

THE STUDY ON
INTEGRATED MANGROVE MANAGEMENT
THROUGH COMMUNITY PARTICIPATION
IN
THE AYEYAWADY DELTA
IN
THE UNION OF MYANMAR

Final Report
Volume IV: Guideline, Manual and Maps



March 2005

**THE STUDY ON
INTEGRATED MANGROVE MANAGEMENT
THROUGH COMMUNITY PARTICIPATION
IN THE AYEYAWADY DELTA**

FINAL REPORT

VOLUME IV: GUIDELINE, MANUAL AND MAPS

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Chapter 1

Fauna and Flora Conservation Guideline

CHAPTER 1 FAUNA AND FLORA CONSERVATION GUIDELINE

1.1 Introduction

The mangrove forest has the peculiar ecosystem which keeps various animals and plants. Terrestrial and marine animals and plants coact, and hold rich ecological balance. It is important for peoples' life such that people receive the natural resources. However, the mangrove forest of the study area has been changed by the inflow of population, and the balance of the ecosystem is degrading. The fauna and flora conservation guideline was therefore prepared. As IMMP considers the conservation and consumption of marine resources separately, this guideline indicates the conservation measures of the threatened animals and plants which inhabit in the study area, and the conservation measures of the biodiversity in terms of terrestrial fauna and flora.

1.2 Objective

The fauna and flora condition is still rich in the study area. However threatened species are gradually decreasing, habitat is degrading, and biological diversity is declining.

The objective of the guideline is to conserve the threatened wildlife and biological diversity in the study area.

1.3 Management Area and Organization

The study area comprises five reserved forest. The management areas and organizations are as follows.

Management Areas and Organizations

Reserved Forest	Management Organization
Kyakankwinpauk	Forest Department
Pyinalan	Forest Department and Fishery Department
Kadonkani	Forest Department and Fishery Department
Meinmahla	Nature and Wildlife Conservation Division
Pyindaye	Forest Department and Fishery Department

1.4 Action Plan

The management organizations are different between the Meinmahla Reserved Forest and other four reserved forests. Therefore the action plan is mentioned for the Meinmahla and other four reserved forests respectively. The summary of the action plan is show in the follow in table. In order to carry out and continue the management (improvement of the protection and increase of threatened species project and maintenance of the biological diversity), capacity development and construction of monitoring and feedback system is

important.

Conservation measures

Reserved Forest	Measure	Item
Meinmahla	Protection and multiplication of threatened species project	<ul style="list-style-type: none"> • Crocodile • Macaques, Otters, Sumber deer, and birds
	Restoration of habitats	<ul style="list-style-type: none"> • Restroration of degraded forest in the northern part
	Capacity development of NWCD officers	<ul style="list-style-type: none"> • Strengthening of regulation • Seminar and workshop
	Monitoring of the biological condition and feedback to the conservation measures	<ul style="list-style-type: none"> • Biological survey • Establishment of feedback system
Other four Reserved Forests	Protection and multiplication of threatened species project	<ul style="list-style-type: none"> • Turtles
	Maintenance of the areas to be protected and core zone.	<ul style="list-style-type: none"> • Establishment of the area • Protection of the forest
	Capacity development of Forest Department officers and local people.	<ul style="list-style-type: none"> • Strengthening of regulation • Public awareness
	Monitoring of the biological indicators and forest condition, and feedback to the review of conservation measures	<ul style="list-style-type: none"> • Biological indicators • Forest structure of core zone • Forest area

1.4.1 Conservation in Meinmahla

(1) Protection and Multiplication of Threatened Species

1) Crocodile

The NWCD established the nursery cages/facilities for crocodiles (*Crocodylus porosus*). The crocodiles are multiplied, and monitored after release. This activity is succeeding and should be continued. Furthermore detailed ecological studies of the species involving a radio-tracking study emphasizing movements and feeding behavior is recommended to carry out.

2) Other Biological Indicators

Population change of other biological indicators should be grasped. If certain species is drastically reduced, protection and multiplication measures should be taken.

(2) Restoration of Habitat

Northern area of Meinmahla, especially along the river, is relatively degraded by the illegal logging. The degraded forest should be restored. The restoration measures are listed as i) natural restoration with leaving the land and ii) plantation. The early restoration by planting of mangrove species is desirable at the water edge. However, since negative impact to the habitat, such as penetration of people, and formation of paths is

thought by planting, the restoration should be progressed with natural succession inside of the land.

(3) Capacity Development

1) Strengthening of Regulation

Meinmahla reserved forest is the wildlife sanctuary, and logging of trees and hunting of animals are prohibited by the protection of wildlife and protected areas law. However, illegal logging and hunting are executed continuously. Therefore, the measures to strengthen the regulation are requested.

Increase of staff who control the wildlife sanctuary and strengthening of the power of the staff are mentioned as measures.

Increase of Staff

Eight Forest camps have been established in Meinmahla. Furthermore, two camps should be established at northeast part and northwest part of Meinmahla where illegal activities are found, and a total of four foresters are arranged. One range officer should be arranged in Meinmahla to take the cooperation among camps, and capacity of regulation should be developed. One wildlife researcher is also requested to be arranged so that the condition of wildlife is always monitored for the appropriate conservative activities.

Strengthening of the Power of the Staff

The authority for the control should be strengthened as such giving the right of arrest to the foresters. Since the local people who act illegal activities have weapons, it is necessary to let the staff carry the effective arms.

2) Seminar and Workshop

A workshop should be periodically held for the purpose of the cooperation and the awareness raising of staff. In the workshop, information exchange about the present condition of the fauna and flora in Meinmahla, and the methods of effective control, the forest management method are discussed. The workshop which invites the forest department staff and discusses on the fauna and flora in Ayeyawady Delta should also be held.

The staff who conserve Meinmahla need to have sufficient knowledge about the feature and function of the ecosystem. Therefore, holding the seminar in the field with academic people contribute to the improvement of conservation activities.

It is required to carry out workshops and seminars periodically so that the capacity of the staff always develops.

(4) Monitoring

In Meinmahla, the survey of birds was conducted supported by Wild Bird Society Japan besides the survey of crocodiles. However, systematic survey has not been conducted.

The condition of fauna and flora changes with various factors, and exact prediction is difficult. Therefore, the monitoring should be periodically implemented, and conservation measures should be established adaptively according to the monitoring results.

1) Biological Survey

Following survey should be implemented in order to prepare the basic information of fauna and flora.

Biological Survey

Organization	NWCD, Forest Department, Universities and NGOs
-Mammals	Species/Distribution; 2 times (rainy season and dry season)
-Birds	Species/Distribution; 2 times (rainy season and dry season)
-Reptiles	Species/Distribution; 2 times (rainy season and dry season)
-Amphibian	Species/Distribution; 2 times (rainy season and dry season)
-Plants	Species/Distribution; 2 times (rainy season and dry season) Vegetation/Forest structure; 1time (dry season)
Analysis and Storage of Information	The results are analyzed by specialists from NWCD and an ecological research report (technical) is prepared.

2) Feedback System

The ecological condition is evaluated and fed back to the management programs. NWCD reviews the present activities and plans the revised program. The program is submitted to the National Commission for Environmental Affairs (NCEA). NCEA has the discussion with academic people, and designate the protected wildlife and protection methods.

1.4.2 Conservation in Kyakankwinpauk, Pyinalan, Kadonkani and Pyindaye

(1) Protection and Multiplication of Threatened Species

Forest department and fishery department have set the protected areas for marine turtles in Kyakankwinpauk and Pyinalan reserved forests. The eggs of marine turtles which are also laid along the seashore of Kadonkani and Pyindaye reserved forests. Since the forest department and the fishery department implement conservation separately, they need to cooperate for the protection and multiplication of marine turtles. Since they have accumulated experiences so far, the handbook for the conservation of marine turtles should be prepared in order to proceed with this activity.

(2) Maintenance of Important Areas

1) Areas to be Protected

The areas to be protected are selected by considering biological indicators. The areas to be protected are shown in Table 2.4.1. The location of the area from ① to ⑦ selected by this guidelines are shown in Figure 2.4.1. Along the shore of ②, ④, ⑥ and ⑦ are designated for the marine turtle and shore birds, and ①, ③ and ⑤ are designated for other biological indicators. The conservation concepts and measures are summarized in

Table 2.4.2.

2) Management Zone of IMMP

The study area is divided into core zone, buffer zone and multiple use zone. Forest is protected and poaching is prohibited in core zone. Core zone should be the fauna and flora conservation area, and protection of threatened species and securing of the biological diversity area. In the mean time, adequate actions are required for the conservation of fauna and flora in buffer zone and multiple use zone. The zoning map is shown in Figure 2.4.1. Definition of each zone in IMMP and fauna and flora conservation activities are shown below.

IMMP and Fauna and Flora Conservation

Management classification	Definition in IMMP	Fauna and Flora conservation
Core Zone	Areas to be preserved in natural condition for strict protection against illegal logging, poaching and encroachment.	Prohibition of ecosystem destruction and human invasion
Buffer Zone	Areas to be functioned for protection of core zone.	Prohibition of exploitation of natural resources, and restriction of human invasion
Multiple Use Zone	Areas mostly used for agriculture production and other production purposes.	Maintenance of remaining forest, and prohibition of illegal activities

(3) Capacity Development

Since the study area is large, it is necessary to conserve selectively core zone and the areas to be protected.

As forest camps have been allocated in Kadonkani, extension of forest camps should be implemented in Kyakankwinpauk, Pyinalan, and Pyindaye. A few forest camps should be established in each core zone, respectively, and foresters are arranged. Deputy Range Officer should be arranged at a base of each core zone. One wildlife researcher is also requested to be arranged in Bogalay and Laputta, so that the condition of wildlife is always monitored for the appropriate conservative activities.

The foresters and deputy range officers need to have the enough knowledge about the ecosystem. Therefore, they should attend the workshop and seminar of NWCD. NWCD also should prepare the handbook for the conservation of fauna and flora, and distribute to the staff of forest department.

2) Public Awareness

It is necessary to extend public awareness related to the importance of fauna and flora conservation to forest officers and local people. The seminars, workshops, and training text prepared by the technical experts should be held from time to time. The foresters should visit villages to promote conservation of natural resources and environment to the local people. Strengthening local institutional capabilities through educational and training programs will contribute to efficient biodiversity management. People's participation is essential for conservation management.

(4) Monitoring

1) Biological Indicators

Monitoring of biological indicators should be implemented for marine turtles and other biological indicators.

As for the marine turtles, population and the number of eggs at each egg-laying site should be recorded.

As for the other biological indicators, the staff of forest department should record the identified individuals on the list and map. The result should be submitted to NWCD headquarter and NCEA, and used to revise the fauna and flora conservation programs.

2) Forest Structure of Core Zone

Forest structure (tree height, dominant and other species, diameter of breast height) should be surveyed in order to find the balance of forest. Results of the survey shall be fed back to the management method of the forest.

3) Forest Area

The satellite image should be acquired once in five years, and distribution of forest shall be grasped periodically.

1.4.3 Registration to Ramsar Convention

The formal name of the Ramsar Convention is “the Convention on Wetlands of International Importance Especially as Waterfowl Habitat Ramsar”. The Ramsar Convention aims at comprehensive conservation including management of basin and conservation of fish resources. Therefore, for promoting integrated conservation management of the Ayeyawady delta, registering this convention, such as recognition of residents, strengthening of monitoring and continuation of management can be used effectively in the study area.

Myanmar is now considering importance of the conservation of wetland and has set up the Ayeyawady delta as one of the most important swamps. The Ramsar Convention recognizes the swamp of Myanmar, and has invited Myanmar as an observer to their meeting. Since then, the forest department has been coordinating with the Ramsar Convention. Also, inventory preparation of wild birds has already been encouraged by the Ministry of Environment and Wild Bird Society of Japan, and formulation of conservation plan is expected to progress by the forest department. Myanmar should become a member of the Ramsar Convention, and registration of the Ayeyawady delta at the Ramsar Convention is expected.

