.4 million trees that could be harvested every seven years. The average added value per year of this activity would 780 -1,620 million kyat (\$0.948 -1.968 million) or less than 5% of the total annual production. This is unlikely to cause large price changes. Thanaka gardens look like a safe investment. However there will be many other people establishing thanaka gardens, so investors should assess the possibility of a price drop in seven years after now.

3.2.10 Production and Market Potential/ Absorption for Aloe Vera

Aloe vera is a well-known medicinal plant in many areas of the world. There is a strong global demand for juice, gel, and concentrates made from the leaves of this succulent plant. World market of raw materials is estimated to be \$70-90 million, the total sector including all processed products made from Aloe vera is estimated to be worth \$35 billion per year. Main producers are US, Mexico. The main part of the plant used is the latex from the leaves, which has medicinal properties especially for healing skin wounds like burning wounds.

In Myanmar, production is concentrated in the dry zone, the center of production is in Yesagyo township in the Maway region. Average yields there are around 1,440 viss/acre fresh leaves. It takes 24 units of fresh leaves to produce 1 unit of “Moke Kha” a popular Aloe vera concentrate used as medicinal plant in Myanmar. Plantations of this crop can produce within one year after planting and produce for five year before a fresh crop needs to be planted. Buying seedlings in the main investment cost. The average net profit is around 1.1 million kyat (\$1,357) per year. If farmers could produce their own seedlings or get them from a project, the net profit would raise to 1.7 million kyat (\$2159) per acre.

The yields obtained in Yesagyo seem to be around 5,000 kg/ha, which is about 10% of the level of 50,000 kg/ha commonly cited as potential yields in other parts of the world. There would seem to be a good potential for raising productivity by improved water management and judicious fertilizer use.

Local demand is strong, there is also some export to China. In short it would seem like a good option for income generation on the short term for Community Forestry Groups. The main uncertainty is the size of the market. There are no statistics on the local market of Moke kha, so it is difficult to predict how an increase in production would affect the market. The annual production from Yesagyo area alone is estimated by local farmers to be perhaps 40,000 viss per year, or 65.5 tons of Moke kha. With a yield of 60 viss per acre, the Yesagyo area can be estimated to be around 670 acres only.

If Ecodev would enable 50 acres to be added in each of 12 target communities, this would add 720 acres to the resource, this could have a serious effect on the price. It would be safer for Ecodev to limit Aloe vera plantations to perhaps not more than 60-80 acres for now.

On the long term the sector could grow much faster if a company could be identified who is willing to invest in developing the Aloe vera industry in Myanmar. More work could be done to develop this value chain by doing feasibility studies and attracting investors.

3.2.11 Potential Scenarios for CF Enterprise Development

For the dry zone, three scenarios for community forestry based enterprise development emerge:

1. -gap filling income generating trees under communal management in existing CF areas
2. -planting income generating trees on individual farm land and around the house
3. -setting up new CF areas on forest reserve land, restricting use rights of these forests to the poor landless households

This is what MA, PS and I came up with as two potential options for CF Enterprise development. Of course, these will have to be discussed in detail with the CF groups in question.

Scenario 1, gap filling trees in the existing CF area is the easiest option. However there are several constraints that will need to be discussed within the forest user groups: how could such valuable trees be managed in an open resource mode, how could benefits be shared equally and where is it possible to actually plant more trees? One way to overcome the first problem would be to allocate individual plots to individual households. Another way could be to use this area for commonly used products such as livestock fodder and firewood only.

Scenario 2 is already being practiced, as many households have established private gardens of valuable trees like thanaka, plum and other fruit trees already. The challenge here would be to make it easier for households who do not yet have such gardens to establish them. The second challenge would be for the owners of existing gardens to find markets and try to gain more income by pooling their sales.

Scenario 3 is the most interesting option from both the poverty alleviation angle and from the angle of providing landless households with access to land and alternative income. The local forest division of Magway township is very supportive of this option, it would seem advisable for NGOs like Ecodev to explore the option for creating new community forests on state forest reserve land.

Most of these state forest reserve lands are rather poor forests which are too low in natural resources for the forest division to manage effectively. This also means the options for planting valuable trees may be limited. More participatory action will be needed to identify what are the best options for combining production of firewood, livestock forages and other forest products that could be managed by poor, land less households. Still this scenario holds the best options for inclusion of local communities in the management of forest resources and using these resources to combat poverty on the long run.

A business plan that encompasses these three scenarios is presented in chapter 6 below.

4 Findings in Kachin State

4.1 Findings on forests and people, products and markets in Kachin state

In Kachin state, two Community Forestry Groups were visited:

1. Wu Jan FUG, Wai Mau township, Kachin State
2. Lwe Hkaw FUG, Myitkyina township, Kachin State

Additional places and people visited include:

1. Ecodev Kachin field office (NGO)
2. MBA Baptist Association (NGO)
3. URM Urban-Rural Development (NGO)
4. KMSS Catholic church development mission (NGO)
5. Anglican Church farmer field schools organization (NGO)
6. Director of Forestry, Wai Mau township (Government)
7. WCS, Wildlife Conservation Society (international NGO)
8. Kin Twata Soe Company, Shadaw village, Myintkyina (rattan exporter)
9. Gawnan village medicinal herbs group (village enterprise group)

4.1.1 Findings on forest user groups in Kachin state

Community Forests in Kachin State have a much greener and denser aspect than those in the Dry Zone. The CF areas per village are bigger, and more trees have been planted (see table 14).

Table 14: Key characteristics of Forest User Groups in Kachin State, May 2011

Village	Wu Yan	Lwe Hkaw	Average
Township	Wai Mau	Myintkyina	
year of CF establishment	2004	2004	2004
CF area (acres)	1,200	900	1,050
upland agriculture	200	n.a.	100
lowland paddy	4,000	3,300	3,650
forest outside CF		20	10
total land	5,400	4,220	4,810
CF %	22%	21%	0
state forest land (acres)	-		-
no landless households	300	0	150
no land owning households	360	550	455
total no households	660	550	605
area CF in acres per hh	1.82	1.64	2
upland area (acres per hh)	1	n.a.	1
lowland paddy (acres per hh)	11	6	9
no trees planted	500,000	360,000	430,000
density trees per acre	417	400	408
trees harvested (metric tons)	60	n.a.	30
% harvested	n.a.	n.a.	n.a.
price per metric ton (kyat)	300,000	n.a.	150,000
value harvest (millionkyat)	18	n.a.	9
tree size (DBH in cm)	20-80	30-90	25-85

The community forests were started in 2004 and large numbers of trees were planted with support from a UNDP project. The most commonly planted timber tree species are : "mesali" *Cassia siamea*, "cheung" or teak, *Tectona grandis*, "yemane" *Gmelina arborea*, "jingaru" or "pyinkadau", ironwood, *Xylia dolabriformis* and "jingma" *Chukrasia tabularis*. The official certificate was awarded in 2007 in both forests. Another often planted tree species is "danyin", dog fruits (*Archidendron pauciflorum*), a tree which produces edible fruits that are very much appreciated in Myanmar.

Contrary to the dry zone, most of the community forests here were established on land that was formerly used for shifting cultivation. Planting useful trees like 'danyin' dogfruits was done mainly with the objective to secure tenure over these plots of land for individual farming households. This strategy seems to have been successful. Up to now, most of the community forest area is therefore divided into individual gardens. This tenure arrangement may also be a factor in explaining why numbers of trees planted in the CF's here are so much higher than in the dry zone.

4.1.2 Findings on forest use in Kachin state

The two communities visited, Wu Jan and Lwe Hkaw, are large communities (360 and 550 HH) with a lot more paddy field for lowland rice at their disposal (4,000 and 3,300 acres) than the communities visited in the dry zone. The main cash crop here is rice, not beans.

Villagers go to the forest mainly to collect products they consume or use in the household, such as firewood, bamboo and edible products such as bamboo shoots, vegetables and forest fruits (see table 15).

Table 15: List of Non-Timber Forest Products listed in the villages of Wu Jan and Lwe Hkaw , Kachin State, May 2011

No	Burmese Name	Common Name	Scientific Name	Price (kyat)	Unit	Price kyat/lb
1	taung ong	wild sugar palm	<i>Arenga westerhoutii</i>	n.a.		
2	taung zim phet	wrapping leaves	Ginger family?	10	piece	45360
3	taungbo hmo, thitkat	mushrooms	various species	5000	viss	1389
4	hyin byin, tanyin ywe	kampong tree	<i>Gnetum gnemon</i>	500	tin	125
5	ngak pyau, nga pauk	dragon plum nut	<i>Dracontomelum dao</i>	4800	basket	192
6	da nyin	dog fruit, jengkol	<i>Archidendron pauciflorum</i>	40000	tree	
7	wa bo	bamboo shoots	<i>Dendrocalamus hamiltonii</i>	300	viss	83
8	damyetsipin	broom grass	<i>Thysanolaema maxima</i>	n.a.		
9	gadein kyin	big cane rattan	<i>Calamus longisetus</i>	n.a.		
10	yamata keyin	yamata rattan	<i>Calamus latifolius</i>	n.a.		
11	kyein ni	red rattan	<i>Calamus guruba</i>	n.a.		
12	kyein ni shoots	red rattan	<i>Calamus guruba</i>	1	piece	
13	indwe	resin	<i>Dipterocarpus tuberculatus</i>	n.a.	viss	
14	wa u, pyan u	elephant foot yam	<i>Amorphophallus konjak</i>	750	viss	208

They also collect a number of NTFPs to sell for cash income (see table 16). In Wu Jan village, on average over all households, the annual income derived from these key NTFPs alone is 27,800 kyat or \$33. These values are much lower than the values found in the dry zone (see table 4).

Table 16: Villager's estimate of NTFP income per year, Wu Jan village, Wai Maw township, Kachin State, May 2011

NTFP	Price kyat/unit	Unit	Quantity units/year	Value whole village kyat/year	Value per HH kyat/year	Value per HH \$/hh/yr
Taw Own palms shoots	2500	shoots	1000	2,500,000	3,788	\$ 4.53
Taung Zim Pat wrapping leaves	15	leave	250000	3,750,000	5,682	\$ 6.80
Hien Bien fruits	500	tin	5000	2,500,000	3,788	\$ 4.53
Mushrooms	5000	viss	500	2,500,000	3,788	\$ 4.53
Ngar Pauk nuts	4800	basket	700	3,360,000	5,091	\$ 6.09
Bamboo shoots	300	viss	10000	3,000,000	4,545	\$ 5.44
Elephant foot yam	750	viss	1000	750,000	1,136	\$ 1.36
Total				18,360,000	27,818	\$ 33.28

The team spent less time in Kachin state analysing incomes and expenditures of households, which may partly explain why these estimates are lower than in the dry zone. More time was spent exploring potential options for future income generation.

Another product that is harvested from forests in Kachin state in big quantities is rattan. The main production area is in the the Hukaung valley, Danai town is the center of the rattan trade. At the moment this area is closed to foreign visitors due to security concerns. The team did observe rattan stands in the village of Lwe Hkaw village, where rattan used to be a major source of income about 10 years ago. At present, perhaps only 10 out of the 550 households are still harvesting and selling cane, the average income per household per year is about 30,000-40,000 kyat (\$36-40).

The main species here is 'gadein kyin', red cane, another species is 'chain ni'. The edible shoots are also harvested and sold for 1 kyat per piece in bundles of 30 pieces. The resource is still there but would need careful management to yield more cane in the future.

The team also interviewed a local rattan factory and an NGO working on sustainable rattan in the Hukawng valley, see also section 4.2.5 below.

4.2 Production data and market potential of key products identified in Kachin

In Kachin state villagers collect firewood, graze their animals and collect Non-Timber Forest Products, to a similar extend as in the dry zone. Because wood is so much more abundant, firewood is not perceived as a big issue. As there is much more natural grass that livestock can reach letting them graze in the forest, not many people have to spend time collecting animal forages like in the dry zone. This section is therefore limited to timber and non-timber forest products.

4.2.1 Timber harvesting from community forests

Community forests in Kachin State are planted with yemane (*Gmelina arborea*), ‘chung’ or teak (*Tectona grandis*), ‘jingru’ or ‘pyinkadau’ ironwood (*Xylia xylocarpa*) and ‘jinma’ (*Chukrasia tabularis*). The key problem of Forest User Groups is that they cannot easily find buyers for these timbers, due to a combination of Government restrictions and lack of buyers. E.g. all teak trees are considered as property of the State. The potential for raising income would seem to be huge if these restrictions could be removed.

For example ‘yemane’, *Gmelina arborea*, is a very fast growing species with a great potential both as a timber product and as a source of pulp for the paper industry. One NGO, MBA Baptist Association, managed to sell a four year old ‘yemane’ trees for about 80,000 kyat per tree. With a spacing of 12x12 feet, their plantation contained around 300 trees per acre, the value was 24.2 million kyat (\$29,404) per acre (see table 17). That is on average 6 million kyat or \$7,351 per acre per year. It is hard to find any other tree or crop with such a high annual income per acre...

Table 17: Example of selling 4 year old yemane trees (*Gmelina arborea*) in 2008.

Source: Kachin Baptist Association, May 2011

Planting density (12x12 feet), no/acre	303
Price per tree (4 years old), in kyat	80,000
Value per acre in kyat	24,200,000
Value per acre in \$	\$ 29,405
Average annual value in kyat	6,050,000
Average annual value in \$	\$ 7,351

It is recommended for NGOs and other civil society organizations to continue their dialogue with the Government pushing for a reform in these community timber marketing regulations, in order to give an economic stimulus for community forest plantations.

4.2.2 Key products identified as having market and income generation potential

In Wu Yan village, villagers selected elephant foot yam as the most promising product in a rapid ranking exercise. They also mentioned other forestry and agricultural products that they believe have good market potential (see table 18).

Table 18: Preliminary ranking of forest/agricultural products with marketing potential by villagers in Wu Jang and Lwe Hkaw.

Product	Scientific Name	Key Use	Village		Overall
			Wu Jang	Lwe Hkaw	
Bamboo shoots	<i>Dendrocalamus hamiltonii</i>	food	2	3	7.5
Dog fruits	<i>Archidendron pauciflorum</i>	food	9	1	5
Elephant foot yam	<i>Amorphophallus konjacki</i>	medicinal plant	1		4.5
Rattan and rattan shoots	<i>Calamus guruba</i>	cane, vegetables		2	4
Tea	<i>Camelia sinensis</i>	stimulant	3		3.5
Pepper	<i>Piper nigrum</i>	spice	4		3
Coffee	<i>Coffea robusta</i>	stimulant	5		2.5
'karawe' cinnamom	<i>Cinnamomum</i> sp.	spice	6		2
Coriander	<i>Coriandrum sativum</i>	herbs	7		1.5
'Nyin Byin'	<i>Gnetum gnemon</i>	food	8		1
Broom grass	<i>Thysanolaena maxima</i>	brooms	9		0.5

4.2.3 Detailed cost benefit studies for key products

Detailed cost benefit studies were made for elephant foot yam and for rattan. The team did not have sufficient time to collect more data and add more cost benefit calculations. It is recommended to add more of these calculations for products such as: bamboo shoots, ‘kanyin’ dog fruits, ‘taw own’ sugar palm fruits, ‘hien bien’ fruits, agarwood, teak, ironwood and ‘mesali’.

4.2.4 Elephant Foot Yam

Elephant foot yams, locally known as “Wa-u” or “phyan-u”, are tubers or ‘corms’ of several *Amorphophallus* species, e.g. *A. paeonifolius* and *A. konjac*. The dried tuber of the konjac plant contains around 40% glucomannan gum. This polysaccharide makes konjac jelly highly viscous. In Japan, India and China, the starch is known as “konjac” or “konyakku” and eaten as a vegan substitute for gelatin. Konjac has almost 0 calories but is very high in fiber. Thus, it is often used as a diet food.

Elephant Foot Yam can be found in many area of Myanmar especially in evergreen forest areas. Over-extracting from natural forest resources has reduced the production levels. Cultivation has started in Rakine Chin and Kachin States.

Elephant foot yam can be harvested within 6-7 months, provided enough seed tubers are available. With a spacing of 3x3 feet the density is 4,856 plants/acre, 12,000 plants per ha.

Taking a 1:3 ration, each tuber of 0.3 viss will grow to 1 viss in weight in seven months. So one acre can yield 4,856 viss of fresh tuber per season (19.6 tons/ha). With one viss of dry chips produced from every seven viss of fresh tubers, 4,856 viss can produce 694 viss of dried chips per acre (2.8 tons/ha). With a price of 3,200 kyat/viss for dried chips, that represents a value of with 2.20 million kyat (\$2,697) per acre.

The main cost is planting materials. There are also labor costs for clearing, planting, harvesting and drying. The total production cost is 942,720 kyat and 120 labor days. The net profit each years is 1,28 million kyat (\$1552) per acre (3.16 million kyat or \$3,835 per ha). With labor wages of 3000 Kyat per day, the net profit would be 13,643 kyat (\$17) per labour day.

Seed yam production can be an attractive business as well. A tuber of 1 viss can be split into 5-6 pieces which will produce seed yams. These can be planted at 1x2 feet, or 19,020 plants/acre. It takes 6-7 months to grow these seed yams to desired size. On one acre, seed yam production yields 1.5 million kyat (\$ 1,862) net profit, or 24,891 kyat (\$30) per labor day.

