Community Forestry in Myanmar: *Progress & Potentials*

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CONTENTS

PLATES, BOXES, TABLES, FIGURES, MAPS

Plates

Boxes

Tables

Figures

Maps

SUMMARY

This paper is the main output of a research project initiated by Pyoe Pin, and led by ECCDI with support from the University of East Anglia, whose aim has been to fill the gap in knowledge over the progress of Community Forestry in Myanmar through a systematic study. This paper presents the key data and findings, and offers policy recommendations based on these.

Of Myanmar's 67.6 m ha land area, forests currently cover around 48%, although there has been a declining trend for the last century (they covered over 65% early in the 20th Century). The declining trend is particularly dramatic for dense forests, which have more than halved in the last twenty years, from covering 45.6% of land in 1990, the single largest land use, to now just 19.9%.

The long -term decline in forests, is due to a combination of factors; change of land use (especially land hunger from the growing population), commercial timber harvesting (and the indirect effect of increasing accessibility through road construction), and also intensifying pressure on remaining forests for livelihood needs especially fuelwood.

Forest reservation was initiated by the British from 1856, creating a national forest estate but taking over control of many villages' forests in the process. Community Forestry has been a successful policy around the world for communities to protect and sustainably manage their forests and derive livelihood benefits. It was encompassed in Myanmar's colonial era policies to some extent through the creation of Local Supply Working Circles. However, these were under Forest Department management and have not been a success, with most becoming encroached or degraded.

Returning control of the management rights and responsibilities for village forests to the villages became seen by policy makers as critically important in the 1990s both to mobilise communities to protect and regenerate adjacent forests, and also to ensure that they fulfil their forest product needs locally. Hence, the Community Forestry Instruction (CFI) was issued in 1995, and initiated the promotion of Community Forestry in Myanmar.

Implementation of the Community Forestry Instruction began immediately, and was promoted by international donor projects (e.g. UNDP / JICA / DFID) as well as through Forest Department promotion, and in some cases self-organization by communities. Implementation received a major boost through the Forestry Master Plan (2001) which mandated that 2.27 mil. acres (1.36% of the country) be handed over to FUGs by 2030-31.

Annual progress of Community Forest establishment since 1995 had averaged 6,943 acres (2,810 ha), and there are now 572 Forest Users' Groups with certificates, managing 104,146 acres of forest, (with more awaiting their certificate). Implementation progress has been highest in Shan, Rakhine, Magway and Mandalay, most of which have been under UNDP project support.

However, the rate of CF handover has been far lower than that needed to meet the Master Plan's 30-year target (i.e. 2.27 million acres by 2030). For this we would need to hand over 50,000 acres (approx. 20,000 ha) per year, a rate almost ten times higher. (The FD also aims to obtain 4.13 million m^3 of wood fuel from community forests, amounting to 25% of the country's total wood fuel requirement of 16.53 million m^3 by 2030, another target unlikely to be achieved at the current rate).

After 15 years of Community Forestry in Myanmar, there are a wide range of experiences which have significant implications for sustainable forest management and community and livelihood development. To understand how community forestry is working we developed a detailed inter-disciplinary research design with a range of stakeholders in late 2010. Having finalised our method we then selected two States

and two Regions (Kachin, Mandalay, Shan, Ayeyawady) for study, and objectively selected 16 FUGs within these, using a statistically sound sampling method to reflect the diverse environments where CF is happening. We then conducted field work in 16 Community Forests and associated villages. This started in the second week of October and was completed by the end of December 2010. The community forests were assessed, the local Forest Users' Group institution researched, and a total of 272 households interviewed.

Our 16 study CFUGs comprised a very wide range of different local situations,

- from very small to very large villages (populations from 171 to over 39,000),
- from very small to very large FUG membership (from 5 to 263 households),
- from very small to very large Community Forests (from 33 to 1200 acres).
- from young to old FUGs (from 4 to 16 years).

What was the pre-formation situation?

Although we lacked baseline data, most all our groups (13 out of 16, or 81%) told us the areas now under Community Forest had been relatively degraded forests prior to formation. They were degraded mainly because they were effectively open access and the village lacked the authority to regulate their use within sustainable levels by users both within and beyond the village. In the remaining FUGs (19% of the sample) the forests were in moderate condition prior to CF but the trend was uncertain. However this aspect of our study is not entirely conclusive as we were not able to spend significant time on investigating the issue of pre-CF land use, tenure situation and condition. This issue therefore demands further investigation in future studies.

Are FUGs becoming institutionalised?

Almost all of the FUGs were initiated in the context of donor project support, although two were self initiated. Villagers were motivated to protect them to improve their condition, ensure environmental services (like water supply), basic needs (fuelwood and grazing etc.) and for income earning opportunities

We found 50% of the study FUGs to have been well institutionalised at the time of formation, and a further 31% to have been moderately well institutionalised. But for 3 FUGs (19% of the sample) the institutionalisation has been seriously flawed; particularly due to elite capture problems. The ostensible 'self selection' of FUG membership runs the risk of elite capture - some were formed from a handful of households leading to inequity in control and use of community resources.

Study villages show a spectrum of equality-inequality. In some cases it is clear the poorest were depending on these resources –so they may have borne the brunt of restrictions for regeneration.

Are FUGs protecting and managing forests effectively?

FUGs have introduced management regimes involving areas under collective plantation, protection, harvesting and individual plots. Species choice is a critically important issue in planning, and it seems that planting options may have been limited, or unclear. For instance the legal marketing status of teak is unclear to many villagers. Forest protection remains a challenge, as outsiders continue to try to harvest forest products: many villages don't want to get into conflictual relations, but FD staff are often not backing them up. So overall our findings indicate almost all FUGs have introduced effective management and protection

Has CF management actually led to regeneration and / or improvement in forest condition?

The forest study data shows us that forest regeneration is occurring across virtually all villages. 13 of the 16 study sites have forests showing overall good or moderately good forest health (by composite indicators).

The success of CF plantations has been adequate but sub-optimal: in most the mean annual increment is below desirable levels, although survival rates for saplings are generally good. However in the Dry zone conditions are particularly adverse: all our Mandalay FUGs are struggling to ensure their plantation efforts succeed: and survival rates are significantly lower than elsewhere in 2 study FUGs (36% and 54%).

Across almost all CF sites improved 'ecosystem services' have been observed e.g. water supply, soil condition and biodiversity habitat. One of the most dramatic ecosystem services has been storm protection in the delta region: in one site the regeneration of the community forest seems to have been the decisive factor in protecting the lives of villagers when cyclone Nargis hit in 2008.

Communities are thus significantly contributing to the national re-greening objectives enshrined in the CF Instructions.

Has forest regeneration led to livelihood benefits becoming available, and are they being shared?

We found almost all FUGs have regenerated their forests, thereby providing a range of timber, fuelwood, fodder, Non Timber Forest Products and ecosystem services (particularly water and soil nutrient cycling). The patterns are complex, depending on the forest type and condition, and the livelihood practices, but the overall picture is very positive.

There is undoubtedly much potential here for enhancing the livelihood benefits through both livelihood oriented forest management and also value addition and marketing development. We performed an economic 'cost-benefit' analysis of one plantation at a study site in the Delta region. This illustrates a very high positive net return. The net cash flow across the 9-year old plantation has shown a FRR of 24.28%, meaning that one Kyat invested in the plantation over the project period has generated K 0.24 per year for every year that the K1 remains committed to the project. Since the rotation has been set at 10 years, if the plantation is clear- felled at the 10th year, there will be large lump sum revenue and in consequence the profit will increase significantly.

Is the distribution of benefits (and costs) from CF fair and equitable, and in particular are the poor and most needy receiving benefits?

Overall we found half of our 16 study FUGs were moderately and 37.5% were highly equitable in their practices. Only 12.5% were found to be inequitable. We also found that several villages were initiating wider community development initiatives, such as building community infrastructure like schools and bridges, using timber and cash generated from the community forest.

Are the FUGs' achievements sustainable?

In terms of *sustainability* we found 3 of our 16 study sites to be stagnated and inactive. They were in Shan and Mandalay, which also have a higher proportion of 'moderately active' FUG sites. Kachin and Ayeyawady FUGs are performing better, and this is probably related to better formation and post formation support from projects, NGOs and government staff, as well as better environmental conditions (especially more rainfall) for forestry to succeed.

We found only 5 of our study sites (31%) are actually submitting their annual reports. Even otherwise well-performing FUGs are neglecting this duty, and the benefits of doing so seem unclear to them. Record keeping is also worryingly poor, indicated by lack of a management plan in 7 of the study sites (44%).

Conflicts exist in 11 (69%) of our study sites and these are serious problems in 5 (31%). The most prevalent problem is conflict over enforcing regulations on extraction. However, there are also conflicts to do with perceived inequitable exclusion from FUG membership in 3 sites (19%).

Post-formation support is generally perceived to be moderate (44% of sites) or poor (31%), with only 2, both relatively recent FUGs in Kachin experiencing a 'good' level (12.5%). The level of support was unclear in 2 sites but likely to be mediocre.

Thus, sustainability is a serious challenge, and demands improved post-formation support to be secured.

In terms of *policy legal and institutional issues*, we found a relatively high level of understanding of the Community Forestry Instruction and CF concepts across Forest Department staff in the townships where we conducted the field study. The most senior level had the clearest understanding (averaging 'excellent') and the Forest Guards and day wagers had the next highest score (75% had a 'very good' understanding and level of commitment). The other levels averaged a majority of 'very good' level of understanding.

Overall we concluded that of the 16 FUGs we studied, 8 were working well according to the above criteria. A further seven were working moderately well but are having some problems (and are in need of post formation support). So overall we can conclude 94% of FUGs are working well or moderately well. Only one was clearly dysfunctional.

Limitations of this study and issues for future research: tenure, food security, gender

This study has been the first of its kind, to attempt to systematically assess how Community Forestry has been working in the field in Myanmar. It was conducted with modest resources over about 3 months of fieldwork. Devolving natural resource governance to the local level, through policies like Community Forestry, involves complex and multi-facetted processes. Whilst we are satisfied with the significant achievements we feel the study has made, we recognise there are several areas which, under the resource constraints, we have not been able to assess conclusively, and which therefore demand further examination with a more detailed social science approach:

We have focussed primarily on the performance o community forestry according to its own terms – i.e. the increase in forest cover in areas labelled community forests and the possibility of benefit sharing from those areas. We have not examined the more complex land use dynamics which introducing community forestry may precipitate. Local people have a range of responses to the proposition of introducing community forestry, and the changes that it leads to. The threat to the continuity of fallows cultivation in upland land use mosaics when they become labelled as 'degraded forests' threatens the food security for some households. On the other hand, despite the restrictions, introducing CF may still be attractive to villagers as a route to more secure land tenure, especially as *taungya* cultivation typically lacks tenure security. Even within households, the pros and cons are likely to be different between men and women, who use the local village lands in different ways according to their culturally ascribed roles.

The issue of the relationship between the state and the village is a delicate on in Myanmar, and CF inevitably affects this relationship in ways we have not examined.

Thus what we might call the 'micro-politics' of Community Forestry and the ways it changes land use practices, the livelihood coping strategies and the effects on food security are still; somewhat unclear, and demand more detailed and systematic further investigation.

Policy recommendations:

IMPROVE THE LEGAL AND POLICY ENVIRONMENT:

The current policy environment for CF, based on the CFI 1995, has limited force as it lacks the status of policy or law. To improve the CF programme, the CFI should be strengthened and its provisions enhanced:

- *The legal basis of CF should be strengthened – from Instruction to a new Law*
- *CFUGs should be socially inclusive – they should be formed from all of the village as far as possible, not just a self-selected group*
- *There should be a specific gendered and pro-poor approach in policy and support for equity*

SUSTAIN AND ACCELERATE FUG FORMATION

Donor-funded projects have been the main initiator of CF formation (UNDP, JICA, DFID), although NGOs, the FD, and committees themselves have played significant initiating roles as well. Donor support is not, however, sustainable, and having effectively developed and demonstrated the CF model can work, projects in this sector have declined, leaving an uncertain funding future for sustained CF handover and post-formation support. Myanmar's main CF challenge is now how to sustain progress in the absence of widespread donor support.

There are numerous diverse location-specific enterprise / commercial opportunities that might also provide a strong incentive for communities, NGOs and the private sector to invest in long term CF support. Other funding opportunities may arise from payment for ecosystem service, particular REDD and other carbon forestry schemes.

- *The government needs to prioritise the accelerated handover of Community Forests, and develop strategies, mechanisms and targets for doing this.*
- *The government and other partners should develop initiatives responding to the changing national and international opportunities.*
- *Practical steps to scale up CF to meet the national target by 2030 should include:*
  1. *The Ministry identifying and allocating regional targets for the final percentage of forest to be put under Community Forestry, and interim annual targets towards their achievement.*
  2. *The allocation of the appropriate financial and staff resources to achieve this. Forest Department regional offices should create FUG formation support teams, to develop expertise in facilitating handover according to best practice. A sufficient number of staff will be needed to be able to fulfil the annual targets identified. There should be incentives associated with the fulfilment of the plan, and disincentives for non-achievement.*
  3. *A national level awareness raising media campaign to villages to understand the CF programme, roles, responsibilities and opportunities. The campaign should motivate rural people towards demanding Community Forestry, and indicate their next steps (i.e. apply to the forest office).*
  4. *All stakeholders, whether NGOs, CBOs and FUG networks, and any other organisations should be encouraged to help implement this, and stakeholder coordination should be facilitated on a regular basis at the regional and township level.*

STRENGTHEN SUPPORT PROVISION TO FUGs ONCE FORMED:

The leading CFUGs are institutionally robust: their forests have matured, leading to improved ecosystem services and livelihood benefits. They are leading Myanmar's CF programme into a 'second generation' phase of more active forest management for multiple benefits, more equitable benefit distribution and are exploring new areas of activity like enterprise development and network development.

- *The best FUGs need to be supported as they move into new areas of activity and develop networks which can provide support to other FUGs.*

Most FUGs are in urgent need of support, however, across a range of issues: institutional mentoring; conflict resolution; enforcement of forest protection and so on. The weakest groups need re-formation. But support needs are not being met: after initial formation, support has declined as so far the FD has not reoriented adequately to fulfilling this role, leaving a 'support vacuum' in which many CFUGs are stagnating.

- *The FD must play the lead role in the post donor scenario. A renewed initiative from Government is vital to consolidate the achievements of existing FUGs.*

IMPROVE ADAPTIVE CO-LEARNING AND MONITORING PROCESSES:

This study, conducted in a short space of time on limited resources, has only scratched the surface of the many complex and location specific experiences and issues.

- *A sustained co learning programme, ideally based around Participatory Action Research with CFUGs is needed, and this could be linked to a need-based FD support service.*

Chapter 1: THE CONTEXT FOR COMMUNITY FORESTRY IN MYANMAR

1.1 Introduction

This chapter reviews the context in which Community Forestry has emerged in Myanmar, covering the physical and historical context, and declining forest cover trends and explanations.

1.2 Geographical and Historical Context

The Union of Myanmar has a total land area of 676,577 km² (or 67.6 million ha) which is topographically divided into four main regions:

- The **Western Mountain Ranges** comprise the Rakhine, Chin and Kachin hills in the west and the north of the country. The elevation in Rakhine State varies from 1,300 m to 1,500 m and in the Chin Hills from 1,500 m to 2,000 m. Mountains bordering China in the north reach an elevation of around 6,000 m. The hills and mountains contain extensive forests comprised of a wide range of types.
- The **Shan plateau** region includes the extensive Shan plateau and the mountain ranges in Kayah, Kayin and Mon States and Tanintharyi Region, rising to about 1,000 m in elevation. The forests range from tropical rain forests in the south to mixed deciduous forests, dipterocarps to pine forests in the north and northeast. Many upland areas are under long fallows *taungya* cultivation
- The **Central Region** includes the fertile agricultural valleys of the Ayeyawady, Chindwin and Sittaung Rivers. The topography is flat to undulating except the hills of the Bago Yoma which rise to about 1,000 m, and bear the finest teak forests of the country
- The **Ayeyawady** delta and coastal region include coastal areas in Rakhine State, Mon State and Tanintharyi Region, which are alluvial plains. Some coastal areas are still covered by mangroves, although most areas suitable for rice cultivation have been cleared.

Myanmar's climate is greatly influenced by the monsoon, leading to three distinct seasons namely hot, rainy and cool. The hot season runs from mid-February to mid-May, the rainy season from mid-May to mid-October, and the cool season from mid-October to mid-February. The Rakhine mountains obstruct the southwest monsoon from coming to central Myanmar, leading to semi-arid conditions with summer temperatures rising to over 40°C, and minimum rainfall, gauging only about 500 mm annually. In comparison, the coastal regions receive as much as 5,000 mm precipitation during the monsoon season.

Temperatures over the whole country vary widely, from less than 0°C in the northern highlands to over 40°C in the central dry zone.

With so much of the country historically forested, the forests are a major factor for both local livelihoods, regional and national economic policy.

> *"Myanmar history dates back to the early 11th Century when King Anawrahta unified the country and founded the First Myanmar Empire in Bagan more than 20 years before the Norman Conquest of England in 1066. The Bagan Empire encompassed the areas of the present-day Myanmar and the entire Menam Valley in Thailand and lasted two centuries"*[1]

Myanmar timber, particularly teak has been world-renowned for many centuries, and the Myanmar ship industry even used to supply hulls to European navies in the 18th Century. However, timber was a key factor in attracting British Colonial attentions, and the British completely colonized Myanmar through the three Anglo-Myanmar wars, in 1824-6; 1852-4 and 1885. The British colonial regime established the

[1] NCEA, 2006: Myanmar national environmental performance assessment (EPA) report.

Forest Department in 1856 to manage and regulate the orderly exploitation of Myanmar timber (see Bryant 1997), after which Forests were gradually reserved, including village forests. The extensive social injustices of the colonial period were documented at the time by Sayar San (1932) who went on to lead an insurrection.

Myanmar was devastated by the Japanese occupation from 1942 to 1945 during the Second World War. Regaining independence on 4 January 1948 after 62 years under colonial rule, Myanmar has had an extremely difficult post colonial reform and state-building process, with continued civil conflicts, particularly in forested areas of the country, which persist in some areas until today.

The country was under democratic administration until on 7 July, 1962 Myanmar Armed Forces (*Tatmadaw*) took over state duties. Following introduction of the 2008 State Constitution, the State Peace and Development Council (SPDC) (*Tatmadaw* Government) held General Parliamentary Elections on 7 November 2010. The SPDC subsequently transferred its State powers to the newly formed government on 29 March 2011.

The Union of Myanmar has a population of 55.4 million (2005-2006 census), including over one hundred indigenous races with distinct dialects, and an annual population growth rate of 2.02%[2].

1.3 Forests: Status and Trends

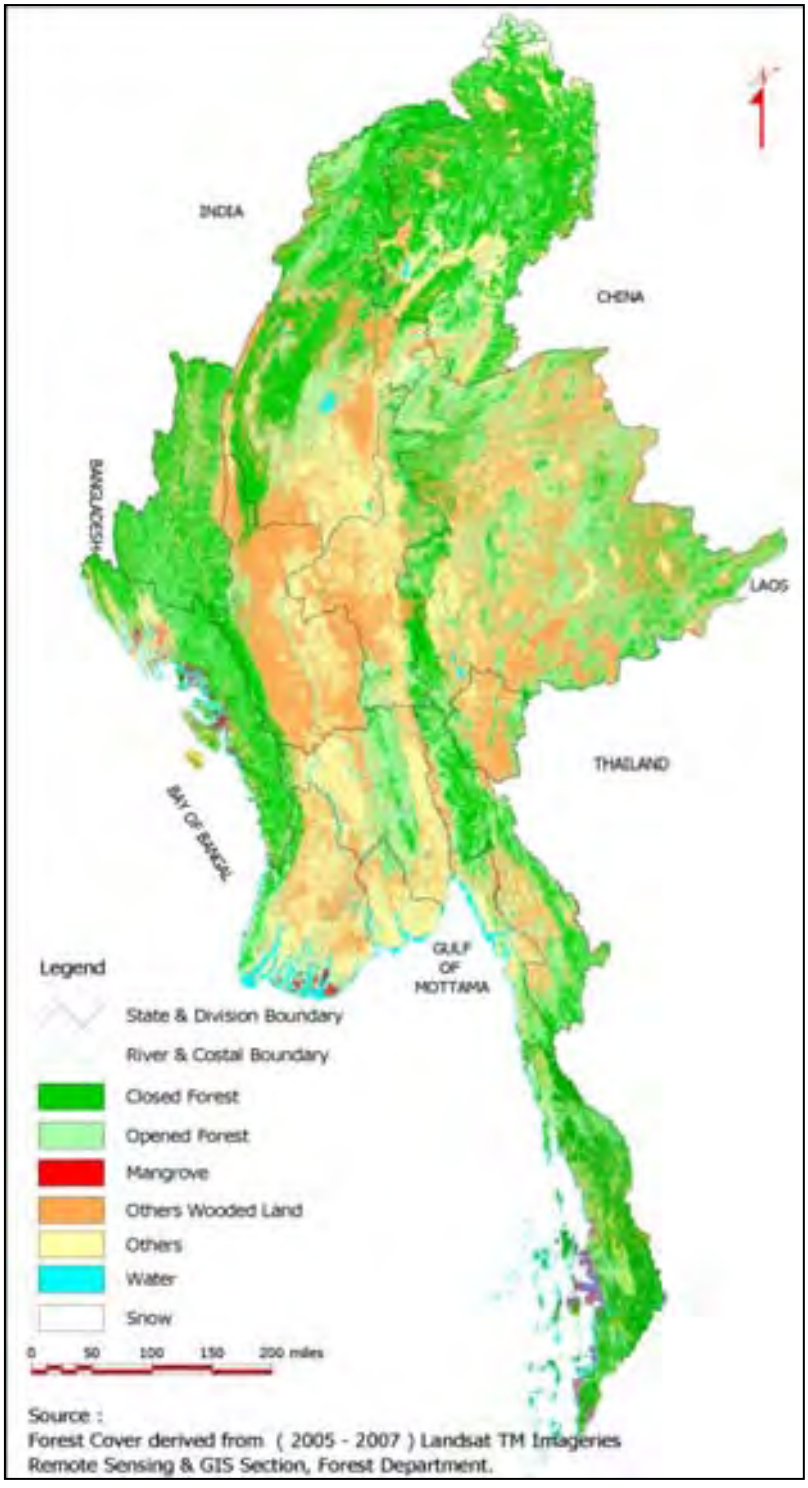
Due to a wide range of topography, soil, rainfall and temperature, the vegetation types, fauna and flora are also diverse. Practically, all the forests in Myanmar are natural forests, which are commonly categorised by eight major forest types, namely

1) tidal forests
2) beach and dune forests
3) swamp forests
4) tropical evergreen forests
5) mixed deciduous forests
6) dry forests
7) dipterocarp forests
8) hill and temperate evergreen forests

Each forest type provides rich biodiversity, high value timbers, land for cultivation (both shifting and sedentary), ecosystem services like water supplies and a range of non-timber forest products. The mixed deciduous forest type comprises 40%of the country's remaining forests[3] and is seen as economically most important, as these forests contain teak and other valued tree species such as pyinkado *(Xylia dolabriformis),* padauk *(Pterocarpus macrocarpus),* binga *(Mitragyna rotundifolia)* and hnaw *(Adina cordifolia).*

Myanmar's national forest cover is currently estimated at 47% (31.773 m ha according to FAO 2010), of which closed forests are estimated to be 19.9%. (See Map 1 below for the geographical distribution) However, forests have shown a gradual decline over time, particularly dense 'closed' forests. According to the National Forest Master Plan (NFMP) of the Forest Department, the forest cover has decreased from 65.8% of the total area of the country in 1925 to 52.3% in 1999[4] (see Fig.1.1). As of the year 2004-2005, Myanmar's forest area stood as shown in Fig. 1.2 and Tables 1.1 and 1.2.

[2] Central Statistical Organization, 2008: Statistical Year Book 2007.
[3] Anon, 2000: Forestry in Myanmar, Forest Department, Myanmar.
[4] Tint Dr. Kyaw, 2002: Review of forestry and related legislation, policies and practices and their impacts / implications on sustainable forest management (SFM) and on the model forest approach to SFM in Myanmar.



Map 1.1: Forest Cover Status of Myanmar 2007

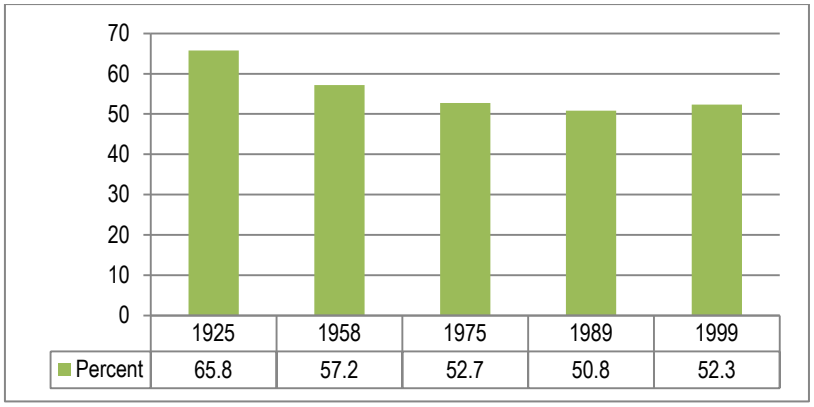


Figure 1.1: Change of forest cover from 1925 to 1999 (*NFMP)*

Myanmar's report to the FAO Global Forest Resource Assessment gives more detail on recent land use change. Figure 1.2 illustrates the trend in land use over the last 20 years.

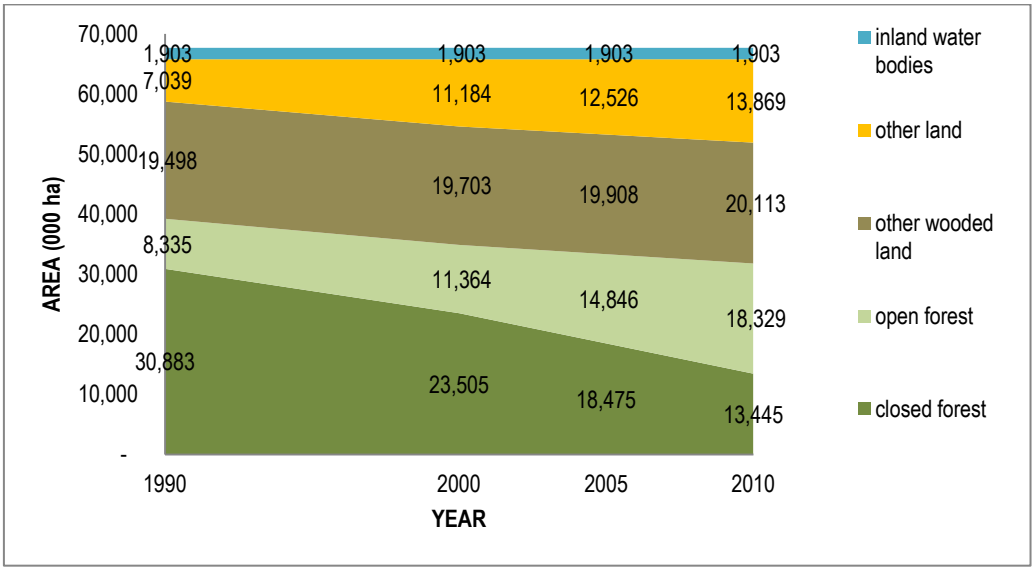


Figure 1.2: Myanmar land cover *(based on data from FAO 2010)*

The data confirms that whilst total forest area has declined gradually from 57.9% in 1990 to 47% in 2010 as 'other lands' have increased, closed forests have precipitously declined, more than halving from 45.6% of total land area to just 19.9% in 20 years, with an apparent corresponding increase in open forests. Myanmar's overall deforestation rate is estimated to be 1.2% per year (1989-2009) (FD 2009)

1.4 Forest Governance and tenure

Of the total forest area (50.2% of the country in 2005-6) the total area of the permanent forest estate has reached 27.16%. Of this 23.23% is Reserved Forest and Protected Public Forest, and 3.93% is under the Protected Areas System.

The Myanmar Forest Policy has stipulated to increase the forest land to 30% and Protected Areas System to 5% of the total land area.

Box 1.1: Forest Administrative Categories

Permanent Forest Estate (PFE) is forest covered land meant for permanency of forest cover by law. It includes RF and PPF.

Reserved forest (RF) is land constituted as a reserved forest under Forest Law 1992. To conserve the environment and maintain a sustained yield of the forest produce Minister, MOF, can constitute, with the approval of the Government, different categories of RF by demarcation on land at the disposal of the Government.

Protected Public Forest (PPF): land declared to be protected public forest under Forest Law 1992. The Minister, MOF, may, with the approval of the Government, declare as PPF, specifying limits on land at the disposal of the Government, outside RFs, for purposes to protect water and soil, conserve arid-zone forests, mangroves, environment and biodiversity, and for sustainable production.

Protected Areas System (PAS): includes parks, national parks, wildlife sanctuaries, nature reserves, etc., that are specifically meant for the conservation of nature, biodiversity and national heritage and culture.

Public forest: Outside of the forest estate – forest covered area at the disposal of the Government.

Table 1.1: Status of Permanent Forest Estate in year 2005-2006

Total land area (km2)	Permanent Forest Estate (km2)		
	Reserved Forest & Protected Public Forest	Protected Area System (PAS)	**Total forest estate**
676,577	157,205	26,620	**183,825**
100%	*23.23%*	*3.93%*	***27.16%***

Source: Statistical Year Book, 2007 p.137

Table 1.2: Forest categories (from 2006/07 data)

Land	Extent (km^2)	Percent of total
Total land area	**676,577**	**100.00%**
1.Forest cover[a]	339,666	50.20%
Closed forest	*247,042*	*36.51%*
Open forest	*92,624*	*13.69%*
2. Permanent forest estate[b]	183,825	27.17%
Reserved forest and protected public forest	*157,205*	*23.24%*
Protected areas system	*26,620*	*3.93%*
Public forest (1-2)	155,841	23.03%

Source: [a] FAO (2006); [b] Statistical Yearbook (2007)

The forests and forest lands are controlled by the Ministry of Forests. Other land is managed by the Department of Settlement and Land Records under the Ministry of Agriculture and Irrigation. Land is convertible to any use.