Tables

Table 2.4.1 List of Areas to be protected

Area ¹⁾	Bio-indicators ²⁾	Reason for Selection	Area Features	Location	
				Reserved Forest	Forest Compartment
①	Macaques	There are comparatively many individuals.	Protected area of FD Laputta TS. The forest is covered with 75% or more of land although villages are included.	Kyakankwinpauk	27
	Sambar Deer	There are comparatively many individuals.			
	Estuarine Crocodile	Nests are observed in some points.			
②	Shore Birds	Shore Birds pass the winter along the shore.	Along the shore, there is protected area of FD Laputta TS. The sands where mud is mixed continue.	Kyakankwinpauk	32,34
	Marine Turtles	Marine Turtles lay eggs. FD promotes protection.			
③	Macaques	There are comparatively many individuals.	The rate of forest covered is high and many mangroves still remain.	Pyinalan	65
	Sambar Deer	There are comparatively many individuals.			
④	Otters	There are comparatively many individuals.	Along the shore of the forest compartment 67 is protected area of a Fishery Dept. The sands where mud is mixed continue.	Pyinalan	63,67,77
	Shore Birds	Shore Birds pass the winter along the shore.			
	Marine Turtles	Marine Turtles lay eggs. Fishery Dept. promotes protection.			
⑤	Macaques	There are comparatively many individuals.	Specified as protected reserve area of IRM (no human habitation). The majority of land is covered with low quality secondary or germinated forest.	Kadonkani	38,43,44,45,46,51,52,53,54,59,60
	Otters	There are comparatively many individuals.			
	Sambar Deer	There are comparatively many individuals.			
	Estuarine Crocodile	Nests are observed in some points.			
	Asiatic Elephant	Five individuals inhabit only in this area			
⑥	Shore Birds	Shore Birds pass the winter along the shore.	The sands where mud is mixed continue.	Kadonkani	74,76
	Marine Turtles	Marine Turtles lay eggs.			
⑦	Shore Birds	Shore Birds pass the winter along the shore.	The sands where mud is mixed continue.	Pyindaye	65,66
	Marine Turtles	Marine Turtles lay eggs.			

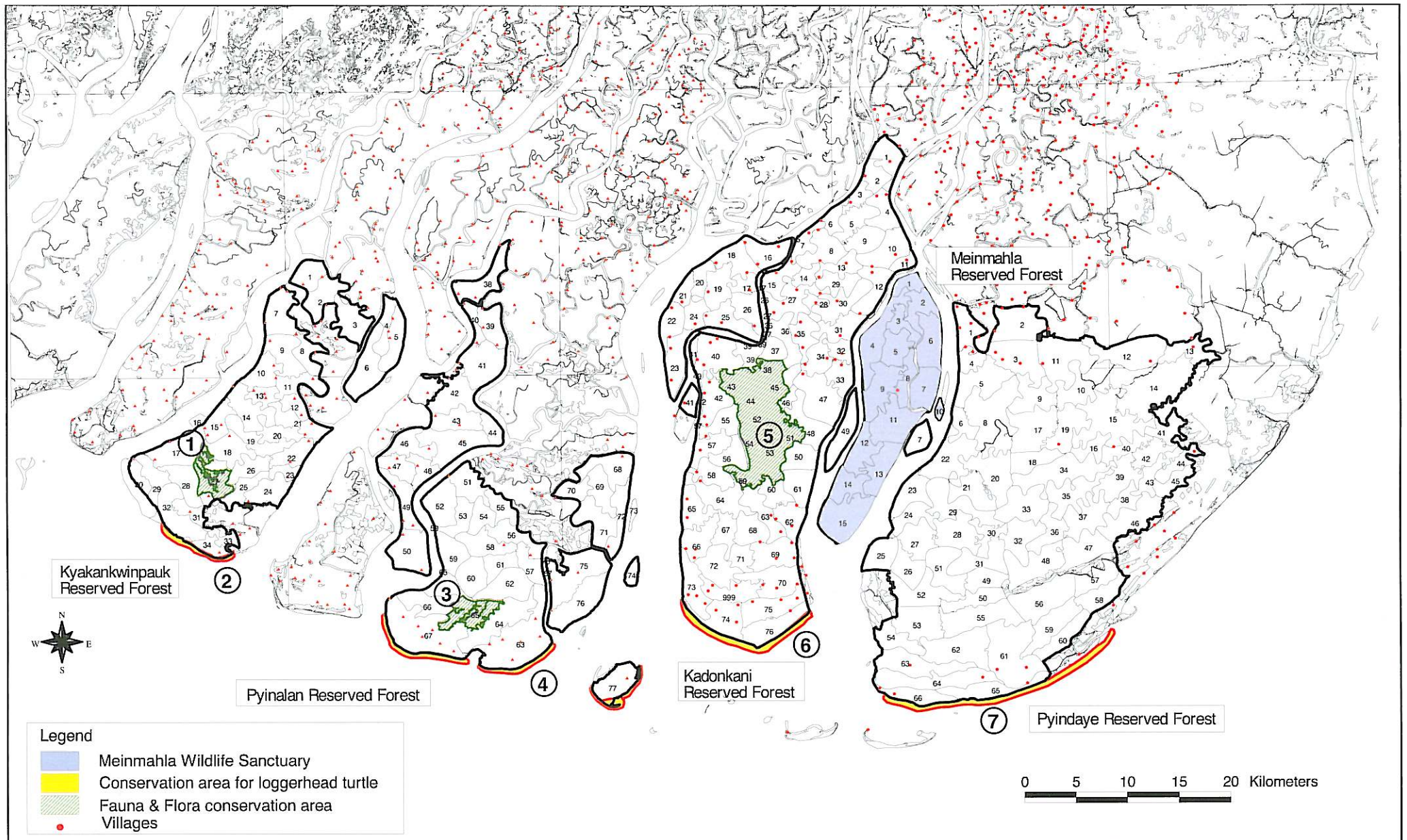
note: 1) Macaques: Crab-eating Macaque and Rhesus Macaque, Otters: Small-clawed Otter and Smooth-coated Otter, Marine Turtles: Olive Ridley, Green Turtle and Loggerhead Turtle

Table 2.4.2 Conservation Concept and Measure

The area to be protected	Conservation Concept	Conservation Measure
①	Conservation of the wildlife in natural forest	Promotion of plantation for vegetation recovery. The additions of Forest camps are planned for watching strengthening.
②	Conservation of the wildlife along the sea side	Entry is forbidden along the shore in the breeding season (Nov.-Mar.) of Marine Turtle and wintering term (Oct.-Jan.) of Shore Birds.
③	Conservation of the wildlife in natural forest	Specify as protected area, forest camp is settled, and guard activities are performed.
④	Conservation of the wildlife along the sea side	Entry is forbidden along the shore in the breeding season (Nov.-Mar.) of Marine Turtle and wintering term (Oct.-Jan.) of Shore Birds. Hunting of otters is prohibited.
⑤	Conservation of the wildlife in natural forest especially Asiatic Elephant as a symbol of mangrove conservation	Promotion of plantation for vegetation recovery. Guard activities are strengthened. Mangroves recovery situation is surveyed. Regarding the conservation of Asiatic Elephant, awareness and collaboration of local people are required.
⑥	Conservation of the wildlife along the sea side	Specify as protected area and watchmen are arranged. Entry is forbidden along the shore in the breeding season (Nov.-Mar.) of Marine Turtle and wintering term (Oct.-Jan.) of Shore Birds.
⑦	Conservation of the wildlife along the sea side	Specify as protected area and watchmen are arranged. Entry is forbidden along the shore in the breeding season (Nov.-Mar.) of Marine Turtle and wintering term (Oct.-Jan.) of Shore Birds.



Figure



Chapter 2

*Mangrove Rehabilitation Manual for the Forest
Department Frontline Staff of the Ayeyawady Delta
(English version)*

**GOVERNMENT OF THE UNION OF MYANMAR
MINISTRY OF FORESTRY**

FOREST DEPARTMENT



**JAPAN INTERNATIONAL
COOPERATION AGENCY**

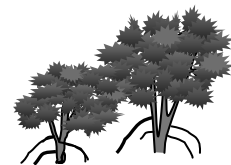


**THE STUDY ON
INTEGRATED MANGROVE MANAGEMENT
THROUGH COMMUNITY PARTICIPATION
IN THE AYEYAWADY DELTA
IN THE UNION OF MYANMAR**

**MANGROVE FOREST
REHABILITATION MANUAL
FOR THE FOREST DEPARTMENT
FRONTLINE STAFF
OF THE AYEYAWADY DELTA**

MARCH 2005

NIPPON KOEI CO., LTD.



Introduction

Contents and Usage of Manual

The aim of this manual is to help front-line Forest Department staff to protect, rehabilitate and manage mangrove resources in the Ayeyawady delta, particularly through community participation.

This manual is comprised of six volumes as indicated in the table of contents. The content and information presented in this manual were compiled based on the lessons and findings accumulated during the pilot project implemented under the JICA Study.

Compared to traditional forestry operations manuals, this manual emphasizes topics related to community forestry (CF). It is intended to provide FD staff with basic knowledge and "how to" for extension, enlightenment, technical assistance, and management of CF activities which will be essential for further rehabilitation of mangrove resources in the delta. Also the manual is intended to serve as a practical guide/reference for applying community forestry and to support sustainable CF activities by users groups in the delta.

This manual is expected to provide the base for front-line FD staff who engage in the mangrove forest management. It is aimed to provide simple but comprehensive answers for mangrove rehabilitation. The key to success is to put these answers into practical use and to incorporate lessons learned from the experience into daily practice and future revisions of the manual.

Introduction

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FD Volume I: Basic Training for CF

I-1: Participatory Development

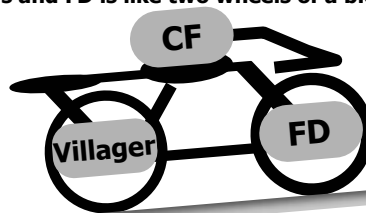
What is Participatory Development ?

1. Basic Concept of Participatory Development

What is participatory development and community forestry (CF) ?

Participatory Development is a basic concept of community forestry activity through:

- Mutual understanding between villagers and the forest department (FD) , and
 - Ownership of villagers, particularly of user groups, and
- Collaboration between villagers and FD is like two wheels of a bicycle; both are needed for the whole to function



2. Purpose of Participatory Development in Mangrove Forest Management

Why CF through people's participation?

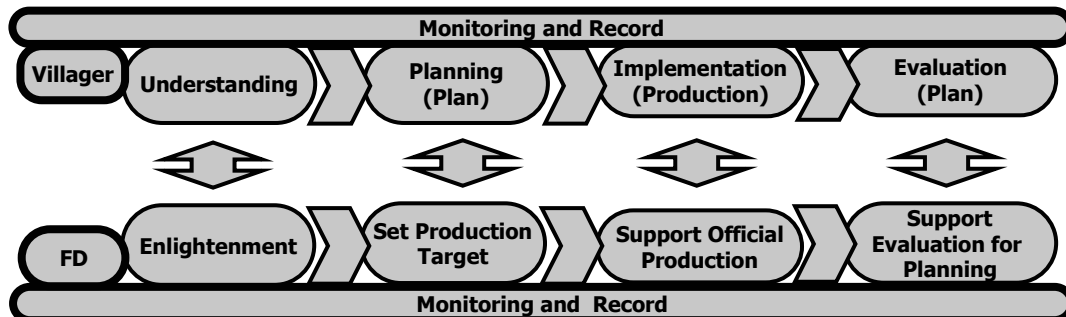
- Many people live in villages inside reserved forests, and their livelihood is deeply dependent on mangrove resources.
- Because encroachers of mangrove resources are mainly people settled inside reserved forests and the people can only survive by encroachment of the mangrove vegetation
- Living inside reserved forests is prohibited by the Forest Law. However, involvement of such people in mangrove forest management is essential
- To simultaneously protect mangrove resources and local people's livelihood and achieve sustainability of both; local people need to be given the right for utilization and duty for protection of the mangrove resources.
- CF is exclusive measure of mangrove rehabilitation by the people who are encroachers



3. Procedure of Participatory Activity

How to do the participatory development?