This plant is already providing jobs to thousands of farmers in the Kachin State especially for harvesting and drying process. The potential for creating more jobs would depend on the absorption capacity of the market. EFY is mainly exported to China via border trade, small amounts also go via international trade at higher prices to Japan and Korea. Total export amount is 4,000 tons approximately for both border trade and normal trade. .

If Ecodev would support 50 households in 20 communities to plant 1 acre of elephant foot yam each, this would result in an increased production of 100 acres (40.5 ha), adding 69,400 viss of dried chips or 113.6 tons. That would represent 2.8% of the total export volume. This increase would be unlikely to cause big price changes.

4.2.5 ‘Kanyin’ dog fruits, jengkol

The fruits of “Kanyin” commonly known as “dog fruit” or “jengkol”, “jering” or “luk nieng” are derived from *Archidendron pauciflorum*, member of the Fabaceae or family of beans. Older synonyms often used are *Pithecellobium lobatum* and *P. jiringae*.

Jengkol is a tree about 18-24 m tall with a spreading crown. It has a grey stem and one pair of glabrous leaves. The leaf is oblong, stiff and papery with 3-5 flowers, which are borne in a panicle. The calyx is sessile with a white corolla. The filament tube is shorter than the corolla. The pods or fruits are 20-50 cm long, 4-5 cm wide, horseshoe-shaped or twisted, deep purple, deeply lobed along the lower suture, and easily broken by hand. There are 3-6 seeds per pod. The seed is 3-5 cm across with yellow testa when young, which turns brown at maturity. The seed is edible with a strong odour.

The fruits are highly nutritious, with 23% protein and high contents of vitamin C (80 mg/100g), Calcium (140mg/100g), Iron (4.7 mg/100g) and Phosphorus (167mg/100g). The smell is not appreciated by everybody and over-consumption should be avoided as it may lead to kidney failure. The fruits grow in characteristic coiled pods on fast growing trees.

In Lwe Hkaw village near Myitkyina in Kachin State, these trees are grown in community forests for raising income. An average household may have around 200 trees planted in one acre, one tree is said to produce up to 2000 fruits per year. With a price of 20 kyat per fruit, such a household could earn 8 million kyat (\$9,720) per acre per year.

This seems to be another good option for income generation from community forests in Kachin State. The market is so far mainly limited to Myanmar, but it is also a well-known product in southern Thailand, Malaysia and Indonesia. The consumption in those countries is estimated to be over 100 tonnes per day. With the current high price, there would seem little danger of over-production. The market potential in nearby China should be explored.

4.2.6 Rattan value chain development

Kachin State is the main resource for rattan exported from Myanmar, the center of production is in the Hu Kawng valley, which is currently not accessible for foreigners due to security concerns. The main market is China, the value of rattan exports is estimated to be 30,000 tonnes per year, worth about \$7.2 million. The main problem is the depletion of raw materials (Myint 2004). NGO's like WCS are developing models for sustainable rattan production in natural forests. Such models have already been proven to be successful in Lao PDR.

For them to succeed in Myanmar, policy changes will be needed. Most of the harvesting is now done by workers hired by export companies who obtained export licences. These companies are based in Mandalay and Yangon. Local communities are hardly sharing in any benefits. To engage local communities, they should be given a larger share in rattan trade benefits.

Secondly, rattan is mainly exported as a raw material at a very low price. There is a great potential for adding value by producing high quality furniture and handicraft products. Some smaller companies in the Yangon area have already established themselves as exporters of such products for the high end of the market.

Support for better networking in the rattan sector could build on these two pillars: sustainable production and better quality design and production of rattan furniture products. Ecodev could work with international players such as INBAR, the international network for bamboo and

rattan, and with national players such as the rattan and bamboo association within the Myanmar Association of Timber Traders.

The feasibility of such an intervention would depend on the improvement of access to the main production area. It may have to be put on hold until the security situation in the area improves.

4.2.7 Potential CF Enterprise Scenarios in Kachin State

Various products could be developed for income generation from Community Forests in Kachin State. While some can be launched in existing markets, the main challenge is to find new opportunities in the border trade with China (see table 19).

Table 19: Market development options for forestry products in Kachin state

	Existing Market	New Market
Existing Product	Dog fruits Rattan “Taung Zim Pat wrapping leaves”	Nyin Byin fruits Dog fruits “Ngar Pauk” nuts Bamboo shoots Mushrooms “yemane” Gmelina wood
New Product	Elephant Foot Yam	Elephant Foot Yam “Taw On” sugar palm fruits

The presence of so many NGOs already supporting community forestry in Kachin State should make it easy to introduce basic value chain and community enterprise development approaches.

Elephant foot yam has the best potential for rapid success in Kachin State. It is not yet grown on a large scale, but some local people are already familiar with it. Trading currently goes to through two routes: to China via Mandalay and to Japan via Yangon. Japan is the desired route as it fetches higher prices and Japan waives import duties and has a large quota allotted for Burmese foot yam imports. Two factories are being built in Yangon to refine local konjac into higher quality products to be sold to Japan. Businesses that trade to Japan were willing to provide free training and technology to the CF groups in Chin State through the CARE project. They can extend this to Kachin, especially if the political situation calms down there.

Secondly the market for dog fruits requires more exploration. The product fetches a very good price, what are the options for expanding the lifetime by semi-processing and packaging, what are the options for expanding exports to other Asian countries?

Thirdly, “yemane” plantations grow very well in Kachin state. There is a growing demand for its timber both in the paper industry and as a source of timber. What are the options for finding new markets in China and other countries?

Fourthly, a number of smaller local products could be exported to China: “nyin byin’ fruits,” ngar pauk” fruits, bamboo shoots, mushrooms and “taw on” palm fruits. While the border trade seems to be disturbed by the present political unrest in Kachin State, it remains the nearest and most obvious export market for Kachin State on the longer term.

5 Stakeholder Analysis: FUGs, business partners, authorities e.g. Forest Department, Agricultural Department

5.1 Private sector partners

Five types of private sector actors were interviewed:

- (1) township plum seed traders
- (2) township and regional medicinal plants traders
- (3) rattan exporter
- (4) rattan furniture design company
- (5) rattan committee of the Myanmar Association of Timber Traders

At township level, plum seed traders are mainly interested in getting better quality plum seed from producers and they are interested in modernizing their grading equipment.

Medicinal plants are interested in having improved product grading at community level. One of them said: “ If you want to intervene in the medicinal plants market, you need to invest a lot of money”. What he means is that the major problem is the uncertainty in the demand from China. Myanmar traders would be better able to say no to low prices and keep products until the price improves, if they had a fund that would allow them to defer selling.

The three star company in Mandalay, the main rattan exporting company, is aware of the long term risk of depletion of rattan resources. The company is interested in working with communities to develop a sustainable rattan raw material production system in the forest. They are also interested in finding new markets for rattan products from Myanmar and adding value to rattan products in the country through improved design and marketing.

The rattan furniture company in Yangon is a good example how innovative design and high product quality can help to sell rattan products in the world market, in spite of the difficulties of selling goods from Myanmar to EU markets. The company needs a relative small amount but stable amount of good quality rattan each year. The company is keen to assist communities in the coastal area to develop sustainable rattan gardens and involve local communities in the value chain.

The rattan committee of the Myanmar Timber Traders Association is well placed and interested in influencing Government policies to boost export of rattan products. They need help in creating a strong vision or roadmap for the sector to gather stakeholders around.

Among private sector actors met, the best entry points for developing community forest based income generation activities would seem to be the actors in the rattan sector. In Kachin state, the actual buyers of forest products are all situated at the border crossing with China. We could not visit there because of security concerns, but it is recommended that local NGOs and FUGs explore options with them first and foremost.

5.2 Interest of FUGs and their capacity

All Forest User Groups visited during this consultancy displayed a strong interest in generating income from Community Forests. They were able to list a number of products they believe have good income potential. They need support in getting to know markets and identifying value adding options. They also need support in developing good business plans and linking with traders. They may also need support in setting up and managing their business. Last but not least they need support in figuring out how especially the most disadvantaged groups could be made to benefit from forest based incomes.

5.3 Interest and capacity of NGOs

The Main NGO is actively supporting FUGs in the dry zone seems to be Ecodev. Ecodev is supporting income generation activities such as onion drying. The staff mainly consists of people from the region who seem genuinely interested and motivated to support the local communities. As far as the consultant team could observe, some NGO staff seemed to act more as technical advisers and implementers rather than taking a facilitating role. They need more training in applying participatory planning techniques or facilitating open discussions among community members.

In Kachin state, besides Ecodev there is a range of other NGOs who are already engaged in Community Forestry: MBA (Baptists), URM (Urban Rural Development), KMSS (Catholics) and the Anglicans. All these NGOs would be very interested in supporting income generation activities around community forest areas.

The strong point of all these NGOs is that they have already developed a history of supporting their target communities in community forestry. They have experienced staff and independent sources of funding.

The only thing that is missing is a good enterprise development and value chain development approach. These approaches have already been developed in neighbouring countries and local trainers are available in Myanmar. NGOs need to invest time and money in training their staff in these enterprise development and value chain development.

5.4 Support of Authorities for NTFP income generation pilots in CF areas

Forestry staff in the Magwe region are familiar with community forestry and are welcoming proposals to set up new FUGs who could manage forest blocks on degraded land inside forest reserve areas.

This would seem a great opportunity to explore further, as it could institutionalize the access of poor landless households to reserved forest resources and to develop income raising activities for them there. Forestry officers could assist in developing sustainable production methods for forest products from these areas and remove any obstacles in marketing. NGO's should develop activities to support landless groups in acquiring access to state forest land under community forest management agreements. They should approach the forest department and start a dialogue on the options in each locality.

5.5 Recommendations on partnership and capacity building

5.5.1 Public-private partnerships

The first type of partnerships that comes to mind is public-private partnerships with companies who could provide large and stable markets for Community Forest Products. One positive example seems to be the IKEA-WWF partnership for sustainable rattan production in Laos, Cambodia and Vietnam. While it is obviously important to link communities to markets, some caution is also needed. No single company has been identified so far that would be able to create a large demand for CF products in Myanmar.

The experience from other countries is that large companies often dominate the value chain and in the end do not provide the expected benefits for local communities. NGO's in Myanmar should perhaps first explore cooperation with organizations representing the private sector, such as the Myanmar Timber Traders Association, before entering into direct partnerships with individual companies.

5.5.2 Partnerships with providers of capacity development services

The best way to support income raising capacity for communities with community forests is to build their skills in market analysis, negotiations and enterprise development. What is needed here are partnerships with providers of capacity development services. So far, there are not many of these available in Myanmar, however a few individual consultants are around that could play this role. The recommendation is for NGO's to seek a partnership with an international organization specialized in forest-based enterprise and value chain development, e.g. IIED from the UK. Such an agency could work with local consultants to create an NGO-based training module and build a cohort of local trained facilitators in Myanmar.

5.5.3 Multi-stakeholder networks

In the absence of clear market leaders that could work directly with Forest User Groups a third type of partnerships that NGO's could pursue would be multi-stakeholder information exchange networks. Such networks would bring private sector organizations, NGO's and Government agencies together to seek for forest-based value chain development options and reach out to international investors. At the same time, such networks could also achieve changes in the policy arena by raising awareness on the need for policy changes and by representing community interests vis-à-vis policy makers.

5.5.4 Field level partnerships between NGOs

At the local level, there seems to be a very good opportunity for various NGOs to work together on developing income raising activities around community forests. Ecodev is seen by other NGOs as having the most technical experience, it would seem well placed to take the lead.

6 Business plans for income generation from Community Forests

5.1 Community Forestry Business Plan for the dry zone

Three scenarios were developed in section 3.2.11 for community forest income development:

1. -gap filling income generating trees under communal management in existing CF areas
2. -planting income generating trees on individual farm land and around the house
3. -setting up new CF areas on forest reserve land, restricting use rights of these forests to the poor landless households

Among all the products surveyed, there is no clear winner. Thanaka and Plums seem good income earners, but they take several years to establish and may not be for communal management. Fodder and firewood products may be better suited for communal land use, but still need to be selected. On the short term, perhaps only Aloe vera is feasible.

For each of these scenarios, communities should select a specific group of households that will implement a community forest-based enterprise. To generate income from community forests, These enterprise groups will need to make a number of choices. Some products can produce a lower income but in a short time frame, others can produce a higher income but may need years to establish. Some products can be planted in common resource land, others may need clear division in individual household plots.

Some products are more suited to the needs of poor landless households, some are more suited to the needs of rich land owning households. In some cases new products can be planted in existing forest, in many cases, new community forest land may need to be established. In some cases FUGs may decide to limit the income raising activity to a select group of poor, landless households. Each community will need to make its own combination of choices among these various options.

In order for this to happen, the best option for NGOs aiming to increase income from community forests in the dry zone would be to adopt a forest-based group enterprise development approach. This approach has already been applied successfully by a number of organizations in various countries. The main steps proposed for Ecodev and other NGOs interested in doing this are:

- 1 Develop a training package and train NGO staff in forest-based enterprise development
- 2 NGOs staff assist FUGs in setting up forest based enterprise groups, select members, select areas, and key products for income generation
- 3 Enterprise groups are assisted in connecting to buyers along the value chain and identify locally adapted value adding options
- 4 Enterprise groups develop FUG business plans
- 5 Explore potential for additional FUGs to be set up existing of landless families to be engaged in co-managing forest blocks inside forest reserves
- 6 Explore the potential for improving fuelwood and fodder production by landless families
- 7 Establish plantations, manage existing stands, implement and monitor business plans

1 Develop a training package and train NGO staff in forest-based enterprise development

Several good training approaches have been developed and tested in surrounding countries and in other parts of the world. The CIAT agro-enterprise manual (CIAT 2010) or RECOFTC/FAO manual (Lecup and Nicholson 2004) are good starting points to develop a local manual. The CIAT manual should be translated into Burmese and tested and adapted to the local situation. This document can be downloaded at: <http://www.saduproject.org/approach.html>

Key Steps of the Agro-enterprise process:

Phase 1: Product Selection

1. Village Prioritization Meeting
2. Rapid Market Mapping
3. Cluster Prioritization Meeting

Phase 2: Analysing the Market

4. Participatory market chain survey
5. Community feedback meetings

Phase 3: Planning for Action

6. Stakeholder Chain Analysis Forum
7. Action Planning

This process can be applied to each of the three scenarios suggested above.

A small team of local consultants should be combined with short-term inputs from an international provider of capacity building services, e.g. IIED, to apply the manual and train NGO staff in at local levels (Macqueen 2008). The best way would be a cascaded training approach, which means that after each step, training is followed by field implementation, after which the results can be evaluated with trainers before the next step is introduced, etc.

2 NGOs staff assist FUGs in setting up forest based enterprise groups, select members, select areas, and key products for income generation

NGO's select the number and location of communities to be supported. They consider the options for clustering villages to form larger units to produce sufficient quantities that provide a better bargaining position. Then they implement the following sub-steps:

1. Village Prioritization Meeting
2. Rapid Market Mapping
3. Cluster Prioritization Meeting

1. Village prioritization meeting

In each community, NGO staff should facilitate a planning meeting where Forest User Groups discuss:

- purpose of the community enterprises to be developed
- target group that will join the enterprise development process. Ask participants to develop criteria for selection of participants such as : dependence on forest (landlessness), ability and willingness to work in forest, honesty, etc.
- the locations where enterprises will be based : existing CF, new CF, private land
- shortlist 3-5 products on the basis of four groups of criteria:
 - market/economy;
 - resource management/environment;
 - social/institutional;
 - science and technology

2. Rapid market mapping by NGO facilitation team

A local team of NGO facilitators identify and interview relevant traders along the market chains of selected products. Key information collected is:

- Who the actor buys from and sells to; the extent of their operation and their contact details
- The number of actors playing the same role as the interviewee, where they are based and their contact details
- Estimates of volumes traded by interviewee and other actors playing the same role
- The functions played by the actors in the chain link map: transportation, bulking, processing
- Volumes traded by the actor, by month, over the last year
- Prices paid and sold for, by month, over the last year
- Estimated volumes of supply from different sources by season
- Volumes sold by actor, per year over last five years
- Average annual selling price over the last five years
- Trader preferred purchase conditions (amounts, frequency, purchase period, packaging, payment, transportation)
- Preferred variety by market
- Product quality grades, definitions and price differences

This will allow them to:

- 1 Know the main actors in the chain, their functions and requirements
- 2 Understand market trends, seasonality and pricing for each product.

In addition to providing information that will help villagers to select a product, RMM has two other functions:

1. It enables the working team to see opportunities to improve market chains at an early stage. This gives them confidence to work through the process.
2. Knowing some of the actors in the market chain allows the working team to later plan the Participatory Market Chain Survey.

Rapid Market Mapping may also reveal opportunities, such as:

- traders willing to pay increased prices for preferred quality or graded product
- better packing or storage options that reduce losses and increase profits.

3. *Cluster Prioritization Meeting*

This is a meeting where several villages come together to coordinate and review their collaboration. Within each scenario, it may be possible to team up with other villages working in the same scenario to team up and combine. The meeting comprises of the following steps:

- Review products selected in each community, discuss and compare priorities
- Present and discuss first findings of the rapid market mapping
- Cluster level product selection

All participants are asked to select one single product for enterprise development.

Product/Market Matrix	
Market Demand - WEAK Production Capacity - GOOD	Market Demand - STRONG Production Capacity - GOOD
Market Demand - WEAK Production Capacity - POOR	Market Demand - STRONG Production Capacity - POOR

- Selection of cluster representatives for the PMCS (Participatory Market Chain Survey).