Virtually, all the countries' natural forests are managed under the Myanma Selection System (MSS), the salient points of which include adopting a 30-year selective felling cycle, based on fixing exploitable sizes of trees, and improvement fellings.

1.5 Deforestation and degradation

Loss of forests is a serious problem for a number of reasons, including decline of availability of both forest products, timber, fuelwood and non-timber forest products, and also decline in ecosystem services; biodiversity and habitat, hydrological services and so on. Forest degradation is also a grave problem: average volume of woody material in the growing stock fell from $145m^3$/ ha in 1990 to $33m^3$ in 2000 (FAO 2001).

The principal cause of deforestation has been land use change and the principle causes of forest degradation have been overexploitation for timber and non-timber forest products.

"Since 1989, about 460,000 ha of natural forest were lost on average each year. And wood removal per thousand ha of forest cover nearly doubled from 624 m³ in 1975 to 1,232 m³ in 2000"[5]

1.5.1 Logging – legal and illegal:

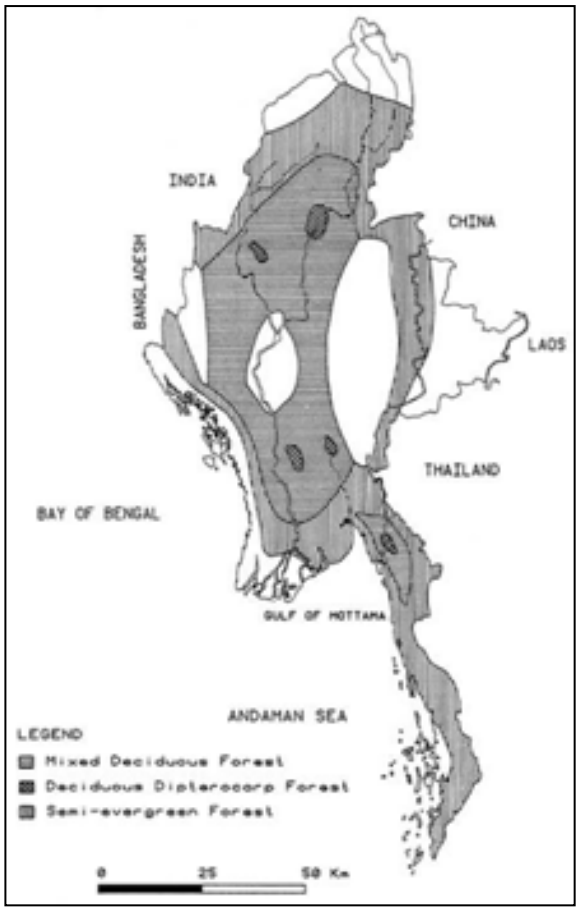
Much of Myanmar's forests contain valuable timber species, most particularly teak. Natural teak distribution occurs in the semi-evergreen forests, mixed deciduous forests and *deciduous dipterocarp* or *Indaing forests*, illustrated in Map 1.2.

Commercial legal logging being done by the Myanma Timber Enterprise (MTE) fluctuates around, but it is believed does not consistently violate, the annual allowable cut (AAC) fixed under the Myanma Selection System (MSS). It may therefore degrade the forest but not leading to deforestation.

"Available data do not support the notion that commercial logging operations systematically violated existing annual allowable cut (AAC) regulations. For instance, AAC for teak was 350,000 and 226,954 hoppus tons respectively before and after 1996 periods but annual extraction of teak during 1975 to 2001 ranged from 203,122 to 489,109 hoppus tons p.a. In case of hardwood species, AACs fixed for periods before and after 1996 were 1.3 and 1.8 million h. tons respectively and actual felling has never exceeded the AAC limits[6].

However, since the private sector has been allowed to export timber after 1988, extraction has increased sharply, and harvestable teak has become scarce, leading to a switch to the logging of the lowland evergreen forests[7]. The construction of roads for logging and transportation also has adverse impacts on the forest ecosystem health, and facilitates subsequent illicit logging in the selectively logged areas.

Illegal logging is a serious problem, particularly in remote and insecure areas, and has proved very difficult to control. It is a major cause of both deforestation and forest degradation.



Map 1.2: Teak-bearing forests in Myanmar

Source: Mehm Ko Ko Gyi and. Kyaw Tint 1995

1.5.2 Rural livelihood use and fuelwood

Most rural communities are very much dependent on timber and non-timber forest products for their livelihoods: communities' wood and non-wood forest needs include fuel, poles, posts and foods. In the absence of alternate fuels, local domestic firewood needs are high and increase every year. It was estimated to be almost 14 times the official extraction of teak and hardwoods in 2005-2006, total production of firewood being 20.54 million cubic tons and the total extraction of logs 1.48 million cubic tons(1). Thus, firewood extraction had been a major, perhaps the major, threat to forest conservation, which demands a constructive policy response.

[5] NCEA 2006 *Ibid.*
[6] NCEA 2006 *Ibid.*
[7] Win Myo Thu 2011 National Biodiversity Strategic Action Plan Myanmar (draft)

1.5.3 Expansion of agriculture and infrastructure development

Another major driver is clearance for shifting cultivation, agricultural expansion and development of infrastructure. Agricultural sown area had increased from 24.6 mil acres in 1988 to 37.14 mil acres in 2004[9].

The number of dams had increased from 138 in 1988 to 162 in 2004. In 2004, 32 dams were under construction and 44 were under planning stage[8]. Construction of dams in the forests had not only directly reduced the forest cover but also compounded deforestation and forest degradation by making the forests more accessible to illicit timber cutters.

1.5.4 Conversion for commercial plantation

Security of land tenure is a particular problem as there is increasing interest from private companies to appropriate land for commodity production, mining and infrastructure development. However, data is currently limited on this phenomenon.

1.5.5 Summary

The overall picture is that drivers of deforestation and degradation involve primarily land conversion for agriculture and other uses, illicit logging, particularly as forests become more accessible, combined with poorly managed or regulated livelihood use.

1.6 Rural Livelihoods and Village Forests

The patterns of rural livelihoods depend in a range of ways on forests – particularly fuel wood, pastures and tree fodder, compost materials, timber, posts and poles for construction & sale, a wide range of non timber forest products (including wild foods and medicines) which can provide both seasonal incomes and a safety net function. Forests also provide local people with a range of ecosystem services, particularly water supply for domestic use and agriculture, and also pollination, soil nutrient cycling and storm protection. Both poverty and malnutrition are a serious problem in Myanmar; therefore, food security needs to be treated as a priority.

Because forests play such an important role in livelihoods, there has been a long history of their local management as a common property resource (as with many other resources e.g. grazing lands, fisheries, irrigation, parks, wildlife habitats and hunting grounds). Historically, customary community control of village forests has been a ubiquitous phenomenon internationally, wherever people have lived at a forest / agriculture interface.

In Myanmar, common property regimes began to be disrupted from the 19th century by the Colonial era, particularly through forest reservation (Bryant 1996). As the colonial state extended its interest in timber it has taken over control of forests, superseding village authority. Village forest areas often became effectively open access leading to a 'tragedy of the commons'. However, some 'informal' commons management seems to have persisted. This includes protection of forests on private / community land, grazing lands, sacred groves, woodlots in and around Buddhist monasteries and shrines, and private watershed forests in the Shan State and so on.

Sacred groves for instance remain fairly widespread (typically devoted to local Nats or spirit guardians). Communities enforce strict prohibition on any exploitation. These groves therefore form community biodiversity reserves.

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[8] Anon 2004 *Ibid.*

[9] *Anon 2004 Myanmar building a modern state*

Collective action is also prevalent. Many villages all over the country have formed community development groups. Local rural people are skilled in cultivating, planting and protecting trees on home plots and field edges

From this discussion it seems that rural communities are ready for Community Forestry, and the government simply needs to provide an enabling policy environment and support.

1.7 Community Forestry

Informal common property regimes lack legal or administrative back-up and are, therefore, vulnerable to powerful interests. With increasing forest degradation around the world, governments have been rethinking forest governance since the 1970s, seeking to return control of forests to communities in order to achieve the twin goals of sustainable resource management and poverty alleviation.

Community Forestry simply involves communities receiving formal endorsement and rights from the administration to assume control, management and use of forests local to them. The basic logic for CF is as follows:

1. In forests adjacent to villages which have become degraded through being open access, the first step is to (re-) establish village institution regulating use and investing efforts in protection, regeneration and management. This often takes outside initiation and facilitation support, and also long-term back up.
2. Over time, the forest condition will gradually improve, leading to increased availability of desired forest products and services valuable to the local community.
3. Although households will have to reduce their forest use in the early years, often leading to hardship for those most dependent on the forest, in time there should be a higher level of sustainable forest product availability for them (see Fig. 1.3)

Figure 1.3: Community forestry – development over time

This model however is not applicable to areas where the label of 'degraded forest' does not fit. In many upland areas land use is a mosaic of agriculture (often rotational fallows), grazing meadows and woodlands, and imposing 'forest' as a land use objective can significantly compromise pre-existing livelihood practices.

Community Forestry has been highly successful in a range of counties, most famously Nepal (see Bhatta 2007) where virtually 100% of mid-hill forests are now under community management, and Mexico (see

Bray et al. 2006). In most cases this is leading to both regenerated and thriving forests, high levels of sustainable benefits for communities, and also tax revenues to the government.

1.8 Emergence of Community Forestry in Myanmar

In Myanmar it had become increasingly apparent that unless the basic needs of the local forest dependent poor especially the need for wood fuel can be met, sustainable forest management would remain elusive.

Sustainable forest management demands sustainable management of the forest's entire ecosystem which will also includes forest dependent communities. To achieve sustainable and effective forest management, the forest development and management system must involve the target community's participation, give the community a sense of ownership and address its needs.

In actual fact this element was originally conceived during the initial stages of the scientific forestry in the country. Forest district working plans used to include Local Supply Working Circles (LSWCs). These were created in forests in the vicinity of the villages for easy access and were managed to provide the local community with fuel wood, poles, posts, small timber and a variety of NTFPs. However, encroachments from agriculture, settlements and infrastructural developments and overexploitation proved uncontrollable, ultimately resulting in their disappearance.

Despite the LSWC experience, it is clear that revived community involvement is essential. A community forestry policy was considered the right choice for Myanmar in the mid-1990s, and consequently, the Community Forestry Instructions were formulated in 1995, and approved by the Minister of Forestry and instructed by the Director-General of the Forest Department for implementation throughout the country starting from 1996 onwards.

The key advance from the LSWC to the Community Forests (CF) is that LSWC was managed by the Forest Department (FD) to satisfy the basic needs of the local community, whereas the CF is *managed by the local community themselves*. The revised Forest Management Manual adopted in 1996 prescribes LSWC and CF in the same category as LSWC/CF.

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Chapter 2: OUR RESEARCH APPROACH

2.1 Rationale for study

One and a half decades have passed since 1996, the year of the establishment of the first Community Forest in the country. Many working in community forestry implementation have extensive personal experiences, and there are also anecdotal reports and some modest review studies (e.g. Lin 2005). However there has been no comprehensive assessment till now, particularly incorporating the institutional, social and livelihood aspects.

The need for a systematic study of CF was formally recognised at the First National CF Workshop in 2008. (EcoDev 2008). Evaluation of the CF performance is critically needed on legal, institutional, ecological, economic and social aspects to identify its gaps, constraints and opportunities in order that CF process can be improved and its progress sped up.

Having recognized the need for a systematic study of CF, ECCDI a leading Yangon based NGO, encouraged and supported by Pyoe Pin Programme of (FCO/DFID) organized a community forest research project design workshop at the Chatrium Hotel in Yangon, in September 2010. ECCDI presented a proposed CF research methodology which participant stakeholders reviewed, improved and approved. The method was then finalised and implemented through field study.

2.2 Research questions

At the outset of this study we identified some key objectives and research questions. The overall objective of the research was to appraise community forests in the context of the following aspects:

- Ecological aspect
- Policy/Legal/Institutional aspects
- Social aspect, and
- Financial/Economic aspect

We also identified a number of specific sub-questions:

1. What was the pre-formation situation (the 'base line' from which to measure change)?
2. Are FUG groups actually being formed properly, becoming institutionalised; continuing to work once formed, and are they receiving adequate post-formation support?
3. Have they been able to manage and protect forests effectively?
4. Has CF management actually led to regeneration and / or improvement in forest condition?
5. Has forest regeneration led to livelihood benefits becoming available, and are they being shared?
6. Is the distribution of benefits (and costs) from CF fair and equitable, and in particular are the poor and most needy getting benefits?
7. Are responsible FD staffs adequately aware of and committed to community forestry and CFI 1995, and are they performing their responsibilities well?

Additionally we wanted to understand:

- What is the future potential of CF?
- Can CF be scaled up, in the context of limited external funding support?

2.3 Approach and sampling

To address these objectives and questions we sought to apply a mixed method across a representative range of FUGs across the country, to represent the diversity of different CFs. We therefore developed a 'nested' research approach, in which we selected four states / regions across the country, then around 4 FUGs in each, and a sample of households within these to study a manageable number of FUGs in depth. Stratified multi-stage sampling was applied to select CFs for appraisal, and sixteen community forests and forest users' groups (FUGs) were chosen. In every selected CF both forest resource and social surveys were undertaken. The selection procedure was as follows.

2.3.1 Region / State Stratification (First stage selection)

Out of the 7 States and the 7 Divisions constituting the Union of Myanmar, two States and two Regions were purposively selected based on the abundance and importance of the CFs. The following were chosen:

1. Kachin State
2. Shan State
3. Mandalay Region,
4. Ayeyawady Region.

2.3.2 Selection of townships (Second stage selection)

Eight townships were selected objectively, according to the frequency of FUGs in the selected states and regions. Although we aimed to have two townships per region or state, only one township could be selected in Kachin State where there are fewer FUGs, while three townships in Shan State, two each in Mandalay and Ayeyawady Regions were selected with probability proportional to the number of CFs in the townships.

2.3.3 Selection of CFs (Third stage selection)

Within each selected township two CFs were selected at random. They were the ultimate units where all observations necessary for the analysis were made. They are presented in Table 3.2. The selection of CFs or FUGs in each selected township was made at random. In planning the sampling design we selected 3 CFs, the third one as a reserve in each township.

Among the 16 FUGs randomly selected at this stage, when we visited the site of Saung Myint FUG in Nyaung Shwe Township, Shan State, it was found to have had dispersed. The FUG and the whole village had 13 households with only about 7 elderly men. When 2 of them died of sickness, the villagers decided to move to nearby villages where they had relatives, so the FUG became inactive, but the CF remained intact, functioning well. It had an area of 364 acres of natural forest established in December 2001 and had already got its Community Forest Certificate. So, we moved to an alternate site: Nar Daung Hla CF which has been selected as a reserve CF at the planning stage.

2.3.4 Household sampling - stratification by wealth ranking

For the social aspects of the research, within each FUG we selected about 20% of households for interview. In order to ensure our selection reflected the range of socio-economic groups we followed a random sampling approach, stratified by subjective wealth ranking. The wealth ranking was done by the participants by completing the following matrix for each household after discussion and having agreed among themselves-

Table 2.1: Wealth ranking categories

	Food secure	Food insecure
Land holding	2 – 'rich'	1 – 'moderate'
Landless	1 – 'moderate'	0 – 'poor'

The wealth ranking system is as follows-

- If a household has land holding and food is secure, then the wealth rank is "2" – 'rich'
- If a household is landless but food is secure, then the wealth rank is "1" 'moderate'.
- If a household has land holding but food is insecure, then the wealth rank is "1" 'moderate'
- Finally, if a household is landless and food is also insecure, then the wealth rank is "0" – 'poor'

After stratifying the village by wealth rank, 20% of households in each stratum were selected for questionnaire survey. A total of 272 households in 16 selected CFs had been surveyed by the two social survey teams.

Table 2.2: Selected States/Regions, Townships and Community Forests

State/Region	Townships selected	Community forests selected
Kachin	Waing Maw	1. Wuyan 2. Gweyutan
Mandalay	Pyin U Lwin	3. Sin Gaung Lay 4. Pa De Thar Myothyit
	Nyaung U	5. Myay Thin Twin 6. Let Pan De
Shan (south)	Pindaya	7. Mine In 8. Pway Hla
	Nyaung Shwe	9. Lwai Nyeint 10. Nar Daung Hla
	Pinlaung	11. Kone Shine 12. 2. Taung Kya- 1
Ayeyawady	Laputta	13. Nyaung Ta Bin 14. Byant Gyi Gon
	Phyarpon	15. Te Bin Seik 16. War Kon
Total: 4 S/R	**8 townships**	**16 community forests**

Maps 2.1 and 3.1 below show sites of selected community forests.

2.4 Methods

Field work in 16 CFs and villages started in the first week of October and completed by the end of December 2010. Research work was organized as shown in the Organogram in Figure 3.2.

We developed a multi-disciplinary method, involving forest assessment, community institutional assessment, and household livelihood assessment. At each site we applied a combined method: Forest Survey (described in detail in Appendix 3.1) and Social survey. Data collection involved four teams – two forest ecosystem survey teams and two social survey teams. They visited each selected CF and its FUG, and collected forest resource, ecological, economic and social data/information.

2.4.1 Forest Survey

The forest ecosystem at each site was studied in detail by the forest survey team – full details are presented in Appendix 3.1. A forest survey team comprised a staff officer, a deputy ranger, two foresters and three field assistants. Deputy Ranger and foresters were provided by the concerned Township Forest Department.

Map 2.1: The study sites for this research

2.4.2 Social Survey

Data was collected using a combination of village level PRA and other assessment, environmental inventory, household interview. Data instruments are available on request. Two social survey teams each comprising three social scientists carried out the social survey. Each team visited eight villages (or CFUGs). The teams used the following PRA tools

1. Wealth ranking
2. Venn diagram

3. Seasonal calendar
4. Mind mapping, and
5. Problem analysis

The PRA covered issues concerning CFUG's awareness on CF, FD's and NGO's supports to CF, FUG's institution and management, economics, sociality, environment and marketing.

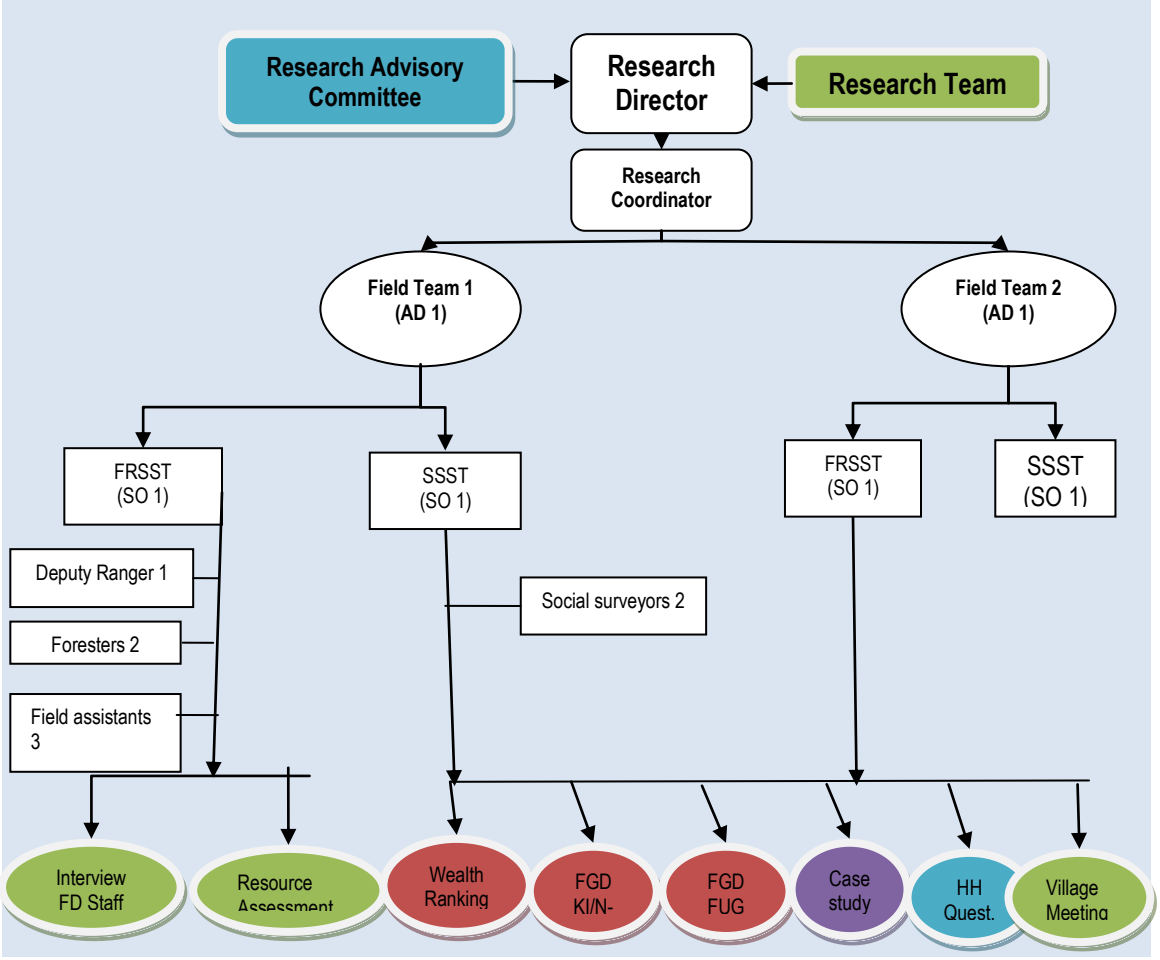


Figure 2.1: Organogram of Community Forest Research Field Process

Notes: AD= Assistant Director; SO = Staff officer; FRSST = Forest Resource Survey Sub-Team; SSST = Social Survey Sub-Team

2.5 Merits and constraints of the method

Our study faced a number of constraints. Perhaps the major one has been that we lack baseline data in order to understand the extent of change. So we are obliged to rely on approximating the 'pre-CF situation, triangulating from various sources. Further, villagers were reluctant to be interviewed by strangers from Yangon, which could have impacted on the quality of the data.

Nevertheless, overall and considering the rapid nature of the study, we are relatively confident that the research is representative due to a statistically sound sampling method in the selection of the sample CFs. However, there is no doubt each region will have a distinct experience – and so to develop regionally appropriate policies each region needs to be considered.

Due to resource constraints we were not able to include non-FUG villages to compare. We were also not able to conduct interviews with other stakeholders, such as local authorities, NGOs and so on.

Chapter 3: The Policy, Legal and Institutional Context of Community Forestry Implementation

3.1 Introduction

This section reviews the emergence of community forestry in Myanmar, and its relationship with the overall forestry policies and laws. It then looks at the implementing partners and particularly the role of donors in supporting implementation. We finally consider the overall progress in implementation and compare different regions.

3.2 Communities, Forestry and Policies

Myanmar's long tradition of scientific forestry was initiated by Dr Dietrich Brandis, the German Scientist, who was appointed as Superintendant of Forests for Bago province in 1856, and who introduced the first working plan for Bago in 1857 with the object of sustainable forest management. Brandis developed the so-called Brandis Selection System.

Brandis proposed in 1856 that the chief objectives of forest management in Myanmar should be:

1. To protect and, as far as possible, to improve the forests, to arrange the cuttings so as to keep well within the productive powers of the forests, and to ensure a permanent and sustained yield from them.
2. To keep the inhabitants of the forests and the people in the vicinity friends and allies.
3. To produce an annual surplus revenue as soon as possible.

Objective 2 indicates that the concept of involving the local community in forestry has been considered since the very initial stage of scientific forestry in Myanmar. Following from this, Working Plans formulated for each forest district in the country included Local Supply Working Circles (LSWCs) in addition to the Teak Selection Working Circle and Commercial Supply Working Circle, etc.

3.2.1 The 1995 Myanmar Forest Policy

The current Myanmar Forest Policy 1995 sets out the nation's forest management aims as: protection, conservation, efficient utilization and sustainable development of forest resources and natural ecosystems to ensure environmental, social and economic prosperity of the people of Myanmar while contributing to global environmental stabilization. It underlines sustainable forest management without impairing the production capacity, while meeting social and community needs and conserving biological diversity and environmental stability (Anon, 1995).

The 1995 Policy, keeping in view principles adopted at the 1992 UN Conference on Environment and Development (UNCED) and the Government's political commitments and national development policy, identifies six imperatives. Of these, regarding community forestry, two imperatives are '*participation*' and '*public awareness*'. '*Participation*' clarifies that by way of practicing community forestry or agro-forestry, communities are to be involved in national and local efforts for:

- Achieving sustainable development of forests;
- Meeting their basic needs; and
- Increasing non-farm incomes.

The imperative '*public awareness*' clarifies that public awareness on the vital role of trees, forests and wildlife in national socio-economic development is to be raised.

3.2.2 The 1992 Forest Law and 1995 Rules

The Government enacted the new Forest Law in 1992, superseding the previous 1902 Forest Act. The new Law has *58 Articles;* however, it does not have any provisions relating to community forestry except *Article 15* which states:

> *"the Director-General of the Forest Department may grant permission to establish, with stipulation, the following village-owned firewood plantations in a reserved forest or protected public forest or on land at the disposal of the Government in the vicinity of the village*
> *a) firewood plantations established by the Forest Department for a certain period and then transferred to be maintained and used as village-owned;*
> *b) village-owned firewood plantation established, maintained and used by the village by collective labour".*

Forest Rules were issued by the Ministry of Forestry in 1995 for the implementation of the Forest Law 1992, according to the empowerment stipulated by the Article 57 (*b*) of the Forest Law. The Forest Rule No. 42 to implement the Article 15 (*a*) of the Forest Law states:

a) Forest Department has to undertake all the first-year activities of firewood plantation to be established;
b) The villagers concerned should carry out all the necessary maintenance and tending works of the firewood plantation starting from the second year till the harvest with the technical assistance provided by the Forest Department;
c) Tax shall be levied by the Forest Department on the villagers if the harvest is used for commercial purpose.

The Forest Rule No. 43 to implement the Article 15 (b) of the Forest Law articulates:

a) Forest Department has to distribute seedlings which are suited to the local conditions for the establishment year;
b) Starting from the establishment year till the harvest, the villagers should carry out all the necessary works of the firewood plantation following the technical guidance provided by the Forest Department;
c) Forest Department should also provide and demonstrate agro-forestry techniques to the villagers;
d) The villagers can harvest for their own use free of charge at the harvest time prescribed by the Forest Department.

There is no single expression of community forestry or community forest in the whole of the Forest Law. Only Section 15 of the Forest Law mentions about the establishment of village-owned firewood plantations established either by FD or by the villages by collective labour. These village-owned firewood plantations cannot be termed as community forests due to the lack of coordination between FD and the villages in establishing and managing these firewood plantations. Thus, to promote Community Forestry new provisions were needed.

3.2.3 The 1995 Community Forestry Instruction

The major shift towards local community participation in managing Myanmar's forest resources formally commenced with the Community Forestry Instructions (CFI), issued by the FD in December 1995 as a policy response to the widespread forest degradation and the increased demand of growing rural communities for forest products and services. Multilateral agencies were also encouraging the Forest Department to create an enabling policy environment for participatory resource management. The Deputy Director General of the Planning and Statistics Dept. at the Ministry of Forestry (the lead author of the present paper, Dr Kyaw Tint) initially formulated the CFI, and when he became the Director General was able to adopt the Instruction and direct all the forest staff to implement it. Myanmar's CF model is described in the Box below-(The CFI 1995 text is shown in *Appendix I)*

Box 3.1: Myanmar's Community Forest model, as specified in the CFI 1995

- A group of interested local people (although not necessary *all* village households) together form a Forest Users' Group (FUG) and select a Management Committee (MC) by consensus.
- The Management Committee identifies the area for Community Forestry and prepares a location map.
- The Management Committee then applies, via the Township Forest Officer (TFO), to the District Forest Officer (DFO) for permission to establish a Community Forest
- The Township Forest Officer assesses the suitability and availability of the area, and submits the application to the DFO with the map and recommendations. (For land at the disposal of the State, if it is not forest land, the TFO must also get the approval of the concerned State/Regional authority)
- On getting the DFO's permission to establish the Community Forest, the Management Committee draws up a Management Plan (MP) with assistance from the FD, and submits the plan to the DFO.
- After confirmation of the Management Plan, the DFO issues a Community Forestry Certificate (CFC) with the relevant rules, etc. attached. The land lease is 30 years initially; extendable and inheritable.
- The FUG Management Committee then establishes the Community Forest. The FUG can harvest timber, fuelwood and NTPFs according to management plan provision, and can sell products surplus to village needs. The FUG must follow the Management Plan, and if they deviate from it DFO can revoke the certificate.
- The Forest Department must provide, free of charge, seeds and seedlings for the first rotation, and necessary technical support.

In terms of Forest Department management planning, LSWC and CF are put together in one Working Circle in District Management Plans. They do not overlap each other, and they are not the same in many aspects: LSWC is established and managed fully by the FD for the local community; CF is established, managed and utilized by the community for the community. The community has the land use right and the land is inheritable.

3.2.4 The Forestry Master Plan 2001

Community forestry implementation received a major boost in 2001 with the 30-year Forestry Master Plan of 2001-02 to 2030-31, in which the important role of community forestry as a participatory tool to achieve sustainable forest management and uplift rural livelihoods was recognized. In pursuance of this the Forest Department set the following targets:

a) To establish CF as an integral part of the strategy to achieve sustainable forest management and to obtain forest products on a sustainable basis;
b) To make a significant contribution towards the rehabilitation of the annual deforestation of 544, 060 acres (220,178 ha) (about 0.3% of the country's total land area of 167.185 mil. acres or 67.66 m ha);
c) To achieve 2.27 mil. acres (0.919 mil ha) of CF by 2030; (or 1.36% of the country)
d) To obtain wood fuel amounting to 4.13 mil m^3 (25% of the total wood fuel requirement of 16.53 mil. m^3 at the end of Master Plan's period).