- Based on villager's decision by themselves, every step has to be proceeded
- Every step of villager and FD have to be inter auctioned each other
- Villagers capable activity, technique, budget and labor force have to be considered



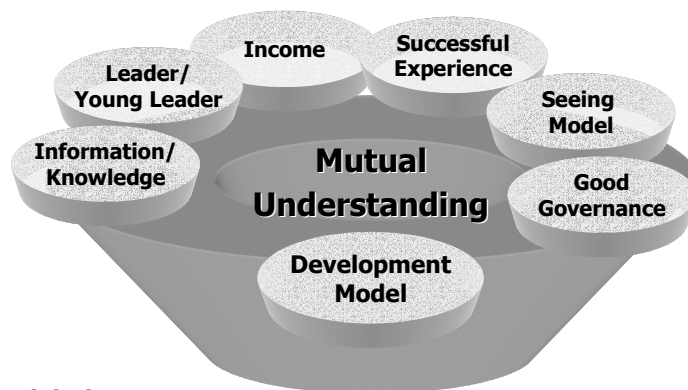
FD Volume I: Basic Training for CF

I-1: Participatory Development

I-2

4. Approach to Mutual Understanding and Enlightenment

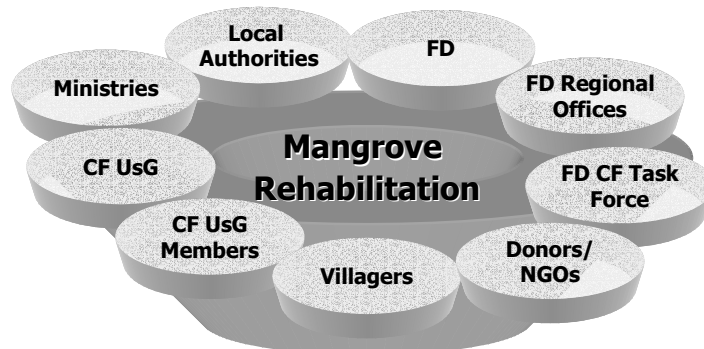
- Development a model village and show the model village for extension
- Employ activities for which villagers technical and budgetary capability
- Derive income of villagers through the participatory activity
- Raise leaders and young leaders of villagers for practicing participatory activity
- Input information and knowledge to villagers
- Show good governance as model



5. Stakeholders - their roles and duties

Who are stakeholders?

All people/organizations who are concerned with mangrove forests are stakeholders: people living inside the reserved forest, fishermen, farmers, traders, government persons, donors, and etc.



Roles and Duties (General)

- The People living inside reserved forest are principal stakeholders. They participate/involve in the all steps of mangrove management
- FD CF Task Force is also a principal stakeholder as partner of the people, to disseminate CF related information, help people to start and carry out CF, and provide technical advice and assistance, and supply seedlings
- Governing local authorities are supporters for governing mangrove rehabilitation
- Ministries related to participatory activities such as agriculture, fishery, livestock, etc are also supporters of mangrove rehabilitation technology
- Donors and NGOs are assistants of local people and CF task force engaged in the activities

FD Volume I: Basic Training for CF

I-1: Participatory Development

I-3

5. Roles and Duties (continued)

a. Forest Department

- FD is in charge of enlightenment on environmental issues, dissemination of CF to promote and start CF activities (Promotion and Certification Stage)
- FD is in charge of technical assistance, patrolling and participatory monitoring/ evaluation and feedback to support user groups for sustainable and continuous CF implementation (Implementation and Production Stage)

b. Local Authorities

- In collaboration with FD, local authorities increase public awareness for protection/ rehabilitation of mangrove resources and promotion of CF within reserved forests
- As law enforcement authorities, take necessary measures against illegal activities toward mangrove resources and CF.

6. Application of Participatory Development to Mangrove Forest Management by CFI

a. Extension method of CF by participatory development for mangrove rehabilitation

- Develop collaboration between the various FD levels, i.e., district, township, village tract and village levels and authorities of the line ministries
- Extension to local people about current critical situation of mangrove vegetation, prediction of disappearance of mangrove vegetation in near future without countermeasures, rehabilitation of mangrove through CF, and advantage of CF
- Preparation of leaflet regarding understandable and visible explanation about the situation of mangrove vegetation for villagers and local authorities
- Dissemination of leaflets with emphasis on the profit of villagers and local authorities from the establishment of CF
- Obtaining villager's understanding about their role for rehabilitation and protection of mangrove resources through villager's capable and profitable activities.
- Extension of mangrove protection and rehabilitation, targeting all villagers i.e. farmers, fishermen, casual labors, traders, merchants, teachers, monks, etc
- Showing the model CF activity to villagers as one of the extension activities
- Conducting the extension in collaboration with local authorities. First target of the extension is local authorities (especially VPDC)

b. Planning stage

- Consolidate villager's ownership of CF mangrove rehabilitation activities
- Let villagers decide by themselves. This is the first step for the consolidation of ownership
- Support villagers in following activities with close communication with villagers
 - ✓ Prepare plan for harvest of forest products, by showing profit as incentive to people.
 - ✓ Support organization of users group, preparing management plan, and drawing map
 - ✓ Set out stakes along with clearly cut lines for demarcation of CF area
 - ✓ Set permanent landmark at high ground level and set substantial stakes at low tide line
 - ✓ Support preparation of rules and regulations of CF area border line management
 - ✓ Support preparing application of CF certificate
- Never expect any monetary payment from villagers for providing the CF support, even for direct costs such as transportation
- Never delay the application procedure for granting of CF certificate to a user group

FD Volume I: Basic Training for CF

I-1: Participatory Development

I-4

6. Application of Participatory Development to Mangrove Forest Management by CFIC. Implementation Stage

Cycle management

- Support villagers to conduct cycle management of: implementation > monitoring > evaluation > reporting > feed back > planning for succeeding cycle > succeeding implementation

Implementation

Support users group (UsG) in the following activities with close communication with UsG members

- Transfer forestry technology for implementation.
- Presentation and practice the necessary technology for mangrove rehabilitation to the user group by demonstrating models
- Arrangement of necessary technology for strengthening of community forestry activity such as agriculture, livestock, water reservoir, group management, marketing, processing of products, etc.
- Marketing, production (harvest), processing (value adding), and selling with sales voucher and removal pass, and license for value adding production
- Management of UsG

Patrol

Patrol and formulation of self-patrolling (watching) by CF user groups

- Operation of quick and fair dispute arbitration through implementation
- Protect the CF activity from encroachment in collaboration with local authorities
- Take action against the encroachers when informed of it by user groups

Monitoring, evaluation and management

- Formulation of a system for monitoring, evaluation and management, and regular conduct of monitoring and reporting by users themselves
- Conducting evaluation of the monitoring results
- Preparation of progress reports based on the monitoring and evaluation results and submission of progress reports to CF Task Force
- Report the results of these supporting activities to FD superior offices and local authorities
- Consideration and preparation of a plan for succeeding activities based on monitoring and evaluation results



FD Volume I: Basic Training for CF

I-2: Basic Knowledge about Mangrove Rehabilitation

Why mangrove rehabilitation ?

Rational of mangrove rehabilitation

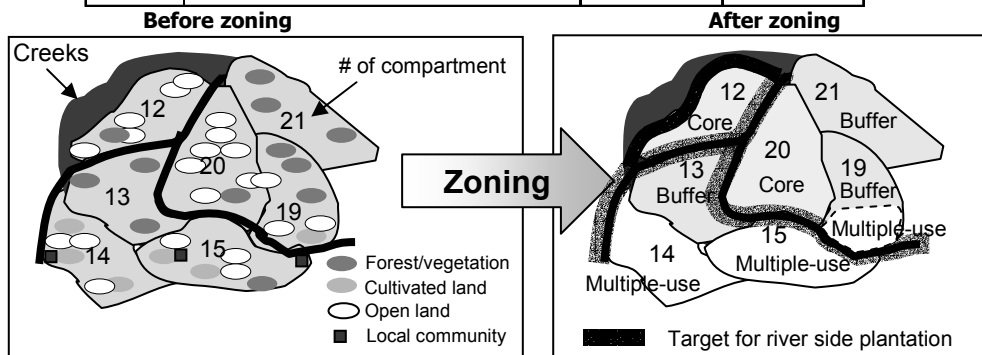
- Protect remaining mangrove forests and improve degraded mangrove forests,
- Objectives and direction of mangrove management (Protection, rehabilitation, utilization) shall be determined based on present land use, distribution of forest, population, and other natural/socio-economic conditions
- Forest department has to take major role, responsibility and initiative for mangrove rehabilitation and sustainable forest management of reserved forests.

Zone management

- The minimum management unit in reserved forests is basically the forest compartment.
- If various kinds of land uses/management objectives exist within one forest compartment, flexibly divide the compartment into segments of suitable size.
- Integrated Mangrove Management Plan (IMMP) formulates zoning for suitable mangrove management in reserved forests as follows;
 1. CORE zone as protection/conservation areas,
 2. BUFFER zone as rehabilitation areas, and
 3. MULTIPLE-USE zone as utilization with rehabilitation areas within reserved forests.
- Each zone shall be delineated based on forest type, land use pattern, settlements, and management objectives of given zone.
- In addition to zoning, banks of rivers/creeks shall be protected from erosion in particular.

Reserved forest zone category

Category	Definition	Goal and Objective	Possible Operations
1. CORE	<ul style="list-style-type: none"> • Areas to be preserved in natural condition for strict protection against illegal cutting, poaching and encroachment. • Production activities shall be strictly regulated or prohibited • Area/ FC declared as Wildlife Sanctuary or any other categories under Protected Area System 	Protection/ Conservation/	Direct operation by forest department
2. BUFFER	<ul style="list-style-type: none"> • Area/ FC to be functioned for protection of CORE • Area/ FC to serve as social fence against outside of CORE 	Rehabilitation (Plantation, forest improvement)	Direct operation by forest department / Community forestry
3. MULTIPLE-USE	<ul style="list-style-type: none"> • Area/ FC mostly used for agriculture production and or other production purposes • Area/ FC which has mangrove forest cover whatever condition or forest type at not more than 20% of the total area of the compartment. 	Rehabilitation (Plantation, forest improvement) / Utilization	Community forestry



FD Volume I: Basic Training for CF I-2: Basic Knowledge about Mangrove Rehabilitation

Why mangrove rehabilitation ?

Forestry operation structure

- Forestry operations are based on land use /forest type/ground level which are identified through aerial photograph/satellite image interpretation and ground truth.
- A breakdown of operations is described in the following table.