3 Enterprise groups are assisted in connecting to buyers along the value chain and identify locally adapted value adding options

This phase basically consists of two steps:

4. *Participatory market chain survey*

This exercise is more comprehensive than Rapid Market Mapping and may take one to two weeks to complete. The objectives of the Participatory Market Chain Survey are to:

- 1 Facilitate face-to-face meetings between village representatives and different actors along the market chain, allowing villagers to better understand the product's value chain and to initiate farmer / trader networking;
- 2 Gather consolidated information on market trends, seasonality and commodity characteristics;
- 3 Develop a detailed understanding of the operations of actors at each point along the market chain and identify opportunities and constraints.

This survey uses the same tools as Rapid Market Mapping but it has more depth and covers more than one actor at each level of the chain. Additional information is gathered and probing becomes much more important. An additional tool is also used to help identify opportunities and constraints. The PMCS is conducted in reverse order, that is, it starts with the end consumers and works back along the chain to the village. This means that farmers will be informed of issues down the chain when they meet actors at the next level. It also means that villagers are moving closer to home each day.

5. *Community feedback meetings*

The objective of the meeting is to allow farmers to understand the market conditions for the product that has been selected. By the end of this meeting farmers will:

- 1 Understand market trends, seasonality issues, preferred product conditions
- 2 Appreciate existing constraints, understand why they exist and clearly see what opportunities are available
- 3 Have increased confidence in the market through better understanding of demand, supply and price
- 4 Prepare questions and suggestions for inclusion in the upcoming Stakeholder Chain Analysis Forum.

4 **Enterprise groups develop FUG business plans**

This step consists of two sub-steps:

6. *Stakeholder Chain Analysis Forum*

The Stakeholder Chain Analysis Forum (SCAF) ensures different actors along the market chain begin to see that cooperation will benefit all parties. However it is unlikely that this diverse group of actors will be ready to formulate an action plan and then implement it of their own accord. It will thus be the role of the Working Team to review the information that's been gathered, develop an action plan and then assist to implement it.

The main steps are for stakeholders to:

- 1) review constraints and their causes

Stakeholder	Problem	Causes
Farmers		
Village traders		
Township traders		
Factory or exporters		

- 2) agree on solutions, opportunities and follow-up activities

Stakeholder	Solutions	Opportunities	Activities
Farmers			
Village traders			
Township traders			
Factory or exporters			

7. *Action Planning*

When preparing the action plan, the working team should work through the following steps:

- a List all the 'desired outcomes' identified in the PMCS and SCAF;
- b Put these in a hierarchy of immediate /intermediate/strategic;
- c Identify the type of 'intervention' needed to achieve the outcome;
- d Identify 'activities' to be achieved in the focus area.

Outcome	Intervention	Activity
Immediate Opportunities		
<ul style="list-style-type: none"> • Increase volume supply and increase output per day • Better continuity of supply throughout the year • Obtain higher prices 	<ul style="list-style-type: none"> • Reduce time/labor for collection and processing • Increased production through domestication • Land-use agreements to prevent livestock damage to porsaa • Boiling to aid bark removal, thus allowing collection in wet and cool months • Bulking to facilitate collection and gain price agreements 	<ul style="list-style-type: none"> • Survey production to assess need for labor saving technologies • Cross visit to illustrate porsaa domestication • Engage private sector to obtain planting material • Zonal meetings to plan production and land use • Pilot new technology, with input from private sector • Zonal meetings to establish standards and bulking points
Intermediate Opportunities		
<ul style="list-style-type: none"> • Higher prices, better quality 	<ul style="list-style-type: none"> • Porsaa traders negotiate higher prices for grading and quality 	<ul style="list-style-type: none"> • Hold forum for porsaa traders (all provinces) to establish issues and negotiating strategies • Conduct study / negotiation with Thai traders
Strategic Opportunities		
<ul style="list-style-type: none"> • Direct trading to third-country markets 	<ul style="list-style-type: none"> • Achieve volume and continuity of supply • Achieve 'A' grade quality for export • Negotiation with third-party, end-user countries. 	<ul style="list-style-type: none"> • Porsaa traders forum: <ul style="list-style-type: none"> - feed back from Thai study tour / negotiations - establish strategies for traders to improve the porsaa sub-sector - consider the formation of a porsaa Traders Association

5.2 Costs of forest based enterprise development facilitation process

A rough model is presented here to estimate the costs of facilitating the process described in the previous section. It is assumed that a team of 4 NGO staff could support 1 cluster of 4 villages, assisted by 1 national trainer/consultant. The calculations are made in labor days, NGOs will need to add their own salary rates to work out the financial cost.

Step	Village members	Rates	NGO staff inputs	Rates	Trainer inputs	Rates	Total Cost
	Labor days	\$/day	Labor days	\$/day	Labor days	\$/day	\$
1. Village Prioritization Meeting			14		4		
2. Rapid Market Mapping			40		10		
3. Cluster Prioritization Meeting			10		4		
4. Participatory market chain survey	40		18		6		
5. Community feedback meetings			10		4		
6. Stakeholder Chain Analysis	10		10		4		

Forum							
7. Action Planning			20		6		
8. Support and monitor implementation			50		4		
9. Evaluation and reporting			24		10		
TOTAL	50		196		52		

5.3 Business Plan for Kachin State

For Kachin State, the business plan consists of three key elements:

- (1) Rapid establishment of elephant foot yam forest gardens
- (2) Exploration of new market opportunities for a range of crops at Chinese border
- (3) Rattan sector development

Options (2) and (3) are not really feasible as long as the present political unrest renders the security and travel situation so unpredictable. Once they do become possible, it is recommended for option (2) to follow the same steps as described for the dry zone above.

For option (3), all the stakeholders are in place, the main aim of this activity would be to organize a series of network meetings to influence Government policy. Once communities could be given more rights to harvest and trade rattan, they would have a strong incentive to implement sustainable production systems. Such a network could also link innovative designers with rattan producers and international markets, which would add lasting value to the national value chain on the long term.

Option (1) would be the only option that may be possible under the difficult conditions of the moment. For the elephant foot yam gardens, NGOs need to identify buyers who would be willing to buy at least 10-100 tonnes of the product from Kachin state for a good price. Secondly, NGOs would need to decide how many communities and how many households could support and what their support package would look like.

NGOs will need to support farmers in locating seed material, teaching and disseminating best practices for cultivation, and assisting producer groups in marketing their product.

The main bottleneck is to provide a continuous supply of seed yams of the size of 500 grams (0.3 viss) for the production of larger tubers of 1.6-3.2 kg (1-2 viss) that can be sold. Initially these seed yams can be sourced from the forest, but for large scale production, they will need to be produced on farms. Seed yams can be produced by splitting a larger yam into 5-6 pieces.

Initially, the program should focus on supporting seed yam producers, who can sell their produce to others.

Appendices

1 List of persons consulted

Date	Name	Organization	Position	Location	Tel	Email
8/5/11	SiuSue Mark	Pyoe Pin	Program Officer	Yangon	01-254658	
8/5/11	Win Myo Thu	Ecodev	Managing Director	Yangon	01-536437	winmyothu@gmail.com
8/5/11	Moe Aung		Consultant	Yangon	09-51327787	moeagsay@gmail.com
8/5/11	Paing Soe		Consultant	Yangon		
9/5/11	Gerry Fox	Pyoe Pin	Programme Manager	Yangon	01-254658	gerry.fox@pyoepin.org
9/5/11	Maung Maung Than	Pyoe Pin	Project Coordinator	Yangon	01-254658	maungmaung.than@pyoepin.org
9/5/11	Kyaw Tint	ECCDI	Chairman	Yangon	01-510902	
9/5/11	U Mehm Koko Gyi	ECDDI	Vice-Chairman	Yangon	01-510902	kk_g@myanmar.con.mm
10/5/11	Barbar Cho	Timber Merchants Association	Secretary 1	Yangon	09-5110832	mtma.mm93@gmail.com
11/5/11	U Kyaw Thu	Classic Home Furniture	Director	Yangon	09-5180836	kyaw.easthome@gmail.com
12/5/11	Myo Oo	Ecodev	project officer	Yangon		-
12/5/11	Hla Mint		Rice trader	Nattalin		-
13/5/11	Ko Ko Aung	UNDP Project	Manager	Singbaungwe		-
13/5/11	Zaw Zaw	Ecodev	Field officer	Magway		-
13/5/11	U Khim Maung Than	Ecodev	Field officer	Magway		-
15/5/11	U Myint Swe	local trader	Gum Trader	Daung Nay, Magway		
16/5/11	U Soe Tint	Magway Township Forest Department	Director	Magway		usoetint17@gmail.com
16/5/11	U Som Ag	Magway Region Forest Department	Deputy Director	Magway		

Date	Name	Organization	Position	Location	Tel	Email
16/5/11	Moe Aung	Min Hla Township Forest Department	Director	Magway		
18/5/11	U Tin Win	Favourite Trading	Owner	Kyaukpadaung	061-50018	
18/5/11	Khin Myo Htway	Popa Botanical Gardens	Research Officer	Kyaukpadaung	02-69162	khinmyohtweo07@gmail.com
19/5/11	Soe Naing	Pakokhu Medicinal Plants Trading	Owner	Pakhokku		
19/5/11	Ni Ni Soe	OISCA CF training center	Project Officer	Pakhangyi, Yesagyo		
19/5/11	U Ohn Maung	Galon Nyinaung Burese Medicine	Owner	Sitha, Yesagyo	09-2301735	
19/5/11	U Sein Tyang	Sein Tharaphu Insense Sticks	Owner	Panyin, Yesagyo	062-20126	
20/5/11	U Maung Maung	Shwe La Trading	Owner	Mandalay	02-31928	
20/5/11	U Kyaw Kyaw (James Hong)	Hi-Tech Forest Industries	Managing Director	Mandalay	09-5018139	jameshong@myanmar.com.mm
20/5/11	U San Myint	Three Red Stars Rattan Trading	Factory Manager	Mandalay	02-88530	trst@mptmai.net.mm
21/5/11	U Maung Than	U Maung Than Trading	Plum Trader	Mandalay	02-33659	
22/5/11	Nhkum Brang Awng	Ecodev	Field officer	Myitkyina		
22/5/11	Mau Mau	Ecodev	Field manager	Myitkyina		
24/5/11	U Tint Shin	Khin Twata Soe Rattan Trading Co.	Outpost In-charge	Myitkyina		
25/5/11	U Yaw Hton	MBA Baptists	Representative	Myitkyina		
25/5/11	Brang Mai	URM	Representative	Myitkyina		
25/5/11	Jalee	KMSS	Representative	Myitkyina		
25/5/11	Nzayo San	Anglican Church	Representative	Myitkyina		
25/5/11	U Ye Mon	Wainmaw Township Forest Department				

Date	Name	Organization	Position	Location	Tel	Email
31/5/11	U Myint Ngwe	FRI Forest Research Institute	Director	Yezin, Nay Pyi Taw	09-5301546	myintgwe75@gmail.com
31/5/11	Ohn Lwin	FRI	Deputy Director		67-416545	ohnpyone@gmail.com
31/5/11	Win Myint	FRI	Deputy Director			
31/5/11	U Kyaw Maung	FRI	Rattan researcher			kwmaung183@gmail.com
31/5/11	Khim May Win	FRI	Rattan researcher			
31/5/11	Aung Sor Mo	FRI	Bamboo researcher			

2 Itinerary

Date	Day	Time		Location	Activity	Importance Notice	Remark
		From	To				
12 May	Thursday	12:00	18:00	Yangon to Pyi	Departure from Yangon Interviews along the way	Car and Hotel arrange by PyoPin; Night stop at Pyi	One staff from ECODEV Ygn will accompany (U Myo Oo)
13 May	Friday	8:00	14:00	Pyi to Magway	Look at local market in Pyi Departure from Pyi		
		2:00	17:00	ECODEV Office, Magway	Meeting with ECODEV team	Night stop at Mgway; hotel arrange by Pyopin	
14 May	Saturday	8:00	12:00	Magway to Padeegone Village	<ul style="list-style-type: none"> Transact walk through CF site Visit Plum Garden 	<ul style="list-style-type: none"> Organize villagers ahead by ECODEV Discussion with villagers 	U Zaw Zaw from Magway ECODEV office accompanies
		12:00	17:00	Padeegone village	Discussion with villagers from Pa De Gone	Night stop at Magway	
15 May	Sunday	8:00	12:00	Magway to CF site, Kan Thar Lay village	Observe Eucalytus plantation & discuss with CF committee	To bring committee to CF site	Arrange by U Khin Maung Than, Magway ECODEV office
		12:00		Magway	Market visit meet with township FD officer	Night stop at Magway	
16 May	Monday	15:00	17:00	Magway to Popa	Departure from Magway	Night stop at Popa; hotel arrange by PyoPin	
17 May	Tuesday	7:00	9:00	Popa to Nyaung Pin Tha Village	Departure for CF village	<ul style="list-style-type: none"> One cycle for each member hired 	Myo Oo will arrange
		9:00	10:00	Village to CF field site	observe Lucena, Acacia Catechu Plantation & Natural Forest maintained by FUG discuss with FUG	Need to walk back and forth 2 hours	
		12:00	15:00	Village	Discuss with FUG	Lunch will be arranged	
		15:00	17:00	Nyaung Pin Tha to Taung Oo Village	Meet with FUG Observe Thanaka garden, Plum seed processing factory	Night stop at Popa	
18	Wednes-	7:00	10:00	Popa, Bagan	Interview with		Myo Oo Departs

Date	Day	Time		Location	Activity	Importance Notice	Remark
		From	To				
May	day				traders in Kyaukpadaung Departure to Bagan		
19 May	Thursday	7:00	9:00	Bagan to Pokakku	Interview with trader		
		12:00	15:00	Pokakku to Sitha village, Yesagyo	Study “aloe” cultivating		
		15:00	17:00	Sitha to Monywa		Night stop at Monywa: Hotel arrange by Pyopin	
20 May	Friday	7:00	10:00	Monywa, Mandalay	Departure from Monywa Interview with traders	Night stop at Mandalay: Hotel arranged by Pyopin	
21 May	Saturday			Mandalay	Meeting with traders		
22 May	Sunday			Mandalay to Myitkyina	<ul style="list-style-type: none"> • Meet with ECODEV staff and arrange for trip 	<ul style="list-style-type: none"> • Nyan Myint Maung, Project officer, ECODEV, Myitkyina Office • Hire U Steven's 4-wheel 	Night stop at Myitkyina; air ticket & hotel arranged by PyoPin
23 May	Monday	6:00	18:00	Myitkyina, villages: CF sites	<ul style="list-style-type: none"> • Visit U Steven (FREDA) CF site • Wu Yang CF site • Discuss with FUG from Wu Yang 		
24 May	Tuesday	9:00	15:00	Myitkyina, villages, ECODEV office	GauNan village, Medicinal Plants ShaDau village: Rattan Trader		
25 May	Wednesday			Myitkyina: villages around	Meeting with local partners of EcoDev, township FD staff		
26 May	Thursday			Myitkyina: Ecodev office, FD.	LoiHkaw Village: CF/rattan regeneration		
27 May	Friday			Myitkyina to Yangon			

3 Forest User Group Interviews

3.1 Pa Tee Kone, Magway township, Magway region

Pa Tee Go Community Forestry Group, Bagway township, Bagway region, Saturday 14 May 2011.

A: the community forest

The village of Pa Tee Go has established 500 acres of community forest since 2002. A total of 20,000 trees were planted. The main tree species planted were Eucalyptus, "oricha" *Leucaena leucocephala*, "mesali" *Cassia siamea* and in smaller quantities: , "thanaka" *Hesperathusa caerulata*, "Zee" *Ziziphus mauretanica*, also known as jujube or plums, *Mangifera indica*, mango and "yingma", an *Acacia* species. 4,000 Eucalypt trees were cut to build a community school.

From visual observation, the community forest can be divided into four sections. The first part, closest to the village, contains rows of eucalyptus planted on bunds around agricultural plots.

The second part is well covered by a vegetation dominated by a tree called "kandaya su", *Acacia* sp. This tree was originally sown by airplanes during the 1980s, and has spread all over the area. It is used for firewood. In the first section, trees are about 2-3 m. high.

The third part looks more like open shrub land of 1-2 m. high, where "kandaya su" is mixed with other firewood trees such as "thana" and "thahat", *Acacia hamiltonia*. The village graveyard is also situated here.

The fourth part consists of heavily eroded gullies, more than five meters deep, with much exposed rock and sparse vegetation.

It would seem that there especially in the third and the fourth sections the challenge remains to find agroforestry solutions that could fit these environmentally damaged areas.

B: the community

Pa Tee Kone village consists of 138 households who are all members of the community forestry group. Out of these, 80 households own agricultural land, 48 are landless. All 138 households are members of the community forest.

C: Land use

Apart from the 500 acres of community forest, there is also 500 acres of irrigated paddy land and 500 acres of upland fields. The total village area covers 1,500 acres. The village is situated next to a canal and a large water pumping station, which takes water out of the Ayurwaddy river to serve irrigation water to several villages. This new supply of water not only feeds the paddy fields but has also improved the growth of trees in the community forest, according to the villagers.