3.2.5 Summary

The CFI is provides a set of instructions to promote community forestry in the country, and as such could be issued by the Ministry of Forestry without requiring the lengthy process inevitably involved in securing Cabinet approval. As such, it is a lesser order of legal instrument than a law. Despite the strong endorsement in the Master Plan the CFI needs strengthening

- ***Although the CFI 1995 forms a good basis, in order to strengthen the CF programme in Myanmar there is therefore a need to issue a Community Forestry Law to consolidate and strengthen the provisions of the Instruction, and the Instruction might then form the basis for Rules[12]***
- ***Therefore, before promulgating a Community Forestry Act, it may be desirable that the existing Forest Law 1992 should be supplemented with appropriate provisions to ensure legal basis for community forestry promotion. Sections that protect the CF are very important and should also be included. This will gain the trust of the community and will also give them the sense of security and ownership.***

3.3 Organisations and Institutions Implementing Community Forestry

Implementation of CF has typically involved a partnership between local communities, the Forest Department, and donor-supported projects

3.3.1 The Forest Department

The Forest Department, which was formally constituted in 1906, issued the CFI and is the main institution responsible for its implementation. The FD comprises 557 officials and 14,591 support staff making a total of 15,148 staff members (Anon. 2003). It does not yet, however, have a separate division or section specifically tasked with the community forestry responsibilities. Rather district-level FD staffs mobilize and sensitize the community and establish community forests in their areas.

As with many countries, adapting to the new policy has been a major challenge to the forest administration. Implementing CF has required a change in working practices; both in terms of providing the technical services for formation (awareness raising, forest boundary delineation, mapping; inventory, management planning and establishment support, paperwork regarding application for certificate); as well as post-formation support.

3.3.2 Dry Zone Greening Department

The Dry Zone Greening Department (DZGD) was established in 1997 with the main responsibility for taking all necessary measures to prevent and check the degradation of the harsh environment of the Central Dry Zone of Myanmar. The majority of this department's activities are implemented through community participation and community forestry. The department comprises 137 officials and 3,094 subordinate staff to make a total staff of 3,231 members (Anon. 2003)

3.3.3 Training Centres

In order to raise the capacity of the staff of the FD and DZGD, FD together with JICA, implemented a project called Community Forestry Training and Extension (COMFORT) from 2004-2005 to 2005-2006. The project was stationed at Pathein Gyi and was an extension of the Central Forestry Development Training Centre (CFDTC), Hmawbi. A total of 25 trainings were conducted during the project period (2004 – 2006) and 424 forest staffs from different levels were trained. Although the project had some to an end, FD is still continuing with the training. Moreover, CF is also taught as part of the course on Social Forestry at the University of Forestry, Yezin.

Table 3.1: Trainings conducted by COMFORT (2004-2006)

Type of Training	Status of trainees	No. of trainees		Total
		Project period	Post project period	
Participatory Extension System	Asst. Director	9	-	211
	Staff Officer	31	26	
	Forest Ranger	32	113	
Participatory Extension Method	Dy.For. Ranger	167	185	354
	Forester	2		
Local Community Forestry Development training course	Local community	148	66	214
Budget and Account	Clerical staff	35	-	35
Refresher course for extension staff	Dy. For. Ranger	-	64	64
Agroforestry training course	Dy. For. Ranger	-	57	134
	Forester	-	77	
Community Forestry development	Forest Ranger	-	18	34
	Dy. For. Ranger	-	16	
Environmental training course	Staff Officer	-	51	51
Total		***424***	***673***	***1097***

3.3.4 Non- Government Organizations

Apart from the major institutions mentioned above, a number of NGOs, namely Ecosystem Conservation and Community Development Initiative (ECCDI), Forest Resource Environment Development and Conservation Association (FREDA) and Economically Progressive and Ecological Development (EcoDev) have also been establishing CFs. Among the International NGOs, CARE Myanmar has been promoting community forestry under its household-level rural livelihood security project in Northern Rakhine State since the mid 1990s.

3.3.5 Donor project support for CF implementation

CF implementation has been strongly supported by donor projects from the start.

Table 3.2: Details of Donor-Funded Project for CF Implementation

Donor	Duration		Area, acre	Funding level	Number of FUGs formed	Regions
	From	To				
UNDP programmes	1995	2001	72,221	*NA*	NA	Southern Shan State, Dry Zone, Ayeyawady Region.
JICA[a] (COMFORT Project)	2003	2006	12,728	*NA*	117 FUGs with 6985 members	Dry Zone
Pyoe pin	-	2011	28,944	*US$1m*	NA	Kachin
FREDA[b]	1999	2010	7,892	*NA*	Phase III is on-going till 2014.	Ayeyawady Delta

[a] JICA in cooperation with Forest Department had implemented a three-year (COMFORT) Project starting from August 2003.
[b] Forest Resource Environment Development and Conservation Association (FREDA) has been implementing Mangrove Reforestation Project phase by phase in Ayeyawady Delta since 1999.
Sources: Kyaw Zaw Thwin and Myint Aung (2002); Anon. (2006); FREDA 2010

The specific approaches of the main donor projects are reviewed in Box 2.2. It is clear that donors have played a key role in investing resources and efforts to promote community forestry and develop the capacity of the local FUGs.

3.3.6 Forest Users' Groups (Community-Based Organizations)

The key local institutions in Community Forestry are the Forest Users' Groups (FUGs), which are Community-based organizations (CBOs) which establish and manage community forests (CFs). They are the on-site managers of forests surrounding them whilst their daily life and forest resources are tightly coupled together. However, from a review of existing literature, observations and discussions with stakeholders there is a clear consensus that the FUGs are suffering from a number of limitations:

- Many of the FUGs are not properly aware of the CFI and community forestry. They have not been adequately trained in this context.
- Generally, FUGs are too weak technically. They need various technical trainings such as planning, reporting, accounting and book keeping.
- Basically they are hand to mouth people with limited resources; therefore, they need early returns for their subsistence or livelihood support to participate in the establishment of CF. It will be difficult for them to wait for 5 or 6 years to benefit from the forest.
- They need follow-up support from FD both technically and legally. They need legal support to protect the forests, forest land and their rights.
- Currently, most of the management committees of FUGs do not include any village administration personnel. The inclusion of local authority in the management committee will lift its status and facilitate management.

Box 3.2: Donor Supported CF projects

The main donor project supported Community Forestry projects are as follows:

United Nations Development Programme:

Since 1994, UNDP has played a major role in complementing the overall rural development and food security effort in an environmentally sustainable manner through its Human Development Initiative (HDI) programme.

1) The first phase of HDI was implemented from early 1994 to late 1996;
2) The second phase, known as the HDI-Extension, from late 1996 to September 1999;
3) The third phase or HDI-III took place from mid-September 1999 to early February 2002.

During the earlier phases of the HDI, community forestry was practiced in order to satisfy the basic needs of local communities and environmental conservation in Southern Shan State, Dry Zone and Ayeyawady Region. Upon completing the HDI third phase, the three-year Integrated Community Development Project was directly implemented by UNDP under the HDI-IV, but with minimal emphasis on community forestry.

Japanese International Cooperation Agency:

JICA, in cooperation with the Forest Department has undertaken a three-year "Community Forestry Training and Extension Project" (COMFORT) in the Dry Zone starting from August 2003. The COMFORT project was designed to provide knowledge and skills of FD staff for promoting participatory forest management in Myanmar. During its project period, COMFORT has formed 117 users' groups, having 6,985 members, covering a total area of 12,728 acres of community forests. Out of these, 26 users' groups with 1,661 members have received community forestry certificates for 3,812 acres of community forests.

UK Government Department for International Development Pyoe Pin:

The Pyoe Pin Programme supported CF activities in Kachin State through EcoDev and Shalom Foundation (local NGOs) by contributing about USD 700,000 for two years from February 2009 to February 2011. The two-year project covered nine townships namely- Waing Maw, Moe Kaung, Moe Hnyin, Tanai, Phar Kant, Chibwe, Moe Mauk, Putao and Mansi. EcoDev has established 14,784 acres of CF for 25,618 households, while Shalom Foundation has accomplished 14,160 acres of CF for 1,187 households. Wuyan and Gweyutyan CFs have been granted CFCs, but the remaining CFs still await CFCs.

Forest Resource Environment Development and Conservation Association (FREDA)

FREDA has been implementing Mangrove Reforestation Project phase by phase in Ayeyawady Delta since 1999 in cooperation with Action for Mangrove Reforestation (ACTMANG) of Japan. During Phase I & II, the project has, among other activities, established 7,892 ac. of mangrove community forests complying with the CFI issued by the Forest Department in 1995. The 5-year Phase III of the project has been in operation starting from 2009 in Ahmar sub-township, Phyarpon District in Ayeyawady Delta.

3.4 Progress in Implementation of Community Forestry

As of 31 May 2010, after almost 15 years of implementation, 572 CFs have been awarded CFCs, covering 104,148 acres (42,148 ha) (as indicated in Figure 2.1 below) and involving 40,062 forest users. Formation peaked in 2001-2, followed by another relatively high year in 2003-4, but has been declining since then. The total area is 104,148 acres (approx. 42,148 ha).

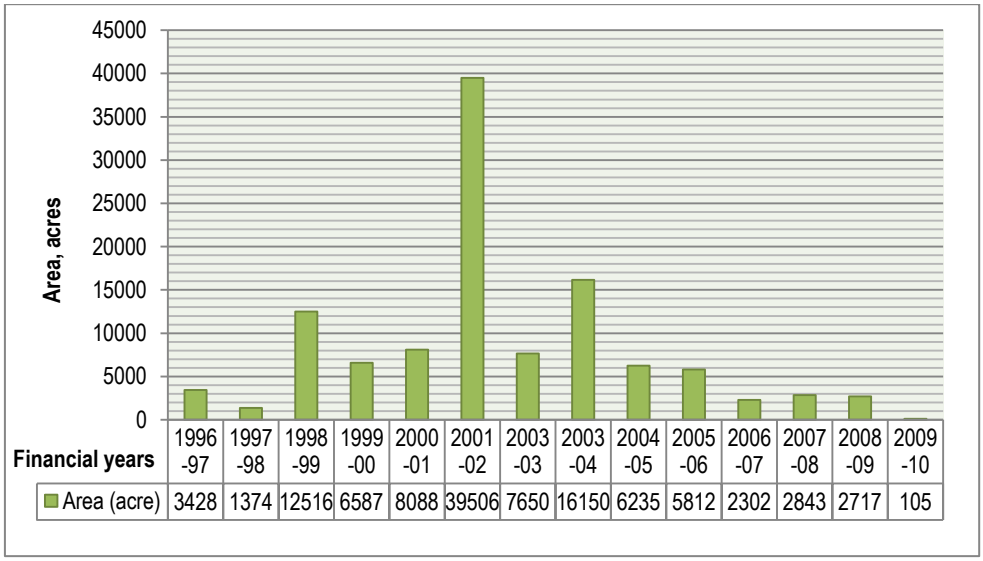


Figure 3.1: Community forest areas established from 1996 to 2010

Source: Planning and Statistics Division, Forest Department

The peak hand-over level of over 39 thousand acres handed over for community forests, occurred in 2001-2002 due to the high inputs from the Human Development Initiative (HDI) project of the United Nations Development Programme (UNDP) in the Dry Zone, Southern Shan State and the Ayeyawady Region(11).

Table 3.3: Cumulative area of community forests and donor contribution (acres)

1996 to 2001*			1996 to 2003**	1996 to 2010#	Remarks (7)
Non-donor (2)	Donor support (3)	Total area (4)	Total area (Mix of donor and non-donor) (5)	Total area (Mix of donor and non-donor) (6)	
5,629	72,221	77,850	-	-	Donor is UNDP. Of 5629 ac. by non-donor implementation, 97% is natural forest CF.
81,732				-	Natural forest CF represents 78%
104,146					572 user groups with 40,062 members

Sources: *Kyaw Zaw Thwin and Myint Aung 2002; **Kyi Maung 2004 ; #Forest Department

During the period 1996 – 2001 (column 4), a total of 77,850 acres of community forest was formed, of which 92.8% represented donor-supported CFs with the remaining 7.2% representing non-donor, the yearly average area was 12,975 acres. The primary donor organization during this period was UNDP which included a community forestry component in its Human Development Initiative (HDI) Programme.

During the period of 1996 to 2003, as shown in column (5), a total area of 81,732 acres of community forest was formed by FD and donors. Thus, only 3,882 acres of CF could have been established in 2002 and 2003; the yearly average was therefore 1,941 acres. This sharp drop in the yearly average was attributable to the lack of capacity of UNDP in community forest establishment in the Integrated Community Development Project under its HDI IV Programme.

Column (6) of the table reveals that between 1996 and 2010, a total of 104,146 acres of community forest was formed by 572 users' groups with 40,062 group members. Therefore, area of community forests formed during the period 2004 - 2010 was found to be 22,414 acres. Out of 22,414 acres, some were established by donor agencies like JICA. The yearly average area of the community forests formed during 2004 – 2010 was, therefore, 3,202 acres.

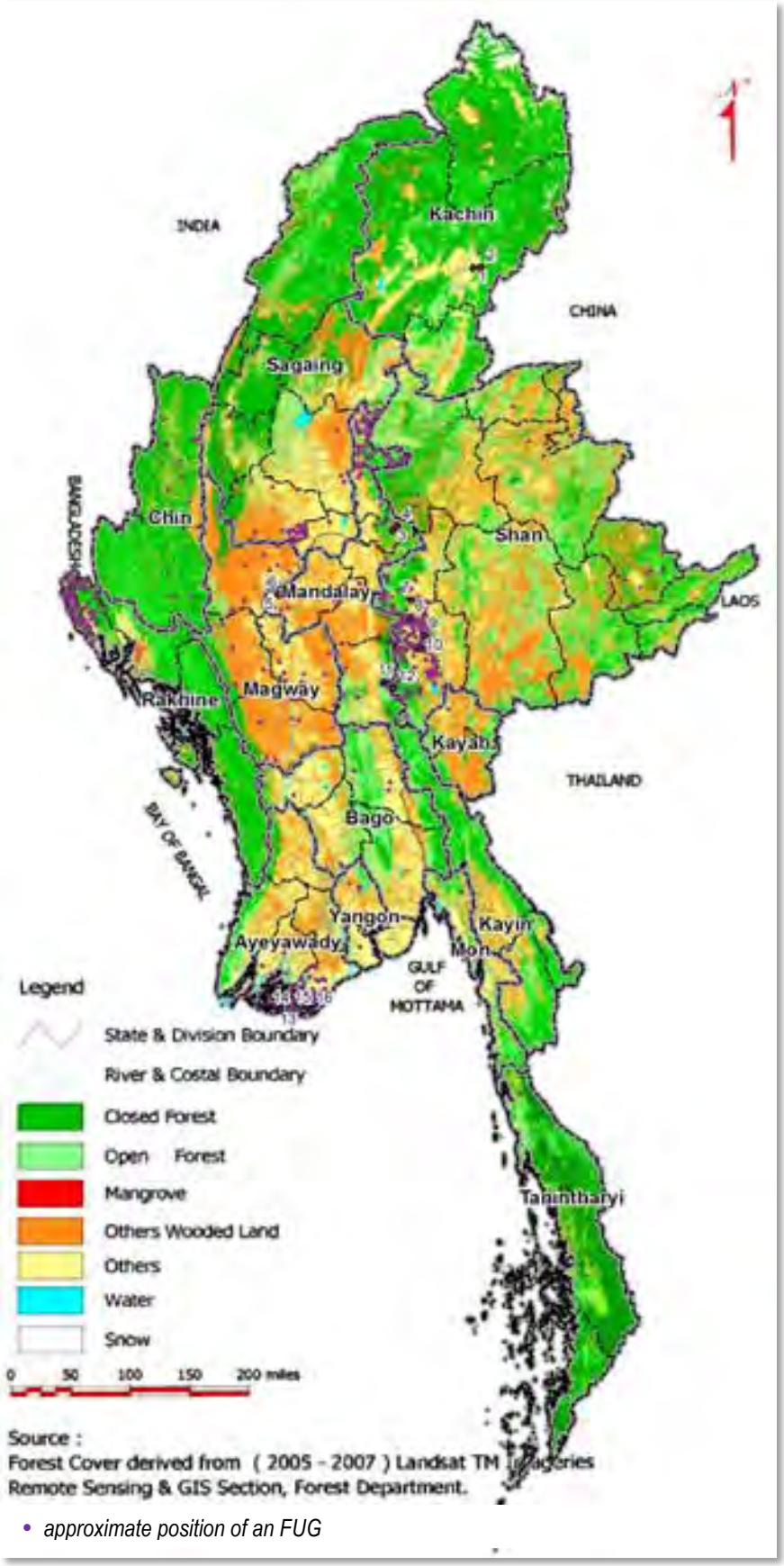
3.4.1 Implementation by State and Region

According to data provided by the Planning and Statistics Division (PSD) of the FD, the total area of the CFs in the year 2010 that have been granted certificates is 104,146 acres, managed by a total of 572 Users' groups with certified CFs with a total of 40,062 members. However, as much as 115,312 acres is under CF if we also include FUGs which have applied for but not yet been awarded community forestry certificates (CFCs) as at end May, 2010. Table 3 and Figure 5 below show the spread of formation by State/Region.

Table 3.4: CF implementation by State / Region (FUGs granted certificate by 31 May 2010)

State/ Region	Popl (2005), 000'	Land area sq.mile	Forest cover area (FAO 2010)		Permanent Forest Estate (2005-06)		No. of FUGs	Area of CFs acres	Mean size of CFs (acre)	CFC granted % of PFE area	Number of FUG members	Mean number of members per FUG
			sq. mile	% of land area	sq. mile	% of land area						
Kachin	1,453	34,379	23,651	*68.8*	11,887	*34.6*	3	3,087	1029	0.041	348	116
Kayah	319	4,530	1,685	*37.2*	2,451	*54.1*	1	100	100	0.006	75	75
Kayin	1,674	11,731	7,891	*67.3*	3,557	*30.3*	4	1,103	276	0.048	278	70
Chin	518	13,907	8,993	*64.7*	2,032	*14.6*	15	3,081	205	0.237	209	14
Sagaing	6,028	36,534	19,496	*53.4*	12,596	*34.5*	33	4,262	129	0.053	1,434	43
Tanin-tharyi	1,562	16,736	13,169	*78.7*	5,637	*33.7*	5	445	89	0.012	118	24
Bago	5,609	15,214	4,273	*28.1*	5,887	*38.7*	7	583	83	0.015	250	36
Magway	5,187	17,305	2,724	*15.7*	4,620	*26.7*	40	10,517	263	0.356	18,188	455
Mandalay	7,739	14,295	3,524	*24.7*	4,162	*29.1*	99	10,914	110	0.410	2,206	22
Mon	2,868	4,748	1,911	*40.2*	911	*19.2*	4	165	41	0.028	59	15
Rakhine	3,078	14,200	9,563	*67.3*	2,820	*19.9*	85	3,337	39	0.185	3,447	41
Yangon	6,460	3,927	415	*10.6*	430	*11.0*	6	765	128	0.278	210	35
Shan	5,306	60,155	28,613	*47.6*	11,131	*18.5*	221	59,582	270	0.836	11,012	50
Ayeya-wady	7,595	13,567	1,549	*11.4*	2,834	*20.9*	49	6,206	127	0.342	2,228	45
UNION	**55,396**	**261,228**	**127,459**	***48.8***	**70,956**	***27.2%***	**572**	**104,146**	**182**	**0.229**	**40,062**	**70**

Sources: 1) Statistical Yearbook 2007, Central Statistical Organization, Nay Pyi Taw, 2008; 2) Planning and Statistics Division, Forest Department (CF area); 3) FAO 2010 Global Forest Resource Assessment – Myanmar (Rome: FAO)



• *approximate position of an FUG*

Map 3.1: Distribution of Forest Users' Groups by Township (with study sites numbered)

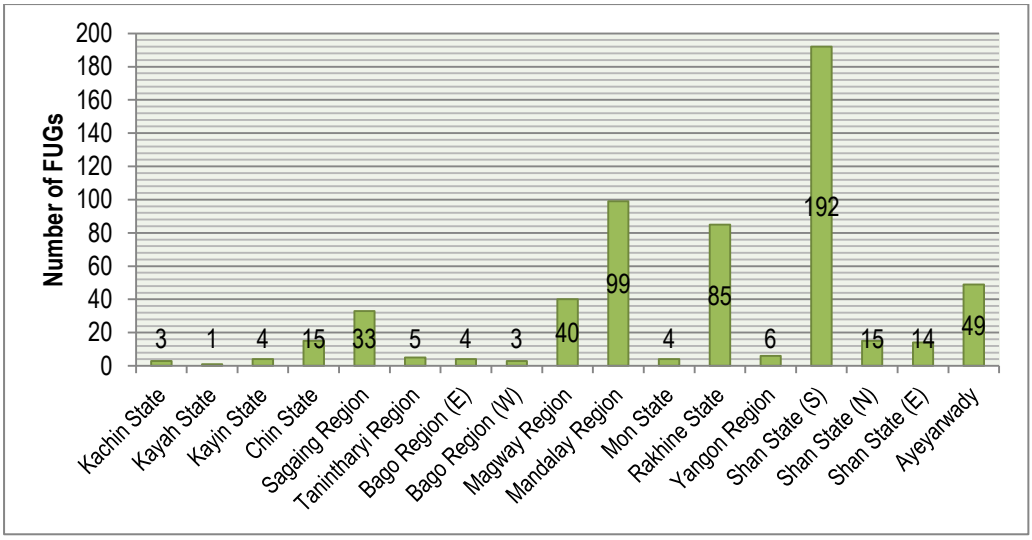
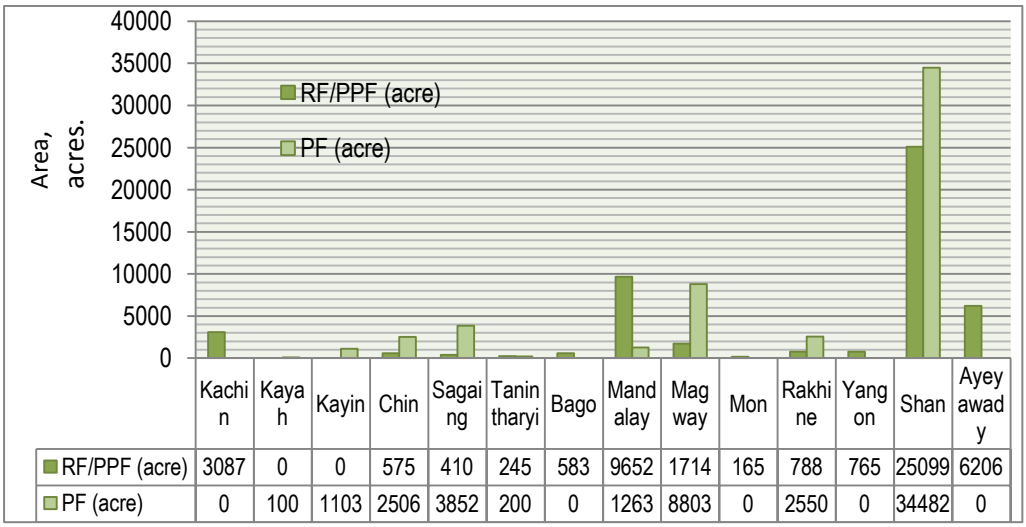


Figure 3.2: Distribution of Community Forests across the States and the Regions

Among the States/Regions Shan, Magway, Rakhine, Mandalay, and Ayeyawady have achieved most, and all excepting Rakhine happened to fall in the UNDP and JICA projects, where both material and technical inputs had been available. Rakhine CFs were supported by CARE.

Shan State had been most active with 59,582 acres (24,113 ha) of CF while Kayah State was the most inactive with only 100 acres (247 ha). Mon State also was very inactive having accomplished 165 acres (67 ha) only in the last 15 years. (See 2.5).

Each FUG has 70 members on average. Average number of participants in a FUG varies greatly from 15 households in Mon State to 455 in Magway Region.



	Kachin	Kayah	Kayin	Chin	Sagaing	Tanintharyi	Bago	Mandalay	Magway	Mon	Rakhine	Yangon	Shan	Ayeyawady
RF/PPF (acre)	3087	0	0	575	410	245	583	9652	1714	165	788	765	25099	6206
PF (acre)	0	100	1103	2506	3852	200	0	1263	8803	0	2550	0	34482	0

Figure 3.3: Distribution of Community Forests by Forest Category

CF sizes vary from 5 acres (2.02 ha) to 2,850 acres (1,153 ha) with a mean size of 182 acres for the country as a whole. Mean membership size varies from 14 to 455, with an overall mean of 70. The ages for community forest plantations range from only a few months to about 15 years. Community natural forests mostly occupy large areas.

The community forests have been established in RFs (reserved forests), PPFs (protected public forests) and PFs (public forests). The total area of CFs in RF/PPF and PF respectively is 49,289 acres (19,947 ha) and 54,859 acres (22,201 ha).

3.4.2 Inadequate pace of implementation

The annual progress of CF establishment in the country in the last 15 years had averaged only 6,943 acres (2,810 ha). This is which is undoubtedly too slow to meet the 30-year target set in the FD's Master Plan. For this we would need to hand over 50,000 acres (approx. 2,000.ha) per year.

At this rate it is impossible to achieve 2.27 million acres by 2030 as targeted in the Master Plan. FD also aims to obtain wood fuel amounting to 4.13 million m^3 from community forests, i.e. 25% of the country's total wood fuel requirement of 16.53 million m^3 by 2030.

Thus, there is an evident need to scale up the CF process many fold to meet the national targets. The main hold-ups are likely to include: insufficient interest and prioritisation, mobilization and commitment from FD staff, delays in approval of applications, lack of communities' trust in land tenure and CF values.

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Chapter 4: The Pre-Community Forestry situation and the Formation process

4.1 Overview of study areas and FUGs

CF has been initiated in villages which cover a wide range of bio-physical, social-economic, and institutional variation. Our study sought to capture this by assessing CF within four diverse states. Table 4.1 illustrates that across our study sites we see variation in forest types, ethnic composition, and livelihoods and poverty levels.

Table 4.1: Diversity in study sites (by State/ Region)

State / Region	Biophysical - Forest types	Ethnic composition In study villages	Livelihoods	Poverty prevalence *(based on wealth ranking in study villages):*
Kachin	Moist deciduous	Kachin *Jinfal* / Lisu	shifting & settled agriculture, trade etc.	Lower (8%)
Mandalay	Dry and moist deciduous	mixed – Myanmar, Kachin, Lisu, Shan	shifting & settled agriculture, toddy palm, labour	Higher (43%)
Shan South	Mixed: dry / moist deciduous	mixed – Shan, Danu, Innthar, Myanmar, Karen	mainly settled agriculture, labouring, home garden	Lower (18%)
Ayeyawady	Mangrove	mainly Myanmar, Kayin	paddy, fishing, fuelwood, nipa, home garden	Higher (~50%)

Table 4.2 below shows the basic parameters of the different study sites: it illustrates how the village populations vary widely, from 171 to 39,257, as do the CF membership sizes, from 5 to 263 households.

Table 4.2: Basic Details of the Study Forest Users' Groups

FUG	District	State / Region	Village		Forest Users' Group			
			Popul-ation	House holds	Hh in FUG	CF size (acres)	Acres / member hh	CF age years (2011)
1 Wunyan	Myitkyina	Kachin	4335	600	263	1200	*4.6*	5
2 Gweyutyan	Myitkyina	Kachin	260	70	70	1400	*20.0*	4
3 Sin Gaung Lay	Pyin U Lwin	Mandalay	295	75	5	150	*30.0*	8
4 Pa De Thar Myothit	Pyin U Lwin	Mandalay	39,257	8000	12	100	*8.3*	11
5 Myay Thin Twin	Nyaung U	Mandalay	975	140	140	33	*0.2*	8
6 Let Pan De	Nyaung U	Mandalay	1175	199	199	33	*0.2*	8
7 Mine In	Pindaya	Shan South	1274	308	95	56	*0.6*	15
8 Pway Hla	Pindaya	Shan South	1500	450	46	*?*	-	*?*
9 Lwai Nyeint	Nyaung Shwe	Shan South	688	157	157	600	*3.8*	14
10 Nar Daung Hla	Nyaung Shwe	Shan South	400	92	73	219	*3.0*	14
11 Kone Shine	Pinlaung	Shan South	198	57	8	300	*37.5*	6
12 Taung Kya - 1	Pinlaung	Shan South	1000	183	12	230	*19.2*	6
13 Nyaung Ta Bin	Laputta	Ayeyawady	552	110	55	637	*11.6*	9
14 Byant Gyi Gon	Laputta	Ayeyawady	171	35	35	513	*14.7*	16
15 Te Bin Seik	Phyarpon	Ayeyawady	3328	778	18	330	*18.3*	12
16-War Gon	Phyarpon	Ayeyawady	390	80	45	140	*3.1*	11

Note: At site 8 Pway Hla we could not establish some basic details as the group was virtually inactive.

The acreage under CF varies from 33 to 1,400 acres, producing an area per member household from as low as 0.2 – 37 acres. The age of the FUGs also varies widely, from the maximum age possible – 16 years for Byant Gyi Gon, formed as soon as the CFI was announced, to 4 years for Gweyutyan in Kachin.

4.2 The pre- CF situation

Here, we consider the access regulation of the study village forests, and their prior condition. We gathered this data through interviews, as we didn't have a 'baseline' data set. Table 4.3 below summarises the information we gathered from PRA discussions.

Table 4.3: Pre-CF formation forest situation

FUG	State / Region	Previous forest condition *estimated	Forest access & livelihood uses
1 Wunyan	Kachin	✘	Open access - for shifting cultivation, though Reserved Forest
2 Gweyutyan	Kachin	~	Shifting cultivation, neighbours cutting, threat of land grab
3 Sin Gaung Lay	Mandalay	✘	RF firewood compartment. Degraded firewood plantation.
4 Pa De Thar Myothit	Mandalay	✘	Open access - led to degradation & undesired plants. Eucalypt stumps after extraction of industrial raw materials.
5 Myay Thin Twin	Mandalay	✘	Open access - overharvesting & grazing led to bare land
6 Let Pan De	Mandalay	✘	Open access - firewood cutting and shifting cultivation
7 Mine In	Shan South	✘	Open access - barren, though good soil conditions
8 Pway Hla	Shan South	~	*Not clear* - pine forest
9 Lwai Nyeint	Shan South	✘	Open access - barren area
10 Nar Daung Hla	Shan South	✘	Land belonged to monks - infertile soil
11 Kone Shine	Shan South	✘	Open access - gradually degrading
12 Taung Kya - 1	Shan South	~	Traditional shifting cultivators existed, still encroaching - mosaic forest landscape
13 Nyaung Ta Bin	Ayeyawady	✘	Cultivators encroached RF for paddy
14 Byant Gyi Gon	Ayeyawady	✘	Open - overcutting for firewood and cultivation
15 Te Bin Seik	Ayeyawady	✘	Mangroves encroached for agriculture, but soil acidified so abandoned
16 War Gon	Ayeyawady	✘	Mangroves encroached for agriculture, but soil acidified so abandoned

Key: ✘ = poor; ~ = moderate; ✓ = good

We found that 13 of the 16 study forests (81%) were in a relatively degraded condition before community forestry began. The remaining 3 sites had a moderate or mediocre forest condition, where local forests may be in a 'mosaic' condition, perhaps due to relatively sustainable use for long fallows cultivation.