Applicable forestry operations by forest type/land use/ground level

Category	Land Use	Forest Type	Low Ground Level	Medium Ground Level	High Ground Level
1. CM1:	Mangrove and/or non-mangrove forest	Closed Canopy High Forest (>12m)	1. Natural Forest Operation - Preservation and conservation: No harvesting - Forest Regeneration Operation: Forest Protection & (Limited NFTP extraction)		
2. CM2:	Mangrove and/or non-mangrove forest	Closed Canopy Medium Forest (6- <12 m)	1. Natural Forest Operation - Preservation and conservation: No harvesting - Forest Regeneration Operation: Forest Protection & Controlled NFTP extraction - Forest Improvement Operation: Forest Protection & Controlled NFTP extraction		
3. CM3	Mangrove and/or non-mangrove forest	Closed Canopy Low Forest (< 6m)	1. Natural Forest Operation - Forest Regeneration Operation: Controlled NFTP extraction & Forest Protection - Forest Improvement Operation: Controlled NFTP extraction & Forest Protection		
4. SM1	Mangrove and/or non-mangrove forest	Sparse Canopy High Forest (>12m)	1. Natural Forest Operation 2. Plantation Operation (with Forest Protection & Controlled Harvesting) - Mangrove spp - Non mangrove spp 3. Other CF Prototypes		
5. SM2	Mangrove and/or non-mangrove forest	Sparse Canopy Medium Forest (6- <12 m)	1. Natural Forest Operation 2. Plantation Operation (with Forest Protection & Controlled Harvesting) - Mangrove spp - Non mangrove spp 3. Other CF Prototypes		
6. SM3	Mangrove and/or non-mangrove forest	Sparse Canopy Low Forest (<6m)	1. Natural Forest Operation - Forest Improvement Operation: Controlled Harvesting & Forest Protection 2. Plantation Operation (with Forest Protection & Controlled Harvesting) - Mangrove spp - Non mangrove spp 3. Other CF Prototypes		
7. Barren Land	Non-vegetation area, open land, settlements, other lands without vegetation	-	1. Plantation Operation (with Forest Protection & Controlled Harvesting) - Mangrove spp - Non mangrove spp (Forest Improvement Operation) 2. Other CF Prototypes		
8. Agricultural La	paddy field, crop field, home garden, etc.	-	- Plantation Operation - Maintain Present Agricultural Activities - Plantation Operation (Forest Improvement Operation) Other CF Prototypes		

River bank protection/rehabilitation

- Apart from the above categories, whole river bank areas within reserved forest shall be protected by re-vegetation operation against watering flow, wave and wind erosion.
- Proper width of bank is 10-30 yard (9-30m) depend on the location and bank condition.



FD Volume I: Basic Training for CF

I-2: Basic Knowledge about Mangrove Rehabilitation

Why Mangrove Rehabilitation ?

Species - Site Matching

- Species-site matching is critical for survival and growth of mangrove species
- Mangroves are distributed in distinct patterns for different ground levels
- Mangrove areas in the Ayeyawady delta can be generally categorized to three ground levels (Low Ground, Medium Ground, High Ground) based on frequency of tidal inundation and flooding
- Species to be introduced in mangrove rehabilitation shall match with ground level and other natural conditions of rehabilitation sites as much as possible.

Common Species according to Ground Level

Land class	Tide level (m) above sea level	No. of days of tidal inundation per month during dry season	Times of flood per month in dry	Watson's Tidal Inundation class*	Common Mangrove Species	
Low Ground	0.1-1.7	all high tides (at least 20 days/month)	62-45	1	<u>High saline water</u> <i>Kandelia candel</i> , <i>Avicennia alba</i> , <i>Avicennia marina</i> , <i>Sonneratia apetala</i> , <i>Aegiceras corniculatum</i>	<u>Low saline water</u> <i>Kandelia candel</i> , <i>Nypa fruticans</i> , <i>Rhizophora apiculata</i> , <i>Sonneratia apetala</i> , <i>Sonneratia caseolaris</i> , <i>Avicennia officinalis</i>
	1.7-2.0	medium high tides/every start of spring tides (10-19 days /month)		2	<i>Nypa fruticans</i> , <i>Rhizophora apiculata</i> , <i>Sonneratia qriffithii</i> , <i>Sonneratia alba</i> , <i>Ceriops decandra</i> , <i>Bruguiera gymnorhizza</i> , <i>Bruguiera sexangula</i> , <i>Avicennia officinalis</i> , <i>Aegiceras corniculatum</i>	<i>Brownlania tersa</i> , <i>Ceriops decandra</i> , <i>Bruguiera gymnorhizza</i> , <i>Aegiceras corniculatum</i> , <i>Avicennia officinalis</i> , <i>Heritiera fomes</i> , <i>Rhizophora apiculata</i>
Medium Ground	2.0-2.3	every normal high tides/mid spring tides (3-9 days/month)	45-2	3	<i>Ceriops decandra</i> , <i>Bruguiera spp</i> , <i>Heritiera fomes</i> , <i>Amoora cucullata</i> , <i>Xylocarpus granatum</i> , <i>Xylocarpus mollucensis</i> , <i>Aegilites rotundifolia</i> , <i>Avicennia officinalis</i> ,	
	2.3-2.6	every spring high tides (at least 2		4	<i>Heritiera fomes</i> , <i>Xylocarpus mollucensis</i> , <i>Xylocarpus granatum</i> , <i>Excoecaria agallocha</i> , <i>Amoora cucullata</i> , <i>Phoenix paludosa</i>	
High Ground	2.6-2.7	4 times in dry season by equinoctial abnormal high tides	4	5	<i>Phoenix paludosa</i> , <i>Cynometra ramiflora</i> , <i>Hibiscus tiliaceous</i> , <i>Chlelodendrum inerme</i> , <i>Lumnitzera racemosa</i> , <i>Myet-kha grass(Mn)</i> , <i>(Heritiera fomes, Excoecaria agallocha)</i>	
Extremely High Ground	2.7-3.3	only flooded by rain water during rainy season	none	6	<i>Phoenix paludosa</i> , <i>Hibiscus tiliaceous</i> and non-mangrove speceis	

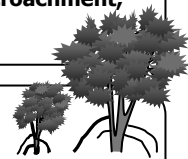
FD Volume I: Basic Training for CF
I-3: Basic Techniques of Mangrove Forestry

I-8

What is mangrove forest management?

1) Setting target area and objective for management

- Identify needs toward mangrove forest (prevent soil erosion, supply forest/non-timber products, conserve biodiversity and wildlife, produce aquatic resources... etc.)
- Identify technical/biological/financial/socioeconomic/institutional constraints& issues (lack of budget and equipments for management, limited technology for forest protection, no access for monitor, poverty in local community, increasing encroachment, immature organizing community... etc.)
- Identify potential /priority are for mangrove management



2) Surveying (data collection, field survey)

- Data collection of socio-economic conditions & natural conditions
 - socioeconomic such as population, gender, major livelihood, location/area of villages etc.
 - natural condition such as land use, forest area, precipitation, temperature, wildlife etc.
- Field survey to confirm target management area and to grasp land use, detailed natural resources, information of surrounding villages, geography and history, and so on.
- Identify applicable management directions and objectives based on the result (FD direct operation? and/ or CF?) .

3) Planning (management plan/annual action plan)

- Develop management alternative (Protection/conservation, rehabilitation and utilization)
- Prioritize /select alternative (s) in accordance with management objective (s)
- Listing up feasible activities such as plantation, nursery operation, agroforestry, aqua-agroforestry, patrolling against illegal cutter... etc.
- Prepare a management plan with map to make sustainable use of mangrove forest for given space and time. For CF, secure economic activities (fishing, agriculture, livestock etc.)
- Formulate implementing body and operation plan
- Prepare an annual action plan based on the management plan

Feedback

4) Implementation of the management plan

- Secure necessary resources, including budget, for implementation
- Rehabilitation for encroached/cultivated mangrove forests (Plantation)
 1. Procurement of seeds, propagates,
 2. Seedling production in nursery,
 3. Site preparation (cutting, digging, staking etc.),
 4. Planting/Re-planting,
 5. Tending/maintenance/Forest Protection
- Conservation and protection for rich/moderate mangrove forest patrolling, public activities, NFIO (natural forest improvement operation) etc.

5) Monitoring & Evaluation (Supervision): Periodic Review of Outputs

- Establish a periodical monitoring system (ex. check submission of reports, site visit) for during/after implementation
- Monitor physical outputs to check an achievement of the objectives
- Make adjustment in plan and /or operations based on evaluation, if needs.
- Develop criteria/indicators (ex. survival rate of plantation, achievement of physical activities, contents of activities record, frequency of submission of periodical report, accounting etc.) to evaluate success or efficiency of the plan
- Consider and apply countermeasures, improvements for continuous forest management



FD Volume I: Basic Training for CF I-4:Public Awareness

Key points

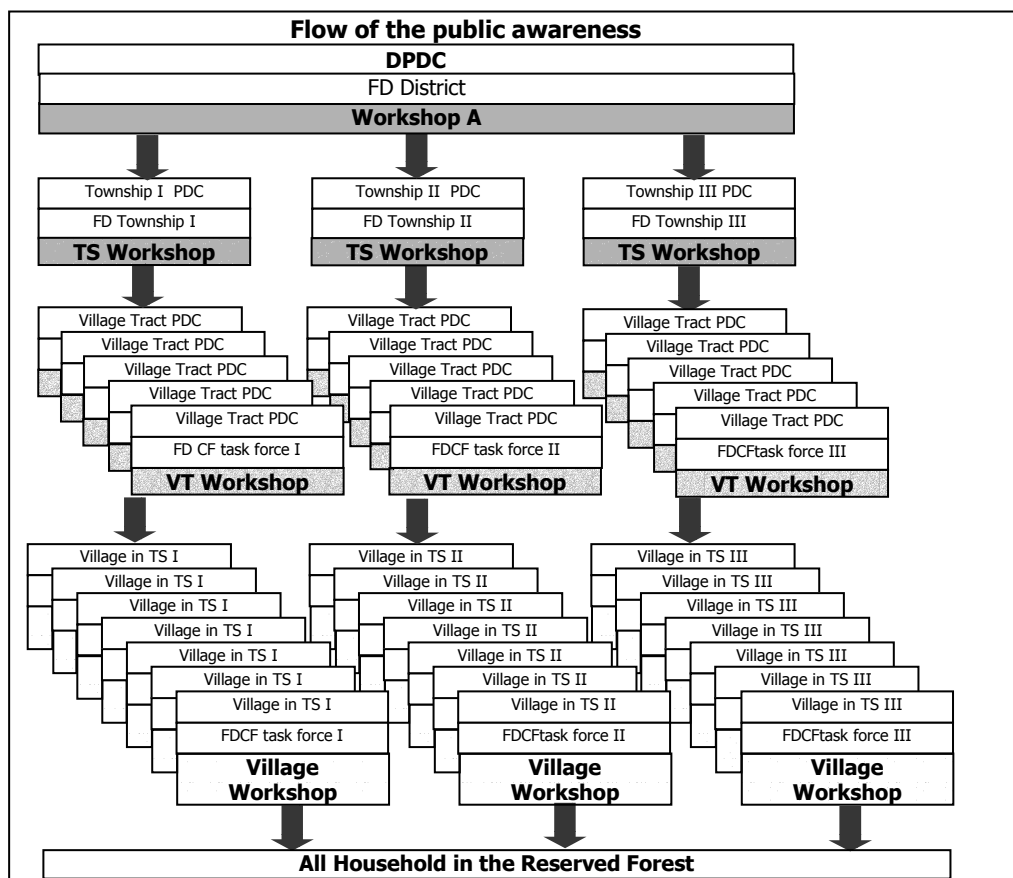
- Obtain villagers’ understanding about the community forestry through understanding of TPDC, VPDC and Village Authority Person regarding current emergency situation, necessity of protection and required rehabilitation activities.
- Use visual material i.e. illustration / drawing for obtaining the understanding (next page).
- Prepare story telling visual material i.e. reason of deterioration>current situation>future with CF or future without CF (next page).
- Make public awareness the first step in community forestry activities.
- Distribute information to all residents in the RF for giving even chance of CF.