D: Forest use

The villagers feel that the community forest has mainly benefited them by providing a cooler and greener environment. The protective management of the community forest also provides the community with much more firewood than in the past. The main source of firewood is "kandaya su".

Another tree harvested for firewood include "tahat". Most of the firewood is used in the community, but some can be sold as well. Last year, 115 truckloads (575 tons or 1,150 oxcart loads) of firewood were sold, worth 46 million kyat. On average, that represents a value of 333,000 kyat(\$404) per household.

Out of the 20,000 trees planted, some 4,000 Eucalyptus trees were harvested to build a community training hall around 2005. This building has already been dismantled as it was falling apart. Eucalyptus wood can only be used inside the community, it cannot be sold to others. With a perceived price of 10,000 kyat (\$12) per tree, the value of the 4,000 trees is estimated to be worth 40,000 kyat, that is 290 kyat (\$0.35) per household). This low average value per household may explain why not more trees were cut.

Other benefits from the forest include animal grazing and the collection of several NTFPs such as "shaw piu" tragacanth resin, jujube plums (*Ziziphus mauretanica*). No estimates for the value of these products could be given.

E: Main sources of household income and expenditure

The 500 acres (202.34 ha) of paddy field produce two crops per year, yielding 70 baskets per acre (3,600 kg/ha) each time. So the total annual rice production is 70,000 baskets (1,460,200 kg) of paddy rice. That is on average 17,990 kg of paddy rice per land-owning household. With a price of 5,000 kyat per basket, the total value of the annual two rice crops is 350 million kyat, which is equivalent to an income of 5.6 million kyat (\$6,804) per land owning household per year.

The average consumption of rice per household can be estimated to be roughly 350 kg of paddy rice per capita per year. For an average household of 5.6 persons, the average paddy rice requirement per household is 1,960 kg or 94 baskets per year (7.8 baskets per month), worth 470,000 kyat. In this case that is equivalent to 11% of the average rice harvest. Rice growing households can sell 89% of their harvest, which is 16,030 kg or 780 baskets, worth 3.9 million kyat (\$4,739) per land owning household.

The uplands are cropped with sesame, green grams and peanuts. Sesame and green grams produce 9 baskets/acre and peanuts 30 baskets/acre. The price of sesame and green grams was 22,000 kyat per basket, the price of peanuts 6,000 kyat/basket. Assuming each crop occupies roughly a third of the total area of 500 acres of upland fields, or 167 acres, the total production of sesame and green grams was 3,006 baskets (worth 66 million kyat) and for peanuts 5,010 baskets (worth 30 million kyat). The total value of these crops was 96 million kyat or on average 1.2 million kyat per land owning household.

The 58 landless families get their main income from labor. In the rainy season, they do weeding and harvesting on other people's bean farms. The average wage in this period is estimated to be 700 per half day or 1,200 per full day. In peak periods, when labor is short, this rate can go up to 2,000 per day. In the dry season, they spend about four months per year collecting firewood and animal fodder. On average they can earn 700 kyat per day with this work. Assuming an average number of 25 days per month worked, and 3 labor forces per household, the income per landless household from labor would thus be 720,000 in the wet season and 210,000 in the rainy season, in total 930,000 kyat per year (total 54 million for all 58 landless households).

From these figures, one could argue that landless households rely for 22% of their annual cash income from forests (total 12 million kyat for all 58 landless households).

Assuming landless households would have the same rice requirement as calculated above for land owning households of 94 baskets per year, they would need to spend 470,000 kyat on rice buying per year. That represents 50% of their total cash income obtained from labor. Considering that poor households also need to buy most of their other food, they will not be in a position to make much savings per year.

For the village as a whole, the total income can be summarized as follows:

- total income from rice and beans (minus labor) 404 million kyat (80%)
- total income from agricultural labor: 42 million kyat (8%)
- total income from labor collecting firewood and fodder: 12 million kyat (2%)
- total income from selling firewood: 46 million kyat (9%)
- Overall village income per year: 504 million kyat (100%)

So the total income derived from forest would amount to 11% of all village income. For the landless households, that rate is 22%. While this is not negligible, it is not sure if this community could be defined as "forest dependent".

F: Ranking of NTFPs for future production and marketing:

- 1: Jujube plums: easy to grow, rapid income, stable market, can benefit many households
- 2: Thanaka: easy to grow, grows slowly, good price, can be done by many people
- 3: Timber trees like "jinma" (Chukrasia) and teak (Tectona grandis)
- 4: Firewood species like "Dahat"
- 5: Betel palms could be grown where there is enough water
- 6: sandalwood: grows very slowly but it has a good price

G: Other observations

- 1) The CF group was originally set up only 75 members. Now all households are members. This could mean that the landless and poor households do not have as much ownership of the CF area as they used to have.
- 2) Many of the trees proposed for planting are trees with high value products that take many years to grow. Such trees are more suitable for growing around the house or in private gardens, rather than in a community forest where they could easily be stolen.
- 3) During the forest walk, we also observed many trees of "thanaung", *Acacia leucophloea*, from which the bark seems to be harvested.

3.2 Kan Thar Lay, Khan Thar Magway township, Magway Region

Kan Thar Lay Community Forestry Group, Bagway township, Bagway region, Sunday 15 May 2011.

A: the community forest

The village of Kan Thar Lay has established 50 acres of community forest between 1995-1997. The main tree species planted were Eucalyptus (9000 trees) and Acacia catechu "sha" (2000 trees). So far, 500 Eucalyptus trees were cut in 2005 to build a school. This school was later broken down again. The forest looks very impressive, the trees are over 30 meters tall and have a girth of 3 feet or more.

B: the community

Kan Thar Lay villages consists of 250 households (1140 inhabitants) who are all members of the community forestry group. Out of these, 110 households own agricultural land, 140 are landless. The 140 landless families are considered as poor, some 35 households have less than 5 acres of land, 75 households have 5 acres or more.

C: Land use

Apart from the 50 acres of community forest, there is also 20 acres of land that consists of creeks. These creeks are dry and sandy areas for most of the year, however in the rainy season they turn into rivers. The total area of agricultural land is 1200 acres. All of this is upland, used to grow beans and pulses, there is no rice paddy. So the total village land covers 1,270 acres. Adjacent to the village lies a protected forest area of 2,000 acres. This area is used by seven villages for grazing animals and to collect firewood.

D: Main sources of household income and expenditure

On average, each of the 110 land owning families can earn around 1.5 million kyat(\$1,823) from growing beans per year.

Landless families get their main income from labor. In the rainy season, they do weeding and harvesting on other people's bean farms. Normally they can earn an average wage of 700 per half day or 1,200 per full day. In peak periods, when labor is short, this rate can go up to 2,000 per day. Over eight months, taking an average income of 1,000 kyat per day, a landless household can get 240,000 kyat (\$292).

In the dry season, they spend about four months per year collecting firewood, animal fodder and small branches for fencing from the protected forest. On average they can earn 700 kyat per day with this work. Not everybody gets involved, in this village, perhaps only 7-10 families regularly go into the reserved forest. For these families, forests provide an additional income of 84,000 kyat (\$102).

E: Present Use of Non-Timber Forest Products

The main forest products providing income to the village are firewood, bamboo shoots, mushrooms and jujube plums (see table below). Total NTFP income is 65.5 million kyat for the whole village, which is equivalent to 262,000 kyat (\$318) per household. Cattle grazing is another main source of income from the forest but difficult to quantify.

There are two other products that exist in the forest that are considered potentially valuable but not yet sold: "Shaw piu" gum and "Tot tham myit" palm roots. The main sources of firewood are "zam" and "khaung lai". Other sources "re thann", "danath" and Leucaena.

Table 20: Estimate of NTFP income for the whole village, Kan Thar Lay village,

Product	Quantity/year	Price	Annual Value
Firewood	6000 carts	4,000 kyat/cart	24 million kyat
Bamboo shoots	3000 viss	7000 kyat/viss	21 million kyat
Mushrooms	5000 viss	35000 kyat/viss	17.5 million kyat
Jujube plums	1500 baskets	2000 kyat/basket	3 million kyat
“Shaw piu” gum	Not sold	8000 kyat/basket	
“Toth tann myit”	Not sold	3500 kyat/basket	
Cattle grazing	Cannot quantify	Cannot quantify	important
			65.5 million kyat

F: Ranking of NTFPs for future production and marketing:

- 1: Jujube plums: easy to grow, rapid income, stable market, can benefit many households
- 2: Thanaka: easy to grow, grows slowly, good price, can be done by many people
- 3: "jinma" (Chukrasia sp.) for timber and firewood
- 4: teak: good price
- 5: sandalwood: grows very slowly, good price

G: Other observations

Mr. Han Soe manages a small tree nursery supported by Save the Children with support from EU. The nursery looked good, there was a good stock of seedlings of thanaka, sandalwood and various other species.

3.3 Nyaung Pin Thar, Kyaukpadaung township, Mandalay region

Nyaung Pin Thar village, Elingo tract, Kyaukpadaung township, Mandalay region.

A: Community forest

The village has a 105 acres of community forests. Of these, 57 acres were planted with financial assistance from the UNDP Project in 1997. An additional 48 acres were added later and also planted to trees. The main tree species planted were Eucalyptus (9,000 trees), “Sha” (Acacia catechu), “Pozagai” (Leucaena), “Zee” (Jujube plums), “Zaingba” (Butea monosperma), “Koko” (Albizia lebecq), “Mesali” (Cassia siamea). Firewood is the main product collected, sometimes branches of Leucaena are chopped to feed the goats.

Next to the village there is a state owned forest on the hill tops covering approximately 1,000 acres. Villagers go there to collect fodder for their animals and collect branches for firewood. Grazing of livestock is considered a very important function of forests. There is also a small weir with a water reservoir situated within the community forest area.

B: Community

Nyaung Pin Tar village counts 105 households, of which 30 landless and 75 landowners. In spite of having access to good irrigated farmland, some 20-30 persons have gone to work as laborers in the jade mines in other parts of the country.

C: Land Use

Apart from 105 acres of community forest, the village land covers 50 acres of wasteland 400 acres of upland for growing beans and pulses plus 300 acres of paddy field. The total village land covers 855 acres. Due to an irrigation system, the paddy can produce two rice crops per year, with an average yield of 50-70 baskets/acre. The main upland crops are sesame and pigeon pea.

D: Estimates for household income

Average agricultural income can be estimated to be over 3 million kyat or \$3,857 per land owning household (see Table 21).

Table 21: Estimated cropping income, Nyaung Pin Thar village, Kyaukpadaung, May 2011.

Crop	Area	Yield/acre	Production	Price	Value	per owner household	
	acres	baskets	baskets	kyat/basket	kyat	kyat/hh	US\$/hh
paddy first	300	60	18000	4000	72,000,000	960,000	\$ 1,166
paddy 2nd	300	60	18000	4000	72,000,000	960,000	\$ 1,166
sesame	400	5	2000	22000	44,000,000	586,667	\$ 713
pigeonpea	400	5	2000	25000	50,000,000	666,667	\$ 810
total					238,000,000	3,173,333	\$ 3,857

E: Present use of forest products

Firewood can be collected for household use but selling is strictly forbidden. The main forest products providing income are bamboo shoots, palm roots and neem leaves. Bamboo shoots ("Myin wa", *Dendrocalamus strictus*) are sold from June to July by some 40% of all households. Average income per collecting household is 420,000 kyat (\$510) per year.

F: Ranking of forest products for marketing development

A group of women in Nyaung Pin Tar discussed and ranked forest products to their potential for improving income through marketing. They included a number of fruit trees which they would like to plant as well.

Table 22: Ranking of products for market development by women of Nyaung Pin Tar.

Product	No of markers	Rank
Thanaka	34	1
Lemon	32	2
Coconut	24	3
Lime	22	4
Guava	21	5
Sugar palm	16	6
Banana	15	7
Mango	15	7
Bamboo shoots	11	8
Tamarind	11	8
Plums (jujube)	7	11

3.4 Taung U, Kyaukpadaung Township, Mandalay Region

This was a relatively short visit in the late afternoon of 17 May 2011. The activities were limited to a short discussion meeting with the Forest User Group, a walk through a tree garden and a visit to a local plum seed mill.

The community forest was established in 1999 with assistance of the UNDP project. It covers only 30 acres. It was planted with orysa (*Acacia auricularia*), Eucalyptus, mesale (*Cassia siamea*) and sha (*Acacia catechu*). The village land also covers 400 acres of paddy and 2,000 acres of upland bean fields where sesame and pigeon pea are the main crops. In these fields plum trees (*Ziziphus mauritania*) and sugar palm trees (*Borassus flabellifer*) are individually owned.

The community is large, counting 550 households, of which 70 landless. The main NTFPs providing income are:

- 1) “Zee” plum seeds: 20,000 baskets of plums are sold per year, that is on average 36 baskets per household. With a price of 2,500 kyat per basket, that represents an average household income of 91,000 kyat (US\$110).
- 2) Tamarind, ‘tot tham myit’ palm shoots and brown sugar made from sugar palms.

For marketing, the community would like to focus on (1) plums (2) mango (3) thanaka (4) sandalwood and (5) lime and lemon. When asked what is stopping them from planting these trees, the FUG members answered that it is quite costly, it requires a huge labor investment. During the UNDP project, 2.5 million kyat was given to the village to establish the 30 acre community forest in the year 2000. Now, in 2011, that would be equivalent to 110 million kyat. (US\$133,650).

If any funds were available for investment in this village, the FUG members would prefer it to be used to establish irrigation systems for the paddy fields.

During a walk through the village, we saw a very well established thanaka garden which is producing very well. We were also led to the market where Ms. Kyi Hlaing is operating a plum seed shelling machine. By shelling the dried fruits, the community can sell only the seeds which means they keep more value in the community.

3.5 Wu Yang, Wain Maw Township, Kachin State

Community Forest User Group in Wu Jan village, Kachin State, 23 May 2011.

A: Status of the Community Forest

Currently the Community Forest in Wu Jan village covers 1,200 acres. Planting of trees started in 2004. The main tree species planted were: “mesali” *Cassia siamea*, “cheung” or teak, *Tectona grandis*, “yemane” *Gmelina arborea*, “jingaru” or “pyinkadau”, ironwood, *Xylia dolabriformis* and “jingma” *Chukrasia tabularis*. A certificate was awarded in 2007, after 300 acres had been planted successfully. Up to now, 600 acres have been planted with 500,000 trees. The forest consists of 600 ha of planted forest, 300 acres of degraded forest where additional trees were planted and 300 acres of natural forest.

So far, the community has harvested 60 metric ton of wood, mainly "mesali" for the construction of a school, a bridge and a church. The value of this timber is estimated to be equivalent to 300,000 kiat per ton, total value 18 million kiat (47,000 kiat or \$57 per household).

Wu Jan village belongs to the Wai Yin village ward. In the other two villages, community forests were established as well: 300 acres in Wai Yin and 800 acres in Lamyan. The total CF area in this ward covers 2,300 acres.

B: Population

The total population of Wai Yin village yard counts 659 households: 363 in Wu Yan, 93 in Wai Yin and 203 in Lamyan. Of the 363 households in Wu Yan, 100 are big land owners (more than 5 acres of paddy per household), 150 are 'landless' in the sense that they have no paddy fields, the remaining 113 are average paddy owning households. The 150 'landless' households used to rely on shifting cultivation.

C: Impact of rubber plantation

About 100 of these households used to grow upland rice on land outside the village area. This land is now occupied by a new Chinese rubber plantation which covers 40,000 acres. The farmers have moved their upland fields from the north of the village to the east. The land in the eastern part is much less fertile than in the previous location. The affected households were not compensated for the loss of their upland fields.

D: Land use

Apart from the 1,200 acres of community forest land, the village of Wu Yan also has about 980 acres of lowland paddy fields. The average yield is 60 baskets per acre, rice is grown only in the rainy season (1 crop per year). About 125 acres can be irrigated, here two crops can be grown per year. There is also about 200 acres of upland field.

E: Rice production and consumption

The rainy season rice crop produces $980 \times 60 = 58,800$ baskets (1,226 tons, 1 basket is 20.86 kg). The dry season rice crop produced $200 \times 60 = 12,000$ baskets (575 tons). Total rice production is 70,800 baskets (1,477 tons). That is about 332 baskets or 6,925 kg per paddy owning household. Averaged over all 383 households (land owning and landless) the production per household is 185 baskets or 3,856 kg. The production from upland fields is not included in this calculation.

The villagers estimate the average rice consumption to be 3 milk tins of milled rice per day or $365 \times 3 = 1,095$ milk tins per person per year. 128 milk tins are equivalent to 1 basket, so 1,095 milk tins are 8.55 baskets. That is equivalent to 291 kg of milled rice (34.01 kg per basket). It would take about 388 kg of paddy rice to produce 291 kg of milled rice. So one person consumes 388 kg of paddy rice per year. With an average of six persons per household, the average annual household consumption of paddy rice would be 2,328 kg or 112 baskets.

In short, on average the annual consumption of rice (112 baskets per household) is about 60% of the annual production (182 baskets per household). The surplus of 70 baskets can be sold, with a price of 5,000 kiat per basket that represents an income of 350,000 kiat (\$425) per household per year.