The causes for the degradation were generally due to *de facto* open access unregulated use. Villagers have not had the legal powers to assert control and regulate use either within the village, or from neighbours and other outsiders. This has led to over-extraction beyond sustainable off-take levels, and land conversion. In Ayeyawady Region the study sites had all had most of their forests cleared for cultivation.

4.3 Formation processes: Are FUGs becoming institutionalised?

Here, we seek to answer the second question: are FUGs becoming institutionalised, through the formation process? We consider five aspects: initiation, the formation process, social inclusion, awareness / understanding, and social mobilisation for CF activities. Data here is from both PRA discussions and key informant interviews.

Table 4.4: Study FUG Characteristics

FUG	State / Region	Initiation by?	Year formed	Age (years from formation)	Year certificate received	Delay in receiving certificate
1 Wuyan	Kachin	DfID / NGO /FD	2006	5	2007	1 year
2 Gweyutyan	Kachin	DfID / NGO / FD	2007	4	2007	-
3 Sin Gaung Lay	Mandalay	Self	2003	8	2003	-
4 Pa De Thar Myothit	Mandalay	Self	2000	11	2002	2 years
5 Myay Thin Twin	Mandalay	JICA / NGO / FD/DZGD	2003	8	2003	-
6 Let Pan De	Mandalay	JICA / NGO / FD/DZGD	2003	8	2003	-
7 Mine In	Shan South	UNDP/FD	1996	15	1996	-
8 Pway Hla	Shan South	UNDP/FD	*2000*	*11*	*?*	*Not Known*
9 Lwai Nyeint	Shan South	UNDP/FD	1997	14	2000	3 years
10 Nar Daung Hla	Shan South	UNDP/FD	1997	14	1997	-
11 Kone Shine	Shan South	UNDP/FD	2005	6	2005	-
12 Taung Kya - 1	Shan South	UNDP/FD	2005	6	2006	1 year
13 Nyaung Ta Bin	Ayeyawady	JICA / NGO / FD	2002	9	2003	1 year
14 Byant Gyi Gon	Ayeyawady	Self initiated / FD	1995	16	1996	1 year
15 Te Bin Seik	Ayeyawady	FREDA NGO / FD	1999	12	2001	2 years
16-War Gon	Ayeyawady	JICA / NGO / FD	2000	11	2000	-

4.3.1 Who Initiated formation?

Three FUGs (Sin Gaung Lay, Pa De Thar Myothit and Byant Gyi Gon) in our study were 'self-initiated'. The leader of Byant Gyi Gon (site 14) heard the announcement of the CF Instruction on the radio news, and immediately consulted with the local Forest Department staff to initiate a group. This is also the oldest of our study FUGs, being 16 years old. The other 'self initiated' groups, Sin Gaung Lay (site 3) and Pa De Thar Myothit (site 4) seem to be small groups of outside elites using the CFI to take over valuable state forest land.

One FUG was formed with local NGO support (15. Te Bin Seik). This was through a local NGO - FREDA with some resource support from a Japanese NGO.

The remaining 12 FUGs (81%) were formed in the context of donor supported projects working with the Forest Department and local NGOs. This illustrates that the CF implementation has been largely donor-driven.

- In Kachin DfID has been supporting local NGOs to facilitate formation.
- In Shan South, half of the study sites were formed around 1996-7 during the UNDP programme, a further two in 2005, and one was unclear.
- In Mandalay Region two FUGs (in Pyin U Lwin Township) were formed by the FD while the other two CFs (in Nyaung U Township) were formed by DZGD in conjunction with JICA in 2003.
- In Ayeyawady Region 2 of the 4 CFs were formed under JICA programme support to local NGOs, one was through a local NGO (FREDA), and one self initiated.

It goes without saying that the FD and DZGD field staffs have played a key role in the process

For the formation process of CF, see "*Myanmar's CF model according to CFI 1995*" in Chapter 2 above. From Table 4.3 we can see that in 8 FUGs the certificate is granted in the same year that the Group is initially formed, although in 7 groups there was delay of more than a year between initially forming the group and receiving the approved CF Certificate (one group could not recall what happened). Where there has been a delay for most groups it was only for one year, however, for 3 groups it was 2-3 years.

According to CFI 1995, the Community Forest must be officially established only after the Forest Users' Group has actually received the CFC. Therefore, strictly speaking FUGs should not establish CFs before they get the CFCs (as no citizen has the right to transform a public forest into a CF at his own will). In some cases, for instance in Kachin the FD staff have expressed concern that communities went ahead to establish CFs without properly consulting with the concerned township FD staff or awaiting a certificate: rather it is said that they established a *de facto* CF, and only then applied for permission. This creates dissatisfaction with the local forest staff.

- ***It is important to follow the sequential process of formation of a group, application for a CF certificate and receipt of the certificate allowing commencement of Community Forest. It requires clear communication between the local community, the township FD staff, and any donors and NGOs involved.***

A further issue here is land tenure: Not only the Forest Department but also the Settlement and Land Record Department handle land management including land tenure. Villagers are struggling to get land tenure rights for establishment of community forests due to the 'red tape' procedure of the line departments.

- ***Securing land title for community land should be made more straightforward, with the appropriate safeguards against elite capture.***

4.3.2 The Formation process

Has formation actually led to effective FUG institutions? We have chosen to consider two indicators:

1. Are the appropriate households included in the group?
2. Are members mobilised for CF activities – meetings and forest activities?

Methodologically it is difficult to really know what happened several years ago, in some cases as long as 16 years ago, so the findings must be treated as somewhat approximate. Table 4.5 below indicates our assessment based on PRA discussions.

Table 4.5: Institutionalisation of Study FUGs

FUG	State/ Region	FUG membership		Appro-priate members included?	Members mobilised?	FUG initial institutionalised?	Comment
		% of village	# hhs				
1 Wuyan	Kachin	*33%*	200	✓	✓	✓	Inclusive & well organised
2 Gweyutyan	Kachin	*100%*	70	✓	✓	✓	Inclusive & well organised
3 Sin Gaung Lay	Mndly	*6%*	5	×	~	×	Mis-formed: elite capture
4 Pa De Thar Myothit	Mndly	*0.3%*	11	~	✓	✓	Small dynamic village sub-group
5 Myay Thin Twin	Mndly	*100%*	166	✓	~	~	Lack of clarity but initial efforts
6 Let Pan De	Mndly	*100%*	222	✓	~	~	Poor grasp of CF but initial efforts
7 Mine In	Shan S	*15%*	47	✓	~	~	Poor grasp of CF but initial efforts
8 Pway Hla	Shan S	*?*	*?*	*?*	×	×	Not launched: no-one understood
9 Lwai Nyeint	Shan S	*100%*	157	✓	~	~	Poor grasp of CF but initial efforts
10 Nar Daung Hla	Shan S	*67%*	73	✓	~	~	Lack of clarity but initial efforts
11 Kone Shine	Shan S	*100%*	57	✓	✓	✓	Despite vague grasp good efforts
12 Taung Kya - 1	Shan S	*6.5%*	12	×	~	×	Mis-formed: elite capture
13 Nyaung Ta Bin	Ayrwdy	*44%*	55	✓	✓	✓	Inclusive & well organised
14 Byant Gyi Gon	Ayrwdy	*91%*	32	✓	✓	✓	Inclusive & well organised
15 Te Bin Seik	Ayrwdy	*2%*	18	~	✓	✓	Small dynamic village sub-group
16 War Gon	Ayrwdy	*62%*	50	✓	✓	✓	Inclusive & well organised

4.3.3 Are appropriate members included? Social inclusion in FUG

According to the CF Instruction, formation involves a 'self-selection' process: those who want to participate can form an FUG. During the formation process there is a need to ensure all are fully aware of the opportunity, and what it entails, before they make an informed decision whether to join or not.

The 'self-selection' formation approach differs from many other counties' CF approach, and is intended to ensure only the motivated participate. Many of the poorest households live 'hand to mouth' and so cannot afford the time or financial inputs to participate, or the risk they may not benefit from their efforts. However, there are risks of their non-inclusion as they may depend on the land which comes under the FUG which may then exclude their use.

From the study sites, we found an average of 55% of the villagers is members of the FUGs.

- In six sites (37.5%) between 90 and 100% of households are included.
- In six sites (37.5%) a third or less of the village compose the FUG.
- In four cases this is a subgroup taking initiative when no one else expressed interested.
- But in two CFs this seems to be dysfunctional 'elite capture' of village land.

Overall we found that 11 of the FUGs seemed to include the appropriate members, and not unduly exclude suitable members. However in two cases there seemed to be moderate concerns over social exclusion, and in two cases severe problems with 'elite capture' of village lands.

- ***The FUG membership selection process for FUG members is a lacuna in the CFI. The CFI does not mandate whether the whole village should be included or indeed all the current users of the forest, even those beyond the village. Neither does it say definitely how many acres a household must be allowed at maximum. This weakness has allowed subgroups to take over control of common property resources. .***
- ***One concern arising is the possible need to 'reform' the FUG to give membership to those non members who want to join. At the moment there seems no such normal process for this.***

4.3.4 Awareness and understanding

A fundamental part of CF formation is imparting an understanding of the basic concepts, roles and responsibilities, across the village, FUG members and committee members. However, as we cannot know exactly the extent of awareness and understanding at the time of formation, we cannot really assess this effectively and have decided not to speculate here. Rather we consider later the current levels of awareness and understanding and their implications for sustainability of FUGs.

4.3.5 Mobilisation

Despite the limitations of limited awareness or inclusion problems, it seems that half the groups showed good initial mobilisation, and 7 of the 16 moderate mobilisation – only one being poor.

4.4 Overall

From our indicators we found 8 FUGs (50% of the sample) to be well institutionalised – mainly in Kachin State and Ayeyawady delta. We found 5 FUGs to be moderately established (31%), but with some problems. And we found 3 FUGs to be poorly institutionalised (19%). Significant problems have arisen from a lack of inclusive inception activities and a lack of effective awareness-raising. So, in answer to the research question most FUGs are getting relatively effectively institutionalised.

Chapter 5: COMMUNITY FOREST MANAGEMENT: PLANS AND PRACTICE

5.1 Introduction

Here, we consider whether FUGs have managed and protected forests effectively. Having brought a forest users' group together their first challenge is to draft a management plan for the forest in question, as it is a prerequisite to get the Forest Department permission to establish the Community Forest. The Management Plan prescribes the methods of planting, silvicultural treatments and management, protection and harvesting, amongst other things. It is of course vital that Management Plan prescriptions are actually implemented in a timely and effective manner for the success and sustainability of the CF.

5.2 Management planning

5.2.1 Formulation of MP

Management planning needs technical skills:

- In case of an ***existing forest*** to be transferred to community management, the preparation of the management plan will involve preparation of a management map and a stock map of the forest, detailed procedure of rehabilitating degraded gaps in the natural forest, silvicultural treatments, method of extraction and distribution of forest products. For natural forests Myanma Selection System (i.e. selection felling not clearfelling) should be practiced.
- In the case of creating a ***new forest plantation***, the preparation of the management plan will involve detailed procedure of establishing a forest plantation, activities for protection and maintenance, adoption of a rotation, method of harvest and distribution of forest products. For plantations, any clear cutting system can be applied after fixing a suitable rotation

5.2.2 Management regimes in practice

Across our study we found a wide range of different sizes and types of community forests, and a range of different management regimes. The four main regime types are:

1. Collectively managed protection for natural regeneration
2. Collectively managed production - plantation
3. Individually managed *taungya* agroforestry plots (planting trees with initial understorey of agricultural crops)
4. Collective management on individually owned plots (only *Ayeyawady*).

In principle, the management committee (MC) is authorised to manage the CF collectively. Although CF management should be collective as under CFI 1995, in practice it has been found to be more effective if the CF area is split into individual plots and allocated to member households to operate and manage their plots.

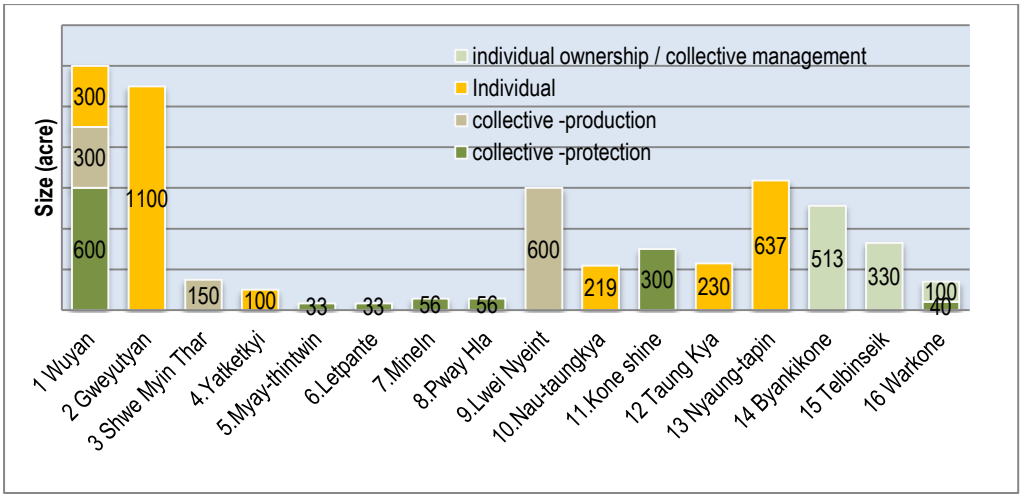


Figure 5.1: CF size and management regime

Table 5.1: Community Forest management practices

FUG	State/ div.	CF Management plan	*collective - protection*	collective - production	Individual taungya	*individual owner /*	CF size *acre*	*Practice according to plan?*	Protection effective?	Comment
1 Wunyan	Kachin	Mixed protection, timber, *taungya*	*600*	*300*	*300*		1200	✓	~	Proceeding well
2 Gweyutyan	Kachin	Mixed protection, *taungya*	*300*		*1100*		1400	✓	~	Good progress – but large forest small group
3 Sin Gaung Lay	Mndly	Plantation		*150*			150	~	~	Clearing some forest areas for cultivation
4 Pa De Thar Myothit	Mndly	Taungya plantation			*100*		100	✓	~	Good plantation, but some fires
5 Myay Thin Twin	Mndly	Plant & natural regen.	*33*				33	✓	~	Occasional illicit felling by neighbours
6 Let Pan De	Mndly	Protection	*33*				33	-	✓	Protection effective
7 Mine In	Shan S	Protection	*56*				56	~	~	Initially effective, but now neighbours cutting
8 Pway Hla	Shan S	Plant & protect	*56*				?	✓	~	Planting & protection but some fire & grazing
9 Lwai Nyeint	Shan S	Plantation		*600*			600	✓	✓	Effective planting & protection with FD support
10 Nar Daung Hla	Shan S	*Taungya* plantation			*219*		219	~	~	Good initial efforts declined: protection failing
11 Kone Shine	Shan S	Protection	*300*				300	~	×	Widespread illegal cutting esp. by 'ceasefire' group
12 Taung Kya - 1	Shan S	*Taungya* cash crops			*230*		230	✓	~	Some illegal cutting esp. by 'ceasefire' group
13 Nyaung Ta Bin	Ayrwdy	Plant & natural regen			*637*		637	~	~	Good initial work, but Nargis major disruption
14 Byant Gyi Gon	Ayrwdy	Plant & protect				*513*	513	✓	~	Good initial work, Nargis disrupted, but still working
15 Te Bin Seik	Ayrwdy	Plant & protect				*330*	330	~	~	FD not permitting harvest. / Illicit cutting increasing
16 War Gon	Ayrwdy	Plant & natural regen	*40*			*100*	140	~	~	Good work. Earning from firewood and seeds

The extent of different management regimes is illustrated in Figure 5.1 and Table 5.1. In the Dry Zone forests tend to be both community controlled and owned. In the Delta and Hill areas the more popular CF arrangement is community owned but individually controlled subplots (e.g. for agro-forestry or

woodlot plantation). In hill areas larger CFs may be split into a mix of some collectively controlled and some individual plots, Wuyan being a good example – there are three different management regimes across this large Community Forest.

5.2.3 Species selection

In the majority of CFs, it has been the FD staff who had largely controlled the planning and species selection process. Under UNDP programme species were selected and promoted by FD to ensure regeneration. In the Dry Zone for instance fast growing exotics such as Eucalyptus were trialled and only the most resilient were chosen for large scale plantation. In recent years there has been recognition that monocultures are not so suited to either village needs or ecological imperatives and so there has been an encouragement of more mixed planting to include local and locally valued species, and also teak for sale (e.g. CFs in Kachin State).

- Teak is the species selected by the FUG, even though it is not allowed under CFI 1995. There has been some legal change (The 1992 Forest Law stipulates that any person or any organization has the right to cultivate and maintain forest plantations with the permission from the Government (Section 14). But a standing teak tree wherever situated in the State is owned by the State (Section 8). So, if someone wants to plant teak he must get the permission of the Cabinet. And CFI 1995 allows only farm level production to meet the basic needs of the community. Forests established aiming at developing the locality and large scale forest operations to supply wood-based industries do not qualify as CFs according to the 1995 CFI.)
- ***Ensuring the right species mix for the community is essential, both to serve their needs and also to motivate them to protect and manage the forest. In the future there is a need to ensure the species composition of Community Forests reflects the priories of the villagers, particularly taking account of marginalised groups and women. It may be that the species mix can be adapted over time.***
- ***Teak is clearly a priority species for villagers – the FD staff should clarify the legal situation and encourage them to plant and harvest following the Government's standing orders.***

5.3 Forest management activities

From our study we found that 9 FUGs had implemented their management plans effectively, and the remaining 7 were doing moderately well, despite some challenges.

The local FD offices had provided the necessary seedlings or saplings and technical support as required by the CFI 1995. However, according to the villagers, FD follow-up support, supervision, monitoring and evaluation urgently need strengthening.

5.3.1 Is forest protection effective?

The major threats to community forest management are:

- forest conversion for agriculture
- grazing, particularly in the early years as saplings are not yet established
- over- extraction and or illicit cutting for timber and/or firewood as the trees mature

Watching / patrolling are the common protection methods to guard against these and challenge contraventions. However, no-one really wants to get into conflict over the forests, especially if they are not sure whether they will receive help from either the FD or other Government line agencies if the situation escalates.

From our study we found that in almost all of the FUGs there remain problems with effective protection. Most groups struggle to exclude outsiders from cutting, especially as they don't want to get into

intractable conflicts with neighbouring villages. It seems that rule-breaking increases where enforcement becomes lax, and so becomes a less credible deterrent. The more frequent pattern is that FUGs are reluctant to challenge as they are frightened to get into conflicts; they request FD's back up. Controlling fire from spreading from adjacent agricultural land is a very tricky protection issue.

In general, however, we find protection is good in 2 CFs; moderately effective in 14. So, overall protection seems to be working, more or less satisfactorily.

5.4 Conclusions

Although CFI 1995 articulates collective management, production and utilization, FUGs have been practicing other management regimes as well. Collective management and protection of CF split into individually owned plots seem to prove more effective and efficient than operating every step of the CF collectively since sense of ownership is a driving force for progress.

In spite of many threats, FUGs had protected their CFs to the best of their abilities, and as a result most forests have improved so much so that non-members who previously were not interested have applied for membership or tried to create another CF. Examples are Kone Shine and Taung Kya-1 CFs in Shan State. They have the problems of land tenure and illicit logging, but still they are appealing to non-members, because the forests are thriving and agricultural crops are generating good incomes.

Many CFs are threatened by outsiders clearing land for agriculture and cutting trees for firewood. To prevent such unlawful acts, FUGs desperately need FD's support. Given FD's back-up, FUGs will trust FD better and be encouraged to scale up the CF.

There are a sizeable number of issues relating to forest management planning and practice which CFs have to address in practice. Foresters, NGOs and researchers need to listen to FUGs, assess their problems and seek solutions.

Chapter 6: COMMUNITY FOREST CONDITION

6.1 Introduction

We present primary data from detailed field survey on the actual condition of the community forests, the outcome of management, applying a range of forestry assessment methods. As this report is aimed at both a specialist and a general audience, we have tried to make these methods as transparent and explicit for the general audience as possible, and have sought to reduce technical jargon to a minimum.

To summarise – the main issues to understand the forest condition include:

a) the stand (no. of trees by species and by size classes) and the stock (volume of trees by species and by size classes) of the CF
b) the annual growth and the mortality of the trees, and
c) the forest health – measured by a range of indicators

The above forestry assessment methods have been developed for commercial scale plantation-based timber production. However, for community forestry the local people are typically interested in multiple uses of forests, so assessment requires adaptation for smaller scale and often natural multi-aged forests, managed for mixed livelihood objectives. Specifically for multi-purpose forests we would also like to assess the non- timber forest products (i.e. shrubs, herbs, bush meat, etc.) and other ecosystem services, although development of detailed methods for this has been beyond the scope of this study.

6.2 The Stand and the Stock of Community Forest

We conducted a complete count and measurement of the trees on sample plots laid at random in each of the selected community forests, and categorised them according to their size class. From these we derived 'stand tables' showing the mean frequency of different size classes of trees per acre of forest.

Box 6.1: Method note: Calculating stand

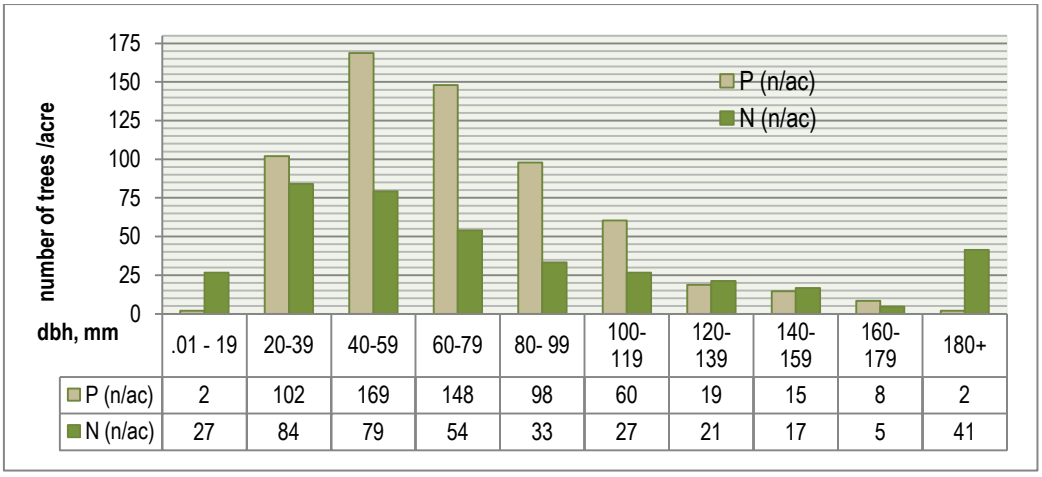
As mentioned in the research method section above, every sample plot was completely enumerated. The diameter of every tree was measured at breast height (dbh) and recorded by individual species. Thus, every dbh-measurable tree was included in the tree list. They were classified by 20mm diameter classes to constitute the stand table.

Based on this stand table, table showing basal area of each species by diameter classes was developed. The stock table for the CF also was based the stand table. The number of trees in each class was converted to volume using the following volume- basal area line:

$v = 0.0007299 * g$ where "v" is total tree volume over bark (m^3) and "g" is basal area (cm^2).

It is a formula generalized for easy application, intended just to give an approximate timber volume content of a tree.

Based on the stand tables, we developed stand basal area tables and the stock tables for all the CFs. Fig. 6.1 shows an example of stand table for Wuyan CF, Kachin State. It shows that the stand structure of the plantation is satisfactory, but that of the natural forest needs improvement in the smaller diameter classes, as they are currently low.

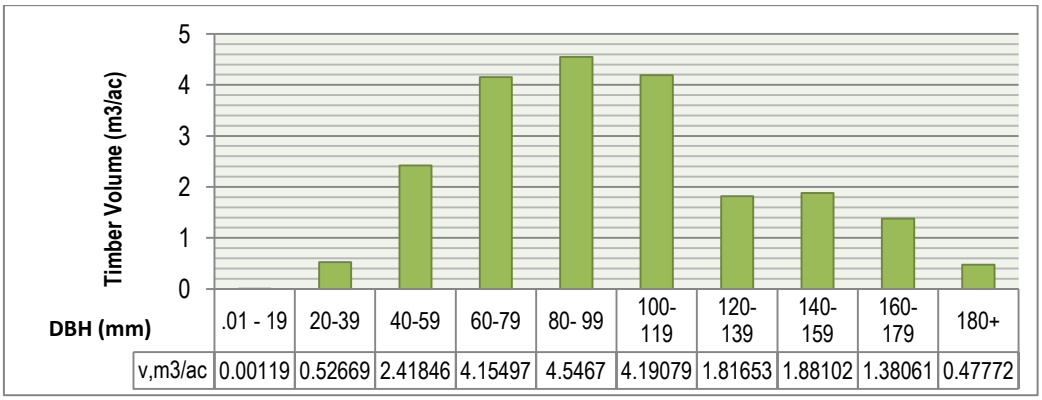


dbh, mm	.01 - 19	20-39	40-59	60-79	80- 99	100-119	120-139	140-159	160-179	180+
P (n/ac)	2	102	169	148	98	60	19	15	8	2
N (n/ac)	27	84	79	54	33	27	21	17	5	41

Figure 6.1: Stand tables of plantation and natural forest, Wuyan CF

Note: P = plantation forest; N= Natural forest

Figure 6.2 shows the timber stock table which we have derived from the stand table above.



DBH (mm)	.01 - 19	20-39	40-59	60-79	80- 99	100-119	120-139	140-159	160-179	180+
v,m3/ac	0.00119	0.52669	2.41846	4.15497	4.5467	4.19079	1.81653	1.88102	1.38061	0.47772

Figure 6.2: Stock table for Wuyan CF: Timber volume of all species (m³/ acre) by size class

6.2.1 Mean tree

The 'mean tree' indicates the average size (or age) of trees in a forest. It will assist in making a comparative assessment of various stand parameters of different community forests. The mean tree was calculated from quadratic mean diameter, and the mean trees of CFs are presented in Table 6.1 and summarized in Figure 6.3 below.

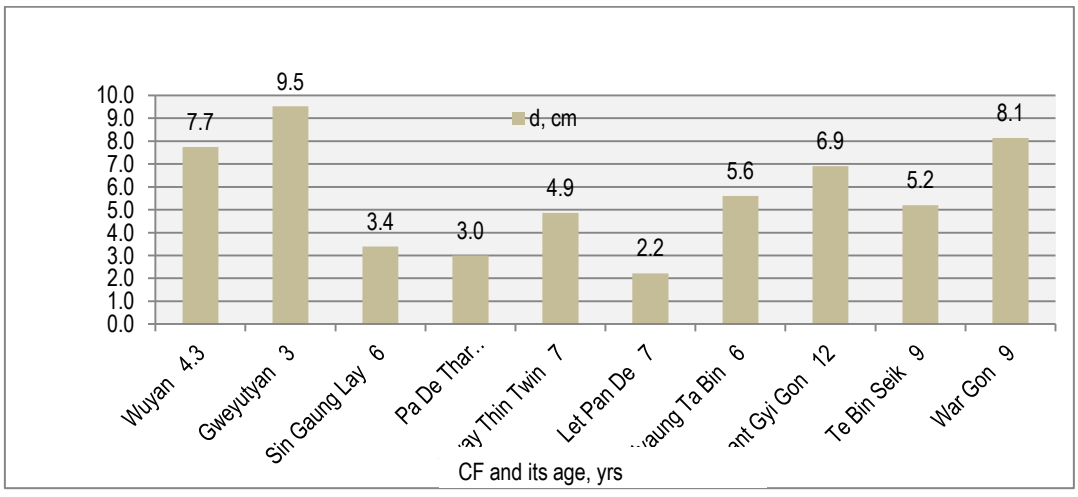


Figure 6.3: Mean diameter of CF plantation against its age

The figure tells us that Gweyutyan CF plantation is the best having achieved a mean diameter of 9.5 cm in 3 years followed by Wuyan (7.7 cm in 4.3 years and Nyaung Ta Bin (5.6 cm in 6 years). Let Pan De CF plantation is the poorest with an average diameter of 2.2 cm in 7 years. The forest was established with JICA support. The case witnessed the unsustainability of the donor funded CFs that were established without community interest and commitment.