Procedure

- Prepare visual material for public awareness(signboard, cartoons, leaflet, slogan).
- Distribute the material based on the figure below.
- Connect the public awareness to following step of planning of the community forestry.

Responsibility of Concerning Agencies

- FD has to be the agency responsible for the public awareness raising in collaboration with local authorities
- DPDC, TPDC, VPDC have to be supporting agencies for the public awareness raising



FD Volume I: Basic Training for CF I-4:Public Awareness (leaflet)

(front: current situation > reason of the deterioration > analysis of current situation)

Development Study on Integrated Mangrove Management through community Participation in the Ayeyarwady Delta

Where you live!
In the Reserved Forest!
Living Inside RF is prohibited according to forest law (01 A)

Future Natural Environment!

Minimum 2 lb/20,000 k

Current Illegal Encroachment!

Planting! Planting! By UG supported by FD!

Reasons why Mangrove degradation
Mangrove degradation because of Increasing population

TOTAL	390,000
Kyakankwinpauk	270,000
Pyinlan	230,000
Kadonkani	207,000
Pyindaye	207,000

More Rapid Population Growth in RF
RF: 3.2% LPT & BGL TS: 1.9%

Decreasing yield of RF paddy field
Half of state average paddy yield

RF	Avg. Div.	Country Ave.
924	1,666	1,412

Current mangrove condition
Mangrove can disappear within 6 years!!!

1995-2001	30%
Decrease!	In 6 Years!!

(back: telling story of future of mangrove with/without the community forestry)

Long-term Benefit:
Rehabilitation of Good Environment
Sustainable Use of Natural Resources
Timber, pole, post Products
More Shrimp, NTFPs

Benefit from NFIO, AAF activities
Fuel wood, pole, post, fish, shrimp

Benefit of Agro forestry Activities
fruits & vegetables

No Land for Settlement
No Natural Heritage for Child, Grand Child

Natural Resource degradation:
Damaging spawning space of fish & shrimp

Small Mangrove Crab
No Mangrove Crab
Scarcity of fish & shrimp

Objective: Economic Development of Country
Environmental Stability
Basic Needs of Local People

Official Benefit
Land Use Right
Community Forestry Certificate

Not Necessary any illegal encroachment
Shrimp pond, paddy encroachment, fuel wood cutting

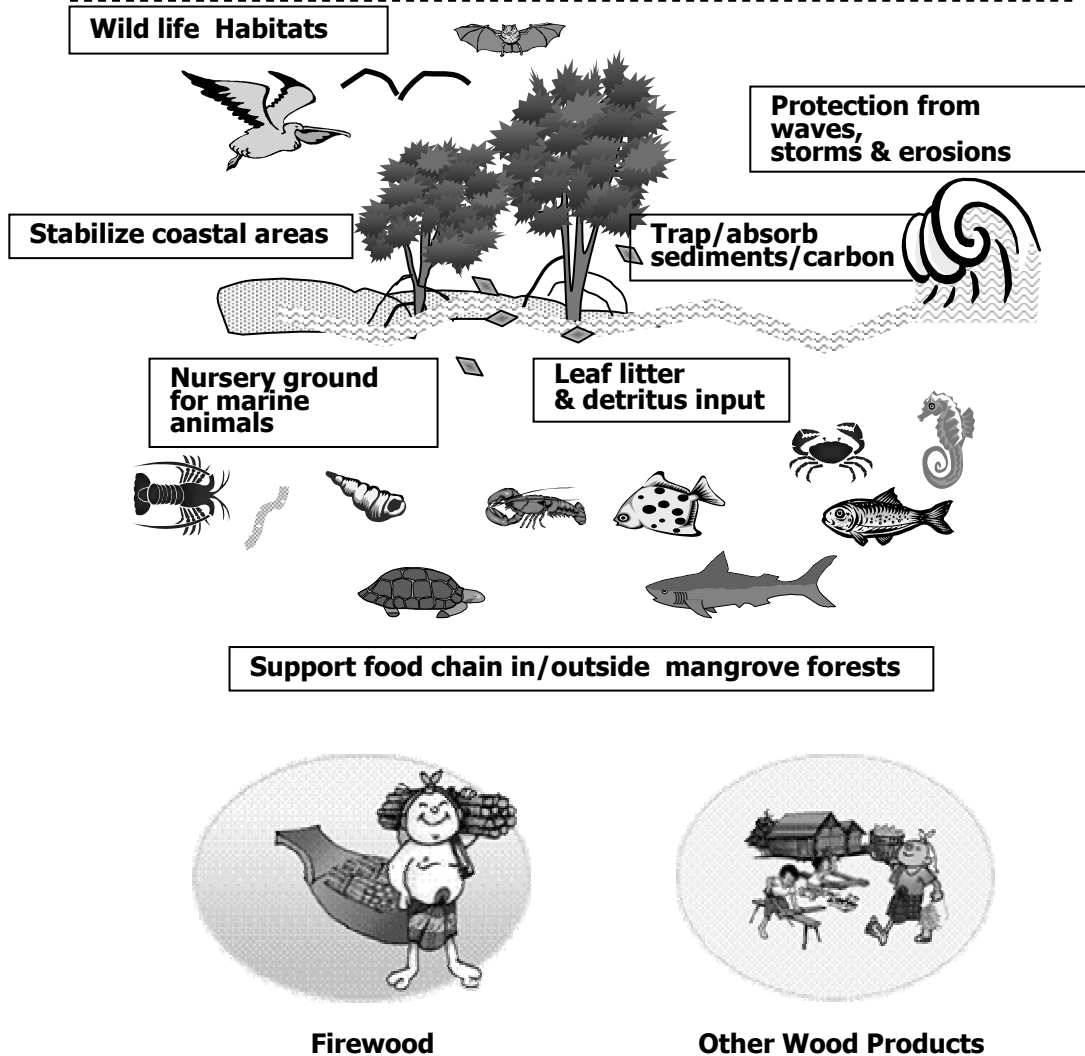
Erosion of land
Not getting valuable mangrove products

With CF Activity

Without CF Activity

Ecological and Economical Benefits/Functions of Mangrove

Upon utilizing and managing mangrove resource, users shall be aware of the following functions and benefits which mangrove forests generate



FD Volume II: Villagers Enlightenment
II-1: Mangrove Environment

Direct and Indirect Benefits of Mangrove:

For human, mangrove forests generate, benefits such as natural environment protection, daily uses and socioeconomic development of local communities.

Direct Benefits

Wood Products

- Firewood & Charcoal
- Construction materials
- Fodder & Green Manure
- Chip & Pulp

Non-timber Forest Products (NTFP)

- Dyes & Tannins
- Food & Beverage
- Medicine

Indirect Products

- Fishery Products
(fish, crustaceans, mollusks)
- Apiculture
- Terrestrial Animals
(birds, mammals, reptiles)

- Raw Material for industries
- Providing household income and employment

Indirect Benefits

- Protection from tidal waves, storms, & wind
- Reduction of silt/sediments/ Organic Pollutants in Water Flow
- Stability of Riverbanks and Coast lines
- Shelters & Nursing Grounds for Marine Organisms
- Food Supply for Marine Organisms
- Habitat for Wildlife
- Research & Education
- Recreation & Tourism
- Biodiversity

FD Volume II: Villagers Enlightenment
II-1: Mangrove Environment

II-3

Current Status of Mangrove Forest:

Key Points

- Currently, mangrove forests in the delta are disappearing at rapid rate.
- There are various reasons for such decrease, but the mangrove destruction is mainly caused by vicious circle (refer to "II-2: Soil/Land Environment" for details).

Transition of Mangrove Forest Areas

Reserved Forest (ha)		Mangrove Area (ha)	
RF	Study Area	1995	2001
Pyindaye	77,000	58,000	34,000
Meinmahla	14,000	12,000	12,000
Kadonkani	61,000	34,000	21,000
Pyinalan	44,000	28,000	25,000
Kyakankwinpauk	29,000	15,000	10,000
Total	223,000	147,000 (66%)	103,000 (46%)

30% of remaining mangrove forests have disappeared between 1995 to 2001.



Mangrove forests will be totally lost by 2015 under current destruction rate!!

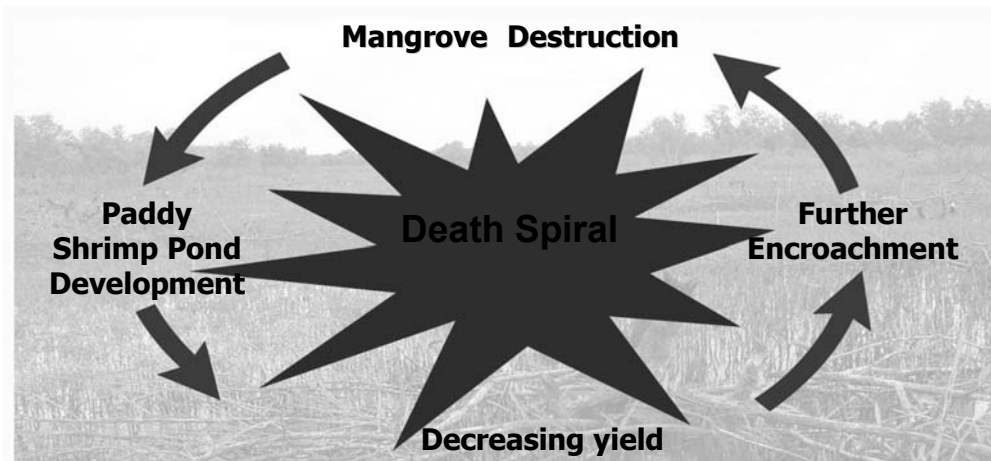


Countermeasures to protect and rehabilitate mangrove resources are crucial!!

Soil Fertility/Bank erosion/Agroforestry/Double Cropping

Key points

- **Encroachment of the mangrove caused by Vicious Circle**
- **The vicious circle is caused by low cultivation techniques and small input for agricultural production**
- **Also increasing population and demand for production accelerates the vicious circle (refer to II-3: Living Environment for details)**
- **Low cultivation techniques results in low yield, thus requires additional areas for agricultural production**
- **Excessive paddy development causes bank erosion and further mangrove encroachment**



Yield of Paddy (kg/acre)

The Average Unit Yield is only 60% of Country and Ayeyawady Division!!

Reserved forest	Ayeyawady Div.	Country Average
924	1,566	1,472

Limited Benefits from Paddy inside the Reserved Forests!!

The Land and Soil of Paddy Have to be Protected by Mangrove!!