F: NTFP use

The main Non-Timber Forest Products collected from the community forest are:

- 1) Bamboo shoots of "wa bo" *Dendrocalamus hamiltonii*. Price 300 kiat/viss for fresh shoots, 300 kiat/tin for dried shoots. The average consumption of the entire village is estimated to be 100,000 shoots per year, that is 30 million kiat or 78,329 kiat (\$96) per household.
- 2) "taw own" large palm shoots of *Arenga westerhoutii*. The price is 2,000-2,500 kiat per shoot.
- 3) "taung zim pat" leaves for packing of *Maranta* spp. The price is 10-15 kiat per leaf.
- 4) mushrooms: "taung boh hmo", "thitkat hmo", price 5,000 kiat/viss.
- 5) "hin pin" vegetables and fruits, 2,000 kiat per plant.
- 6) "ngar pauk" nuts of *Dracontomelum* sp. price 4,800 kiat per basket, we can sell 400-800 baskets per year or 1.9 to 2.8 million kiat, 500-1,000 kiat (\$0,62-1.24) per household.
- 7) "hwa on" elephant foot yam *Amorphophallus* sp. We sold 1,000 viss at a price of 500 kiat/viss: 500,000 kiat or 1,305 kiat (\$1.58) per household.

Later during the transect walk, we noticed several oxcarts carrying bamboo from the forest. We also noted many houses using thatch roofing. The use of thatch, bamboo and firewood is not included in these calculations.

The total value of NTFPs sold per household is difficult to estimate as we could not get clear estimates of the volumes of all products. For bamboo shoots, nuts and elephant yam alone, the total value is 80,384 kiat (\$98) per household.

G: Forest dependency

The value of the timber extracted so far was 47,000 kiat (\$57) per household. The value of NTFPs (without thatch, bamboo poles or firewood) is 80,384 kiat (\$98). Altogether the forest provided an income of 127,384 kiat (\$155) per household. Income from rice growing provided 350,000 kiat or \$425 per household per year. Income from selling livestock was not calculated. On the basis of rice and forest products alone, total household income would be 477,384 kiat (\$580). Forest products provided 27% of household income.

H: Selecting NTFPs for marketing

The Forest User Group members of Wu Ya community believe the following products have the best potential for income generation through improved production and marketing:

- 1) "hwa on" elephant foot yam *Amorphophallus* sp. It is easy to grow and the market used to be good. In the past, Chinese traders would come and buy this product. As we collected all from the forest, the product became scarce and now the Chinese traders do not come any more. If we want to sell this product on a larger scale, we must go and establish selling relationships with Chinese traders at the Chinese border.
- 2) Tea, *Camelia sinensis*. We have never grown tea, but we think it would not be difficult and the price seems to be good.
- 3) Black pepper, *Piper nigrum*. We see other people grow it, we know we can do this and the price seems to be good.

- 4) Coffee, *Coffea arabica*. This is in the project plan of the NGO Sjalom to assist us in planting coffee. We do not know where the factory would be, probably in Mandalay or Yangon.
- 5) Karawe, cinnamon, *Cinnamomum zeylanica*. We have some trees in our home gardens already, it seems to grow well and the Chinese seem keen to buy it.
- 6) Turmeric seeds, *Alpinia galangal*. We can easily grow this and the price is good.
- 7) Coriander, *Coriandrum sativum*. We grow it in our homegardens, the price is 100 kiat per bunch.

We would like the project to help us with provision of seed materials and with finding reliable buyers for our products.

I: Other observations

An area of 40,000 acres of former upland farm and fallow land were recently given as a concession to a Chinese company by the central Government. Against that background, the Community Forest Certificate given to Wu Yan community becomes a powerful tool for Wu yan villagers to protect their forest from being taken away by outsiders. It confirms their legal tenure rights in a clear way. Issuing of CF certificates to other communities who did not receive their CF certificate yet should be accelerated. This would improve their tenure security over forest land enabling them to protect it from being taken over by foreign investors.

3.6 Lwe HKaw, Myintkyina Township, Kachin State

Lwe Hkaw Community Forest User Group, Myintkyina township, Kachin State, 26 May 2011.

A: Status of the Community Forest

Originally this area was part of large forest area called Phidaw forest. Over the last forty years, many people settled here and converted forest into agricultural land applying shifting cultivation. People started planting trees like dog fruit to secure their ownership over their fields. Since 2002, some 400 acres have been managed as a community forest area. Another 500 ha have since then be added. In this area, tree planting occurred through the method of "gap filling", with assistance of the Farmer Field School Project supported by the KMSS (Catholic mission). In practice, many households retain their individual tree gardens inside the community forest. Besides dog fruit, villagers also planted 'jemane' *Gmelina*, 'jingaru', ironwood and 'chun' teak. Rattan stands are naturally occurring and being harvested as well.

B: Population

Lwe Khaw is a large community counting 550 households, all of them own some land, there are no landless households here. In 1972 there were only 30 households here, many people settled here as land was plentiful and easy to obtain. The main sources of income by now is gained working as laborers in the jade and gold mines nearby or in rubber plantations (more than 50%). Other income is obtained from selling NTFPs as well as cultivating rice in paddy fields.

C: Impact of rubber plantation

So far, commercial rubber plantations have only had a limited impact, still some 30 households lost their dog fruit plantations to commercial rubber plantations.

D: Land use

The community forest are covers 900 acres. There are also paddy fields and other land, acreages could not be given and rice yields were not discussed.

E: NTFP use

The main Non-Timber Forest Products collected from the community forest are:

- 1: “danyin”, dog fruits (*Archidendron pauciflorum*). Perhaps 165 households (30%) sell dog fruits regularly. A mature tree can give 2000 piu of fruits, they sell 20 khyat per piu, so one tree yields 40,000 kyat. A typical household may own 200 trees, so they could get an annual income per household of 8 million kyat (\$9,720) ???(need to check these numbers).
- 2: thatch. Imperata grass is harvested and used as roofing material
- 3: broom grass. *Thysanolaema maxima* is a grass used to make brooms
- 4: 'indwe' resin.
- 5: rattan. We used to sell a lot, now much less. Now only a dozen or so households are still doing this. The main species is red cane (*Gadein kyein*). On average, each household can sell perhaps 30,000-40,000 kyat (\$36-48) per year.
- 6: fuelwood. People could be observed taking fuelwood from the forest.

F: Forest dependency

In terms of cash income, forests play a minor role in the household economy. In terms of land tenure, each household owns a plot of land inside the forest area. Community forests here have become a way of securing access to land, a key part of the household assets.

G: Selecting NTFPs for marketing

The villagers of Lwe Khaw are already harvesting dog fruits, thatch, broom grass and indwe as well as some rattan. There would seem to be a good potential for restoring rattan resources. The forest user group is interested to work on adding value to rattan, as well as find new markets for dog fruits, e.g. in China. Selling of teak and mesali is also seen as a potential future income source from forests.

4 Interviews with NTFP Traders

4.1 Interview with Mr. Myint Swe, trader in "shaw piu" gum

Date and Place: Daung Nay village, Magway Township, Magway Region, 15 May 2011

1: Market prospects

The village of Daung Nay has been selling "shaw piu" (gum karaya of a *Sterculia* spp.) for at least 20 years. Mr. Myint Swe has been the main trader for the last four years. When he started, the price was 800 kiat per viss, now the price is 8,000 kiat/viss. Demand is steady and the price is

going up every year. Mr. Myint Swe sold around 7,000 viss last year (turnover 56 million kiat or \$7,000).

He believes the product is mostly exported to Thailand and India where they use it in making soft drinks and other food products.

2: Market map

Mr. Myint Swe buys the product from 100-150 households in 10 surrounding villages. He sells the product directly to Company 1-1-1 in Yangon. There is not much competition, there is one other trader in Magway city, Mr. U Ar Louay. The price is set by the company in Yangon, they usually announce their buying price in the month of June each year, at the beginning of the harvesting season.

3: Product quality criteria

The best quality is colourless and dry. Yellow to brown colouring is caused by contact with rain. The price difference for best quality is 1,500 kiat/viss.

4: Government regulations

No special permits are needed and no tax is paid over "shaw piu".

5: Raw material production

The trees are carved with V-shaped incisions, which exude the gum. With careful cutting techniques, one tree will start producing after five years and can then be used for about ten years before it dies. Mr. Myint Swe has also started a nursery to distribute seedlings of "shaw-piu".

6: Packaging and transport

The gum is packed in standard polyethylene rice bags containing around 40 kg per bag. Transport from the village to Magway town is done by public transport at a cost of 1 kiat/viss. The product is transported from Magway to Yangon by truck at a cost of 200 kiat/viss.

7: financing, support needs

Mr. Myint Shwe uses his own capital to pay producers, he does not need any capital from the bank. To increase income of village communities from this product, three types of outside support would be useful according to Mr. Myint Shwe. The first is improving and ensuring large scale demand at a secure price from buyers in Yangon. With larger demand, traders like Mr. Myint Shew may need more capital to advance payments to village producers, so access to capital would be the second support need. The third need is support in the form of technical assistance: how to enhance growth rates of the trees, get more gum per tree, improve quality etc. Mr. Myint would welcome more competition, as this would likely drive up the price further.

4.2 Visit to Cutch factory in Seik Pyu township, 16 May 2011.

Mr. Moe Aung and Mr. Joost Foppes of the Ecodev/Pyoe Pin NTFP marketing research mission visited a cutch making factory in Seik Pyu township. They were not allowed to take any pictures but were shown around the factory.

Large pieces of "sha" wood, *Acacia catechu*, were used as raw material. On average these pieces were about 3 feet long and 4 feet or more in girth, the bark already peeled off. The first treatment is sawing into sticks of around 4 inches diameter. The sawing is done by two hand saws operated each by two men.

The second treatment is chipping the sticks into chips by feeding them into a large and rather loud chipping machine, driven by a diesel engine. The third treatment is boiling the chips with water in three large autoclaves. The juice resulting from this treatment is then applied with a fourth treatment: evaporation of surplus water in a tall distillation tube that is air cooled. The fifth step is putting the resulting residue into moulds and allowing it to cool down, producing blocks of cutch. The boiled chips are used as fuel for the water boiler.

The capacity of the factory is about 2 tons of wood per day. One ton of wood produces around 350 kg of cutch (NB 35% recovery is much higher than the rate quoted in Rodger's handbook of forest products of Burma, where the recovery rate is stated to be 3-10% only, this needs to be checked).

The factory manager referred to the factory owner in Yangon for more details about the trade volume and prices. The owner is U Than Naing, telephone no: 01-393337.

4.3 Interview with Mr. Maung Maung, medicinal plants trader, Mandalay.

Mr. Maung Maung is the director of the Shwe La Co, Mandalay. Interview date: 20 May 2011.

I sell about 30 different medicinal plants, the quantities and prices change all the time, if one does not sell well, the other one will. The main products are:

- 1) "Naylay", *Psoralea coryifolia*, 2009: 2,000 tons, 2010: 4,000 tons. Price: 2009: 4,000 kiat/viss, 2010 2,000 kiat/viss, exported to China. For this product, you can see how quickly we sometimes saturate the market by a small increase in production. As the production doubled within a year, the price fell down to half as a result.
- 2) "Tayoke zagar", white/yellow flowers of the pagoda tree, *Plumeria rubra*, exported to China. The harvesting just finished, you see it here in my warehouse.
- 3) "Sanwin" turmeric. 2009: 3,500 kiat/viss, 2010: 2,000 kiat/viss, 4000 ton is exported per year to India.
- 4) "Kyaung ban", now I am stuck with a quantity of 100,000 viss, cannot sell.
- 5) "Phala" Chinese cardamom, *Amomum ovoideum*, I think Myanmar sells about 1,250 tons to China per year. The price is 25,000 kiat/viss for the shelled seeds, 13,000 kiat/viss for the unshelled fruits.
- 6) "Kyaung sha", dried seeds from *Oroxylum indicum*.
- 7) Elephant foot yam, *Amorphophallus* sp. is really popular right now. The price is 4,000 kiat/viss. I receive most of it from the Ayurvadhi delta. I think that this product is the most promising at the moment.

All these products are exported through the Myanmar-China border crossing at Shweli, my main customer lives there. It is hard to say how this market could be improved. We depend very much

on the market from China, we cannot predict how demand or prices will change. At the supply side, we need to improve farm gate quality of the products by introducing stricter grading and quality standards.

5 Interviews with actors in the rattan value chain

5.1 Interview with Mr. Kyau Thu, rattan furniture company, Yangon.

Contact: Mr. Kyau Thu, Classic Home rattan furniture, 09-5180836, kyaw.easthome@gmail.com

Date and Place: 10 May 2010, Yangon.

Question 1: What is your engagement in the rattan sector?

Answer: I started designing and selling rattan furniture and handicrafts since 1993. We export rattan furniture to various countries. I have many clients in Holland and in Germany. In Holland one of my main customers is the Blokker retail chain, who are mainly buying cheap types of basketry in larger quantities. In Germany, the demand is more for higher quality furniture products.

Question 2: Where do you obtain your raw materials from?

Answer: We basically use three types of rattan:

(a) big diameter (20-30mm) cane "kaboh", which comes from the mountains north of Yangon, the price is 800 kyt per cane.

(b) medium diameter (10-22 mm) canes such as moutnain cane and yamata, 200-450 kyat per cane. Main production area is in Kachin state.

(c) small diameter cane (5-15 mm) such as water cane and red cane, 50-80 kyat per cane. Most of small cane also comes from Kachin state.

Question 3: What are the main problems you are facing with supply?

Answer: I rely mainly on rattan extraction companies such as "Three Red Stars" from Mandalay who extract cane from the forest. It is getting difficult to find good quality cane of sufficient length.

For the future, I would like to have my own supply. I believe that rattan plantations could be a good source of income for poor households in the Irrawaddy delta. In that area, the Government is giving land to poor people to plant crops to rebuild their livelihoods after the big floods that happened there some years ago. I am planning to support smallholder rattan plantations there, but I could use some support for starting up.

From my experience, we can plant cane 6 feet apart, that would give about 1300 clumps per ha. With about 30 harvestable canes per clump, one hectare could produce 360,000 canes, worth about \$1,000, in 4-5 years.

Question 4: How is the rattan sector organized?

Answer: All exporters are member of the Rattan and Bamboo Group under the Myanmar Timber Traders Association. We have regular meetings and we organize seminars on rattan development.

Question 5: What is your experience with INBAR?

Answer: We received a visit of Dr. Zhu, he came to my shop. It was interesting to talk to him, he seemed to be impressed with what we are doing. He gave me some good advice. He also told us the total rattan export from Myanmar is about 30,000 tonnes per year, worth about \$7.2 million.

However the role of INBAR in Myanmar so far seems to have been limited. The only activity I have seen is that INBAR paid for some staff from the Forest Research Institute to go on a study tour to China.

Please do not work with the Forest Research Institute. They do not engage with the private sector and they do not work much with communities. They only work on their own plot inside a forest reserve, with very limited impact on others.

Question 6: What is the kind of support institutions like INBAR could be providing to the rattan sector in Myanmar?

Answer: We need more experiments on the raw material production. How to manage wild stands in Kachin state? How to promote good quality rattan plantations for our industry?

Technical support for such initiatives could be channeled through the Bamboo and Rattan Group of the Myanmar Timber Traders Association. We can work directly with rattan producing communities.

Secondly, we need more support on modern design and on markets for high quality rattan products. Myanmar exporters need support to go to the main trade shows in Milano, Paris, Frankfurt and Shanghai.

Thirdly, we could use support to help us overcome trade sanctions. Right now my customers in Europe have to pay 6% higher taxes over every piece of rattan handicraft or furniture they buy from Myanmar, compared to others. It is very difficult for us to compete under these conditions. We would appreciate anything that could be done to promote the competitiveness of Myanmar rattan products.

5.2 Interview with Mr. San Myint, Rattan Export Company, Mandalay.

Contact: Mr. San Myint, Three Red Stars Rattan Trading Company, Kyaw Kyaw Cane factory (E-4, 62nd street, San Pya Heavy Industrial Zone-1, Mandalay, Myanmar, tel. +95-2-88530, email: trst@mptmail.net.mm).

Date and Place: Mandalay, Friday 20 May 2011.

Before the interview, Mr. San Myint showed us around his factory. There is a large warehouse where large quantities of rattan are stored. There are also halls where rattan is split and polished with small hand operated machines.

Question: What are main products produced in this factory?

Answer: Most of the product (90%) is exported to China as split and polished rattan, where it is used to make rattan furniture. Some rattan is also used here to make furniture for the local market.

The main steps in processing are:

- 1) drying/storage
- 2) cleaning/ brushing canes by hand
- 3) splitting and polishing by machine
- 4) bundling in packages of equal size

Question 1: What are the main types of rattan you process?

- 1) "kha baung" (large diameter), we use about 4,000 metric ton per year. The main source area is Bayo mountain area.
- 2) "yechi" water rattan (smallest diameter). We use about 300 metric tons per year. The main source area is Kachin state.
- 3) "Yanata" (medium diameter). We use about 1,000 metric ton per year. The main source area is Kachin state.

Question 2: How are these products delivered to your factory?

Answer: we send our own teams of rattan harvesters to the source areas, to ensure good quality supplies. Usually the source areas are very remote, so rattan is first taken out of the forest by elephants, then it comes down the river by rafting, then it gets on the train to Mandalay and we use a truck to get it from the station to the factory.

Question 3: do you perceive any problems in the supply of these three species?

Answer: Not really, we can still get the amounts we need every year. We expect that it may become more difficult in the future.

Question 4: who is your main buyer?

Answer: I export all rattan to my brother who lives in the Kuangdong area of China (Mr. Jiao De Wei, Li Ping Company, tel. 135 00 26 87 34). He sells the material to Chinese furniture producing companies. They export their products all to the USA.