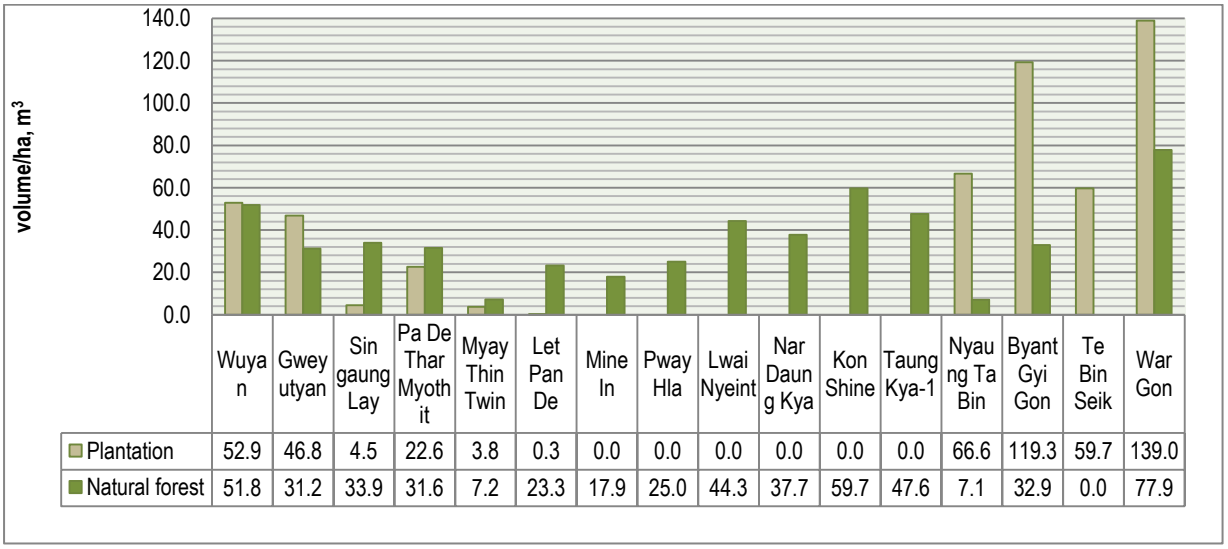
Plate 6.1: A CF established in natural forest in Shan State

Table 6.1: Summary of forest data

CF	Type of forest	Age (yrs)	No. of trees per ha (all species)	Basal area per ha, m^2	Volume per ha, m^3	Mean Annual Increment /ha			Main species *see appendix IV for codes
						Mean tree dbh, cm	basal area, m^2	volume, m^3	
1. Wuyan	Plantation	4	1,539	7.24	52.87	7.7	1.67	12.21	1,2,35,81,84,98,195,270,304,339
	Natural forest	-	909	7.10	51.81	10.0	na	na	24, 90, 98, 145, 148, 166, 173, 195, 213, 339, 437, 450, 478
2. . Gweyutyan	Plantation	3	902	6.41	46.81	9.5	2.14	15.60	1,2,41,90,98,195
	Natural forest	-	494	4.28	31.23	10.5	na	na	48,57,90,98,103,142,175,213,270,339,349
3. Sin Gaung Lay	Plantation (*Yemane*)	6	684	0.62	4.51	3.4	0.10	0.75	41, 157, 195, 383, 478
	Natural forest	-	2,293	4.65	33.91	5.1	na	na	20,28,50,63,157,266,361,405
4. Pa De Thar Myothit	Plantation (*Yemane*)	8	4,371	3.09	22.56	3.0	0.39	2.82	195,414
	Natural forest	-	1,339	4.33	31.57	6.4	na	na	36,361,405
5. Myay Thin Twin	Plantation	7	279	0.52	3.77	4.9	0.07	0.54	4,98
	Natural forest	-	1,137	0.99	7.22	3.3	na	na	157,236,441,478
6. Let Pan De	Plantation	7	94	0.04	0.27	2.2	0.01	0.04	4,478
	Natural forest		504	3.19	23.30	9.0	na	na	4,47,138,193,476
7. Mine In	Natural forest	-	702	2.46	17.94	6.7	na	na	157,242,319,362
8. Pway Hla	Natural forest	-	143	3.43	25.03	17.5	na	na	325
9. Lwai Nyeint	Natural forest	-	1,102	6.07	44.33	8.4	na	na	58,118,141,232,236,269,285,319,378,393
10. Nar Daung Hla	Natural forest	-	546	5.17	37.74	11.0	na	na	118, 195, 236, 319, 437
11. Kon Shine	Natural forest	-	726	8.18	59.73	12.0	na	na	86, 204, 257, 405, 434
12 Taung Kya-1	Natural forest	-	262	6.53	47.64	17.8	na	na	83,120,148,265
13. Nyaung Ta Bin	Plantation	6	3,707	9.13	66.63	5.6	1.52	11.11	47,408,411
	Natural forest	-	2,399	0.97	7.06	2.3	na	na	64,122,169,206,369,472,473,478
14. Byant Gyi Gon	Plantation	12	4,371	16.34	119.28	6.9	1.36	9.94	122,291,473
	Natural forest	-	2,046	4.51	32.90	5.3	na	na	47,64,153,169,291,473
15. Te Bin Seik	Plantation	9	3,865	8.19	59.75	5.2	0.91	6.64	47
16. War Gon	Plantation	9	3,660	19.04	138.96	8.1	2.12	15.44	47,65,408
	Natural forest	-	2,281	10.67	77.87	7.7	na	na	47,65,122,411,478

6.2.2 *Comparison of 'growing stocks'*

A comparison of the growing stocks of the CFs is shown in Fig. 6.4. It shows that of the total 16 CFs in the study, nine CFs have both natural and planted forests, all the six CFs in Shan State contain natural forests only, and also Te Bin Seik CF in Ayeyawady region does not have natural forest.



	Wuyan	Gweyutyan	Sin gaung Lay	Pa De Thar Myothit	Myay Thin Twin	Let Pan De	Mine In	Pway Hla	Lwai Nyeint	Nar Daung Kya	Kon Shine	Taung Kya-1	Nyaung Ta Bin	Byant Gyi Gon	Te Bin Seik	War Gon
Plantation	52.9	46.8	4.5	22.6	3.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	66.6	119.3	59.7	139.0
Natural forest	51.8	31.2	33.9	31.6	7.2	23.3	17.9	25.0	44.3	37.7	59.7	47.6	7.1	32.9	0.0	77.9

Figure 6.4: Growing stocks of natural and planted forests by CF (Volume/ha, m³)

The CF plantations have growing stocks ranging from 0.3 m³/ha (Let Pan De) to 139 m³/ha (War Gon). Let Pan De has the lowest while War Gon has the highest stand density.

Let Pan De CF is seven years old, but the original *Yinma* plantation had disappeared, and *Sha* and eucalypt plantation have suffered 28% mortality. However, because the FUG has protected the CF, natural regeneration has occurred. However, it is still very young with a mean diameter of about 2.3 cm only.

The CFs in Kachin State and Ayeyawady Region are very promising. The natural forests in these CFs are also in good condition, although the existing stocks are still much below the average norms. However, since they are still very young, their stocking can increase rapidly with increasing age and the appropriate treatments. The reasons for their success so far include the interest and active participation of the local people and, not less, the various support provided by local organisations and international donors.

CFs in the Dry Zone, particularly Myay Thin Twin CF and Let Pan De CF have shown a poor performance, in terms of growing stocks. They will require financial and technical supports in order to improve their performance. Regular visits, technical assistance and monitoring the CF process by the responsible forest staff could help to encourage the users.

6.3 Growth of CF Plantations

As the age of each CF plantation was available, mean annual increments were estimated for all CF plantations. They are shown below by CF (Fig.6.5). Note that all the six CFs visited in the Shan State do not have plantations; they are natural forests. Obviously, prediction of growth of natural forest is impossible with one short inventory since its age is unknown.

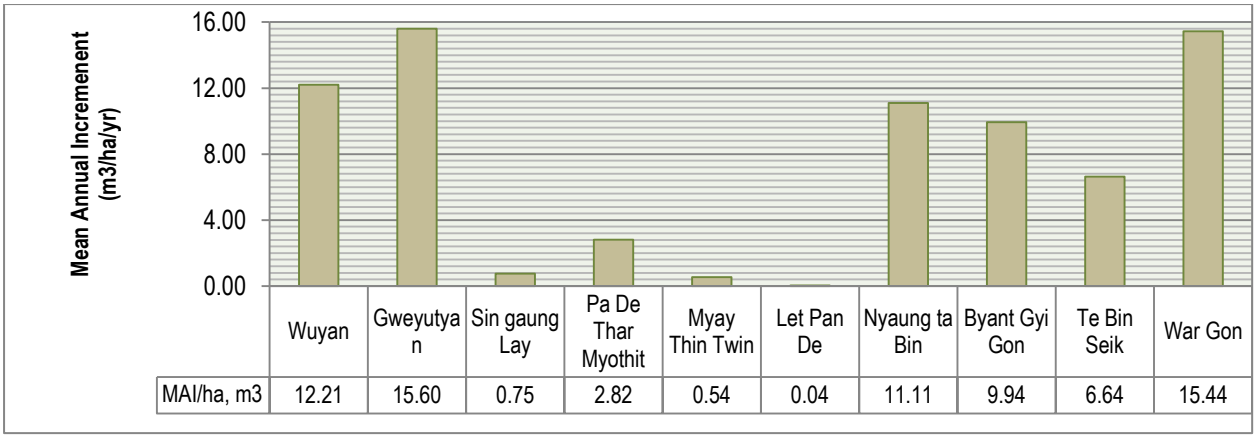


Figure 6.5: Mean Annual Increment of CF plantations (v/ha/yr in m³)

For the sample CF plantations, their ages range from 3 to 12 years. Number of trees of all species per acre varies between 38 (94 trees/ha) in Let Pan De and 1,769 (4,371 trees/ha) in Byant Gyi Gon, depending on the age, spacing and species.

The mean trees of CF plantations ranged from about 2.2 cm in dbh in Let Pan De to 8.2 cm in War Gon CF.

Mean Annual Increment was highest in Gweyutyan CF with 15.6 m³/ha at the age of 3 years, second highest in War Gon CF with 15.44 m³/ha at the age of 9 years, and lowest in Let Pan De CF with 0.04 m³/ha at the age of 7 years.

Excepting Gweyutyan and War Gon CFs, the MAIs are not considered satisfactory, compared to what would normally be expected (e.g. over 15m³/ha/year). The slow increment might be due to insufficient initial stock, poor site, planted species not matching the planting site and lack of proper silvicultural treatments.

6.3.1 Survival rates

Survival rates of trees have a significant effect on forest ecosystem. Information on the dead and missing trees was available for all CF plantations. Mortality/survival rates were calculated for all of them. They are shown in Table 6.1 below.

Plate 6.2:: A successful plantation established in CF in Kachin State

Table 6.2: Survival of CF plantations

Community Forest	State/Region	Average age (yr.)	No. of sample trees counted	No. of sample trees surviving	Survival %	Species involved
1. Wuyan	Kachin	4	324	300	92.6	1,2,35,81,84,98,195,270,304,339
2. Gweyutyan	Kachin	3	325	311	95.7	1,2,41,90,98,195
3. Sin Gaung Lay	Mandalay	6	100	88	88.0	41,157,195,383,478
4. Pa De Thar Myothit	Mandalay	8	75	75	100.0	195,414
5. Myay Thin Twin	Mandalay	7	50	27	54.0	4,98
6. Let Pan De	Mandalay	7	50	18	36.0	4,478
7. - 12.: no plantations	*Shan*	-	-	-	-	-
13. Nyaung Ta Bin	Ayeyawady	6	50	39	78.0	47,408,411
14. Byant Gyi Gon	Ayeyawady	12	75	63	84.0	122,291,473
15. Te Bin Seik	Ayeyawady	9	75	61	81.3	47
16. War Gon	Ayeyawady	9	100	77	77.0	47,65,408

Note: Six CFs studied in the Shan State have no plantations. For species codes see *Appendix III*

Survival levels are generally very good (i.e. above 75%) except for Myay Thin Twin and Let Pan De CFs, both in Mandalay, in the Dry Zone, where only 54% and 36% of planted stock survived respectively.

6.3.2 Stand dynamics

In order to assess the stand dynamics for forest management planning and to appraise the financial/economic efficiencies of projects we normally develop correlations between various tree and stand parameters. However, since the CFs under this study are very young, it is impossible to make any reasonable time series analyses. But in an attempt to fully utilize the available data, some, mostly static, functions have been developed. They are provided in *Appendix 6.2*.

6.4 Ecological status of Community Forests

In order to judge the ecological status of the selected Community Forests we considered the following parameters for each: 1. forest health, 2. ground cover, 3. erosion control, 4. wildlife, 5. biodiversity, 6. pests/diseases, 7. natural regeneration, 8. water resource, 9. illegal extraction, and 10. encroachment.

The inventory crews collected information on the natural environment on every sample plot and sub-plot. The results of the assessment are presented in Appendix-3. They are summarized in the following table (Table 6.3).

Plate 6.3: Measuring ecological status of CF at Nar Daung Hla

Table 6.3: Forest condition by various indicators

CF	Forest health	Ground cover	Erosion control	Wildlife	Biodiv-ersity	Pests/ Diseases	Nat. Regeneration	Water re-source	Illegal extract-ion	Encroachment	OVER-ALL
1. Wuyan	F	G	G	PR	F	PR	F	PR	PR	A	**G**
2. Gweyutyan	F	G	G	PR	P	PR	G	PR	A	A	**G**
3. Sin Gaung Lay	G	G	G	PR	G	A	F	PR	A	A	**G**
4. Pa De Thar Myothit	G	F	G	PR	G	PR	F	A	A	A	**G**
5. Myay Thin Twin	F	F	F	PR	F	A	F	A	A	A	**F**
6. Let Pan De	F	P	F	PR	F	A	F	A	A	A	**P**
7. Mine In	P	F	G	PR	P	PR	G	A	PR	PR	**P**
8. Pway Hla	P	F	G	PR	P	PR	F	PR	PR	A	**F**
9. Lwai Nyeint	F	G	G	PR	P	PR	G	PR	PR	PR	**F**
10. Nar Daung Hla	P	P	G	PR	P	A	F	A	PR	A	**P**
11. Kon Shine	F	G	G	PR	P	PR	G	PR	PR	PR	**F**
12. Taung Kya-1	G	G	G	PR	F	PR	G	PR	PR	A	**G**
13. Nyaung Ta Bin	G	G	G	PR	F	A	G	PR	PR	A	**G**
14. Byant Gyi Gon	F	F	G	PR	F	A	G	PR	PR	A	**G**
15. Te Bin Seik	F	F	G	PR	F	A	F	PR	PR	A	**F**
16. War Gon	G	G	G	PR	F	A	G	PR	PR	A	**G**
Good (%)	31.25	50.00	87.50	-	12.50	-	50.00	-	-	-	50.00
Fair (%)	50.00	37.50	12.50	-	50.00	-	50.00	-	-	-	31.25
Poor (%)	18.75	12.50	0	-	37.50	-	-	-	--	-	18.75
Present (%)	-	-	-	100.00	-	50.00	-	68.75	68.75	18.75	
Absent (%)	-	-	-	-	-	50.00	-	31.25	31.25	81.25	

Note: G=good; F=fair; P=poor; PR=present; A=absent

6.4.1 Forest health

Forest health was judged by crown, crown cover, vigour, absence/presence of disease or insect attack, soil erosion, natural regeneration, and categorised for each CF as good, fair or poor. Forest health was found to be satisfactory (i.e. fair or good) in 13 of our study sites (81%).

6.4.2 Ground cover and erosion control

CFs create good ground cover and hence no serious erosion has occurred in all 16 CFs. (Ground cover is assessed by the density of the vegetative growth on the forest floor).

6.4.3 Wildlife and biodiversity

Small wildlife especially has returned to all CFs whether natural or planted. Biodiversity is satisfactory in more than 72 % of the community forests. Mono-plantations are less diverse biologically than natural forests. (The biodiversity assessment was based on the number of different species of flora and fauna).

6.4.4 Pests and diseases

The occurrence of pests and diseases has been noticed in half of the CFs being studied.

6.4.5 Natural regeneration

Natural regeneration has taken place in all types of forests of CF.

6.4.6 Water sources

About 69% of CFs have water sources. But it is impossible to infer that CFs are attributable to their appearance since previous data does not exist except for Wuyan CF in the Kachin State where water sources have reappeared three years ago. They had disappeared when the dense natural forests were depleted.

Plate 6.4: Water sources reappeared at Wuyan CF in Kachin State

6.4.7 Illegal extraction

Illegal extraction of forest products has been taking place in about two thirds of the inspected CFs. Non-FUG members are usually responsible for such illegal activities. They cut firewood and poles, and collect mangrove seeds in the delta CFs illegally.

6.4.8 Encroachment

Encroachment for *taungya* (shifting cultivation) and agriculture is a concern for approximately 19% of FUGs.

6.4.9 Overall summary of forest ecosystem

The overall assessment of forest ecosystem of each and every CF was made subjectively based on the conditions of its individual indicators classifying them in three categories as Good 'G', Fair or Moderate 'F' and Poor 'P'. See table 6.3. It shows that in 8 out of 16 CFs (50%) the overall state of forest ecosystem is good, 5 CFs (31.25%) have moderately improving forests and 3 CFs (18.75%) are poor. The three poor CFs namely Let Pan De in Nyaung U Township, Mine In and Nar Daung Hla both in Pindaya Township had been established with donor supports. It seemed that FUGs concerned lost interest when external support had stopped.

In general, CFs are protected well. Communities are thus significantly contributing to the national re-greening objectives enshrined in the CF Instruction `

6.5 Harvesting and ecosystem services

Since CFs are still very young, timber has not been harvested as yet; only a very few of them have started providing poles, firewood, seeds and some NTFPs. But because FUGs had not kept proper records, information on production, expenditure and income, etc. from CFs is sketchy and mostly not good enough for analysis. Extraction of poles and firewood will need regulation or advice of FD.

At the other end, all FUGs have been enjoying improved ecosystem services of their CFs in terms of water supply, improvement of soil fertility, erosion control, improving habitats for wildlife, wild plants and fisheries, and protection against adverse impacts of strong winds and waves.

Increased carbon sequestration and storage due to increased forest cover through CFs is an implicit intangible value of the established community forests in the country.

6.6 Conclusions

During the last 15 years the community forests have increased the national effective forest cover by about 2,800 hectares annually (42,147 ha in 15 years). It means that the Forest Department and local people together have been able to restore and effectively protect more than one hundred thousand acres (more than forty two thousand hectares) of degraded forests during the period.

The community forests have also been providing goods and environmental services in the interests of the local communities - including promotion of the forest's capacity of absorbing and storing atmospheric

carbon. Some CFs represent success stories. Provided rightful awareness, interest and active participation of the community, CFs are successful. Otherwise, community forestry fails.

It is vital that the responsible forest staff educate and mobilize the community and secure its trust in this context in order to be able to speed up the progress of CF development. The current pace of progress is far from adequate to meet the long term national target.

Chapter 7: Economic Analysis Of Community Forestry

7.1 Introduction

Although the data on forest ecology/ resource, social and environmental aspects presented above has sufficed for respective appraisals, data gathered on the economic aspects of CF tended to be sketchy for almost all the FUGs. The only exception was War Gon CF. Because War Gon CF has had a reasonable time series of recorded expenditures and incomes it was suited to more detailed study. War Gon CF is a mix of plantation and natural forest, and one-acre thame (*Avicenia officinalis)* plantation has been chosen here to study the financial implications of the Community Forest as a test case.

7.2 Background

Wargon CF is located in compartment 56 of Pyindaye Reserved Forest, Phyarpon Township, Ayeyawady Region (Division, formerly) (at North latitude 15°80′ and East longitude 95°92′). The CF was established on the 16th of February, 2001, and consists of 65 acres of plantation and 75 acres of natural mangrove forest. Before it became CF it had been encroached for agricultural land. FREDA initiated the CF, assisting in formulating the Management Plan, and gave technical advice and agricultural inputs . FUG members gradually became active and enthusiastic.

The planted species include byu (*Bruguiera cylindrica*), kambala *(Sonneratia apetala) and* thame *(Avicenia officinalis*) . The thame plantation has enjoyed a 64% survival rate. The rotational felling period of the plantation was set at ten years. The natural mangrove forest in the CF also contains the same mangrove species. Other species, including nwai-net (*Derris trifoliata*) and hnget-kyi-taung (*Monolylla correa*) which are medicinal and edible, were found among the undergrowth. Wildlife in the CF includes little egrets, water fowl, jungle fowl, wild cats, birds and crocodiles.

Plate 7.1: 9-yr old *thame* plantation, War Gon CF, Ayeyawady Region

The FUG has 45 members, who are now getting incomes from the sale of firewood, seeds and propagules (cuttings for tree propagation) which they collect in the CF. However, there is the problem of encroachment for land from non-members.

7.3 Study approach

The forest survey team conducted an inventory in the CF and the social survey team conducted socio-economic assessment in the CF village from 16 to 21 November, 2010. Costs and incomes of the CF were recorded to assess its financial profitability. (See Chapter 3 for method details)

7.4 Stand and stock tables

Stand and stock tables of the plantation were developed based on the inventory (See figure 7.1).

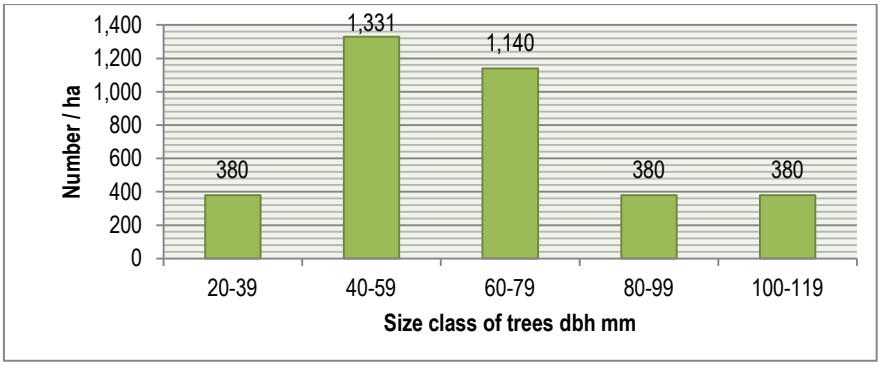


Figure 7.1: Stand structure of *thame* plantation (War Gon CF) – number /ha of different size classes of trees

The inventory tells us that the plantation has:

- 3,611 trees per hectare and a growing stock of 97 m^3/ha,
- A mean tree diameter at breast-height of 7 cm and a mean tree height of 6.2 m,
- A mean annual increment of 10.8 m^3/ha at the age of 9 years.

7.5 Financial analysis of incomes, expenditure and net cash-flows

The FUG members have been collecting and selling firewood and seeds from the plantation since 2007. We here estimate overall income, expenditure and net cash flows.

7.5.1 Input table

The input table shows the costs incurred for the CF during the study period. The costs include cost of plantation establishment and administrative cost.

Cost of plantation establishment was high in the initial year amounting to K29,650 including estimated annual administrative cost of K1,000. Weeding was done in the following two years. No silvicultural treatments had been undertaken until year 2010. If the plantation were clear-felled at the rotation age of ten years, there will be cost of harvest and revenue from the final harvest of forest products. Now because the plantation is being kept growing, no such costs and revenues have occurred as yet. However, there should be intermediate costs which would have incurred in collecting firewood and mangrove seeds. They have been ignored here probably because the activity had not involved hired labour and the cost was negligible.

Table 7.1: Inputs: Costs of thame plantation (Kyats per acre)

Activities	Years										Total
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	
Site preparation	3,000	0	0	0	0	0	0	0	0	0	**3,000**
Staking	1,800	0	0	0	0	0	0	0	0	0	**1,800**
Planting	1,800	0	0	0	0	0	0	0	0	0	**1,800**
Weeding- 2 times	3,600	2,970	1,570	0	0	0	0	0	0	0	**8,140**
Patching	300	0	0	0	0	0	0	0	0	0	**300**
Nursery	18,150	0	0	0	0	0	0	0	0	0	**18,150**
Administrative	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	**10,000**
Total costs	**29,650**	**3,970**	**2,570**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**43,190**

Source: The cost data for plantation establishment were collected by Dr. Maung Maung Than, Consultant at Pyoe Pin Programme.

7.5.2 *Output table*

Thame plantation has been producing firewood since 2007 and seeds since 2009. The following table shows the outputs of the plantation by types of products and years.

Table 7.2: Outputs- Forest products collected from thame plantation

Products	Measurement unit	Years									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
***Thame* seeds**	Basket	0	0	0	0	0	0	0	0	1.0	3.9
Firewood	Ton	0	0	0	0	0	0	2.1	2.4	9.826	9.270

7.5.3 *Unit value table*

Unit values of the forest products are presented in the following table. They were market values at site.

Table 7.3: Unit values of forest products

Products	unit	Years									
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
***Thame* seeds**	Kyat/basket	-	-	-	-	-	-	-	-	1500	1500
Firewood	Kyat/ton	-	-	-	-	-	-	8300	8300	8700	8700

7.5.4 *Cash flow of incomes or benefits*

From the output table and the unit value table (tables 7.2 and 7.3) benefits are calculated and presented in the following table.

Table 7.4: Cash flow of benefits

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total
Benefits (K)	0	0	0	0	0	0	17,430	19,920	86,990	86,500	**210,840**

This shows that after the forest becomes productive it yields almost 87,000 kyat / acre per year.

7.5.5 *Net cash flow*

The net cash flow is constructed by subtracting the costs from their corresponding benefits. It is shown in the following table:

Table 7.5: Cash flows of one-acre thame plantation

Years	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL *TO DATE*
Benefits (K)	0	0	0	0	0	0	17,430	19,920	86,990	86,500	210,840
Costs (K)	29,650	3,970	2,570	1,000	1,000	1,000	1,000	1,000	1,000	1,000	43,190
Net cash flow (K)	**-29,650**	**-3,970**	**-2,570**	**-1,000**	**-1,000**	**-1,000**	**16,430**	**18,920**	**85,990**	**85,500**	**167,650**

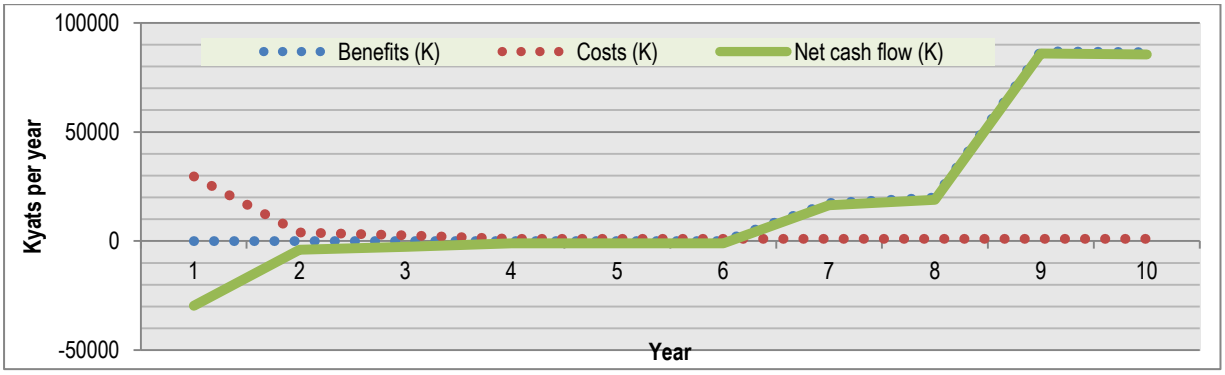


Figure 7.2: Costs, benefits and net cash flow of the 1 acre plantation (kyat / year)

As has been mentioned earlier, costs include costs of plantation establishment and administration, while incomes (or benefits) were received mainly from the sale of firewood and to a lesser extent from mangrove seeds. The net cash flow has shown-

- a Financial Rate of Return (IRR/FRR) of 24.28% , and
- a Cost-Benefit Ratio (BCR) of 2.47 at 10% discount rate. 10% is the current bank interest rate set by the Government of Myanmar.

7.6 Conclusions

Given the available data on the costs and benefits, the thame plantation is highly financially profitable. The monetary benefits could even increase with increasing age of the plantation. Furthermore, since the plantation has not been clear-felled, the capital is growing.

On the other hand, there are also the opportunity costs that might have occurred because of establishing the plantation and at the same time there are the intangible values of the forest as well, which should be taken into consideration in deciding land use change or efficiency of a development project. They have not been covered by the current exercise. The intangible values could be exposed only through economic analysis in terms of Economic Rate of Return (ERR).

Box 7.1: Calculation and Interpretation of Internal Rate of Return (= FRR or ERR)

Definition: The IRR is the rate of return that the investment will earn.

Calculation procedure is the same for financial rate of return (FRR) and economic rate of return (ERR). The difference lies in valuing costs and benefits. The financial analysis takes into account only monetary costs and benefits which occur to the investor. The economic analysis takes into account all costs and benefits that occur to society as a whole. It determines whether or not the project is worthwhile from society's point of view.

How to calculate FRR:
No formula is available when more than one cost and/or benefit is involved. So, trial and error method is used as follows:

1. First calculate NPW (net present worth) using a discount rate (dr) considered to be close to the expected FRR
2. If NPW is negative, FRR is lower than the dr used, if positive FRR is higher.
3. Repeat calculating NPW until one positive and one negative values are obtained.
4. The FRR now lies between these two discount rates. Estimate FRR by–

$$\text{FRR} = (\text{lower rate of discount}) + (\text{difference between both rates of discount}) \times \left(\frac{\text{positive NPW}}{\text{absolute difference between positive and negative NPWs}} \right)$$

When all expenditures and receipts occur at the beginning or end of the period the estimate of IRR is simple using the following formula–

$$IRR = \left[\left(\sqrt[n]{\frac{R}{E}} \right) - 1 \right] \times 100$$

where R = actual receipts, E = actual expenditures

Nowadays, computer software is available to calculate IRR and other economic decision-making tools.
How to interpret FRR of 24.28%. It is the return of the resources used in the one-acre thame plantation over 9 years from 2001 to 2010. It means that K100 invested over the project period will generate K24.28 per year for every year as long as the K100 remains committed to the project.

Reference: H.M. Gregersen and A.H. Contreras 1979 "Economic analysis of forestry projects".

Chapter 8: Livelihoods and Equity Issues in Community Forestry

8.1 Introduction to livelihood issues

Community Forestry affects local people's livelihoods in complex ways. Household's livelihood strategies in forested landscapes are themselves complex.

Box 8.1: Livelihoods concepts

Livelihoods are comprised of assets, livelihood activities, incomes and market engagement, income allocation and consumption.

Households have **asset endowments** categorised conventionally into five areas:

- human (number of household members, their age and health; education and skills)
- physical (house, tools, vehicles, radio etc.)
- natural (land extent and quality; trees; livestock etc)
- financial (savings and debts, and access to credit etc.)
- social (networks, reciprocal relations)

Households also have access to community endowments, like irrigation sources, grazing land, and community forests.

Households allocate their labour time along with other assets to a range of **production activities** (e.g. domestic activities, cultivation, forest product collection and processing; livestock keeping; labouring; artisanal production; trading etc). Household members allocate their labour to these according to a range of reasons which can fluctuate (e.g. skills, remuneration, assets, health, seasonal conditions; cultural preferences).

To achieve **food security** households typically engage in markets, exchanging their products for income to buy food, borrowing, buying inputs to grow food, or selling surplus.

Surplus income may be saved or invested, adding to asset endowments.

The **role of forests** in these activities varies according to the household, their assets and skills. Forests provide a wide range of products and services to the different users, and the benefit (and cost) is themselves fluctuating for environmental and social reasons. Benefits include a range of different products and services.