FD Volume II: Villagers Enlightenment
II-2: Soil/Land Environment

II-5

Soil Fertility/Bank erosion/Agroforestry/Double Cropping

Key points (Continued)

- Not only paddy production, but also yields of other agricultural crops are low in reserved forests
- Countermeasures such as agroforestry and double cropping shall be applied for soil improvement and/or for prevention of bank erosion
- Countermeasures shall be implemented as CF activities

Methodology

- Target is CF user groups
- Agricultural activities to be conducted under CF as one of CF prototypes: CF Paddy, CF Agroforestry, CF Aqua-agroforestry, etc.
- CF Agroforestry: Alley cropping, aqua-agroforestry, and boarder/windbreak
- Double Cropping: Stops deterioration of soil during summer season
- Combination with compost making for improvement of soil fertility and production

Rules

- Agricultural production inside reserved forests to be certified under CF
- Collaboration among concerned offices (FD, agriculture, fishery, local authorities, etc.) for erosion protection and production
- First step is for development relationship of mutual trust between villagers and FD
- Then arrange the agriculture and fishery technology support

Agricultural Yield Comparison

Species	Production (acre/kg)			Difference	
	RF	Country	Ayeyawady	Country	Ayeyawady
Sesamum	87	165	164	53%	53%
Sunflower	82	161	147	51%	56%
Ground nut (husk)	450	590	490	76%	92%
Green gram (Paedesein)	98	306	335	32%	29%
Black-eyed pea	256	-	-	-	-
Green gram (Matapae)	74	362	379	20%	20%
Cow pea	185	297	299	62%	62%
Coconuts (nos/acre)	1,963	1,058	1,220	185%	161%

After all, protection of national land and improvement of production through CF will protect Mangrove

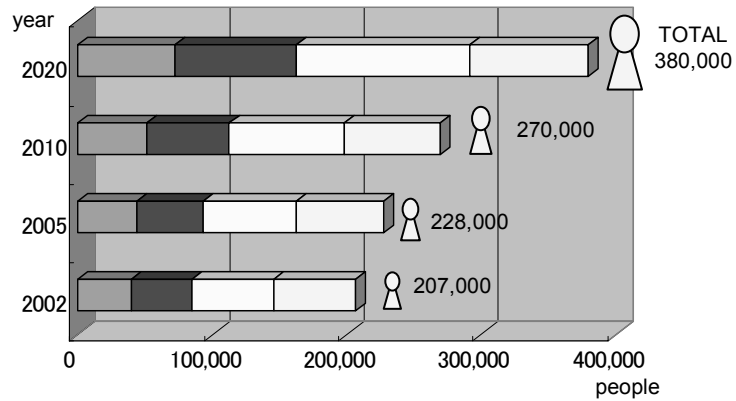
FD Volume II: Villagers Enlightenment II-3: Living Environment

Key points

- Population inside RF is increasing tremendously
- Higher Population growth rate than outside of RFs (Bogalay, Laputa townships)
- Increasing population highly influences the deterioration of mangrove forests (refer to the "vicious circle")
- Promotion and Implementation of CF is the most reasonable option to rehabilitate mangrove forests and improve the livelihood of population inside RFs
- Diversification of CF activities is essential for sustainable promotion and implementation of CF inside RFs
- The community forestry can control population growth of the reserved forest in the delta, because of exclusive use of the community forestry area by the CF user group member.

Illegal Settlement in the RF

-  Kyakankwinpauk
-  Pyinalan
-  Kadonkani
-  Pyindaye



More Rapid Annual Population Growth in RF!  RF = **3.3%**
Lpt & Bgl Tsp. = 1.9%

Vicious Circle will be accelerated by population increase, and results in higher rate of mangrove deterioration!!



Control of Migration shall be seriously considered to protect mangrove forests and existing population inside RF



Promotion and implementation of CF is one possible measure to protect/ rehabilitate mangrove forests and improvement of livelihood of existing population inside RFs

FD Volume II: Villagers Enlightenment II-3: Living Environment

Key points

- Rain is the only fresh water resource of the delta (except for some limited areas with wells)
- Water is the foundation of life and economic activities, so the number of water reservoirs needs to be increased
- Promotion and diffusion of water reservoir construction
- Promotion of public (village) water reservoir for drinking water under the community forestry system
- Promotion of private water reservoir for home gardens
- Promotion of water reservoir construction and maintenance under CF (CF water reservoir)
- Water management as a CF user group activity
- CF water reservoir can provide services not only to user group members but to all villagers, including poverty households

Utilization

- Instead of digging type, embankment type water reservoirs shall be promoted to adapt to the delta landscape, i.e. protection from intrusion of salty water
- Reinforced embankment by buffalo compaction with coconut fiber for protection of water intrusion
- Utilization of local material: buffalo, clay, poles, bamboo sheet, and coconut fiber
- No plantation of fruit trees or vegetables on the water reservoir bank

Shortage of Drinking Water

- Forty-two percent of households purchase drinking water in the delta
- There is no irrigation Water
- Estimated economic loss is caused by water shortage (5,000 ks/season/HH)
- Not only quantity but also quality of water shall be improved for the livelihood improvement of local people (refer to "water filtration" of Volume V for details)

Subject/Year	2002	2005	2010	2020
Estimated Population	206,939	228,500	270,200	379,300
Population purchasing Water	85,259	94,142	111,322	156,272
Gross Water Price (x 1,000 kyat)	69,060	86,524	120,301	208,672

FD Volume II: Villagers Enlightenment II-3: Living Environment

Diversification of Activities

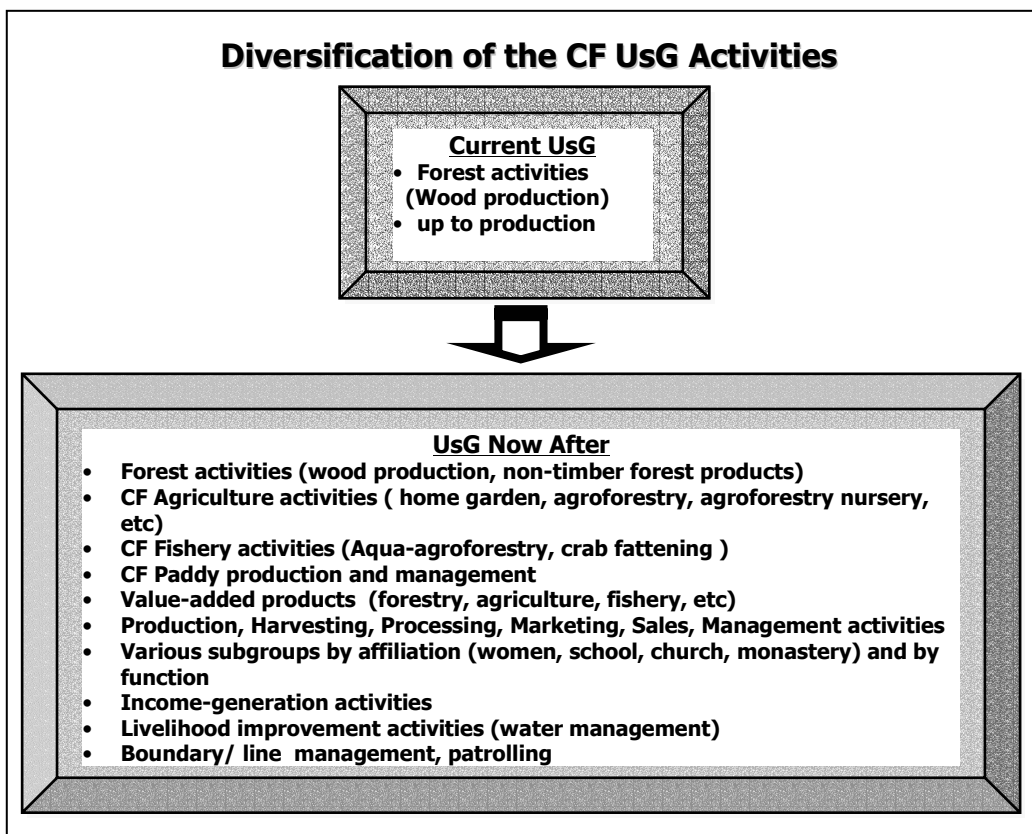
Key points

To overcome the vicious circle, and to sustain mangrove resources and livelihood of people inside reserved forests:

- Diversified activities are necessary to match the reality and the needs of local people
- Promotion and consolidation of group activities
- Of group activities, CF activities by user groups shall be prioritized inside reserved forests
- CF activities cover not only forestry, but also various production, protection, processing, marketing, sales, group management activities.

Utilization

- UsG activities by the whole UsG, by subgroup, and by individual, based on the type and objectives of activities
- CF prototypes are applied as diversification of CF activities



II-9

**FD Volume II: Villagers Enlightenment
II-4: School Children Environmental Education
Mangrove Conservation from School!**

Necessity of Environmental Education

- **Why Environmental Education?**
 - Many villagers notice the degradation of natural resources and forest products.
 - But they are not aware of the coming result of mangrove degradation on their livelihood.
 - Children are the inheritors of the Mangroves
 - Natural resources have to be rehabilitated and conserved
 - Therefore, the education of children about the importance of environmental conservation / mangrove rehabilitation is essential.
- **School as Center of Environmental Education of Child for Mangrove Conservation**
 - Environmental education at school is one of the key activities of villagers' enlightenment.
 - Education during childhood stays throughout their life.
 - School teachers can be leaders of environmental education
 - Therefore, the forest department shall proceed children's environmental education in collaboration with school and school teachers
- **Role of Forest Department**
 - Forest staff trained in environmental issues can supply text and materials for environmental education to schools and school teachers
 - The environmental education of school children have to combine lectures in the class room and field training such as school woodlot, school nursery, etc and visiting mangrove areas
 - Therefore, the forest department has to support the field trainings and take school children to core zones, protected areas, and successful CF plantations of mangrove area.

Advantageous Activities

- **Mangrove Conservation Education**
 - Teacher's training and workshops at the Extension Center given by FD Staff
 - Lectures to children by trained teachers in classroom once a year
 - Participatory learning: children observe the actual state of mangroves in the village
 - Field visit to core zones, protected areas and successful CF plantation
- **School Nursery**
 - A good experience for children's participation in the mangrove conservation
 - There is an example of school nursery in Pyindaye RF
- **School Planting Activity**
 - A good experience for children's participation in mangrove protection
 - Experience of cooperation work among children
- **CF School Woodlots**
 - CF UsG formed by PTA members, and CF activities continuously implemented by successive PTA members
 - Production from CF activities shall be distributed to maintenance of school facilities and activities

FD Volume II: Villagers Enlightenment
II-4: School Children Environmental Education

II-10

**Mangrove Conservation from School!
(continued)**

Expected Outcomes

Expansion of Awareness toward Mangrove Conservation

- Experience and knowledge received in childhood continue for a whole lifetime
- Experience and knowledge of children are transferred to their parents and other adults
- Experience of cooperative work may modify the Burmese tradition of individual, separate work

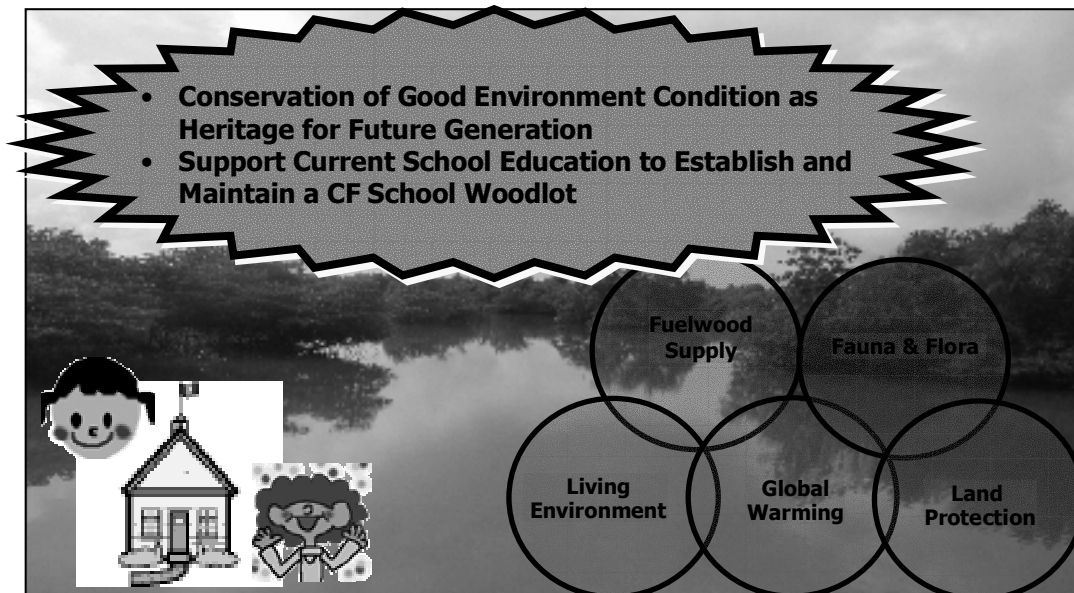
Commitment to the actual mangrove conservation activities

- Knowledge of environmental issues will be diffused from children to parents and surrounding adults
- They are expected to start to think of the environmental balance when they use and cut the mangrove forest.
- As a result, the speed of mangrove degradation is expected to lessen
- School plantation itself is important for mangrove conservation
- In the near future, the proportion of local people educated on environmental issues will increase.