Question 5: What is the trend in the demand for your products?

Answer: there is a steady demand for rattan furniture in the USA.

Question 6: how do you transport your produce to China?

Answer: In the past we used to ship it through Yangon by boat to China, but now all our produce is transported by road directly to China via the Musay border gate.

Question 7: do you use any financial support from outside to finance your operation?

Answer: No, there is no need. Sometimes Chinese buyers cannot pay in cash, then they send us back some furniture which we can sell on the local market.

Question 8: What is the role of the Government in the rattan trade, is there anything the Government could do to improve the trade?

Answer, there are no problems, they ask us to pay taxes, we are used to that. Otherwise, the Government does not have much involvement.

Question 9: What is your perception of the international competition?

Answer: Everybody knows that Indonesia is the main producer of rattan cane. We cannot compete in bulk, we need to compete in quality and price. We should also try to keep our forests intact. Vietnam has no rattan resources left but they have a very high technical competency to produce rattan furniture and other handicrafts. Also their Government provides very strong support to the rattan handicraft sector. They mainly export to Europe, not to USA, so they are not in direct competition to our company.

Question 10: If we look back at the two strong points you mentioned about Vietnam: high technical competency and strong Government support, to what extent should Myanmar follow their example?

Answer: Of course, we would benefit from improved technical competency and from more Government support to our sector.

Question 11: how large do you estimate the total rattan export to China?

Answer: I would think Myanmar exports about 10,000 metric tons per year.

Question 12: In Lao PDR, WWF is supporting the development of a model for selling rattan that is certified by the Forest Stewardship Council (FSC). How do you see the future potential for certified rattan?

Answer: Yes, I have heard about certification. For the moment, this is not really on the horizon for us. I would be interested to follow the development of this process. On the long term this may become relevant.

Question 13: What do you see as the main research support needs of the rattan sector in Myanmar?

Answer: What we need most is more knowledge on all rattan market chains. It would be great if Myanmar could not only export cane to China, but also higher value processed products to other markets.

Question 14: What could be the role of INBAR, the international network for bamboo and rattan research?

Answer: As I mentioned, I would really like to learn more about the world rattan market.

5.3 Interview with Rob Tizard, WCS rattan project, Kachin State

Interview with Robert Tizard, WCS, Mandalay, Sunday 22 May 2011

Question 1: What type of work is WCS engaged in Kachin state?

Answer: All the work of WCS, the Wildlife Conservation Society, in Kachin state is aimed at tiger conservation. Part of this work is engaging remote village communities in sustainable management of tiger habitat.

Question 2: Does this also involve working with Non-Timber Forest Products (NTFPs)?

Answer: Yes, we work specifically on sustainable harvesting systems for NTFPs that are important for villager's livelihoods. Typical products that villagers want to work on are bamboo, rattan, palm leaves for roofing houses and various medicinal plants.

Question 3: How are sustainable harvesting systems developed?

Answer: This work is guided by a well-known NTFP specialist from New York botanical gardens, Dr. Charles M. Peters. Villagers have done detailed forest inventories to identify the status of their NTFP resources. By studying with villagers the growth rate and regeneration patterns of different species we can determine exactly how much you can harvest from each species per year without damaging the natural resource.

Question 4: So once you have good resource management, villagers can expect to get more income from NTFPs?

Answer: It is not that simple. We found is that most of the commercial NTFPs such as rattan are not harvested by the villagers, but by teams rattan harvesters who come from outside. The way it works is that a trader from Yangon or Mandalay gets a permit from the central Government to collect rattan in Kachin state. Once they obtain such a permit, they prefer to send their own teams of rattan collectors to harvest the plants. The villagers are missing out on a lot of potential NTFP income because of this permit system.

Question 5: What could be done to give villagers more chances of earning a share of the income from harvesting these commercial NTFPs from the forests they are co-managing?

Answer: I guess we need to work on several fronts. At the central level, policy-makers need to be persuaded to change these harvest permit quota systems. Giving villagers the right to harvest rattan and stopping outsiders from entering the forest would give villagers a powerful incentive to manage forests in a sustainable manner. At the local level, we are trying to organize stakeholder meetings between villagers and local authorities to identify better systems for benefit sharing. It is not easy.

Question 6: It would seem this is an area where NGO's could collaborate for more synergy. Would WCS be interested in cooperation with organizations like Ecodev and Pyoepin, if that opportunity would arise?

Answer: Certainly, we can always talk about collaboration. I believe this is the single most important issue to tackle when you talk about improving NTFP income for villagers in Kachin state.

Question 7: Where are the key wild rattan resources located?

Answer: We see most rattan harvesting activity in the Hukaung valley, Danai town is the center of the rattan trade. At the moment our organization cannot access that area due to security concerns.

Question 8: to what extent is NTFP trade to China important?

Answer: We are primarily concerned about reducing illegal wildlife trade crossing the border with China. I also believe orchids are being exported. Then there are many NTFPs such as

medicinal plants being sold to China, which may be less of a problem of biodiversity loss. We have not investigated this type of trade yet.

Question 9: Are you also promoting NTFP cultivation on farms to reduce pressure on wild resources?

Answer: We would like to do this. One issue that makes it difficult for us to do so is that the Government responsibilities for managing land in Kachin state is sharply divided between the Forestry Department, looking after all forest land, and the Agriculture Department, looking after all agricultural land.

Our organization has an MOU with the Forestry Department. We can easily propose activities that take place on forest land. As for the agricultural land, it is more difficult for us as we do not work directly with the Agricultural Department and they see us as part of the Forestry Department. This remains a big challenge for promoting agroforestry practices on agricultural land.

6 Interviews with local NGO's

On 25 May 2011, interviews were held with four NGO's active in community forestry in Kachin State: MBA (Baptists), URM (Urban Rural Development), KMSS (Catholics) and the Anglicans.

6.1 Baptist Association MBA

We talked with Mr. U Yawn Hton of the MBA. The MBA supports community forests around 63 Baptist churches. Every church manages its own budget for this activity, with some support from the central church.

Over 100,000 trees were planted so far. Especially 'jemane' *Gmelina arborea* plantations are doing well, it is "the next best thing" after teak. These trees grow very fast, they can reach a diameter of 1 foot on three years only. We just sold 'yemane' trees this year (2011), that were planted in 2008. The initial spacing is 6x6 feet so 1,225 trees per acre, later through tinning the spacing becomes 12x12 feet or 306 trees per acre. The thinned wood is used for firewood and fencing posts. As to the mature trees, we got 61.25 tons per acre. The price is 400,000 kyat per ton, so the value is 24.5 million kyat (\$29,769) per acre. These high profits really encourage people to invest their time in community forestry.

Lately, people are also becoming interested in growing agarwood, *Aquilaria* sp. We are told it could produce valuable black resin by drilling holes in the stems. Where can we find seedlings? We discussed how agarwood has become a hype in Laos but there is the risk of it becoming a pyramid scheme.

Much land in this area is now being taken away from communities by big companies to plant rubber. There is a lot of competition for land, we see the small companies disappear, only big companies remain. We hope that our community forests can somewhat reduce the risk of all the land being taken away from the communities.

The MBA does not have much access to capacity building services for CF. They work together with Ecodev on technical aspects of tree planting. There is also a Dr. Aung who promotes agarwood plantations.

MBA believes there is a good market for 'yemane' timber. Perhaps value could be added by making furniture out of it. It could perhaps also be exported to China. Young trees and branches are used for firewood. Another popular firewood species is 'phat wai' called 'num du hpu' in Kachin language.

6.2 Urban Rural Development (URM)

We talked with Mr. Brang Mai, URM program coordinator. URM does development through churches with support from Swissaid. We employ 18 staff full time, our annual budget is around US\$100,000. The program comprises of training and awareness raising, cattle banks, food security funds and environmental projects. There is also a project to plant medicinal plants in gardens, where we have sent villagers to the Traditional Medicine Institute in Mandalay for training.

Community Forestry is another important part of the program. It started in 2006 and has been implemented so far in 12 villages. Each community forest covers between 700-1200 acres. We are trying to get these forests certified by the Government, so far none has received the certificate, but we believe the process will be completed soon. We mainly plant 'jemane' *Gmelina arborea*, but also 'chung' teak, *Tectona grandis*, 'jingru' ironwood, *Xylia xylocarpa* and 'jinma' Chukrasia.

We also distributed plots of agricultural land inside community forests to individual landless households, where they can grow crops in between the trees. Villagers also extract bamboo shoots from the forest. We distinguish between three types of community forest: forest plantations, gap planting and natural forest.

Communities can get income from community forests in several ways. They can grow crops like ginger and pumpkins in the first two years. We believe that elephant foot yam could be an interesting crop as well with a high profit potential. Mr. Brang Mai estimates that up to 50% of all households in the 12 villages would be interested to grow elephant foot yam. Currently the price is 3,000 kyat per basket. However we notice that the ladies who buy it can sell with a profit of ten times or more. So we think there could also be a potential in local processing of the product. The extracted product 'manang' or glucomanan is sold in three grades: white (low quality), yellow (medium quality) and pink (best quality).

Some trees already can be harvested from year three onwards. We are interested to learn more about the potential of macadamia nuts, we have already established a trial plot. The nuts have a very high price, but yields are still low. We discussed how they have been grown successfully by the royal project in Chiangrai, Thailand, but it takes a long time and careful management to get success.

We realize also that villagers need land for food production. So we also start to distribute seedlings of fruit trees.

There are several problems that our communities have to deal with. Some of our communities have lost land to the rubber company. So in fact, most of the people there have become laborers on the rubber plantation. Some villages are situated between the two sides in the on-going local conflict between the KMA and the Government. So they end up doing labor for both sides.

6.3 KMSS Karuna Catholic Development Mission

We talked with Mr. Chalee, agricultural program coordinator. KMSS established Community Forests in the Way Mo area with support from Spectrum. Besides community forestry, we also have programs on agriculture, education and disaster management and kitchen gardens, the latter program is supported by Swissaid.

In another area, Loi Khaw, we have established 800 acres of community forest with assistance from Misereor. The forest is divided into individual household plots. On average each household has 5 acres. They plant 'da nyin', dog fruit, *Archidendron pauciflorum*, 'jemane', *Gmelina arborea*, 'chung' teak, *Tectona grandis* and 'jingru' ironwood, *Xylia xylocarpis*. People can also collect rattan, bamboo shoots and medicinal plants from the community forest. The main type of rattan sold is red cane, 'gadein kyein'. (N.B. This village was later selected for our field visit).

Then we also collaborate in another six villages with Ecodev, where we also plant coffee, lime and pepper. As to the NTFPs, we believe that wrapping leaves, lime and lemon all have a good market. Some communities also start cultivating tea, but this is mainly outside community forestry areas.

Some of our villages have problems where they lost land to rubber companies, some also lost land to road construction. However the areas involved are not large yet.

6.4 Anglican Church Development Organization

We met with Mr. Nzayo San. The Anglican church supports community forestry in two villages. The certification of one of them was signed just last night, we are very excited about this. The main trees planted are 'chung' teak *Tectona Grandis*, ironwood and 'jemane' *Gmelina arborea*.

People also sell NTFPs from community forests such as 'hien pin' fruits bamboo and rattan shoots, 'yone' thatch grass, 'inwe' resin. Every household in our villages also has paddy land for rice growing. We would like to introduce paddy threshers, they would free up labor time that could be used to work more in the forest.

Our main concept for working with communities is the "farmer field school" concept. It means we work with farmers who experiment and learn from each other how to grow rice, soy beans and other crops. We also promote organic farming practices and composting. Around 50 households are engaged in this program.

7 Interviews with Government Officials

7.1 Interview with Forestry Officers in Magway Region, Monday 16 May 2011

Mr. U Som Ay, Deputy Director, Magway Regional Forestry Office

Mr. U Soe Tint, Director, Magway Township Forestry Office, email: usoetint17@gmail.com

Mr. Moe Ang, Director, Min Hku Township Forestry Office

Ecodev/Pioe Pin consultants: Mr. Moe Ang and Mr. Joost Foppes

Question 1: Do you have any statistics on the production of Non-Timber Forest Products in this region? Answer: Sorry, we do not keep any statistics on NTFP.

Question 2: How could Community Forestry (CF) contribute more to village community incomes?

Answer by U Soe Tint: to my mind, CF could be more linked to livestock raising through applying agro-pastoral systems. I used to work as a forester in Jakain Region, where CARE supported CF. The soils are better there, so they have paddy fields at the bottom of the valley, then they have upland cropland higher up and at the top of the slope they would plant fruit trees as prescribed by the Forestry Department. I think we could also grow more food producing trees in CF here in the dry zone.

Question 3: Your suggestion on linking CF and livestock raising is interesting. How could CF specifically contribute to livestock raising?

Answer (U Soe Tint): As you may know, villagers already collect grasses and tree leaves from our protection forests to feed their animals. For the CF forests, I believe that certain leguminous trees can be used as fodder, e.g. Gliricidia (Paycherry), jinma, thana and sha. Several species could be tested.

In general we should look at multiple uses of trees. We had one foreign consultant visiting us, Mr. Oliver, who suggested Eucalyptus leaves could be used to extract Eucalyptus oil.

Question 4: Talking about Eucalyptus, in the villages we visited so far, they have nice Eucalyptus forests, but so far these forests provided little income to the communities. What are the options for generating income from Eucalyptus?

Answer (U Soe Tint): Villagers have already used some of their Eucalyptus to build a school and to construct electricity poles. They can also sell Eucalyptus wood if they want to, but they have to pay tax over it: 1,000 kiat per ton for fuelwood, 1,200 kiat per ton for charcoal, 200 kiat for poles smaller than 1 foot in diameter and 500 kiat per pole for poles larger than 1 foot in diameter.

Question 5: So the villagers are allowed to sell Eucalyptus?

Answer (U Soe Tint): Yes, they can sell, but mostly they do not wish to sell as this is common property, so the profit would have to be shared with so many families that it is not worth their while. Communities prefer to use this common property for community purposes.

Question 6: Coming back to NTFPs, we saw that the CF forest is quite densely planted with Eucalyptus, could any NTFP possibly be planted in those forests?

Answer (U Soe Tint): No, that would not be feasible. We used to prescribe a planting density of 3 by 3 feet, with that density, the trees will shade out any other plants. However, for new CF forests, we have recently received a new instruction from our Deputy Director General of the Forestry Department. His new instruction is aimed at promoting the planting of crops in

between the trees. According to the new instruction, trees should be planted in rows of two, 6 by 6 feet apart, and each pair of these rows would have a space of 48 feet in between to allow crops or NTFPs to be grown. This instruction just came out this year.

Question 7: What type of NTFPs do you believe to be most suitable in this region?

Answer (U Soe Tint): Well, first of all I believe it might be feasible to plant *Acacia catechu*, "Sha". I have heard there is a factory in Seik Piu township that buys the wood of these trees and boils "cutch" out of them which is exported to India. There is apparently also a company from India applying for a permit to open a similar factory in the same area.

Other NTFPs that seem to have market potential and can grow in the dry zone are: Thanaka, Sandalwood and "Shaw piu" gum karaya.

Mr. Moe Aung from Min Khu township adds: In my area we also plant Aloe vera "Mok kha", it is sold to Yangon.

Question 8: These are all good suggestions. However we are talking here about tree species that take many years to grow and produce high value products. There is a big risk of theft, as we have heard even some of the *Eucalyptus* trees were stolen from CF forests. Is it really suitable to plant such trees without protection in the CF forests, far away from the village, or should they rather be planted around the houses in the village for more safety?

Answer (U Soe Tint): In general it is difficult to look after CF forests. We have planted thousands of acres of CF forests during the UNDP project, but now only a few of these are still surviving, the vast majority has been lost. In general, the chances of survival are higher if forest plots are owned by or looked after by individual families.

With the new guidelines from our Director General, it may be more attractive for communities to plant trees and NTFPs together. You are welcome to establish more CF plots in our region. We have 5,600 acres of protected forest in our township. Some of that land could be turned into CF areas as well.

8 Detailed product profiles

8.1 Thanakha (*Hesperathusa craenulata*)

a. Product names and use

“Thanaka” is the bark of a small tree called *Hesperathusa caerulata*. The bark is used all over Myanmar by women as a cosmetic. Small stem cuttings of 2-4 inches are rubbed with some water on a wooden slab producing a yellow paste which is applied to the face. The main quality criteria are the yellow color and the smell of the bark.

b. Main production areas

The main production area is in the dry zone. In particular the area around Shinmataung in Yesagyo in Magway region is well known for its good quality thanaka. Along the road from Pakoku to Monya, many new gardens can be observed being planted to this crop.

c. Growth rate, frequency of harvest

Thanaka is a slow growing tree species. On a good soil it takes around 5 years to reach the minimum marketable size of roughly 1.5 inches diameter. Most trees are harvested when they have a stem diameter of about 3 inches or more, which takes 7 years to reach. Such a tree is sold for 3,000-6,000 kyat per stem at farm gate level. The tree is cut as a whole, and it will take another 7 years for a new tree to grow to harvestable size from coppice.

Around Yesagyo township, the trees are planted in rows 3x6 feet, that means 2,420 trees per acre (5,979 trees/ha). So 1 acre can yield a value of 7.26 to 14.5 million kyat in seven years or on average 1.0 to 2.1 million kyat/acre/year or \$3,133 to \$6,266 per ha per year (see Table 23 **Error! Reference source not found.**).