Products include:

- timber, poles etc
- fuelwood,
- fodder
- bush meat
- wild foods (fruits, vegetables & tubers, honey etc.)
- crops from agro-forestry systems
- medicinal and aromatic plants
- a wide range of other 'niche' NTFPs

Ecosystem services include:

- water – e.g. recovering springs
- soil protection and nutrient cycling
- pollination
- habitat (e.g. for fish spawning in delta)
- storm protection in the delta reducing damage and potentially saving lives

The introduction of CF affects livelihoods in subtle as well as obvious ways. Impacts can be differential, particular between members and non-members, but also within FUGs by wealth ranking, occupation, gender, location in village (remote and more central) and so on. Impacts even vary within households – if grazing land is converted to forests then those who tend the animals will have to spend more time and

travel further. The management plan for instance is an outcome of negotiations between the FUG addressing different priorities, in which the more powerful are likely to prevail.

Community Forestry impacts must be understood according to their sequence in time and in relation to the pre-CF situation and trends (where open access use may even lead to higher incomes, but on an unsustainable level),

- the 'during regeneration' stage may involve tight restrictions on use for regeneration to take place; this will affect those who are more forest-dependent the hardest.
- finally a post or regenerated stage, where the forest is more productive, but is used only within sustainable levels. Sustaining improvements in the long term, of course, demands that communities overcome all sorts of challenges.

Finally, many aspects of forest use are informal, some even illegal. Shift in extraction of forest products, for instance, from the new Community Forest typically occurs as restrictions are applied, but understanding whether the pressure just shifts to other adjacent forests is difficult unless these are studied in as much detail. These are very difficult to capture in brief research visits.

Beyond tangible changes in forest product and services flows, more intangible changes in social cohesion are difficult to quantify and understanding them depends on lengthy anthropological investigation.

In this brief study we are only able to sketch the outlines of how livelihoods are affected, mainly for FUG members, and to make tentative conclusions regarding the effects of community forestry.

In order to thoroughly understand livelihood change due to community forestry, we would need a more in-depth study. A baseline dataset to measure change from the initial situation and consideration of some control villages to compare with the FUG study groups, to see how much their livelihoods have changed over the period without community forestry. Further, at the study FUGs we would ideally be able to contrast the livelihood changes of FUG members with non-members, both in the village and in neighbouring areas. Unfortunately, this is beyond the scope of the current study.

Below, we discuss the context, the range of possible changes due to community forests and then discuss our findings for the study villages.

8.2 The rural livelihood context

According to the UNDP / Ministry of National Planning & Economic Development Household Living Conditions Survey (2007: 3) 10% of the population falls below the 'Food Poverty Line' or FPL (i.e. enough income to pay for adequate nutrition), with incidence as high as 40% below in Chin State and only slightly less in Shan North and East, and Kachin, Ayeyawady and Mandalay are closer to the average level of below FPL incidence.

Rural livelihoods and food security are heavily dependent on agricultural production which may be sedentary in lowland areas but often involves long fallows in hill areas for nutrient cycling. Agriculture may be complemented by pastoralism, forest product collection and also artisanal production, trading, labouring and so on. The UNDP survey indicates that average landholding is 6.1 acres, and that landholdings correlate with poverty. Landholdings are lower in hill areas, and one quarter of agricultural families are landless (UNDP 2007: 8).

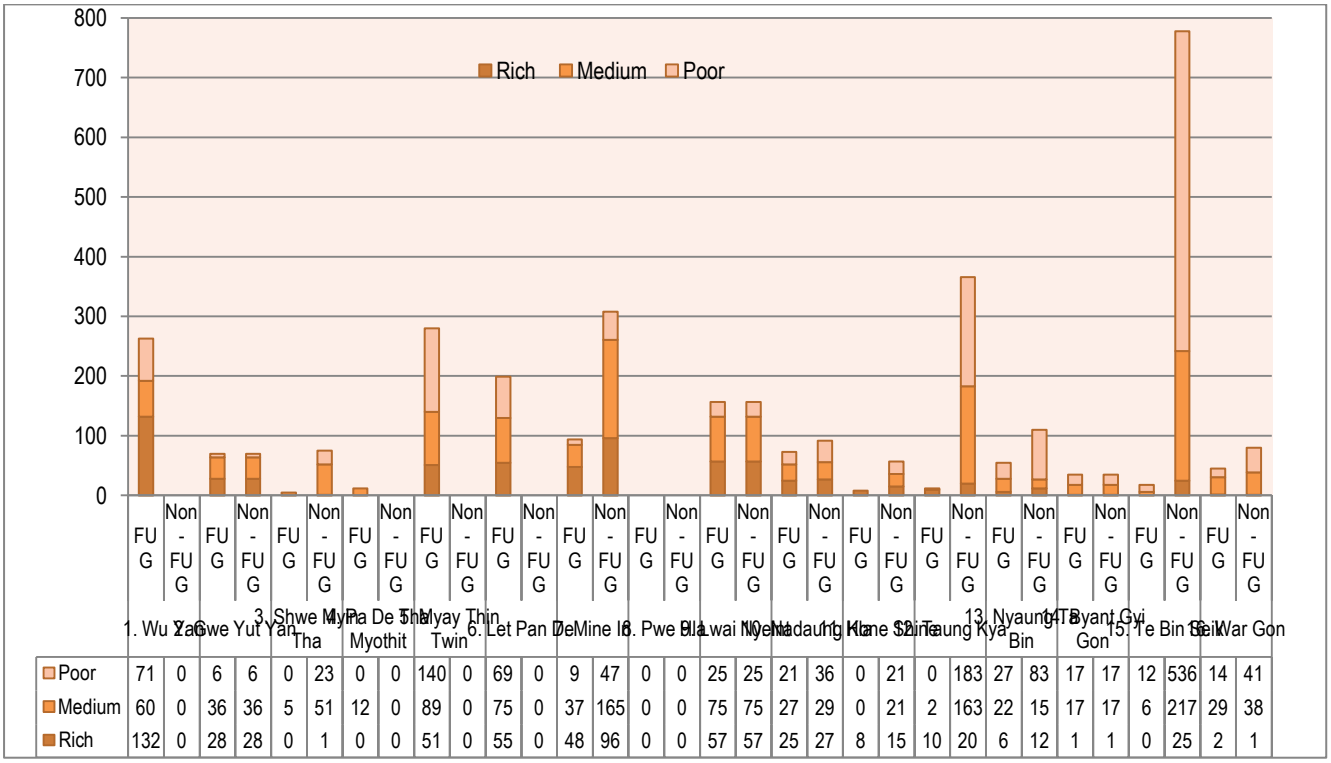
There are underlying changes already going on in rural livelihoods in Myanmar. Farmers report increasing vulnerability due to depressed rice prices, and increasingly erratic rains leading to stagnant and

even declining productivity. Livestock fodder management is a significant issue: as livestock populations increase but pasture land is disappearing.

8.2.1 Livelihoods and wealth rank profile of villages

In our study we conducted wealth-ranking exercises for each village, categorising households into rich/ well-off; medium; and poor according to land holding. (Of course income levels are not consistent between villages, and a 'poor' household in one village may be significantly better off than one in another.)

The figure below (Fig. 8.1) illustrates that, for three of the study FUGs, (19% of the sample)) membership includes the whole village (groups 1; 5; 6), whereas for most of the study FUGs (10 groups or 62%), the FUG membership is a significant part of the village. In the three remaining cases only a small fraction of the whole village are members, (19% of the sample: groups 3, 11, 15) excluding the majority of village households. There seems to be no significant pattern of exclusion of poor from membership.



	1. Wu Yaw		2. Zawe Yut Yan		3. Shwe Myin Tha		4. Pa De Thalyay Thin Myothit		5. Twin		6. Let Pan De		7. Mine Ie		8. Pwe Kla		9. Lawi Nyeint		10. Nadaung Kha		11. Kha Sa Lin		12. Taung Kya		13. Nyaung Bin		14. Byant Gyi Gon		15. Te Bin Gyi		16. War Gon	
	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG	FUG	Non-FUG
Poor	71	0	6	6	0	23	0	0	140	0	69	0	9	47	0	0	25	25	21	36	0	21	0	183	27	83	17	17	12	536	14	41
Medium	60	0	36	36	5	51	12	0	89	0	75	0	37	165	0	0	75	75	27	29	0	21	2	163	22	15	17	17	6	217	29	38
Rich	132	0	28	28	0	1	0	0	51	0	55	0	48	96	0	0	57	57	25	27	8	15	10	20	6	12	1	1	0	25	2	1

Figure 8.1: Wealth rank of FUG and non-FUG member households: number by FUG sites.

8.2.2 Benefits & costs/ use

Although Community Forestry can lead to a range of livelihood benefits, this depends on improvements to the forest condition, and also on households being able to access the forest. There may also be a range of costs involved particularly at the outset when access to the forest may be restricted, and when efforts and investment are required.

The table below (Table 8.1) illustrates the range of possible costs and benefits to different households

Table 8.1: Possible costs and benefits to households from Community Forestry

Factor	Possible costs (-)	Possible benefits (+)
Land use	- Loss of previous land use forestry (especially grazing, fallows and cultivation) - Obstructed access routes through forests	+ More sustainably productive use of land than open access + Legitimate access to forest, either collective or individual plots
Time use	- Additional time required for deliberation and management - Further travel for forest products due to access restrictions	+ Time saved in collecting forest products more easily + Time used in value addition of forest products increases productivity
Forest product flows	- Restrictions of forest product extraction	+ Products for own use and sale + Products for community development (e.g. timber for school building) + Job opportunities from enterprise development
Cash	- Investment expenses for plantation etc. - Loss of revenues where forest product sale becomes restricted	+ Incomes from product sale
Ecosystem services	- Loss of water sources due to high water demand from fast growing exotics (esp. dry zone)	+ Range of local ecosystem services, e.g. water supply improvement, soil conservation and nutrient cycling + Extreme weather event protection
Social 'capital' / cohesion	- Exclusion from FUG - Social conflict between FUG members and non members, including neighbours and outsiders	+ Improved social cohesion + Development of community development planning and management skills + Conflict resolution skills

8.3 Are there livelihood benefits from CF?

At the study sites we found a wide range of benefits being enjoyed, as well as the anticipation of future ones. Across the study sites the general pattern is that community forest protection and regeneration is leading to a range of available livelihood benefits. The table below illustrates the complex range. However, most FUGs are too young for the forests to achieve the maximum sustainable productivity yet.

We see a general pattern of increase in forest benefits to members in 13 of the 16 sites (81.25%).

Plate 8.1: Social survey being carried out in the Shan State

Table 8.2: Change in Forest Benefits for FUG Member households

FUG:	State/ div.	Net improved forest benefits?	Forest Products								Environmental Services				Costs	Comment
			Timber, poles etc	Fuel-wood	fodder	Wild food	medicinal plant	bamboo	other NTFP	agric	spring improved	soil protection	Aesth-etic	Env. protection	Exclusion from access	
1 Wuyan	Ka	↑	↑	↑	↑	↑	↑				↑	↑				○ 54% member hhs getting fuelwood, ○ Fodder; timber for community development
2 Gweyutyan	Ka	↑		↑	↑	↑	↑	↑			↑	↑				○ 71% member hh getting fuelwood ○ Uncertainty over whether they can sell teak
3 Sin Gaung Lay	Ma	↑	↑		↓					↑	↓	↓			↓	○ The few FUG members getting many benefits ○ Severe exclusion of non members for forest use
4. Pa De Thar Myothit	Ma	↑			↓					↑	↑	↑			↓	○ The few FUG members getting many benefits ○ Severe exclusion of non members for forest use
5.Myay Thin Twin	Ma	~		↑	~		↑					↑	↑			○ Improvement in ecosystem service – springs ○ Some hhs getting much fodder & NTFPs
6.Let Pan De	Ma	↑		↓	↑		↑				↑					○ Fodder increase leading to livestock breeding income ○ Tradeable medicinal plant seeds generating income
7.Mine In	Sh	~									↑	↑	↑			○ Outside illicit collectors taking fuelwood
8.Pway Hla	Sh	↑	↑	↑			↑		↑		↑	↑	↑			○ Timber, fuelwood & NTFPs
9.Lwei Nyeint	Sh	↑	↑	↑												○ Community use of poles & timber ○ domestic timber provided - pro-poor basis
10.Nau Daung Hla	Sh	~		↑	↑		↑									○ modest: fuelwood; medicinal plants; grazing
11.Kone Shine	Sh	↑	↑	↑					↑							○ timber for community dev. & house improvement ○ NTFP – yam. turmeric, cardamom
12 .Taung Kya-1	Sh	↑					↑		↑	↑						○ Many NTFPs traded – very profitable ○ Timber & poles for community development
13 .Nyaung Ta Bin	Ay	↑	↑	↑						↓				↑		○ Pre-Nargis – income from fuelwood sale ○ Poles for hh use
14 .Byant Gyi Gon	Ay	↑		↑										↑		○ Env. Protection from Nargis saved many lives ○ Post Nargis – fuelwood & timber for reconstruction
15 .Te Bin Seik	Ay	↑	↑	↑					↑					↑		○ Timber - community dev: school, teacher house, bridge ○ Post Nargis income from seeds; fish thriving
16. War Gon	Ay	↑	↑	↑					↑					↑		○ Fuelwood & poles – to use and sell for income ○ Selling seeds & propagules to neighbouring villages

Note: ↑- increasing trend; ~ roughly equal; ↓declining trend

Although we lack precise quantified data, this includes the following products:

- An apparent increase in sustainable timber and poles offtake in 50% of sites.
- An apparent increase in sustainable fuelwood offtake in 11 sites (69%), though a reduction in one site.
- An apparently balanced picture in terms of fodder, with 2 sites increasing, two reducing availability, and one stable.
- Increasing wild food harvesting in two sites.
- Increasing medicinal plant harvesting in 7 (44%).
- Increasing bamboo harvesting in one site.
- Increasing harvesting of 'other' NTFPs in five sites (31%) – these vary by forest type, and include yam, turmeric, cardamom, seeds and propagules.
- In three sites agro-forestry cultivation has increased for commercial crops.

Environmental services are also improving:

- Six study FUGs (37.5%) reported improving water supplies, a particularly important issue in dry zone areas. However, one site experienced declining supplies.
- Seven study sites (44%) experienced improved soil protection benefits, including reduced soil erosion and improved soil condition and nutrient cycling.
- All the delta FUGs experienced improved Environmental Protection from storms, and of course in the context of Nargis the community forests saved many lives in these villages.
- Finally three groups expressed the aesthetic benefits from improved forest condition.

Plate 8.1: Plate 8.2: CF at Byant Gyi Gon that protected the village from Cyclone Nargis

The environmental protection function of community forestry has been most evident at Byant Gyi Gon FUG. The village leader personally initiated formation of CFUG after hearing a radio report about the CF initiative in 1995.Thirteen years later, when Cyclone Nargis hit the Delta region in 2008 the mature community forest took the brunt of the impact, and all the villagers survived, whereas in neighbouring villages without CF over 30% of people were killed.

8.4 Wider social benefits

Although more difficult to measure there are a range of social benefits which seem to be emerging from Community Forestry. Perhaps the major one is security of access / tenure to the forest resource – local people can again regulate use to ensure resource use within sustainable levels.

There is also the prospect that managing the forest collectively allows experience of deliberative social processes. As Myanmar is undergoing constitutional reform this may be a particularly critically valuable 'training for democracy' process, as it has been in Nepal. Several of the study villages reported improved social cohesion and confidence, skill development including leadership skills and conflict management skills, and the effective organisation of social development initiatives.

On the other hand, there are exceptions to this where users are excluded, where conflicts are not being effectively managed, and where a lack of post formation support is leading to stagnation.

8.5 Is the benefit distribution (and costs) equitable?

Equity is synonymous with fairness or justice, and two aspects are commonly identified: equity in procedures and equity in outcomes. In relation to Community Forestry there are three evident dimensions:

- Intra household equity: male and female especially – do women's priorities like reducing fuelwood collection times get reflected in management?
- Within the Forest Users' Group: i.e. are all members able to participate?; are costs and benefits shared fairly?; is there a fair relationship between the Management Committee and the general body?, etc.).
- Within the village and across different occupational groups: i.e. has the formation process been fair in giving all an equal opportunity to join?; are particular occupational groups (e.g. pastoralists, fishers etc) or non-members unfairly excluded from benefits? and so on).
- Inter-village: are neighbouring villages treated unfairly, or do neighbours treat the FUG unfairly or disrespectfully?

In our brief study we have not been able to assess each of these aspects in detail. We have, however, been able to gather from PRA discussions and household interviews an overall sense of the FUG members' perceptions of fairness and satisfaction, as shown in table 8.3.

Table 8.3: Equity in Forest Users' Groups: an initial assessment

FUG	State / Region	Equity assessment	Remarks
1 Wuyan	Ka	✓	Good: All village satisfied
2 Gweyutyan	Ka	✓	Good within FUG
3 Sin Gaung Lay	Ma	✗	Mis-formed small group benefiting at cost of large village
4.Pa De Thar Myo Thit	Ma	~	Good within FUG but dissatisfaction with non-members
5.Myay Thin Twin	Ma	✓	Inclusive group
6.Let Pan De	Ma	~	Fairly good
7.Mine In	Sh	~	Rich donated land, but now neighbours taking benefits
8.Pway Hla	Sh	~	Fuelwood shared equally but overall unclear
9.Lwai Nyeint	Sh	✓	Equitable & pro poor
10.Nar Daung Hla	Sh	~	Moderately fair
11.Kone Shine	Sh	~	Earlier fair, now MC taking more
12 .Taung Kya-1	Sh	✗	Small FUG taking benefit, wider village loosing
13 .Nyaung Ta Bin	Ay	~	Households lost paddy lands before CF – product distribution fair
14 .Byant Gyi Gon	Ay	~	Not all benefits equally shared across village – poorest can't participate
15 .Te Bin Seik	Ay	✓	Very fair: Poorest households are non-members: they are also getting substantial benefit from seed & propagule sale
16. War Gon	Ay	✓	Very fair- -non members get needs too

- 6 of the 16 study sites (37.5%) indicate equity in their practices. The best of these are both highly inclusive and actually pro-poor in ensuring the poorest households' needs are considered.
- Half the study FUGs (50%) get a 'moderate' assessment: whereby there are some good aspects (e.g. equal sharing, inclusion etc.) but these are balanced by some less equitable aspects (e.g. non members, sometimes the poorest feel excluded, neighbouring villagers or the management taking the benefits of regeneration).
- A small number (2 or 12.5%) show poor levels of equity. These groups are very small FUGs who have taken over forest land from the larger village, and are benefiting from it significantly but at the expense of the non-members.

Overall there is a clear tendency for poorer households to participate less in CF as they are too preoccupied with food security, and lack the time to participate. They are also likely to depend of the forest more as they lack private assets like their own land, from which they might get tree products etc. Some FUGs have been socially inclusive, and ensured that the poorest are involved and get an equal share of benefits even if they are not able to invest their time. However, some FUGs have not been able, or have not tried to include the poorest.

- ***For the future it should be made a priority to ensure the poorest are included and that their livelihoods benefit from CF, and certainly are not negatively affected. This can be achieved at formation by ensuring all community members are made part of the FUG, and encouraging the FUG to have pro-poor benefit sharing provisions. It may also require reformation of group membership to include the poor. It may also require regular monitoring to ensure the poor are benefiting and are not suffering from the CF process.***

A particular concern is the cases where CF has been introduced on land where households have been cultivating e.g. *Taungya* cultivation in hill areas or paddy in the Delta). We recommend that CF should not be used as to 'territorial control of land use, for both equitable and practical reasons – it is likely to lead to counter-productive conflicts. Rather it should emerge from a consensus. The self-selecting membership of CFUGs is a serious problem for social inclusion – as it is highly vulnerable to opportunistic elite capture.

8.6 Further issues

There are several issues which have been beyond the scope of the current study.

8.6.1 Wider social development initiates

In several FUGs we are seeing wider social development processes emerging. These include community development initiatives (i.e. school building and timber support), pro-poor and even pro-non-member initiatives (e.g. in Ayeyawady). In some groups there are social inclusion processes emerging in order to form new groups for non-members.

8.6.2 Is CF Pro-poor?

We have not in this study tracked the livelihoods of non-FUG members, and therefore it is hard to assess whether poorer non-member households are enduring hardship due to CF.

8.6.3 Gender issues

Due to ascribed gender roles in rural societies women and men are likely to have different objectives from forests. As men predominate in village positions, do women's priorities get considered? We have not been able to explore these issues in adequate depth to draw conclusions at this stage.

8.6.4 Livestock & grazing issues

There are reports citing growing livestock numbers across Myanmar, but declining grazing land availability. CF may contribute to / exacerbate this by converting grazing land into forest plantation. On the other hand, planting fodder species, which once established will allow grazing, may contribute to solving this challenge. We have not, however, been able to develop a clear picture of grazing issues across our sites, so this must await future study.

8.7 Conclusions

The overall picture is complex: generally there are substantial benefits becoming available through improvement in the forest condition from improved protection and management. Often these benefits are being distributed fairly. But in some villages the FUG seems to be being mis-used, and so benefits are as yet being unfairly shared, sometimes amongst a small group at the expense of restricting the rest of the village households' use of the forest.

- ***The self-selecting group structure may have been ideal to get FUG going as only the interested and motivated participate. But this has led in a handful of cases to elite capture and inequity; Inclusive FUG formations and reformation is essential;***
- ***Poorer households lack time and resources to participate and invest, but they are more likely to depend on the forest resources. Therefore they need to be included and or have alternate livelihood opportunities;***
- ***There is undoubtedly much potential here for enhancing the livelihood benefits through both livelihood oriented forest management and also creation of value added products and marketing development.***

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Chapter 9: FUG SUSTAINABILITY

9.1 Overview

We reviewed in Chapter 4 the extent to which FUGs are institutionalised at formation. Here we ask, have they subsequently remained institutionalised? This question is of course critically important for the overall prospects of the CF initiative in Myanmar. We need to know how many 'survive' beyond the initial formation phase, and the critical threats to them for which they need support.

We use a number of indicators to assess this: current activity level, fulfilment of reporting requirements, level of awareness and understanding of CF, and conflict issues. Our assessments are shown in Table 9.1 below:

Table 9.1: Indicators of Institutional Sustainability of Study FUGs

FUG:	State / region	*Initially Institutionalised*	Currently active?	Annual report to FD?	Awareness & understanding	Absence of conflicts
1. Wuyan	Ka	✓	✓	✓	✓	✓
2. Gweyutyan	Ka	✓	✓	✓	✓	~
3. Sin Gaung Lay	Ma	✗	✓	✓	✗	✗
4. Pa De Thar Myothit	Ma	✓	✓	✓	✓	✗
5. Myay Thin Twin	Ma	~	~	✗	~	~
6. Let Pan De	Ma	~	✗	✗	✗	-
7. Mine In	Sh	~	✗	✗	✗	✗
8. Pway Hla	Sh	✗	✗	✗	✗	-
9. Lwai Nyeint	Sh	~	~	✗	✗	✓
10. Nar Daung Hla	Sh	~	~	?	✗	✓
11.Kone Shine	Sh	✓	✓	~	~	~
12 .Taung Kya-1	Sh	✗	✓	✗	✗	✗
13 Nyaung Ta Bin	Ay	✓	~	~	✓	~
14 Byant Gyi Gon	Ay	✓	✓	~	✓	✗
15 .Te Bin Seik	Ay	✓	~	✗	~	~
16. War Gon	Ay	✓	✓	✓	~	~

9.2 Are Formed FUGs Currently Active?

Compared with initial institutionalisation, we consider here whether FUGs have continued to work once formed up to the present. Indicators include: are they meeting, protecting and managing the forest and so on.

- Half the study FUGs (50%) are currently functioning well.
- Five of 16 FUGs (31%) are functioning moderately well, but with significant problems.
- Three of the 16 sites (19%) are stagnant (3 of 16) with little sign of collective activity.

By region Kachin and Ayeyawady are performing well (no 'stagnant' FUGs), whereas Mandalay has one and Shan has two. In the Shan study, well functioning FUGs are in the minority.

One might have expected Nargis, being a major shock, to have fatally disrupted the new CF practices in the Delta region. But it seems that because environmental protection proved such a major benefit, and also that the more productive CFs have provided a range of products and services valuable for recovery, Delta FUGs have redoubled their efforts and are highly motivated despite the hardship and devastation caused by Nargis.

The current activity can best be explained in relation to the formation process. The 3rd column in Table 9.1 shows the assessment of the initial formation. No groups that were scored highly for their initial formation have failed in their sustainability assessment. However, some are now having problems. It is the villages that had a mediocre formation processes that have now stagnated. Note that although we assessed two groups as having poor formation processes this was because of 'elite capture' and these small groups function effectively, partly because they are highly motivated.

- ***To ensure FUGs survive the FD must first effectively monitor their 'health' on a regular basis;***
- ***Support should be urgently focussed on those that are struggling, to help them back to 'health';***
- ***Stagnated FUGs need revitalisation support.***

9.3 Are FUGs Submitting Annual Reports?

There is a low level of submission overall: only 5 study FUGS (31%) are reliably submitting their annual reports. These are all active FUGs. The rest of our study group (11 of 16 FUGs or 69%) are not regularly submitting, including three otherwise highly active FUGs.

This seems to be symptomatic of a weak relationship between the District Forest Office and the FUGs. We might question whether the FUGs know why they are supposed to submit them, and whether the FD exerts a 'demand pull' to receive them. The answer is probably not (although we need to explore this further). There don't seem to have been any repercussions from not submitting, nor benefits from submitting. Thus there is little incentive or disincentive. On the other hand, the annual reporting could form the key basis for communication and monitoring between the Township Forest Office and the FUGs, as it does in many other countries.

There is also concern regarding other forms of record keeping. Seven FUG management committees out of a total of sixteen do not have the management plans with them anymore and four FUG management committees have only the photocopies of the Community Forestry Certificates (CFCs) with them.

- ***The annual reporting process should be revitalised and strengthened to form a key communication and monitoring information flow, and database for tracking FUG progress and support needs;***
- ***FUG record keeping practices need to be part of reporting and monitoring. Records need to be kept up-to-date, with FD staff assistance as necessary.***

9.4 Awareness and Understanding.

We are interested here in the breadth of awareness across the village and FUG members, and also the depth of understanding regarding Community Forestry regulations and roles, particularly in the Management Committee. The FD is fully responsible to raise awareness of and educate the FUGs on CFI and CF issues at the formation stage. We found

- A&U is good in 5 of our study FUGs. The villagers have a clear grasp of the principles, and the Management Committees have detailed understanding of the issues and regulations.
- A&U is at a mediocre to poor level in 4 of our study sites. Most people may be aware of CF and they may be vaguely aware of the basics, but they lack a clear grasp of the fundamental principles and do not have a detailed understanding

- It is very poor in 7 sites. This is 44% or almost half the study sites. Villagers and even the Management Committee do not have a grasp of what CF is, and feel it doesn't apply to them, even when they may be members!

➢ ***Ongoing awareness-raising is probably needed to maintain understanding across the MC and general body.***

9.5 Conflicts and conflict management

Some degree of social conflicts in community forestry is inevitable: as the management regime changes and regulated use is enforced there are inevitably disagreements. Prevalent issues across FUGs include conflicts over illicit product extraction and land occupation.

- Four sites (25%) have no conflicts – and in two sites conflicts have been effectively resolved with active FD support.
- In 6 sites (37.5%) there is a moderate level of conflict.
- In 5 study sites (31%) there is more serious conflict.
- In one site (6%) we could not establish the level of conflict.

Table 9.2: Conflict issues in Study FUGs

FUG:	State / region	Absence of conflicts	Comment
1. Wuyan	Ka	✓	No apparent conflicts
2. Gweyutyan	Ka	~	Disputes with neighbours, Struggling to control some outsiders from cutting
3. Sin Gaung Lay	Ma	✗	Exclusion: complaint on CF Certificate by non-members
4. Pa De Thar Myothit	Ma	✗	Exclusion: Conflicts with village non-members
5. Myay Thin Twin	Ma	~	Disputes with neighbours, but FUG wants the FD to handle it
6. Let Pan De	Ma	✓	No apparent conflicts
7. Mine In	Sh	✗	Disputes with neighbours, illicitly taking fuelwood, but want FD to handle it
8. Pway Hla	Sh	?	*Not known*
9. Lwai Nyeint	Sh	✓	Resolved disputes with neighbours extracting with FD support
10. Nar Daung Hla	Sh	✓	Resolved disputes with neighbours extracting with FD support
11.Kone Shine	Sh	~	Some illicit cutting and occupation for shifting cultivation
12 .Taung Kya-1	Sh	✗	Exclusion: Small FUG group excluding wider village who want to participate
13 Nyaung Ta Bin	Ay	~	Some illicit cutting
14 Byant Gyi Gon	Ay	✗	Much illicit cutting
15 .Te Bin Seik	Ay	~	Some illicit cutting
16. War Gon	Ay	~	Some illicit cutting by neighbours

There are only two main causes of conflict. These are:

1. Exclusion from membership: elite capture is a serious cause of conflicts with non-members within the village. In these cases the FD needs to help re-organise the FUG membership.
2. The struggle to enforce cutting regulations, particularly to exclude outsiders but also with villagers, especially those occupational groups more dependent on their traditional forest use.

The challenge to manage conflicts fairly and effectively requires a confident FUG with support and back-up when needed from FD. If conflicts continue unmanaged they may dissipate the village's interest in Community Forestry as a whole.

➢ ***Forest Users' Groups need to feel backed-up by FD field staff in order to cope with conflicts confidently. The FD should play a more active role in conflict resolution.***

9.6 Support relationships

What sort of support can and do FUGs get? Table 9.3 shows that across our study sites support is quite limited.

- Only the two FUGs in Kachin (12.5% of the sample) receive 'good' support.
- Seven FUGs (44%) receive moderate / mediocre support.
- Five FUGs (31%) feel they receive poor support. Limited support becomes a problem when there are crises that only the FD can resolve – like enforcing regulations against illicit felling.
- For 2 FUGs (12.5%) support levels were unclear.