Obtain successful experience for mangrove conservation and production activities

- CF woodlots, CF school nursery, CF school plantations etc. enables successful experiences for mangrove conservation and production to be obtained

Image chart of school plantation or participatory learning



FD Volume II: Villagers Enlightenment II-5: What is CFI and CF?

II-11

Key Points

1. Definition of the Community Forestry

- By groups consisting of people living in the area or nearby
- Purpose: for local supply, environment and national economy
- Target area: where existing needs of forest and forestry products through self production
- Land use of CF area: only forest is permitted as land use type

2. Rational for Applying / Promoting of the Community Forestry

- Right and duty to use and maintain CF lands for first 30 years and expandable for another 30 years
- Production
 - Expected preliminary products: wood, timber and NTFP (non-timber forest products: mushrooms, flower, bamboo, medicinal material, fish, livestock, domestic fowl, etc)
 - Expected secondary products: preliminary processed products such as charcoal, fish paste, sprouted seeds
- Protection of national land, disaster prevention, and environmental conservation

3. CF Activities

- Group operation: planning and operation and management of CF user groups
- Production: CF plantation, NFIO, CF agroforestry, CF public woodlot, other CF prototypes, and
- Post harvest, processing, sales and benefit sharing

4. Benefit and Incentives

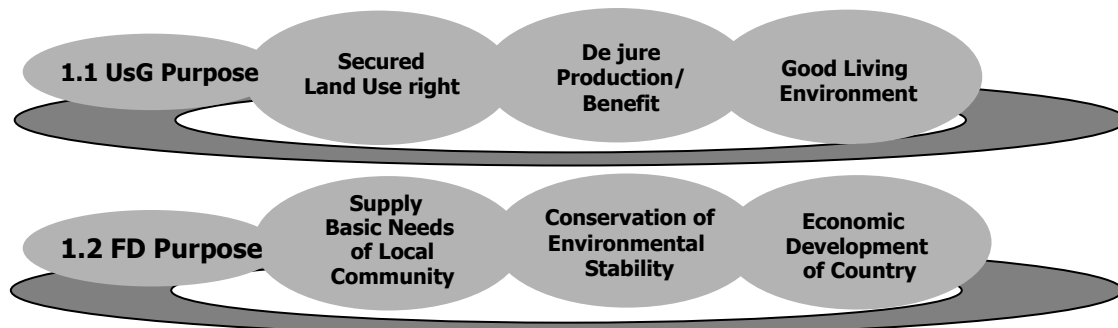
4.1 Of Community/People

- Short term: short cycle products i.e. fish products, sprouted seed, and land use rights
- Mid term: seasonal cycle products: i.e. agroforestry products, livestock, domestic fowl, etc
- Long term: wood/timber products, heritage of good environment and saving of tree for succeeding generations
- Capacity development/poverty alleviation

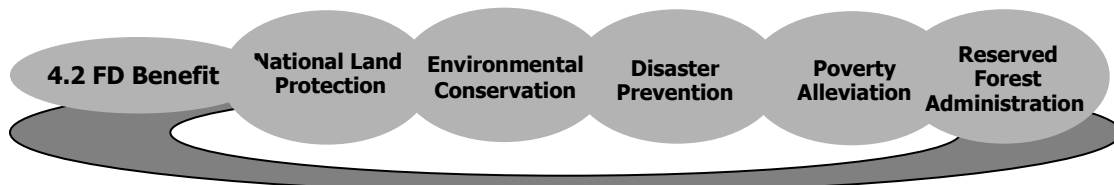
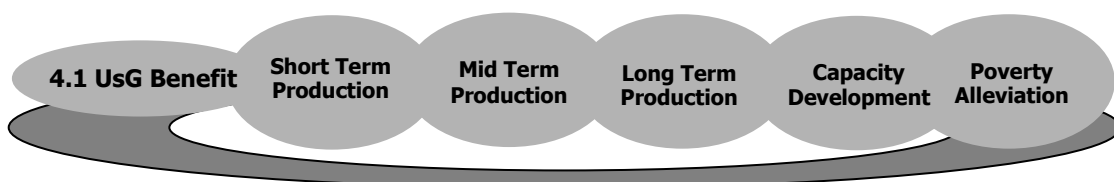
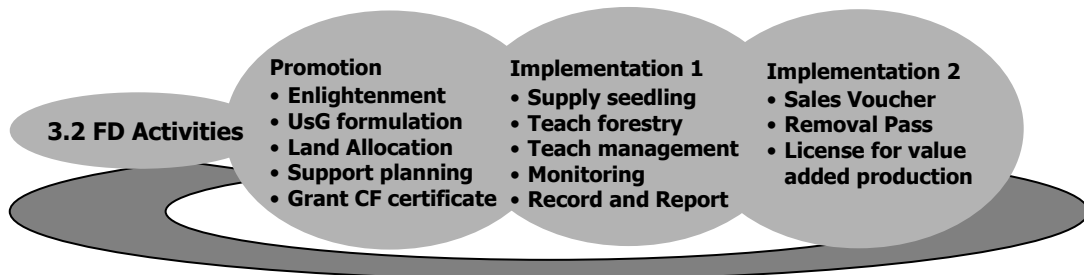
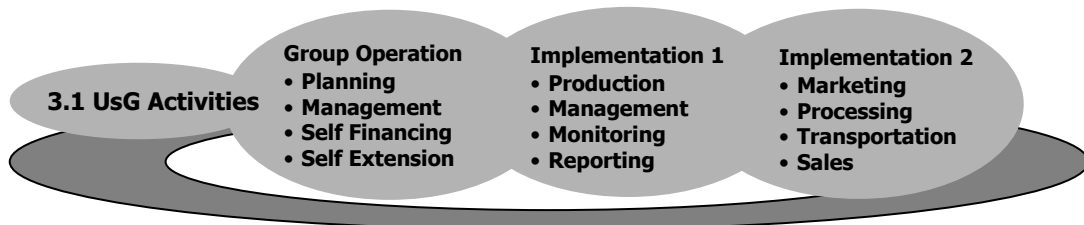
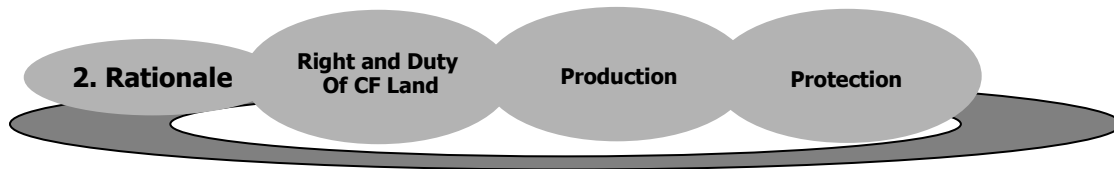
4.2 Of the Forest Department/Government

- Maintaining national land in collaboration with the people engaged in CF
- Conservation of environmental condition through CF
- Disaster prevention
- Poverty alleviation
- Administration of the reserved forest through CF

Key Points



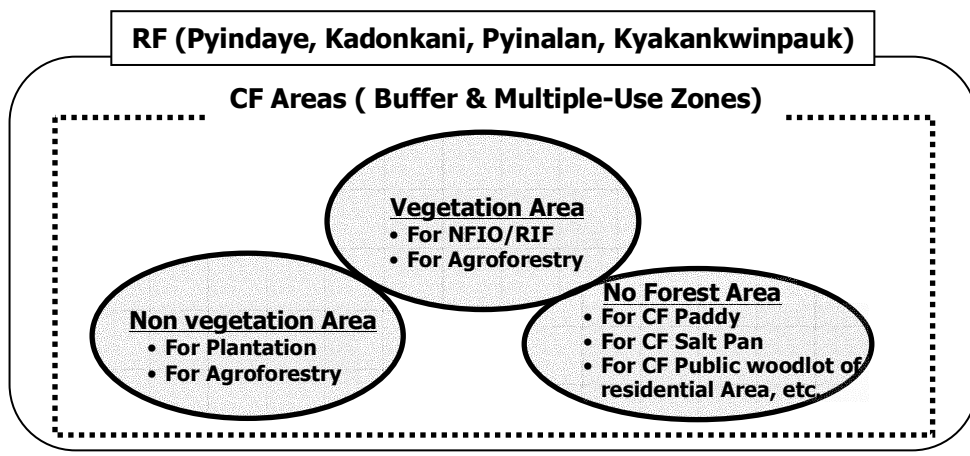
II-5: What is CFI and CF?



II-5: What is CFI and CF?

5. Target Areas for CF (approximately 261,000 acres)

- All of non FD direct operation areas in Buffer and Multiple-use zones are targeted for CF certified areas (except for Meinmahla RF)

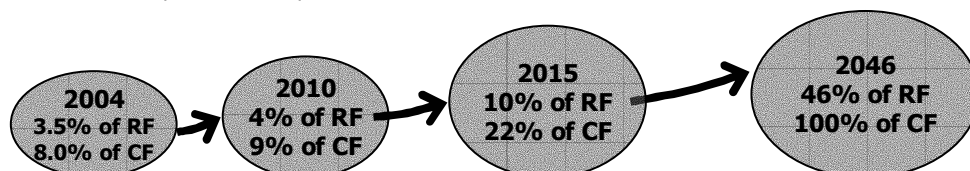


6. Status & Target UsG and Area (tentative)

- By 2045/2046, all settlements inside reserved forests are expected to join in user groups and participate in CF activities
- By 2045/2046, all areas eligible for CF activities inside reserved forests are expected to be certified with CF certificates and subject to CF activities