Table 23: Values of Thanaka (*Hesperathusa caerulata*) in Yesagyo township, May 2011

planting density	3x6 feet	low value in kyat per acre	7,259,282
distance between rows	3	high value in kyat per acre	14,518,563
distance within row	6	no years to grow	7
no plants/acre	2,420	low value kyat/acre/year	1,037,040
no plants/ha	5,979	high value kyat/acre/year	2,074,080
low selling price in kyat/tree	3,000	low value in \$ per ha	\$ 3,133
high selling price in kyat/tree	6,000	high value in \$/ha	\$ 6,266

d. Investment and recurrent costs

The initial investment consists of land preparation (30,000 kyat and 4 labor days per acre) and planting of seedlings (seedlings 243,500 kyat -100 kyat per piece-, plus 30 labor days per acre at 1,000 kyat/day is 30,000 kyat). Many farmers also invest in fencing (materials 515,700 kyat, 24 labor days). The total initial investment is 275,000 kyat and 34 labor days without fencing. With barbed wire fencing, the investment cost is 790,700 kyat plus 58 labor days.

Subsequently, every year, the field has to be weeded two times per year (90 labor days per year, total 7*90=630 days). Also once per year 2 bags of urea are applied (20,000 kyat per year,

applied during weeding). The total recurrent cost per year is 20,000kyat and 630 labor days. The total maintenance cost over 7 years is 140,000 kyat and 630 labor days (see Table 24).

Table 24: Investment costs and recurrent costs of one acre of thanaka plantation.

Investment costs	materials	labor	labor cost	Recurrent costs	materials	labor	labor cost
per acre	(kyat)	(days)	(kyat)	weeding 2 times/year		90	90,000
land preparation	30,000	4	4,000	urea 2 bags/year	20,000		
seedlings (100pp)	245,000	30	30,000	Total costs per year	20,000	90	90,000
Total without fencing	275,000	34	34,000	No of years	7	7	7
fencing posts	112,500	16	64,000	Total recurrent costs	140,000	630	630,000
barbed wire	403,200	8	98,000	Harvesting	-	123	122,500
Subtotal fencing	515,700	24	162,000	All costs, no fencing	415,000	787	786,500
Total investment with fencing	790,700	58	196,000	All costs, with fencing	930,700	811	948,500

e. Returns per acre and returns over labor

In table 20 below profits are calculated for eight cases: with fencing and without fencing, using own labor or paying for labor, with a low price and a high price scenario. The net profit ranges from 0.769 million kyat per acre per year (with fencing, counting labor costs, low selling price of 6,000 kyat per stem) to 2,015 million kyat per acre per year (no fencing, not counting labor costs and with a high price of 15,000 kyat per stem).

The average return to labor ranged is 2,538 kyat per day with the low price and 7,282 kyat per day with the high price. For a land owner paying for labor, the net profit per acre would be 1 million kyat per acre selling at the low price and 4.2 million kyat in case of a high price. With a production period of seven years, the average profit per year ranges from 145,857 kyat per acre per year for a landlord paying for labor and receiving the low price, to 690,714 kyat per acre per year for a farmer using his own labor and getting the high price (see Table 25).

Table 25: Estimated net profits from Thanaka production per acre and per labor day, based on a yield estimate of 2,450 stems per acre, for a low price of 6,000 kyat/stem and a high price of 15,000 kyat/stem, May 2011.

Thanaka profit calculations	without fencing		with fencing	
Profit estimate	low	high	low	high
Income per acre	7,259,282	14,518,563	7,259,282	14,518,563
Costs per acre no labor	411,976	411,976	927,676	927,676
Costs per acre with labor	1,196,964	1,196,964	1,874,664	1,874,664
Profit per acre without labor	6,847,306	14,106,587	6,331,606	13,590,887
Profit per acre with labor	6,062,318	13,321,599	5,384,618	12,643,899
Profit per acre/year no labor	978,187	2,015,227	904,515	1,941,555
Profit per acre/yr with labor	866,045	1,903,086	769,231	1,806,271
Income per labor day	8,464	17,437	7,827	16,800
Income per labor day in \$	\$ 10.58	\$ 21.80	\$ 9.78	\$ 21.00

If a farmer would use his own labor to do all the work, the income per labor day would be very high, ranging from 7.827 kyat (\$9.78) to 17,437 kyat (\$21.80) per day worked. Thanaka is a highly profitable crop at this time in history.

f. Difficulty to cultivate/ local knowledge available

This plant is not so easy to cultivate, without adequate care it grows too slowly to make any profit. In the key production area around Yesagyo, however, farmers have all the local knowledge to grow thanaka successfully.

g. Ease of access to technologies and inputs needed

All inputs are locally available (seedlings, fencing material, urea).

h. Potential for jobs creation, especially for women's involvement

Thanaka is already providing jobs to thousands of farmers in the dry zone. Women's involvement would be possible, from observation, the crop is mainly grown by men. The potential for creating more jobs would depend on the absorption capacity of the market for more thanaka.

i. Demand in domestic and international market

Thanaka is mainly popular in the domestic market. A rough estimate of the domestic demand can be made as follows. More than 90% of all women in the country apply thanaka daily on their face. Small boys and girls are also treated with the product every day. The average consumption per person per year ranges from 8,000-16,000 kyat per year. With a population of 28 million women, 90% would be 25.2 million women using the product. They would spend between 201.6 to 403.2 billion kyat or \$252-504 million per year on buying thanaka.

An average tree is sold to consumers in city markets for 25,000 kyat per tree. So the total amount of trees consumed in the whole country can be estimated to be 8-16 million trees per year. It takes the harvest of 23,040 to 46,080 acres to produce that much thanaka every year (see table 21 below).

So far, we have not obtained any figures on overseas demand. Traders estimate overseas demand to be less than 10% of national consumption, worth perhaps \$35,000 per year.

Table 26: Estimated national consumption of Thanaka in Myanmar, May 2011.

total population	56,000,000	average price/tree sold (kyat)	25,000
total no women	28,000,000	number trees/year low	8,064,000
90% of all women	25,200,000	number trees/year high	16,128,000
kyat per person/year low	8,000	number acres low	23,328
kyat per person/year high	16,000	number acres high	46,656
total consumption low (kyat)	201,600,000,000	number hectares low	9,441
total cons. low (\$)	\$ 252,000,000	number hectares high	18,881
total consumption high (kyat)	403,200,000,000	average number trees/yr	12,096,000
total cons. high (\$)	\$ 504,000,000	average no acres	34,992
Average consumption (kyat)	302,400,000,000	average no hectares	14,161
Average consumption (\$)	\$ 378,000,000		

j. Income & price trends/stability

All FUG's interviewed in the dry zone mentioned thanaka as a tree they wish to plant as they believe the price is going up. The farmers in the Yesagyo area also mentioned the price is going up. Furthermore, many newly established thanaka farms can be observed in the Yesagyo area.

k. Policy restrictions

Farmers and traders did not mention any major policy restrictions.

l. Monopoly of the trade

Thanaka is such a common product, the amount of retail traders in this product is estimated to be several thousands and the amount of inter-state traders must be in the hundreds. There is no sign of any monopoly on the trade in Thanaka.

m. Risk of over-supply

At the moment, the very high price for thanaka makes it a very profitable tree to grow. On the short term, there may be some space for expanding the acreage to cover market shortages that may have occurred over the last five years according to traders.

On the long run, expansion should probably follow the same pace as the annual population growth of 1.75 per year. This would be the surest way to avoid a situation of over-supply that could bring the price down. To achieve that, the annual increase in thanaka acreage should probably not be higher than 400-800 acres per year (see Table 27**Error! Reference source not found.**). If the intention is to keep thanaka prices at their present level, only 400-800 households should be planting a new plantation of 1 acre per year. If more households would plant thanaka, surplus production is likely to cause a drop in prices seven years later.

Table 27: Sustainable increase of Thanaka acrages at 1.75 % per year (annual population increase).

Thanaka resource	Present	sustainable area expansion estimates at 1.75% growth per year						
estimate	acreage	year 1	year 2	year 3	year 4	year 5	year 6	year 7
number acres low	23,328	408	415	423	430	438	445	453
number acres high	46,656	816	831	845	860	875	890	906
number hectares low	9,441	165	168	171	174	177	180	183
number hectares high	18,881	330	336	342	348	354	360	367

8.2 Plums/jujube (*Ziziphus mauretanica*)

a. *Product names and use*

Plum or jujube (*Ziziphus mauretanica*) is a local fruit tree called "zee" in Burmese. The fruit is consumed fresh by people across the country, and also marketed as preserved products in the dried form. However the seed, extracted out of the seed pod, is exported to China where it is known as “Suan Zao Ren”, a popular remedy against insomnia or sleeplessness². Traders in Myanmar do not know the exact usage purposes of this product, they only know that bigger seeds are perceived by the buyers in China to be of better quality.

b. *Main production areas*

The main production area is in the Dry Zone, mostly from privately owned jujube trees that are naturally growing in the upland farms. Plum plantation is not practiced much yet. Farmers used to cut plum trees to avoid shading on their crops. Since the demand for plum seed has gone up, farmers let the jujube plums grow. Goat breeders in the Dry Zone also enjoy the benefit of selling the seeds picked from goat droppings after the animals ate fallen fruits.

c. *Growth rate, frequency of harvest*

Plum is a relatively fast-growing species of the Dry Zone, taking about 3 years until it starts to yield the first fruits. Although the sweeter, less sour fruits are preferred for fresh consumption and preserved food industry, the quality of the fruit is irrelevant for seed harvesting purposes. The fruiting season is from March to May of every year, and could be harvested until the tree is over 20 years old when the fruiting rates start to decline.

On average, a young jujube tree of less than 5 years old yields 6 to 15 viss per season, but a mature tree of between 10 and 20 years of age yields about 75 viss per season. This is equivalent to 10-25 kg per tree for young trees and 123 kg for old trees³. These estimates are comparable to India, where mature trees are quoted to yield 80-200 kg per tree⁴.

Fruits are usually sun-dried before the seeds are harvested. The weight loss from sun drying is estimated to be 40-50%. So a tree yielding 123 kg of fresh fruits would yield about 55 kg of dried fruits.

The fruits contain a kernel which is filled with small seeds. Ms. Kin Than New, a plum mill owner in Taung U village, estimates that one basket of dried plum fruits weighs about 3 viss. She can obtain 0.25 viss of plum seeds from one basket. In other words, 1 kg of plums yields $(0.25/3=)$ 0.083 kg or 83 grams of seed. So a mature tree yielding 55 kg of dried plums would produce about 5 kg of plum seed.

Plum harvesters in Kyaukpadaung and Pakhokku Townships harvest the fruits from naturally growing trees around the township. Some farmers have started planting plum trees at a spacing of 6 -7 meters apart, which means 83 trees per acre (204 trees/ha). With an average yield of 5 kg per tree, a density of 7 x 7 meters would yield 940 kg of seed per hectare or 232 viss per acre (see Table 28).

² Source: <http://chinesemedicinegem.com/herbs/natural-herbs-for-insomnia-suan-zao-ren/>

³ One viss is 3.6 pounds or 1.637 kg.

⁴ These estimates are comparable to India, where mature jujube trees are quoted to yield 80-200 kg per tree. Source: http://en.wikipedia.org/wiki/Ziziphus_mauritiana

Table 28: Estimates of seed yields of jujube plum/jujube (*Zizyphus mauretanica*) in Taung U village, Kyaukpadaung township, Mandalay division, May 2011.

Jujube yield calculations	young trees	mature trees		young trees	mature trees
fresh fruits per tree in viss	33	75	density per acre	83	83
fresh fruits per tree in kg	54	123	density per ha	204	204
fresh fruits per tree in lb	119	271	fresh fruits, lb/acre	9,831	22,344
dried fruits/tree in kg	24	55	fresh fruits kg/ha	11,025	25,056
dried fruits/tree in lb	54	122	dried fruits, lb/acre	4,424	10,055
seeds per dried fruit	0.083	0.083	dried fruits, kg/ha	4,961	11,275
seeds kg/tree	2	5	seed yield in lb/acre	367	835
seeds lb/tree	4	10	seed yield in kg/ha	412	936
seeds viss/tree	1.24	2.81	seed yield viss per acre	102	232

d. initial investment and recurrent costs

The initial investment consists of land preparation, weeding and planting costs (72000 kyat or 24 labor days per acre), and costs for tools at about 15000 kyat. The cost of weeding every year is about 60,000 kyat, or 20 labor days per year. Fertilizers might be needed on a plantation but not for the naturally growing trees currently harvested. The total initial investment is 87000 kyat and 24 labor days. The total recurrent cost per year is 20 labor days. The total production cost over 10 years is 15000 kyat and 224 labor days.

Table 29: Estimated costs of Plum/jube (*Zizyphus mauretanica*) seed production in Taung U village.

Unit costs	kyat	labor days
Land preparation, weeding planting	72,000	24
Tools	15,000	
Weeding (every year)	60,000	20
Harvesting years 4-10 (every year)	126,000	42
Harvesting years 10-20 (every year)	495,000	165
<i>Cost Estimates</i>		
Year 1:	87,000	24
Years 2-3:	120,000	40
Years 4-10:	1,116,000	372
Years 10-20:	5,550,000	1,850
TOTAL	6,873,000	2,286
Average per year	343,650	114

e. Returns per acre and returns over labor

One acre of mature trees (older than 10 years) can yield 232 viss (see Table 28 above). At a price of 15,0000 kyat per viss, 1 acre would yield an income of 4.6 million kyat or \$5,633 per year, equivalent to 7.4 million kyat or US\$10,681 per hectare (see Table 30). For younger trees aged 3-10 years, the average yield is estimated to be about one third of that of the mature trees.

Table 30: Benefits of Plum/jujube (*Zizyphus mauretanica*) seed production in Taung U village (per acre)

<i>Benefits of Plum/jujube seed production</i>	Yield viss	Price	Annual Value		Overall Value	
	viss/acre	kyat/viss	kyat	\$	kyat	\$
Years 1-3	0	13,000	-	\$ -	0	\$ -
Years 4-10	102	15,000	1,529,985	\$ 1,859	10,709,893	\$ 13,013
Years 10-20	232	20,000	4,636,317	\$ 5,633	46,363,173	\$ 56,334

Over the first three years, the owner will only have investment and maintenance costs. Over the early production years (years 4-10), the average net profit is 1.5 million kyat (\$1,943) per acre per year (see Table 31). Over the last ten years when the trees are mature, net profits would be 4 million kyat (\$4,959) per acre per year. The net profit over twenty years is on average 2.5 million kyat (US\$ 3,050) per acre per year. With labor wages of 3,000 kyat per day, the average return per labor-day is 21,960 kyat (\$27).

Table 31: Cost-Benefit comparison of Plum/jujube (*Zizyphus mauretanica*) seed production in Taung U village (per acre, over a period of 20 years).

<i>Cost-Benefits of Plum/jujube seed production</i>	Income	Costs	Balance	Income per acre/year		Income per labor day	
	kyat	kyat	kyat	kyat	\$	kyat	\$
Year 1:	0	87,000	(87,000)	(87,000)	\$ (106)	(3,625)	\$ (4)
Years 2-3:	0	120,000	(120,000)	(40,000)	\$ (49)	(3,000)	\$ (4)
Years 4-10:	10,709,893	1,116,000	9,593,893	1,598,982	\$ 1,943	25,790	\$ 31
Years 10-20:	46,363,173	5,550,000	40,813,173	4,081,317	\$ 4,959	22,061	\$ 27
TOTAL	57,073,066	6,873,000	50,200,066	2,510,003	\$ 3,050	21,960	\$ 27
Average per year	2,853,653	343,650	2,510,003				
	\$ 3,467	\$ 418	\$ 3,050				

f. Difficulty to cultivate/ local knowledge available

Plum is a kind of tree that the local people do not practice any tending measures and that it is very easy to cultivate. It grows well in all parts of the Dry Zone. People in all of Dry Zone have all the knowledge of how to let this plant regenerate. It is a bonus that no special care is necessary to get the fruit of certain quality, since the seed the only element of interest of the tree.

g. Ease of access to technologies and inputs needed

First the fruit is stripped of its flesh, and the seed pod cracked and the seed is taken out, all steps carried out by machinery. The seed is then sieved with manual labor, mostly by women, to take out all the dust, chipped parts of seeds, and other impurities. The machines are widespread. In Kyaukpadaung, the “Favourite” Trading Company has been selling seeds processed with machines since 1978. Some villages, e.g. Taung U in Kyaukpadauw township, have their own processing machines so they can sell the processed seeds.

h. Potential for job creation, especially for women’s involvement

Since plum collection is not time consuming and relatively easy in its current production format, it creates a side job for many upland farmers and goat breeders. Full-time jobs go to women separating seeds from dust and other impurities if there is a processing machine around. If plum is planted in plantations, it would create jobs for weeding, tending, and harvesting associated with intensive plantations.

2. Market potential

a. demand in domestic and international market

Plum seeds are sold solely to the Chinese market. Even though one trader reported exporting to South Korea a few years ago, it was in small quantity and has stopped ever since. All of the plum seeds are traded across the border. One trader Mandalay that specializes in plum kernels said that they export about 200 Tons per year and that there are about 5 or 6 traders like them, which puts the export figure each year between 1000 tons and 1500 tons per year, plus a certain amount traded by the exporters who are not specialized in plum trade. If it is assumed to be 1000 tons (740740 viss) per year, and if it is traded at current market price of 13000 kyat per viss, the plum seed trade is could be valued at 13,000,000,000 Kyat or 16,250,000 US dollars per year.