Table 9.3: Support relationships

FUG:	State / region	Support	
1. Wuyan	Ka	✓	NGO (Shalom) and FD both supporting. Also involved in FUG network
2. Gweyutyan	Ka	✓	NGO (Shalom) supporting. Also involved in FUG network
3. Sin Gaung Lay	Ma	✖	FD not enforcing rules despite contraventions (elite pressure likely cause)
4. Pa De Thar Myothit	Ma	~	Claim don't need – although conflict with non members persisting
5. Myay Thin Twin	Ma	~	FD visits but not significant help; NGO support
6. Let Pan De	Ma	✖	No apparent support
7. Mine In	Sh	✖	Poor back-up from the FD
8. Pway Hla	Sh	✖	None beyond seedling supply
9. Lwai Nyeint	Sh	~	Some support from FD but more needed to protect trees as they mature
10. Nar Daung Hla	Sh	-	*Not clear*
11.Kone Shine	Sh	-	*Not clear*
12 .Taung Kya-1	Sh	~	Limited support from FD
13 Nyaung Ta Bin	Ay	~	Previously JICA project, now limited
14 Byant Gyi Gon	Ay	✖	Villagers want effective legal action from FD to enforce protections
15 .Te Bin Seik	Ay	~	Limited help, but limited need
16. War Gon	Ay	~	NGO (FREDA) giving agricultural inputs support

Some key issues arise from the question of FUG support.

- ***The FD role in CF support seems unclear, and the terms of reference between FUGs and the FD field office need clarifying for the long term. Has FD had sufficient budget allocation to fund these CF support activities? Has CF become part of FD field office normal responsibilities, or some sort of marginal duty they have no time for?***
- ***FUGs in Kachin have formed FUG mutual support networks to help themselves. This sort of initiative should receive substantial support in order to grow, as it is the most practical way FUGs can secure the support they need without depending on other agencies***

9.7 FUGs aims and issues for the future

During the PRA discussions we asked the FUG members what their action plans were for the future. They are summarised in Table 9.4.

Table 9.4: Issues for the future

FUG:	State / region	
1. Wuyan	Ka	Members uncertain whether they will really get the benefits from their efforts
2. Gweyutyan	Ka	-
3. Sin Gaung Lay	Ma	Non-members want to participate now it is clear CF can be trusted
4. Pa De Thar Myothit	Ma	-
5. Myay Thin Twin	Ma	Alternative energy supply for jaggery production sought instead of fuelwood
6. Let Pan De	Ma	Improve communications -want to understand CF principles better
7. Mine In	Sh	Revitalise and form local network as all FUGs groups face similar issues
8. Pway Hla	Sh	Youth group want to reform the FUG – very enthusiastic regarding CF
9. Lwai Nyeint	Sh	They want to strengthen their institution in order to sustain achievements
10. Nar Daung Hla	Sh	Want to revitalise & conduct plantation, better choosing species
11.Kone Shine	Sh	*Improve coordination with FD for enforcement. Train 2nd line leaders*
12 .Taung Kya-1	Sh	Revise FUG to include those excluded
13 Nyaung Ta Bin	Ay	Renovate forest condition and include non-FUG members
14 Byant Gyi Gon	Ay	-
15 .Te Bin Seik	Ay	Plantation to improve species composition
16. War Gon	Ay	Non members want to form their own FUGs

The points raised can be divided into two areas:

1. Basic institutionalisation issues – three groups (sites 7, 8, 10) wish to revitalise their FUGs which are struggling
2. Further FUG development – the rest of the groups are planning to improve their institution or forest management practices in a range of ways.

9.8 Conclusions

From our sample - most FUGs remain reasonably well functioning – the dominant pattern is that they are institutionally effective at the outset– but with lack of effective support, stagnation and loss of impetus become a serious problem.

However, the problem of FUG stagnation may be worse than it seems from this study. Some Forest Department regional directors have reported that they guess that as few as 10% of formed FUGs are active in their division. But without an effective monitoring system it is impossible to know.

Chapter 10: Overall Conclusions: Policy, Legal and Institutional Issues and Recommendations.

10.1 Overview

In this final section we cover three main areas: we sum up our findings from the FUG study and draw out the main insights, conclusions and policy recommendations. We then consider the Forest Department institution, the level of understanding and commitment of FD staff, and we again draw up policy recommendation; and thirdly we review the legal framework and give some key recommendations based on our learning from the field study.

10.2 Forest Users' Groups: Conclusions and Recommendations

We have now discussed all the main aspects of community forestry for our study sites. Our findings are summarised in table 10.1 below:

Table 10.1: Summary of FUG indicators:

FUG:	State/ Region.	1 Prior Forest condition (table 4.3)	2 Institut-ionalised? (table 4.5)	3 Forest protection effective? (table 5.1)	4 Forest Condition (table 6.3)	5 Improved Benefits (table 8.2)	6 Equitable (table 8.3)	*7. Currently active? (table 9.1)*
1. Wuyan	Ka	✗	✓	~	✓	✓	✓	✓
2. Gweyutyan	Ka	~	✓	~	✓	✓	✓	✓
3. Sin Gaung Lay	Ma	✗	✗	✗	✓	✓	✗	✓
4. Pa De Thar Myothit	Ma	✗	✓	~	✓	✓	~	✓
5. Myay Thin Twin	Ma	✗	~	~	~	~	✓	~
6. Let Pan De	Ma	✗	~	✓	✗	✓	~	✗
7. Mine In	Sh	✗	~	~	✗	~	~	✗
8. Pway Hla	Sh	~	✗	~	~	✓	~	✗
9. Lwai Nyeint	Sh	✗	~	✓	~	✓	✓	~
10. Nar Daung Hla	Sh	✗	~	~	✗	~	~	~
11.Kone Shine	Sh	✗	✓	✗	~	✓	~	✓
12 .Taung Kya-1	Sh	~	✗	✓	✓	✓	✗	✓
13 Nyaung Ta Bin	Ay	✗	✓	~	✓	✓	~	~
14 Byant Gyi Gon	Ay	✗	✓	~	✓	✓	~	✓
15 .Te Bin Seik	Ay	✗	✓	~	~	✓	✓	~
16. War Gon	Ay	✗	✓	~	✓	✓	✓	✓
✓ good		-	**50%**	19%	**50%**	**81%**	38%	**50%**
~ moderate		19%	31%	**69%**	31%	19%	**50%**	31%
✗ poor		**81%**	19%	12%	19%	-	12%	19%

The aggregate performance of the FUGs studied is summarised in figure 10.1 below. It shows that, for indicators 2 to 7 over 80% of study FUGs are classed as 'moderate' / 'medium' or 'good'.

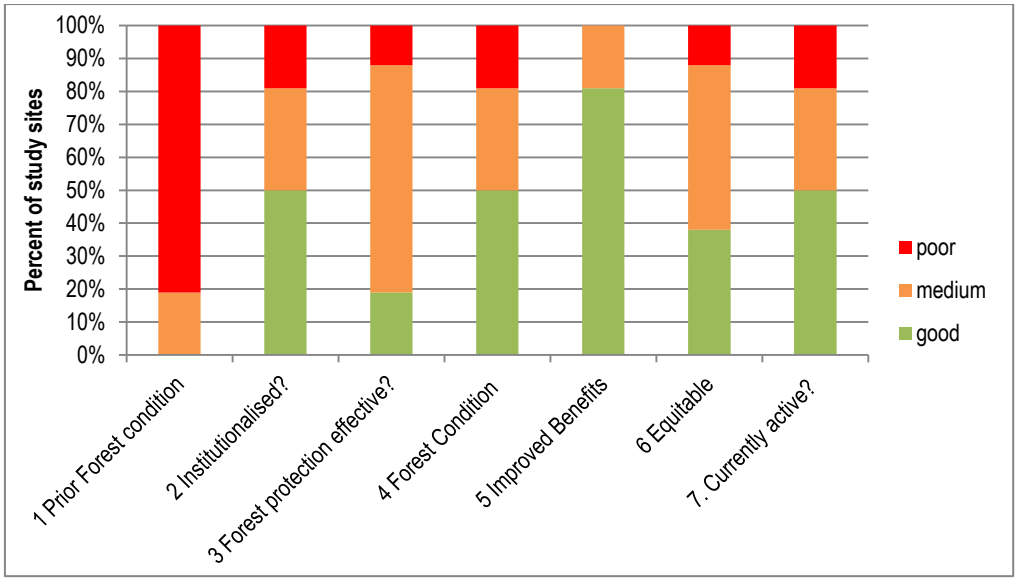

Figure 10.1: Summary of Study FUG's performance indicators

The policy challenge is therefore twofold: Firstly, how to fulfil the Master plan targets by scaling up Community Forestry handover. And secondly how to ensure all FUGs fulfil their potential – i.e. can be moved from poor or medium to 'good' for each of these indicators.

We offer some evidence-based recommendations here:

10.2.1 Critical mass of FUGs not yet reached

There has been significant formation / handover, however this is insufficient to lead to a 'critical mass' that can become a general movement. The handover process has been too slow and inadequately resourced. The process itself seems prohibitively difficult / expensive for the village and FD to manage alone, without donor funding. The policy challenge is how to scale up the CF handover process to help achieve a 'critical mass' of Community Forestry.

- ***Policy should make FUG formation streamlined so that more 'self-initiated' FUGs can emerge.***
- ***More resources should be allocated for CF formation, both by government, donors and others.***

10.2.2 Sub-optimal FUGs and Post-formation support

Overall the FUGs are functional, albeit at a sub-optimal level, and their sustainability is threatened. Much of the substantial achievements in terms of improved forest management and protection, which led to improved forests and livelihood benefits, are threatened by declining activity.

We have observed a wide variety of village level CF processes. In some cases we have noted a remarkably dynamic performance. Groups show a significantly stronger performance in Kachin State and Ayeyawady Region. The general performance is weaker across Mandalay and Shan. Successful CFUGs are often found where there is a combination of dynamic leadership, good social cohesion and effective support provision. Overall, we can see that where CF works, it delivers a 'win-win' outcome of sustainable environmental management and community development. The most dynamic groups may now be moving into a 'second generation' phase of enhanced active forest management, village to village demonstration /extension support / networking etc., community and livelihood development etc.

But at the other end of the spectrum some groups are in complete stagnation or working very poorly. Reasons for this include: lack of clear understanding conveyed at the outset by FD, limited leadership capacity, unchallenged illicit cutting / grazing, lack of support, esp. after donor project support ends. Some groups exhibit 'elite capture' of the major benefits (e.g. Shan)

Most FUGs are somewhere in the middle – they are not performing exceptionally well, however, they are not failing, and are able to carry out most CF operations. FUGs face major challenges post formation / post project, which without adequate support leads to stagnation:

- Conflict, especially over illicit extraction
- Delay in getting FD permission for timber harvesting
- Disruptions which are difficult to recover from (esp. leadership change)

Therefore, a key policy challenge is how to shift the faltering CFUGs onto a more robust development path. Projects provide funds for intensive village development, but when they finish, new village institutions like CF have to function with much more limited support. There has been a lack of FD capacity for post-formation support, but FUGs require back-up from FD.

- ***The critical challenge is strengthening FD's post-formation support provision, including***
  - *Awareness raising*
  - *Monitoring*
  - *Management support / harvesting endorsement*
  - *Conflict resolution*
  - *Reform of dysfunctional groups*
  - *Inclusion of non-members in the process: (either review of FUG membership or new group formation)*
  - *Pro-poor inclusion and support from FUG benefits*
- ***Need for improved general post-formation support to maintain dynamism of CFUGs and avoid stagnation. A key cause of stagnation is identified as a lack of FD enforcement back up to CFUGs when they try to challenge illicit cutting and land grabbing. FD must give legal backup and enforce punishments.***
- ***FD must provide back-up and support CFUGs, especially when there is illicit felling.***
- ***CFUGs need to diversify sources of support – and network between themselves.***

10.2.3 Identifying and revitalising stagnating CFUGs

The study found 19% of groups were experiencing a degree of stagnation, but without a monitoring system it is impossible to know how many groups are losing impetus and experiencing declining productivity throughout Myanmar.

- ***Need for a nationwide monitoring system as part of post-formation support.***
- ***Need to identify stagnating groups and take remedial action when stagnation occurs.***

10.2.4 Raising Awareness and Understanding CF concepts, roles and responsibilities

Many villages have failed to grasp key principles because they were not trained effectively, sometimes by teams who themselves do not clearly understand the subject matter.

- ***Need for more effective reorientation and training of FD staff. CFDTC provides training to FD staff, but anecdotal reports suggest they themselves lack field experience in the 'nitty-gritty' of actually carrying out FUG formation and post-formation support.***
- ***NGOs can play valuable complementary support, facilitation and a training role for communities***

10.2.5 CF not yet pro-poor but potential exists

We need to find ways to ensure poor are not excluded and pushed deeper into poverty by restrictions on their resource use. Where there is individual plot ownership approach – support is needed for fast return crops for the poorest households.

- ***Social inclusion of the poorest households must be prioritised. It is recommended that all interested households in the village are included, rather than self-selection as practised currently.***
- ***Alternative livelihood options and enterprise development. Concessions on allowing the poorest to continue to access the resource.***

10.2.6 Inadequate Legal basis for CF.

The CF Instruction was passed in order to rapidly initiate CF without undergoing the lengthy processes required to develop a law. But Forest Users' Groups cannot compete for land against other departmental claims as effectively as if the CFI were enshrined in law. Furthermore, appropriate laws could include detailed and binding rules for implementation.

- ***Need to evolve CF Instruction into new Law and Rules.***
- ***Need for policy revitalisation and renewed emphasis from senior staff.***

10.2.7 Forest Users' Group – Policy recommendations summarised

The following are our observations of the strengths and weaknesses of FUGs and our recommendations to address the weaknesses (Table10.2)

Table 10.2: Issues and Recommendations relating to FUGs and CF

✓ Strengths	× Weaknesses	➢ Recommendations
1. FUG Formation & membership eligibility		
✓ Formation of FUG is easy and flexible	× Self selection for FUG, inclusion of opportunists and elites, non-eligible members, exclusion of poorest and customary right holders are not in accordance with CFI 1995. × Self-selection creates conflicts within MC and between FUG and other members, predominance of elites and inequitable distribution of benefits.	➢ Eligibility criteria for membership of FUG should be set clearly. ➢ The membership should be targeted to the poorest and customary right holders residing in the locality. ➢ The whole village, if feasible, should be included in FUG, and local authority in MC. ➢ Proposed CF area and list of members of FUGs should be notified to local communities to seek feedback from them in a reasonable period as in Reservation procedure.
2. Awareness of CFI		
✓ Most FUGs, are not well aware of the CFI, but still protect and maintain their CFs effectively.	× Awareness is generally weak: Out of 16 FUGs, 6 is good, 5 moderate and 5 poor. × Some members know nothing about CF, and think they are forming forests for the government. They have never been properly sensitized on CF.	➢ FD should explain to the villagers about CF and CFI in detail before forming CF, and train them on planning, management, conservation, silvicultural treatments and utilization of forest.
3. Practices and Capacity		
✓ Most CFs have been effectively institutionalized.	× Despite having received CFCs, and been managing their CFs well, some FUGs have very poor or even absence of record keeping and reporting. × Nearly half of the study FUGs do not have original MPs; 40% have copies. × Most FUGs do not submit annual reports to FD. × FUGs lack capacity to face encroachers. They are reluctant to conflict with outsiders.	➢ The capacity of the FUG in the context of record keeping, preparation of income-expenditure accounts should be raised through trainings and demonstrations. ➢ FD should provide follow-up support, monitor the performance and assist FUG to prevent illegal acts and resolve conflicts. ➢ FD should encourage FUGs to submit annual reports, and give some benefit / clear reason to FUGs for doing so. ➢ Simplified report format for completion of each CF activity, the one which CFI miss, should be delivered to FUGs.
4. Adaption of Membership		
	× Successful FUGs are generally reluctant to accept new members	➢ FUGs should be carefully 'reformed' and made accessible to all eligible villagers.
5. Conflicts		
✓ Some of the best FUGs can resolve conflicts effectively	× Conflicts occur between MC and other members, between members and non-members within village, and between villages	➢ FUG should include all villagers especially poor and woman-headed households, and MC formed with consensus. ➢ Internal regulations of FUG should be developed with consensus facilitated by FD staff. ➢ Roles and responsibilities of Chairman, Secretary and other members of MC should be well identified before selecting candidates for MC with consensus.
6. Additional issues		
	× Follow up activities in collectively managed CFs are insufficient and not sustainable × Activities of some donor-supported CFs stopped after the project.	➢ Measures to ensure food security of the members should be integrated in the establishment of CF at the very beginning. ➢ FD's material and technical supports should continue. ➢ MCs should be educated to abide by their duties, responsibilities and regulations. ➢ Capacity of FUG should be promoted continuously.

10.3 Forest Department: Findings and Recommendations

10.3.1 Assessment of the understanding of, and commitment to, Community Forestry by FD staff

In order to study the understanding and commitment of the Forest Department (FD) staff regarding CF, questionnaires were given to all the FD staff in the 8 townships where the study was carried out.

10.3.1.1 Township-wise assessment of FD staff

Of the staff assessed across all the 8 townships, we found:

- 24.3% had an 'excellent' level of understanding of the CF Instructions and CF concepts.
- A further 54.3% had a 'very good' understanding.
- The understanding of 17.1% was considered as 'Moderately good', and
- Only 4.3% of the staff members had a 'poor' or 'very poor' understanding of the concept.

Plate 10.1: Plate10.1: Rank-wise assessment of the Forest Department staff

Table 10.3: Township-wise assessment on understanding and commitment on CF by FD staff

Townships	State / Region	Excellent (90%-100%)	Very good (70-89%)	Moderately Good (50-69%)	Poor (40-49%)	Very poor (<40%)	Total
Waing Maw	Kachin	18.2%	**72.7%**	9.1%	…	…	100%
Nyaung U	Mandalay	**50.0%**	30.0%	10.0%	10.0%	..	100%
Pyin U Lwin	Mandalay	…	**80.0%**	10.0%	10.0%	…	100%
Pindaya	Shan S.	20.0%	**80.0%**	…	…	…	100%
Nyaung Shwe	Shan S.	36.4%	**63.6%**	…	…	…	100%
Pinlaung	Shan S.	…	**66.7%**	33.3%	…	…	100%
Laputta	Ayeyawady	12.5%	25.0%	**50.0%**	…	12.5%	100%
Hpyarpon	Ayeyawady	**44.5%**	22.2%	33.3%	…	…	100%
Total		**24.3%**	**54.3%**	**17.1%**	**2.9%**	**1.4%**	**100%**

Thus, generally, level of CF awareness held by FD staff seems to be very good.

Rank-wise assessment

Next, the assessment was broken down by the understanding and commitment on CF by FD staff according to their different levels.

- Assistant Directors / Staff Officers: 75% have a very high level of understanding of and commitment to the concept of CF and CFI while 25% can be considered as average.
- Forest Rangers and Deputy Rangers: 60% showed a good level of understanding of the CFI and CF concepts.
- Foresters: 52% showed a good understanding of and commitment to the concept of CF and CFI
- Forest Guards/Daily Wagers 75% showed good understanding and commitment on the concept of CF and CFI

Table 10.4: Assessment of understanding and commitment on CF by FD staff level

Rank	Number	Excellent (90%-100%)	Very good (70-89%)	Moderately Good (50-69%)	Poor (40-49%)	Very poor (<40%)
Assistant Director / Staff Officer	4	**75%**	..	25%	…	…
Forest Ranger	15	20%	**60%**	7%	13%	…
Deputy Ranger	20	25%	**60%**	15%	…	…
Forester	27	22%	**52%**	26%	…	…
Forest Guard/Daily Wager	4	…	**75%**	…	…	25%
Total	**70**	**24.3%**	**54.3%**	**17.1%**	**2.9%**	**1.4%**

The overall picture that emerges is that the majority of the forest officers understand the CFI well and are committed to the concept of CF, while over 50% of the staff at Forest Ranger level and below also showed good understanding and commitment on the concept of CF and CFI.

Field observation

The above evidence shows that the foresters' understanding of and commitment to CF and CFI are found to be good. However, observations and discussions with the FUGs in the 16 CFs surveyed showed that there are nevertheless weaknesses to overcome.

Ba Kaung (2006) also carried out a survey at 3 CFs in the Central Dry Zone of Myanmar. He found that generally, most of the CFs in the Dry Zone were established with the support of FD, Dry Zone Greening Department (DZGD) or organizations like UNDP, JICA, Community Forestry Training Project (COMFORT), etc. Ba Kaung stated that there were very high inputs from UNDP and JICA, and the CFs were successful during the project period but were not sustainable. Inputs were very low in CFs established by FD and COMFORT. However, COMFORT supported 60 motorbikes to target FD Townships for mobilizing and sensitizing the communities. This raised the awareness of the community and prompted them to request the establishment of CFs by themselves.

Myanmar's CF process may benefit from comparison with some international experiences. We have chosen to compare with Namibia (see Box 10.1) in particular, because CF in Namibia is very successful and the benefits made by the users' group is increasing every year.

Box 10.1: A Namibian example of Community Forest management

Under the Namibia CF project, communities receive not only the use rights but also responsibilities in resource management. The community – not the government – decides the use of the resources in line with the approved management plans. Permits for utilization of resources were issued and thereby monitored by the communities only. Fees for permits and charges for sold products go into the communities' cashbox for financing further activities

By managing resources sustainably, communities secure their resources for further generations. The community becomes empowered to take over responsibility of their own resources and to handle their own community funds. The Community Forest is not only a forest initiative. The management plans consist of zonations and leave open areas for grazing and other traditional agriculture activities. The Traditional Authorities (TA), who are linked with CF in Namibia, mobilize the communities; supervise the establishment of Forest Management Committees and the distribution of income. TA prosecutes offenders of the agreed management plan.

One of the regulations to be met for the Gazette is the installation of a benefit sharing system. It specifies the distribution of generated income. For example:

If 1,000 N$ are earned by selling wood products

- 100 N$ running costs
- 500 N$ salary for communal labour / harvesters
= 400 N$ net profit

From this 400 N$, 25% go to the Traditional Authority, 25 % go to the Forest Management Committee (compensation for their work) and 50% to go into the community's cashbox for community development.

With this system, people can benefit directly from their labour (paid harvesters) and indirectly from investments into community development (e.g. the purchase of a water pump).

The Forest Management Committee members receive intensive training in basic skills like planning, reporting, evaluation, use of flip charts and how to effectively organize meetings, bookkeeping and accounting, participatory resource assessment and monitoring of the forest resource.

10.3.2 Institutional Aspect of Community Forestry – issues, strengths and weaknesses

Community Forestry Issues: in relation to the Forest Department

The following are our observations of the strengths and weaknesses of the concerned forest staff we interviewed and our recommendations on how to address the weaknesses (Table 10.5)

Table 10.5: Community Forestry Issues: in relation to the Forest Department

✓ Strengths	× Weaknesses	➢ Recommendations
1. Policy Framework		
✓ FD 's 30-year Master Plan prioritized CF to contribute to SFM and national fuel wood demand.	× There is a lack of clearly defined national CF policy supported by Law × Lack of partnership mechanism between related ministries × Insufficient budget allocation	➢ Formulate national CF policy, amend 1992 Forest Law as appropriate and promulgate CF Rules as a matter of urgency to scale up community forestry in the country. ➢ To remove land-use related conflicts between Ministries and speed up CF hand over, it is crucial for MOF to partner with other related ministries, e.g. through creation of a National CF Task Force ➢ Poor FUGs need support to initiate CFs, and so also FD and DZGD for CF operations. So, sufficient budget allocation should be claimed from the national capital budget.
2. FD Capacity to Support FUGs		
✓ FD has staff of 15,148 and DZGD 3,231: they are strong, qualified and well equipped organizations to implement CF across the country.	× Need more effective reorientation and training of forest staff × Post formation support and monitoring for FUGs insufficient – they need dynamic leadership from FD × Lack of a unit within FD specifically assigned to CF × CF not yet part of normal field responsibilities, still remains sort of marginal and optional duty × FD traditionally more concerned about timber than social, conservative and restrictive × Frequent shift of trained personnel disrupts rapport between FD staff and FUGs	➢ The foresters should recognise and accept that: ○ the basic needs of local communities for wood and NTFPs are to be satisfied from local forests; and ○ community forestry is a participatory approach to arrest deforestation and forest degradation, and to satisfy the basic needs of the community contributing to SFM. ➢ FD should regard community forestry as a part of its mainstream forestry with long-term perspective. ➢ A Special FD Unit specifically tasked with CF should be formed. ➢ CF planning should start from the bottom: to address and seek to satisfy community needs. ➢ FD should monitor and evaluate the performance of the CFs regularly providing support as necessary. ➢ Concrete notes should be made for handing over of CF activities in case of shift of trained staff. ➢ FD should develop rules of thumb for quick transfer of CF land use rights to the communities. ➢ Rules should be site and objective specific.
3. Training		
✓ CFDTC has been continuously giving in-service CF trainings to foresters of FD and DZGD .	× CF is an ongoing co-learning process, and so far training has not fulfilled this need adequately. Much more training is needed at all levels to raise awareness, clarify confusions and motivate and empower	➢ Training should be ongoing at every step of CF & experience-based. ➢ Training of dedicated staff should be prioritized. ➢ Training should transform and update foresters' attitude from being classical forest managers focussed on protection, law enforcement and commandeering, to become social workers and facilitators. ➢ Training should also be provided on the FUGs. ➢ Periodic revision of training curriculum should be exercised to cope with dynamic nature of field reality.
4. Partnerships & collaboration		
✓ INGOs, NGOs and UN organizations have supported FD to conduct trainings and establish CFs.	× Much more could be achieved with further collaboration	➢ FD should enhance collaboration with NGOs and other organizations, and mobilize technical and financial resources. ➢ Participatory monitoring system should be developed with support of NGOs.
5. Re-orientation		
✓ Over 78% of FD staff are well aware of and committed to CFI & CF concepts	× Lack of bottom-up approach in CF planning and establishment × FD staff act as managers, not as facilitators × No needs assessment and prioritization of community needs in MP	➢ Bottom-up approach should be adopted in the CF planning and establishment. ➢ Staff of FD should serve as facilitators and not as managers. ➢ Need assessment and prioritization of community needs should be considered in MP.
6. Forest User training		
✓ Forest field staff have imparted CF concepts to communities, especially during FUG formation	× Failed to effectively raise awareness of the community on CF and CFI × Failed to train FUG on CF principles, CFI 1995, management, silvicultural treatment, protection and harvesting of CF	➢ Communities' awareness on CF and CFI should be raised. ➢ FUG should be trained on CF principles, CFI 1995, management, silvicultural treatment, protection and harvesting.

7. Formation processes		
✓ Many FUGs formed by FD staff	× Weak to supervise and advise in forming FUG- (to consider gender, poorest, predominance of powerful, inclusion of ineligible, exclusion of eligible)	➢ Capacity of the FD staff should be strengthened through local and international trainings and workshops. ➢ FD should supervise FUG formation so that it includes all those who are eligible and exclude those who are not eligible. The inclusion of women and poor should be prioritized. ➢ As mentioned in the CFI, FUG should be formed with interested households. Not with individual persons. ➢ Individual hh profile should be recorded to consider the appropriate amount of land for particular hh by DFO in case of agro-forestry plantation in CF.
8. Post-formation monitoring and support		
✓ Foresters routinely interact with FUGs once they have formed	× Slow handover of land × Failed to monitor the performance of CF and FUG × Failed to provide need-based post-formation support × Lack of capacity to provide assistance to FUG in protecting CF against unlawful acts of outsiders- in solving conflicts × Failed to protect against land grabbing by elites and business men in some cases	➢ FD should make it a point to monitor the performance of CF and FUG. ➢ FD should provide post-formation support. ➢ FD staff should be trained to provide assistance to FUG in protecting CF against unlawful acts of outsiders and in solving conflicts. ➢ Amend forest law as appropriate and enforce it. ➢ Simplify CF certification procedure. ➢ Speed up land acquisition through a CF task force.
9. Responding to problem FUGs		
✓ Most FUGs continuing to function	× There are FUGs that have stopped functioning.	➢ Need to monitor and reform dysfunctional FUGs

10.4 Policy and Legal Aspects of Community Forestry

To promote CF, a pathway should be mandated and guided by policy.

10.4.1 Policy Measures Recommended

Regarding community forestry, Myanmar's Forest Policy 1995 has identified '*participation*' and '*public awareness*' as two imperatives, among others.

The '*participation*' imperative clarifies that by way of practicing community forestry or agro-forestry, communities are to be involved in national and local efforts for:

- Achieving sustainable development of forests;
- Meeting their basic needs;
- Increasing non-farm incomes; and
- Enhancing food security and alleviating poverty.

The imperative '*public awareness*' asserts that public awareness is to be raised regarding the vital role of trees, forests and wildlife in national socio-economic development.

In adopting policy, measures as guidance for CF development should-

- ***Reflect the above-mentioned two national policy imperatives;***
- ***Recognize that local communities have significant local knowledge about the management of trees and forests surrounding or adjacent to them;***
- ***Recognize that local communities have a right to utilize forest products both wood and non-wood for their basic livelihood needs and household income;***
- ***Recognize that there is a need to change the role of foresters from being agents of enforcement and protection to those of extension, facilitation and servicing;***
- ***Recognize that community forestry should promote food security, value addition and commercialization; and***
- ***Recognize that CF policy should be market-oriented and needs to be integrated into national development plan.***

Taking the above considerations into account, community forestry policy measures that suit the country-specific conditions may include:

- ***Creation of enabling conditions for local communities to establish and manage community forests in a sustainable manner;***
- ***Security of community basic needs and early returns to reduce poverty, and ecological integrity by forming both artificial and natural community forests (CFs);***
- ***Security of the sustainability and legitimacy of community forests through built-in measures and legislation;***
- ***Setting policy target of say 20 percent of the permanent forest estate area to be transferred to the communities as community forests; and***
- ***Value addition and commercialization of CF products in harmony with social and environmental stability to enhance food security and contribute to local and national economies.***

10.4.2 Strategic Approaches Recommended

In order to implement the policy measures, the following strategic approaches may be identified:

- ***To sensitize and mobilize local communities to participate in community forestry through advocacy, extension, education and community consultation;***
- ***To form community forests to meet national fuel-wood requirement as stipulated in the 30-year master plans of Forest Department and Dry Zone Greening Department;***

- ***To integrate agriculture, livestock breeding and fisheries into forestry in establishing CFs to enhance food security and income and for value addition and commercialization;***
- ***To enhance the capacity of local communities in support of self-reliance and sustainability;***
- ***To create opportunities for increased collaboration with assistance from government agencies, NGOs and, donor and financial institutions during the establishment phase; and***
- ***To amend the existing Forest Law 1992 and promulgate National Community Forestry Rules.***

10.4.3 Updating or Amending the Existing Forest Law, 1992

In order for the land tenure to be secure and the community forests sustainable, community forestry needs legal support. The CFI 1995 was issued by the Ministry of Forestry without requiring Cabinet approval, and is therefore a lesser order of legal instrument (JM Lindsay, FAO legal consultant, 1995).

The Forest Law enacted in 1992 has no provisions concerning establishment and management of community forests. Only Section 15 of the Forest Law mentions about village-owned firewood plantations established either by FD or by the villages by collective labour. Strictly, these village-owned firewood plantations are not community forests according to CFI 1995.

Therefore, it is a matter of urgency to amend the Forest Law 1992 to provide for community forestry and promulgate CF Rules as appropriate. The CFI 1995 may be used as the basis for drafting the CF Rules.

The 1992 Forest Law amended in respect of community forestry, as a matter of urgency, should-

- ***Clearly define local community and community forestry reflecting country-specific conditions; Define scope of CF; Terms of land lease; and rights and responsibilities of FUG among others.***

10.4.4 Updating the CFI 1995

The following are our observations of the strengths and weaknesses of the CFI 1995 and our recommendations to address the weaknesses (Table 10.6).

Table 10.6: Issues and Recommendations relating to Updating the CFI

✓ Strengths	× Weaknesses	➢ Recommendations
1. Legal basis		
✓ The instructions are admirably flexible, and serve as a good basis for CF Rules (Lindsay, 1995)	× Instructions are a lesser order of legal instrument. Hence, CF is vulnerable. × Legal uncertainty constrains the pursuit of CF strategies (Lindsay 1995)	➢ Strengthen legal framework to ensure land tenure and sustainability of CF.
2. Management plan - adaptation		
✓ Because DFO is empowered by DG to issue CFC, the CF process is short and simple, and to get permission to establish CF can be quick.	× The contents of MP as stipulated by CFI are too rigid. × They may not be appropriate in some localities and some communities may not be able to write.	➢ Simplify management plan and adapt CF to local conditions.
3. Paper-work		
✓ Formation of FUG with consensus of all users is sound and democratic.	× Record-keeping requires excessive detail so compliance difficult. × Excessive reporting sends message to community that it is not controlling process.	➢ Reduce record keeping to minimum. ➢ Train FUG on accounting, book-keeping and report writing. ➢ Let FUG keep income-expenditure accounts properly.
4. Right to revoke CFC		
✓ The right to create CF on any land subject to approval incentivises; community participation in forestry.	× CF rights are subject to easy termination. Even a minor infraction of CFI can lead to the withdrawal of the CFC by the department.	➢ CF rights should be terminated only for repeated serious violations and for failure to undertake remedial measures in disregard of FD warnings. ➢ CFC should be revoked only by DG. ➢ FUG should have the right to appeal.
5. Eligibility		
✓ 30-year land lease which is extendable and inheritable is reasonable, attractive and compares well with international practices.	× CFI fails to define user eligibility. × It seems anybody wherever he/she lives can become a member of FUG or any traditional user of the designated land can be excluded.	➢ CFI should clearly define the eligibility criteria for the villagers to become members of FUG. ➢ The traditional users and the poorest of close geographic connection should be targeted.
6. Scope of CF management		
✓ The technical and material assistance to be provided by FD free of charge is critical to CF promotion.	× CF scope to meet basic needs for fuel wood and other forest products and to generate food, household utilities and income at the farm level only has become out-dated now.	➢ CF should also encompass environmental, social and economic aspects on a broader scale. ➢ CF should be market oriented (whilst sustainable) ➢ Access to ecosystem services, value addition and commercialization of products should be promoted
7. Livelihood integration		
✓ Forest users get more secure and sustainable product flows through CF.	× CFI fails to integrate forestry with agriculture and/ or livestock breeding and fisheries to enable FUG to enhance food security and income. × Trees bring benefits only after a lapse of a few years. × CFs established with forest trees only cannot attract poor communities who have to work daily for food.	➢ Food availability and income must be realized as early as possible and on a continuous basis. ➢ In view of this, forestry should be integrated with agriculture, livestock breeding and fisheries wherever possible. ➢ Site specific design of agro-forestry should be adopted for food security and better income for FUG without losing sight of environmental stability.
8. Top-down or bottom up?		
✓ FD and FUGs both plan activities	× Management planning usually starts from the top ignoring the needs and wishes of the grassroots poor especially women.	➢ FD should assess the needs of the potential users first, and involve them in formulating CF management plan to address their needs and wishes. ➢ CFI should prioritize community needs and clearly mandates involvement of all users including housewives in management planning.
9. FD-village relationship		
✓ FD / community relationship gradually improving through CF	× CFI fails to build trust between FD / government and the local community	➢ FD should raise advocacy campaigns and work intimately with FUG not as its manager but as facilitator and advisor.

10.5 Conclusions

According to the forest cover appraisals conducted by the Forest Department, per capita actual forest area available was estimated at 6.84 acres in 1931 and it had fallen to 1.36 acres in 1997 due obviously to deforestation (land use change) and population growth (Tint 2008). Population was 14.7 million in 1931 and 46.4 million in 1997 (Anon. 2002). The annual deforestation rate in the last few decades stood at 0.54 million acres. Forest cover loss and population growth have led to a dwindling supply of forest products as against the rise in demand. The requirement to fulfil the need of the local community and to work together with them was in the mind of foresters since the beginning of scientific forestry in this country in 1856. However, community forestry as a participatory forest management approach to restore forests and meet the basic needs of local communities, particularly fuel-wood only came into being in 1995.

The current study of Community Forestry has found that:

- ✓ 84% of studied FUGs are working either moderately or very well;
- ✓ Most of the studied CFs have shown good forest, good regeneration and good forest health; they have been providing the communities with a multitude of benefits such as improved ecosystem services, small timber, fuel wood, fodder, seeds and NTFPs thereby enhancing household incomes and livelihoods;
- ✓ The level of understanding of CFI 1995 and CF concepts across FD staff is relatively high;
- ✓ The FD and the DZGD field staff have played a key role in the CF process;
- ✓ Donor contributions have been vital especially in the initiation of many CFs across the country;
- ✓ A cost-benefit analysis of a CF plantation has shown a very positive financial net return.

On the other hand, there are also issues to address which include-

- × Insecurity of land tenure: there are cases of land grabbing by elites, agricultural encroachment, development of infrastructure on forest land and so on;
- × Poor CF formation: a number of cases of poor adherence to the correct sequential process of FUG formulation and CF creation by donor agencies emerged. This creates dissatisfaction on the part of the concerned forest staff and delays in handing over the land to FUGs. Most importantly it adversely affects the sustainability of the established CFs;
- × Illicit cuttings and intrusions by neighbours: many FUGs have struggled to enforce access regulations, and need FD's support to resolve, which is generally lacking;
- × Too low rate of CF establishment: since the 1995 CFI was issued, the rate of formation has been far too low to meet FD's 30-year Master Plan target;
- × Insufficient monitoring and post-formation support by FD staff: FD's monitoring and support are crucial to build trust of the FUGs and sustainably develop CFs, but are generally lacking;
- × Lack of community awareness on Community Forestry principles: poor understanding of the basic concepts and local arrangements has discouraged community participation in the CF activities;
- × Weak legal basis of the CF instructions;
- × Need of good governance by both FD and FUG.

The CFI 1995 had been issued in 1995 primarily to address the basic needs of local communities and environmental stability. It defines community forestry as neither regional development forestry nor an industrial enterprise based on forest products. It aims at providing only the bare necessities of rural lives.

But, now it is realized that the scope of community forestry needs to expand in order to support food security and poverty reduction through increased food production and income generation, in other words from subsistence to enterprise. On account of its expanding scope, activities of the present-day community forestry should integrate agricultural, fishery and livestock farming activities with re-afforestation, collection of NTFPs, and timber harvesting on a significantly larger scale.

Many factors influence the success of community forestry, and they include the communities' technical and managerial capacities, access to finance, institutional support, equipment, legal resources and market information as well as integration within and between FUGs. Capacity building of FUGs being an important necessity for the long-term viability of community forests should be exercised in a continuous manner.

Access to external support was shown to facilitate the development of community forests, but it should not be a factor to entice the community to establish CF. Sustainability of the CF depends upon the understanding and commitment of the FUG on CFI.

The limitations of the current legislation should be transformed into a driving force for the sustainable development of community forestry, and devolution of decision-making power to FUGs in managing community forests shall have to be ensured and expedited. Legal framework and institutional arrangements are to be in place to ensure legal authority and institutional support for CF processes.

While FD will take the role of leader as well as facilitator, and instil a sense of ownership within local communities, mutual support and trust between FD and the communities is vital.

In essence, the main actor for the success of community forestry in the country is the FD under the Ministry of Forestry which involving all related ministries and stakeholders should endeavour its best with the realization that CF is a real necessity to achieve SFM while uplifting the lives of the local forest dependent poor.

10.6 Further research agenda

We hope that this study has helped improve gaps in understanding of the CF process in Myanmar, its progress to date and the measures needed to ensure it achieves its best potential in the future. There remain several areas where further investigation is needed:

- ***The key need is for detailed action research to work further with FUGs, NGOs and Forest Department staff to understand the dynamics of the social processes which can lead to FUGs 'taking off' onto a sustainable institutional development path, and detailed insights into how FUGs can overcome challenges and succeed.***
- ***How to achieve low cost scaling up of CF implementation. There are a number of areas to work on: streamlining the formation process, promoting 'self-initiation' through awareness raising and local support, promoting FUG networks for self-help, involving the private sector for incentivising formation through offering incomes for producing desired forest products, and so on.***
- ***How to ensure FUGs integrate effectiveness in forest management, efficiency in set up and management costs, and equity and pro-poor benefit (and cost) distribution.***
- ***What sort of enterprise opportunities are there, and how can CF support and promote rural enterprise development? What products can be produced, and how can FUGs assume a more entrepreneurial role in forest product supply, processing and marketing?***
- ***What have been, and could be, the effects of CF on poverty alleviation and therefore what should the role of Community Forestry be in the respective national poverty policies?***
- ***To what extent can Community Forestry play a role in biodiversity conservation and management?***

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APPENDIX I: COMMUNITY FORESTRY INSTRUCTION 1995

Introduction

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

Definition

2. Community Forestry means:
   - Afforestation of areas where there is not sufficient fuelwood or other forest products for community use
   - Planting of trees and exploiting of forest products to obtain food supplies, consumer products and incomes.
3. Community Forestry is neither a regional development forestry nor an industrial enterprise based on forest products.

Suitable Areas for the Establishment of Community Forest

4. Community forests can be established in the following areas:
   a. Reserved and non reserved forests authorized by the government and the lands which could be managed by the government
   b. Village owned firewood plantations established with the permission of the Director General of the Forest Department.
   c. Private lands permitted by their owners and lands which are owned by governmental or non-governmental organizations

Areas permitted for the Establishment of Community Forests

5. Community Forests will be permitted to be established in the following:
   a. In deforested areas where natural regeneration is difficult.
   b. In areas where it is possible to meet the local demand of forest products
   c. Areas Suitable for the Establishment of Community Forest due to the need for Conservation Activities
   d. Natural forests which for various reasons should be managed by the community
   e. Forest lands traditionally managed by the community

Application for the Establishment of Community Forestry

6. Households who would like to establish the community forestry shall form the users' group.
7. By consensus a management committee will be formed from the users' group. This committee will consist of a chairman, a secretary, and 3 members.
8. On behalf of the users' group the Chairman has to apply to the District Forestry Officer through the Township Staff Officer for the establishment of a community forest.
9. If the application is accepted, the district forestry officer has to identify the place and issue the paper of permission. He will submit the detailed data and a map of the area to the State/Regional Forestry Officer. Copies should be forwarded to the Director General and Director of the Planning and Statistics section of the Forest Department. If the land is not under the management of Forest Department, the District Forest Officer has to undertake instructions from the district forest conservation committee.
10. The Director General of the Forest Department will give authority to the district forest officers according to the Section 15 of the Forest Law.

Allotment of Lands for the Establishment of Community Forests

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

Duration of Land Lease for Community Forest

12. The duration of land lease for the establishment of Community Forest is set initially for 30 years.
13. After the period of 30 years, the District Forestry Officer will, with the approval of the Director General of the Forest Department, determine whether or not to extend the lease depending on the performance and the desire of the users' group.

Preparation of the Management Plan

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

Community Forest Establishment Certificate

15. After confirmation of the management plan, the District Forestry Officer will issue the Community Forest Establishment Certificate (Annex 3). Forest rules, instructions, and restrictions relevant to the Community Forest will be attached.
16. If the users' group is found to neglect or to violate the existing laws and acts of the Forest Department, the directives, regulations and prescriptions of the management plans, the District Forestry Officer has the right to revoke the issue of the certificate.

Assistance from the Forest Department

17. The Forest Department has to provide the users' group:
    a. Seeds and seedlings necessary for the first period of extraction from the Community Forest
    b. Technical assistance and expertise necessary for the establishment, management, conservation and development of Community Forest

Responsibilities and Duties of the Users' Group

18. The responsibilities and duties of the users' group are as follows:_
    a. Establishment of tree plantations in barren areas
    b. Using natural methods of conservation rehabilitation in forested areas
    c. Protection against fire hazards
    d. Development of forest plantation, and natural forests
    e. Protection against indiscriminate cutting, felling, girdling, pruning, removal of barks etc.
    f. Protection against extraction of stones, sands, earth and metals in the designated area
    g. Prevention of illegal land use activities
    h. Methodical utilization to avoid undue losses of forest products
    i. Protection against soil erosion and environmental deterioration
    j. After the primary extraction period, the users' group shall, under the supervision of the Department of Forest, engaged in collecting seeds, establishing nurseries planting seedlings and conserving the soil
    k. Implementing activities as described in the management plan

Prohibitions

19. No members of the users' group will engage in the following:
    a. Activities not prescribed in the management plan
    b. Selling and renting of the community forest

c. Metal extraction and other activities that would cause forest degradation
d. Construction of houses or sheds not meant for the conservation of the community forest
e. Land allotted for community forest development should not be used for gardening or shifting cultivation purposes, with the exception of agroforestry

Exploitation of Forest Products from Community Forest

20. Users' group can exploit the forest products of the community forest in accordance with the prescription of the management plan
21. No tax shall be levied on the users' group or members of the users' group concerning the forest products exploited from the community forest
22. Surplus forest products can be sold to non members of the village at reasonable prices. Taxation shall be exempted from the sale of these products
23. The users' group can market the surplus forest products to areas outside the village
24. For marketing, for marketing of the forest products to areas outside the village, tax shall be conferred to the Forest Department at specified rates
25. The users' group will use the incomes mainly for the implementation of the management plan and for the development of the community forest
26. Surplus incomes can only be used for social welfare and economic development of members of the users' group with the wish of the members.
27. The users' group can utilize forest products of the community forest and surplus cash to develop business enterprises that produce high quality products

Funds

28. The fund of the users' group will be managed as follows:
    a. The Secretary of the management committee will keep a detailed account on particulars pertaining to the funds
    b. The Secretary can, with the approval of the management committee, keep a certain amount of money. Funds excess of that amount shall be kept in the bank or in a secure place.
    c. The bank account must be opened jointly by the chairman and the secretary.
    d. The Secretary must submit the particulars of the financial accounts at least once a year to the users' group.

Price Setting

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

Receipts

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

Transportation of forest products from the Community Forests

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

Offenses and Penalties

33. Users' group must adhere to the directives and instructions issued for the community forest, forest laws, regulations and instructions periodically issued by the forest department.
34. Violation of the above mentioned laws, directives, regulations and instructions can lead to legal actions which include the termination of the community forestry enterprises.
35. Any violation of the above mentioned laws and regulation will result in punishment in accordance to the terms mentioned in them.

Records

36. The secretary of the management committee will keep a detailed record concerning tree planting, pruning and production activities in forms attached to the management plan.
37. The Township Forest Officer, and the District Forest Officer will inspect the community forest and its records as conditions permit. Instructions and corrections are to be provided when they are deemed to be necessary.

Report

38. By the end of the budget year the management committee must submit the progress report to the District Forest Officer through the Township Officer within the period of one month.
39. The District Forest Officer shall submit the progress report of the users' group together with his comments and recommendations to the Regional/Divisional director of Forest. A true copy will be forwarded to the Director of the Planning and Statistics section of the Forest Department.

Director General

Forest Department

APPENDIX II: FOREST SURVEY PROCEDURE

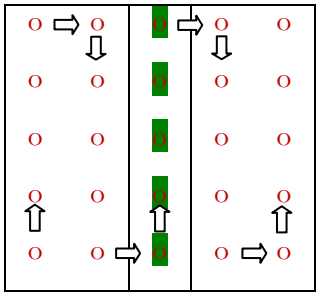
Sample plots

Because the selected CFs covered both plantations and natural forests, sample plots (SPs) were designed separately for plantations and for natural forests.

Sample plot for plantations

The sample plot for plantations was a square matrix of 5 x 5 initial pegs where the seedlings had been transplanted. Thus, the size of a SP varied with the original spacing of the plantation. For example, with 9' x 9' spacing, the size was 45' x 45' or 2,025 sq. ft. and with 12' x 12' spacing it was 60' x 60' or 3,600 sq. ft. There was a sub-plot in the middle of the SP to enumerate useful herbs and shrubs and to assess parameters of the forest ecosystem. The sub-plot was 9' wide and 45' long for 9' x 9' spacing. The SP together with its sub-plot is shown in Fig. 2.1.

Figure 2.1: Sample plot for plantation



A square matrix of 5 x 5 initial pegs (trees) where the seedlings had been transplanted.

Sample plot for natural forests

The sample plot for natural forests was a strip 33' wide and 330' long making an area of 10,890 sq. ft. or 0.25 acre. The SP was laid with its length lying across the contour. There was a sub-plot formed along the centre line. The sub-plot was 10' in width (5' on either side of the centre line) and 330' in length. In the sub-plot all useful shrubs and herbs were enumerated and the forest ecosystem was assessed.
The SP together with its sub-plot is shown in Fig. 2.2.

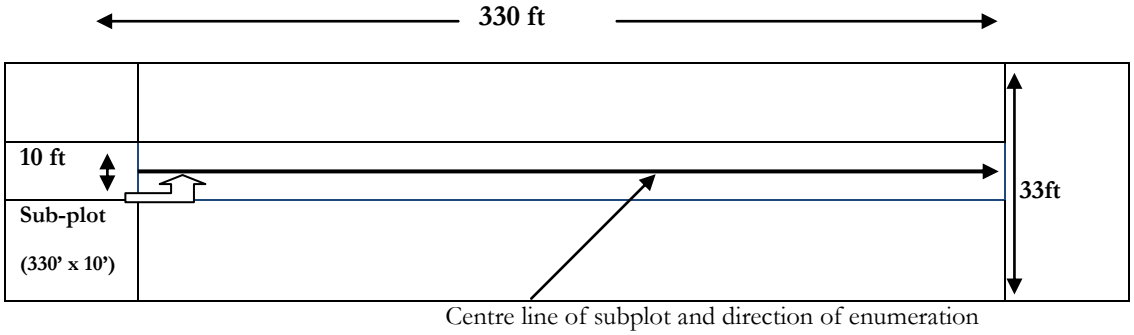


Figure 2.2: Sample plot for natural forest (SP is 330' x 33' and SSP is 330' x 10' in size)

Locating and establishing sample plots -Plantation

Sample plots were laid at the rate of one SP per 50 acres of the plantation in the selected CF. If the area of the plantation was less than 50 acres two SPs were laid. Locations of the SPs were selected at random.

Natural forest

Sample plots were laid randomly at the rate of one SP per 100 acres of the natural forest in the selected CF. If the area of the natural forest was less than 100 acres two SPs were laid. Locations of the SPs were selected at random.

Activities on the sample plots

Activities undertaken on each sample plot and sub-sample plot are -

(A) Activities on the sample plots:

i. Measurement of dbh of all trees in millimetres and recording them on the enumeration sheet by species;
ii. Measurement of mid-diameters (in mm) and total height (in meter) of the five trees standing along the centre column;
iii. Enumerating dead and missing trees;
iv. Assessing health and quality of the forest (good, fair, poor, well looked after or neglected, ground cover, soil erosion, presence of other crops, pests and diseases, etc.);
v. Recording the presence or absence of wildlife or wild birds;
vi. Assessing natural regeneration
vii. Inspecting boundary demarcation
viii. Appraising the status of water resource (present, absent, improved, etc.)
ix. Recording illegal extraction and encroachment
x. Recording the location of the CF using GPS.

(B) Activities on the sub-plots:

i. Enumerating all useful shrubs and herbs, especially medicinal plants;
ii. Assessing soil condition (whether erosion is taking place or not, etc.);
iii. Assessing soil cover (dense, fair, poor or absent).
iv. Inspection for pests (present or not):
v. Inspection for diseases (present or not, if present to describe type of disease);
vi. Assessing wildlife (present or not, if present to identify species);
vii. Assessing biodiversity (fauna and flora rich, fair or poor)
viii. Inspecting water resources (yes or nil, improving or no difference);
ix. Assessing aesthetic appreciation (pleasant to observe, enjoyable, etc.).

Financial Analysis – Procedure and Data Collection

To enable the analysis of financial profitability of CF, the following tables were completed at the meetings with the users.

Input table

This is the table showing cash flow of expenditure.

Output table

This table records yearly outputs of the CF by type of product. CF might have been producing wood, non-wood, agricultural and other products.

Unit value table

The table shows market values by respective years of the products recorded in the OUTPUT TABLE. Combining the OUTPUT TABLE with the UNIT VALUE TABLE produced cash flow of income.

Stakeholder Interviews (with Forest Department Staff)

The main objective of this exercise was to assess the understanding and commitment of the FD staff in the context of community forestry and CFI 1995.

At the termination of the field work in the township, meeting with all township forest department staff was organized at the office of the Township Forest Officer. TFO was briefed on the findings of the field survey.

Then, the participants of the meeting completed the questionnaire (Questionnaire For The FD Staff)

APPENDIX III: REGRESSIONS BETWEEN TREE PARAMETERS

CF	Species	Regression	Function	R^2	Data range		No. of observations
					dbh, mm	h, m	
1.Wuyan	All species	Dbh- Height	$h = 1.238 \times d^{0.429}$	0.360	1-200	2-20	91
	Yemane	Dbh- Height	$h = 0.649 \times d^{0.593}$	0.768	1-200	2-14	13
	Yemane	Age - Dbh	$d = 31.11 \times A^{0.899}$	0.814	40-160	3-6	6
2.Gweyutyan	All species	Dbh-Height	$h = 0.351 \times d^{0.663}$	0.622	1-150	1.5-16	47
	Teak (planted)	Dbh-Height	$h = 0.101 \times d^{1.018}$	0.825	10-100	1-10	36
3.Pa De Thar Myothit	All species	Dbh-Height	$h = 0.253 \times d^{0.718}$	0.662	10-110	1-8	81
	Yemane	Dbh-Height	$h = 0.325 \times d^{0.640}$	0.995	10-50	1-4	4
4. Sin Gaung Lay	All species	Dbh-Height	$h = 0.506 \times d^{0.535}$	0.717	1-150	1-9	107
5. Myay Thin Twin	All species	Dbh-Height	$h = 0.620 \times d^{0.424}$	0.360	5-70	1-5	26
6. Let Pan De	All species	Dbh-Height	$h = 0.773 \times d^{0.372}$	0.736	1-150	1-5	22
	Eucalypts	Dbh-Height	$h = 0.595 \times d^{0.536}$	0.962	10-35	2-4	5
7. Mine In	All species	Dbh-Height	$h = 0.303 \times d^{0.677}$	0.924	1-500	1-20	13
8. Pway Hla	Pine	Dbh-Height	$h = 0.046 \times d^{1.003}$	0.992	200-450	5-20	4
9. Lwai Nyeint	All species	Dbh-Height	$h = 0.173 \times d^{0.745}$	0.606	20-120	1-8	31
10. Nar Daung Hla	All species	Dbh-Height	$h = 0.097 \times d^{0.836}$	0.522	50-130	2-7	13
11. Kone Shine	All species	Dbh-Height	$h = 0.603 \times d^{0.631}$	0.158	100-220	5-25	15
12. Taung Kya- 1	All species	Dbh-Height	$h = 0.002 \times d^{1.593}$	0.591	100-300	10-25	10
13. Nyaung Ta Bin	All species	Dbh-Height	$h = 0.365 \times d^{0.685}$	0.671	5-60	1-8	51
14.Byant Gyi Gon	All species	Dbh-Height	$h = 0.511 \times d^{0.575}$	0.604	1-80	1-7	58
	Madama	Dbh-Height	$h = 0.431 \times d^{0.588}$	0.316	7-15	1-3	9
15. Te Pin Seik	Thame (planted)	Dbh-Height	$h = 1.046 \times d^{0.390}$	0.692	1-150	2-8	19
16. War Gon	All species	Dbh-Height	$h = 0.721 \times d^{0.528}$	0.582	1-200	2-14	66
	Byu	Dbh-Height	$h = 1.827 \times d^{0.333}$	0.578	10-100	4-9	20
	Thame	Dbh-Height	$h = 0.642 \times d^{0.539}$	0.791	10-200	2-14	21
	Thame (planted)	Dbh-Height	$h = 0.912 \times d^{0.447}$	0.696	20-150	3-9	12
	Kambala (planted)	Dbh-Height	$h = 0.088 \times d$	0.577	80-140	6-13	6

Note: In the above regressions d is diameter at breast height (dbh in millimeter) and h is total tree height in meter.

APPENDIX IV: CODES OF TREE SPECIES

Code	Botanical name	Myanmar name	Code	Botanical name	Myanmar name
1	*Tectona grandis*	*Kyun*	*193*	*Glochidion spp.*	*Tamasok/Buzo*
2	*Xylia xylocarpa*	*Pyinkado*	*195*	*Gmelina arborea*	*Yemane*
4	*Acacia oatechu*	*Sha*	*204*	*Helicia erratica*	*Daukyat-gyi*
24	*Alstonis scholaris*	*Taung-me-ok/Letpan-ga/Tettok, Thinbon*	*206*	*Heritiera fomes*	*Kanazo/Pinle-kanazo*
35	*Anthocephalux cadamba*	*Ma-U-Lettan-she*	*213*	*Holarrhena antidysenterica*	*Lettok-gyi/Lettok*
36	*Antiaris toxicaria*	*Hmyaseik*	*232*	*Lagerstroemia speciosa*	*Pyinma*
41	*Aquilaria agallocha*	*Akyaw*	*236*	*lLennea grandis*	*Nabe*
44	*Artocarpus lakoocha*	*Myauk-lok*	*242*	*Litsaea glutinosa*	*Ondon/Tagu, Tagu-shaw*
47	*Azadirachta indica*	*Tama/Tama-kha*	*257*	*Mangifera caloneura*	*Taw-thayet*
48	*Baccaurea sapida*	*Kanaso*	*265*	*Markhamia stipulata*	*Mahlwa*
57	*Berrya spp.*	*Pet-wun*	*269*	*Melanorrhoea usitata*	*Thitsi*
58	*Betula alnoides*	*Cherry-bo/Layaung (kachin)*	*270*	*Melia burmanica*	*Pantama/Taw-tamaga*
64	*Bruguiera conjungata*	*Byu-u-talon*	*285*	*Millettia pendula*	*Thinwin*
65	*Bruguiera cylindrica*	*Byu*	*291*	*Mitragyna rotundifolia*	*Binga*
78	*Barallia brachiata*	*Mani-awga*	*304*	*Oroxylum indicum*	*Kyaung-sha*
81	*Cassia fistula*	*Ngu/Ngu-shwe*	*319*	*Pentacme siamensis*	*Ingyin*
83	*Cassia renigera*	*Ngu-sat/Pwabe*	*325*	*Pinus merkusii*	*Hna-khwa-tinyu*
84	*Cassia siamea*	*Mezali*	*339*	*Protium serrata*	*Thadi*
86	*Castanopsis spp.*	*Thit-e/Gon/Kat*	*349*	*Pterospermum semisagittum*	*Nagye*
90	*Cedrela multijuga*	*Taung-tama*	*361*	*Quercus serrata*	*Nyan*
98	*Chukrasia tabularis*	*Yinma*	*362*	*Quercus spicata*	*Sagat*
103	*Cinnamomum obtusifolium*	*Nalingyaw*	*369*	*Rhizophora candelaria*	*Byu-chidauk/Payon-apo*
118	*Dalbergia cultrata*	*Yindaik*	*378*	*Salmalia malabarica*	*Letpan*
120	*Dalbergia kurzii*	*Thitpok*	*393*	*Schleichera oleosa*	*Gyo*
122	*Dalbergia ovata*	*Madama/Wun-byaung*	*405*	*Shorea oblongifolia*	*Thitya*
138	*Diospyros montana*	*Gyok*	*408*	*Sonneratia apetala*	*Kambala*
141	*Dipterocarpus tuberculatus*	*In*	*411*	*Sonneratia griffithii*	*Laba*
142	*Dipterocarpus spp.*	*Kanyin*	*414*	*Sterculia spp.*	*Shaw/Shawa*
145	*Dolicahndrone spathacea*	*Hingut*	*434*	*Terminalia belerica*	*Thitsein*
148	*Duabanga grandiflora*	*Myauk-ngo/Thit-kazaw*	*437*	*Terminalia chebula*	*Panga*
157	*Emblica officinalis*	*Zibyu*	*441*	*Terminalia oliveri*	*Than*
166	*Eugenia spp.*	*Thabye*	*450*	*Tristania burmanica*	*Taungthabye*
169	*Excoecaria agallocha*	*Kayaw/Thayaw*	*472*	*Xylocarpus granatum*	*Pinle-on*
173	*Ficus cunia*	*Thadut/Ka-on, Ye-ka-on*	*473*	*Xylocarpus moluccensis*	*Kyana/Kyat-nan*
175	*Ficus glomerata*	*Thapan/Ye-thapan*	*476*	*Zizyphus mauritiana*	*Zi*
			478	*Zizyphus rugosa*	*Myauk-zi/Zi-ganauk*