It is not clear how much more plum the market could bear since the plum traders in Mandalay said that the price is already going down because of the overproduction this year. However, it is unclear how much the production has increased compared to last year. Demand from other countries except China is not known.

b. income & price trends/stability

We could not find any trade statistics, but all the traders interviewed estimated that the average price of plum seeds over the past two years has been stable even though there were sharp rises and falls during each year.

c. policy restrictions

Farmers and traders did not mention any major policy restrictions.

d. monopoly of the trade (risky to prices)

Plum seeds are exported only to China and hence totally dependent upon the demand from Chinese traditional medicine producers. The traders in Mandalay voiced their desire to find another market that could provide them with a cushion.

Since seed trade has become substantially profitable, the flesh of the plum fruit is either discarded or used for compost, and the seed pods are used as fuel for fire. If there were enough of demand for these by-products, or if a way to add value to these could be found, plum plantation could become more profitable, and less dependent on the Chinese demand.

8.3 Aloe vera (shazaung let pup/Moke kha)

a. Product names and use

Aloe vera (“sha zaung let pup”) is a drought-resistant plant. It is a stemless herb with lanceolate leaves large, thick, fleshy, sessile, apex sharp, spiny margin. The inflorescence is a raceme, scape longer than the leaves, dense; flowers yellow or orange cylindrical.

The main product is the gum produced in the leaves. Fresh leaves can be used to make juice or jelly. In Myanmar, they are used to produce a condensed semi-hard product called “moke kha”. Both fresh gum and moke-kha are used as a medicinal plant, good for healing and soothing skin wounds especially burning wounds. It is also said to be good for the digestive system.

b. Main production areas

The main production area is in the dry zone. In particular the area within Yesagyo township in Magway region is well known for its good quality Moke Kha.

c. Growth rate, frequency of harvest

Aloe grows in all type of soil and well in sandy coastal to loamy soil. It can be harvested within one year after harvesting and then for another four years from regenerating leaves, so the cropping cycle is five years. In some areas the crop can be harvested twice per year, but the volume of gum will be more or less the same as when harvest once a year. It is planted at a distance of 9 inches by 9 inches spacing using basal shoot slips as planting material. Around Yesagyo, some farmers are intercrop with thanaka.

Farmers in Sitha village, Yesagyo township mentioned that one acre of aloe plantation can produce 60 viss of Moke Kha (1200 tins of gum) per year. The price is around 35,000 kyat/viss. So 1 acre can yield a value of 1.5-2.1 million kyat or \$2,552 per year (see table).

Table 32: Production costs and benefits of Aloe Vera in

Aloe production data	High yield	Costs per year	
yield dry product tins/acre	1,200	Seedlings	3,300,000
no tins/viss dry product	20	Planting labor	24,000
yield dry product viss/acre	60	<i>Total establishment cost</i>	<i>3,324,000</i>
conversion fresh to dry	24	Weeding	98,000
fresh yield viss/acre	1,440	Harvesting and processing	220,000
plant density (9x9inches)	60,000	<i>Recurrent costs</i>	<i>318,000</i>
fresh yield in grams/plant	39	Total cost over 5 years	4,914,000
fresh yield kg/ha	5,825	Net Profit	
price kyat/viss	35,000	Net profit over five years(kyat)	5,586,000
Value kyat/acre/year	2,100,000	Average per year	1,117,200
\$/acre/year	\$ 2,552	in \$	\$ 1,357
Total benefits over 5 years	10,500,000	if seedlings are free (Kyat)	1,777,200
		in \$	\$ 2,159

There would also seem to be a lot of potential for increasing yields. The fresh yield obtained here is equivalent to 40 grams per plant per year, or 5.8 tons/ha/year. This would seem quite low compared to yields cited from India, Mexico, Kenya and other places where yields of 30-50 ton/ha are commonly cited on various Aloe web pages, with much lower plant densities.

It could be that the conversion factor mentioned by local producers here is actually higher, or actual yields could be higher than producers say. Still it would seem likely that there is a potential for improving yields by improving production techniques (improving water supply and applying fertilizers).

d. initial investment and recurrent costs

The man initial investment consists of the cost of buying seedlings (3.3 million kyat per acre) as well as some labor cost. Subsequently, every year, the field has to be weeded two times per year (2x48 labor days per year, total 98 days). Also every year, the field has to be harvested and the product needs to be processed by boiling. The total annual recurrent cost is 318,000 kyat per year. The total costs over a five year cycle would be 5.6 million kyat.

e. Returns per acre

With a gross benefit of 10.5 million kyat and costs of 4.9 million kyat, the net profit over five years is 5.6 million kyat, that is on average 1.1 million kyat (\$1,357) per year.

One way to increase profits would be for farmers to produce their own seedlings. Seedlings are the main investment cost. If farmers could either get free seedlings from a project or produce their own, the net benefit per acre would rise to 1.78 million kyat per year or \$2,159.

f. Difficulty to cultivate/ local knowledge available

This plant is easy to cultivate, without adequate care. Providing irrigation may increase yield of gum and too drought may affect grow rate and success rate of plant. The key production area around Yesagyo, however, farmers has all the local knowledge to grow aloe successfully.

g. Ease of access to technologies and inputs needed

All inputs are locally available (seedlings, fencing materials etc). As mentioned above, there would seem to be a big potential for improving yields by better water management and fertilizer application. Present yields seem to be at 10% of the potential yields. More local research is required. Organizing seedling production could also improve profits.

h. potential for jobs creation, especially for women's involvement

Aloe is already providing jobs to thousands of farmers in the dry zone especially for weeding and harvesting. The potential for creating more jobs would depend on the absorption capacity of the market for more moke kha as import substitution.

i. demand in domestic and international market

The International Aloe Science Council (IASC) estimates raw material sales of Aloe vera are currently \$70-90 million globally with 35% growth expected within the next five years. The U.S. is by far the largest single supplier with 60-65% of total sales; Latin America constitutes another 20-25% and Asia and the Pacific Rim (Australia, China and India) together make up 10% of the market. The total sales value of processed derivatives and ingredients has been estimated by the IASC to be \$1 billion per year in the mid-1990s and has grown continuously since that time. Trade in finished products containing aloe ingredients, are estimated to be over \$35 billion globally (Source: http://www.nutraceuticalsworld.com/issues/2003-05/view_features/aloe-vera-an-international-success-story/).

Sha zaung lat pup jam is mainly produced for domestic market. But Moke Kha is both domestic traditional medicine and export market. It was noted that 2011 May alone 7 MT exported to China for their traditional medicine used.

What seems to be lacking is an investor who could take the Aloe vera sector in Myanmar to international export level. While there is strong competition from countries like Mexico, Kenya and India, Myanmar could probably compete on price. More investigation and investment research is needed to identify the options for opening up this potentially huge market for Aloe vera produced in Myanmar.

j. income & price trends/stability

For now, prices seem to be stable, due to limited supply.

k. policy restrictions

Farmers and traders did not mention any major policy restrictions.

l. monopoly of the trade (risky to prices)

Moke Kha is such a common product for majority of traditional medicines in Myanmar and it trading was through traditional medicinal raw product shops from Yangon or direct to traditional medicine houses.

8.4 Elephant Foot Yam

a. Product names and use

Elephant foot yams, locally known as “Wa-u” or “phyan-u”, are the tubers of several *Amorphophallus* species, e.g. *A. paeonifolius* and *A. konjac*. The dried tuber of the konjac plant contains around 40% glucomannan gum. This polysaccharide makes konjac jelly highly viscous. In Japan, India and China, the starch is known as “konjac” or “konyakku” and eaten as a vegan substitute for gelatin. Konjac has almost 0 calories but is very high in fiber. Thus, it is often used as a diet food. It can also be used for facial massage accessories which are currently popular in Korea.

--	--	--

b. Main production areas

Elephant Foot Yam can be found in many area of Myanmar especially in evergreen forest areas of Kachin state, Chin state, Rakhine state, Shan state, Mon state, Tanintharyi region, Bago region & Yangon region. Over-extracting from natural forest resources has reduced the production levels. Cultivation has started in Rakine Chin and Kachin States.

c. Growth rate, frequency of harvest

Elephant foot yam is a short duration crop. If young tubers are planted, they can be harvested already after 6 -7 months. It prefers well-drained, fertile and sandy loams soil but can grow other soil. 1000 – 1500 mm per year is helpful for tuber grow rate and if drought or less rain fall area irrigation may be required to grow tubers optimally. Tropical climate is better for EFY.

The actual yam crop is planted in the rainy season, planting takes place in May – June and harvest in November – December. 90 cm (3-ft) x 90 cm (3-ft) spacing is recommended for seed size 400 – 500 grams (0.25–0.5 viss, average 0.3 viss). Such a density represents 4,856 plants per acre (12,000 plants/ha).

The conventional multiplication ratio is 1:3-4 but maximum yield ratio is 1:10 with optimal soils and fertilization. Taking a 1:3 ration, each tuber of 0.3 viss will grow to 1 viss in weight in seven months. So one acre can yield 4,856 viss of fresh tuber per season (19.6 tons/ha). With one viss of dry chips produced from every seven viss of fresh tubers, 4,856 viss can produce 694 viss of dried chips per acre (2.8 tons/ha). With a price of 3,200 kyat/viss for dried chips, that represents a value of with 2.20 million kyat (\$2,697) per acre.

d. initial investment and recurrent costs

The initial investment consists of land preparation: 10 labor days for site cleaning + 30 labor days for planting, total 120,000 kyat or 40 labor days per acre. Secondly there is the cost of seed: 4856 tubers of 0.3 viss each, bought for 400 kyat/viss or 120 kyat/piece or 582,700 kyat. For harvesting cost 90,000 Kyat or 30 labour days per acre and drying process cost 150,000 Kyat or 50 labour days. The total production cost is 942,720 kyat and 120 labor days.

e. Returns per acre and returns over labor

The net profit each years is 1,28 million kyat (\$1552) per acre (3.16 million kyat or \$3,835 per ha). With labor wages of 3000 Kyat per day, the net profit is 13,643 kyat (\$17) per labour day.

Table 33: Cost Benefit Calculation for Elephant Foot Yam

Costs	no/acre	unit	price	cost (kyat)	cost (\$)
land preparation	10	labor days	3000	30000	\$ 36
Planting costs	30	labor days	3000	90000	\$ 109
seed materials	4856	tubers 0.3 viss	120	582720	\$ 708
harvesting	30	labor days	3000	90000	\$ 109
drying	50	labor days	3000	150000	\$ 182
TOTAL	120	labor days		942,720	\$ 1,145
Benefits	no/acre	unit	price	value (kyat)	value (\$)
large tubers 1 viss	4856	viss	3200		
dried tubers	694	viss	3200	2,219,886	\$ 2,697
Net Benefits				1,277,166	\$ 1,552
Per labor day				13,643	\$ 17

f. Difficulty to cultivate/ local knowledge available

This plant is easy to cultivate and does not need much care. The main risk is in poor drying techniques, resulting in low quality dried chips.

One thing not discussed so far is where farmers would obtain their seed yams. The first step is to produce seed yams of 400 – 500 grams (0.25–0.5 viss, average 0.3 viss). These can be produced by splitting a mature yam of 1 viss into 5-6 pieces. It takes 6-7 months to produce seed yams of the desired size. The recommended planting density for seed yams is 1x2 feet, or Costs of seed yam production are not yet known for Myanmar, in India they are estimated to be similar as the actual crop ((Nedunchezhiyan 2008). It means that farmers should keep around 20% of their crop to produce seed yams for the next crop, if they cannot buy seed yams elsewhere. Seed yam production could also become a specialized activity for some farmers, supplying others. The economics of seed yam production are summarized in the table below.

Table 34: Cost Benefit Analysis of Seed Yam Production for Elephant Foot Yam

Costs	no/acre	unit	price	cost (kyat)	cost (\$)
Land preparation	10	labor days	3000	30,000	\$ 36
Planting costs	30	labor days	3000	90,000	\$ 109
Seed materials	4,840	tubers 1 viss	360	1,742,400	\$ 2,117
Harvesting	30	labor days	3000	90,000	\$ 109
TOTAL	70	labor days		1,952,400	\$ 2,372
Benefits	no/acre	unit	price	value (kyat)	value (\$)
Seed yams 0.3 viss	29,040	viss	120	3,484,800	\$ 4,234
Net Benefits				1,532,400	\$ 1,862
Per labor day				24,891	\$ 30

g. Ease of access to technologies and inputs needed

All inputs are locally available (seedlings, fencing material,).

h. potential for jobs creation, especially for women's involvement

EFY is already providing jobs to thousands of farmers in the Kachin State especially for harvesting and drying process. The potential for creating more jobs would depend on the absorption capacity of the market.

i. Market potential

EFY is mainly exported to China via border trade, small amounts also go via international trade at higher prices to Japan and Korea. Total export amount is 4,000 tons approximately for both border trade and normal trade.

The price in cross-border trade is around \$1,300 per ton. The price in international trade is much higher, around \$8,000 per ton, however this trade is limited by very small quota accepted by countries such as Korea and Japan. It would be worthwhile to explore the options for increasing the exports to these two countries. In the meantime, for Kachin State the cross-border trade to China is much more interesting as it cuts out several steps in the value chain.

If Ecodev would support 50 households in 20 communities to plant 1 acre of elephant foot yam each, this would result in an increased production of 100 acres (40.5 ha), adding 69,400 viss of dried chips or 113.6 tons. That would represent 2.8% of the total export volume. This increase would be unlikely to cause big price changes.

j. policy restrictions

Farmers and traders did not mention any major policy restrictions.

k. monopoly of the trade (risky to prices)

The demand for 'slimming' products is likely to grow among urban consumers as their wealth increases. So the outlook is good. Right now, Myanmar, depends mainly on demand from China. It is not clear how that will affect prices and demand on the long term.

8.5 Dog fruit or Jengkol

The fruits of “Kanyin” commonly known as “dog fruit” or “jengkol”, “jering” or “luk nieng” are derived from *Archidendron pauciflorum*, member of the Fabaceae or family of beans. Older synonyms often used are *Pithecellobium lobatum* and *P. jiringae*.



Jengkol is a tree about 18-24 m tall with a spreading crown. It has a grey stem and one pair of glabrous leaves. The leaf is oblong, stiff and papery with 3-5 flowers, which are borne in a panicle. The calyx is sessile with a white corolla. The filament tube is shorter than the corolla. The pods or fruits are 20-50 cm long, 4-5 cm wide, horseshoe-shaped or twisted, deep purple, deeply lobed along the lower suture, and easily broken by hand. There are 3-6 seeds per pod. The seed is 3-5 cm across with yellow testa when young, which turns brown at maturity. The seed is edible with a strong odour.

The fruits are highly nutritious, with 23% protein and high contents of vitamin C (80 mg/100g), Calcium (140mg/100g), Iron (4.7 mg/100g) and Phosphorus (167mg/100g). The smell is not appreciated by everybody and over-consumption should be avoided as it may lead to kidney failure. The fruits grow in characteristic coiled pods on fast growing trees.

In Lwe Hkaw village near Myitkyina in Kachin State, these trees are grown in community forests for raising income. An average household may have around 200 trees planted in one acre, one tree is said to produce up to 2000 fruits per year. With a price of 20 kyat per fruit, such a household could earn 8 million kyat (\$9,720) per acre per year.

This seems to be another good option for income generation from community forests in Kachin State. The market is so far mainly limited to Myanmar, but it is also a well-known product in southern Thailand, Malaysia and Indonesia. The consumption in those countries is estimated to be over 100 tonnes per day. (source: <http://naturallycares.com/pithecollobium-jiringa-or-pithecollobium-labatum/>). With the current high price, there would seem little danger of over-production. The market potential in nearby China should be explored.

9 References

- Bhattaray, T. (1996). Report on the national training workshop on wood fuel trade in Myanmar. Forest Research Institute, Yezin, 27 - 30 November 1996. Regional Wood Energy Development Programme in Asia, RWEDP GCP/RAS/154/NET. Bangkok, Food and Agriculture Organization, FAO.
- CIAT (2010). Starting an Agro-enterprise Development Process in the Lao PDR. Vientiane, CIAT SADU Project.
- Hartsough, B. R. and G. Nakamura (1990). "Harvesting Eucalyptus for fuel chips." California Agriculture **44**: 7-8.
- Lecup, I. and K. Nicholson (2004). Field facilitators guidelines Community-based tree and forest enterprises: Market Analysis and Development. Rome, Food and Agriculture Organization of the United Nations (FAO).
- Macqueen, D. (2008). Supporting small forest enterprises – A cross-sectoral review of best practice. IIED Small and Medium Forestry Enterprise Series No 23., IIED, London, UK.
- Myint, W. (2004). Rattan and Rattan Industry in Myanmar. Forestry Research Institute, Forest Department, Union of Myanmar. "Regional Conference on Sustainable Development of Rattan in Asia", 21-23 January 2004, Manila, Philippines.
- Nedunchezhiyan, M. (2008). "Seed Corn Production Techniques in Elephant Foot Yam." Orissa Review, September-October 2008: 64-66.
- Tun Tun, U. (2000). "Greening the dry zone of Myanmar." Myanmar Journal of Forestry: 8-14.