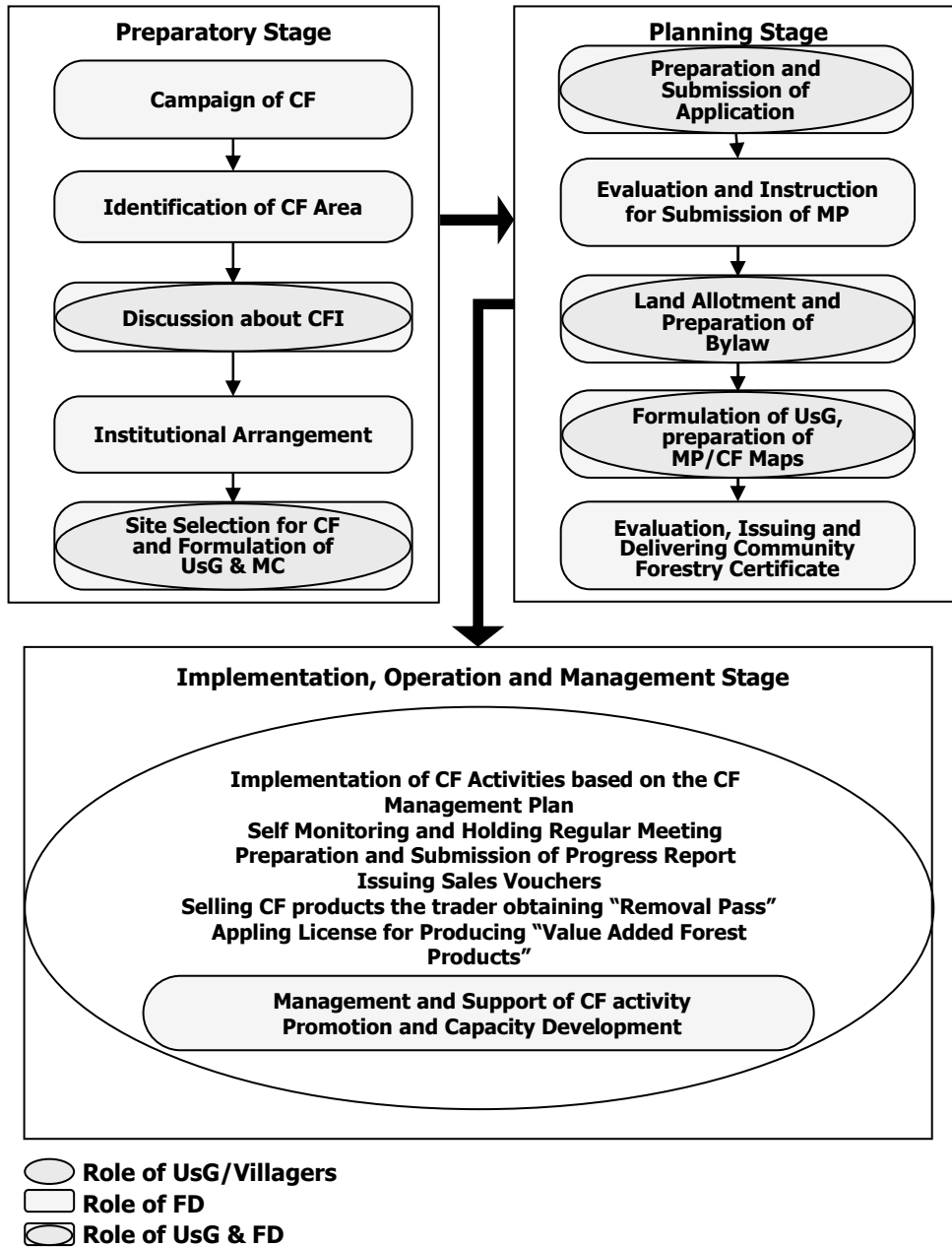
	New UG No	new CF area (acre)	Total UG No	Total CF Area (acre)
2046		204,351		261,000
2015	100	33,500	190	56,649
2010	10	3,400	90	23,149
2004	80	19,749	80	19,749

Note: current status as of March 2004 includes some UsG and CF areas in Kakayn RF of Laputta Township



II-5: What is CFI and CF?

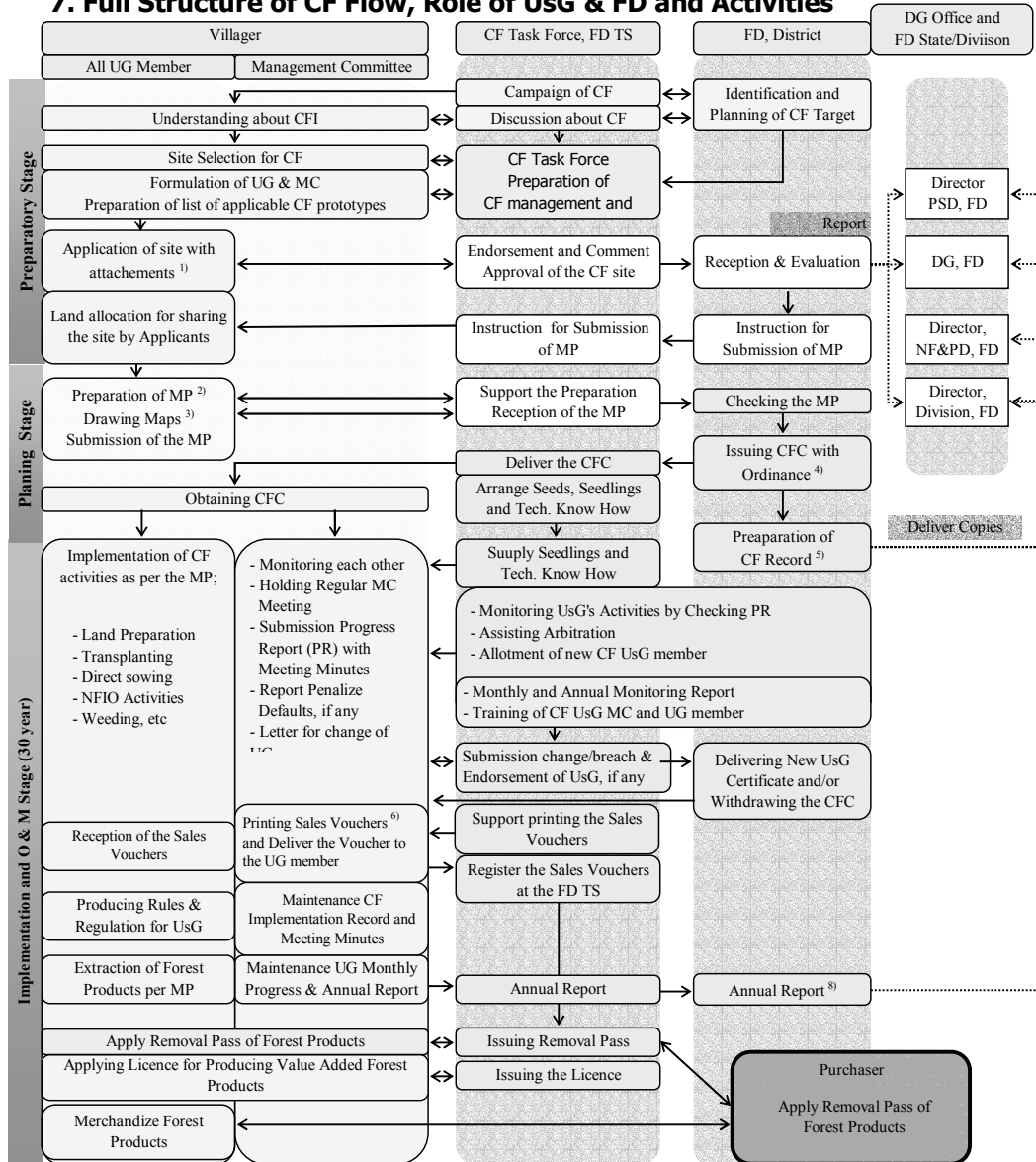
6. Overall Procedure, Role of UsG & FD and Activities



II-5: What is CFI and CF?

II-15

7. Full Structure of CF Flow, Role of UsG & FD and Activities



- Notes:
- 1) Attachements are 1) PRA map, 2) Appendix "form 1", 3) Member list & signature, and 4) Meeting minutes
 - 2) Selection of species, establishment of plantation and maintenance and rehabilitation of natural degraded forest (NFIO)
 - 3) Maps are 1) Location map, 2) Stock map, and 3) Management map
 - 4) The ordinances are; 1) CFI, 2) Forest Law, 3) Forest rules and regulations, and 4) Special Instruction for CF
 - 5) The CF record is composed by; 1) Application, 2) Approval of township beat officer, 3) Approval of Asst. Director.
 - 6) Three kinds of sales vouchers for distribute forest products to 1) within the village, 2) within the T.S. and 3) outside the T.
 - 7) The Rules and Regulation for UsG is constitution of the CF UsG. Required its preparation as of first activity of CF.
 - 8) The Annual Report is evaluated by ASD and reported.
 - 9) Bolded items are recommended subjects for reinforcement of the CFI operation.

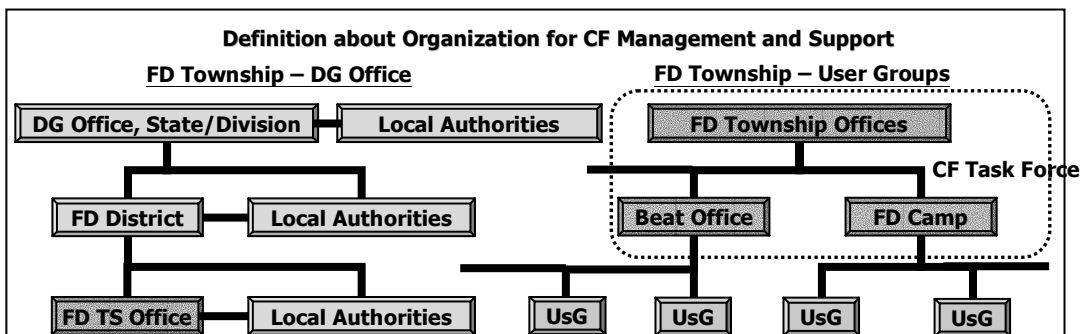
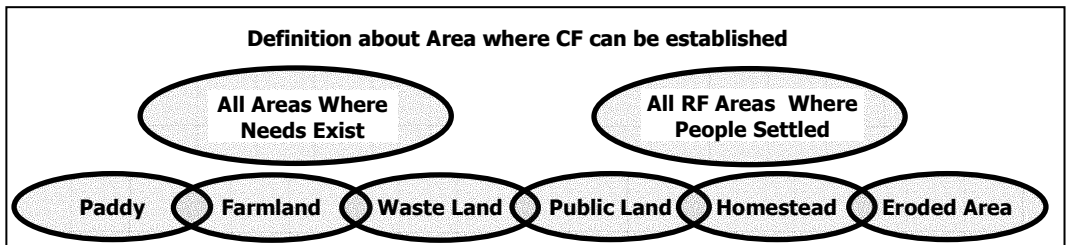
FD Volume III: CF Management III-1 CF Management Preparatory Stage

III-1

Campaign-Discussion-Site Selection

Key points

1. Target area for the Promotion of Community Forestry
 2. FD Organization for CF Management and Support
 3. Approach to the Campaign for Community Forestry
 4. Target Villagers for CF Promotion
 5. Site Selection
1. Target area
 - All areas where the needs exists for wood/NTFP products, and other products
 - All areas where people settled inside reserved forests
 2. FD Organization for CF Management and Support
 - First formulate organization for CF management and support at FD district and township offices.
 - Connect user groups and FD district office through FD Township office by the organization.
 - Set Up CF Support Organization with Local Authorities concerned i.e. Peace and Development Council, Myanma Agriculture Service, Fishery Dept., etc. at district, townships and Village Tracts, or formulate CF task force for CF Management and Support
 3. Approach (how to start the community forestry)
 - FD townships in collaboration with FD districts shall prepare the CF Promotion Plan for setting promotion areas
 - Conduct campaigns about CF with local authorities based on their understanding about CF
 - Promote CF based on expected benefits and activities for all kinds of villagers
 4. Target Villagers for CF Promotion
 - Promote CF to all strata of villagers i.e. Land Owner-Farmer, Casual Labor-Landless, Fisher men
 - Promote CF to all villagers who need wood products for their life and economic activities
 - Promote CF based on villagers understanding about benefits and incentives of CF
 5. Selection of CF area
 - Select CF areas for all type of Land Use i.e. paddy, waste land, home, factory, office, school, etc.
 - Select good access areas for user group members



FD Volume III: CF Management III-1 CFI Management Preparatory Stage

Formulation of UsG & Management Committee (MC)

Key points

1. Set duties of the FD camps, beat offices, or CF task forces for formulation of UsG and MC
2. Start the formulation of UsG at villages which possess high incentive for CF, based on CF promotion results
3. Gather all villagers at a meeting for selection of user group members and MC members
4. Request support to local authorities for the meeting
5. Sub groups have to be formulated based on needs of activities and will of UsG members

Procedure

- First, select MC members by election
- Basically five MC members: Chairman, Secretary, Member, Extension leaders (2)
- Then, register all UsG members
- The first activity of UsG is development of a set of bylaws
- The bylaws have to define the land allocation and boundaries of CF areas to UsG members
- Then, in accordance with the bylaws, formulate of small groups/sub groups of the UsG

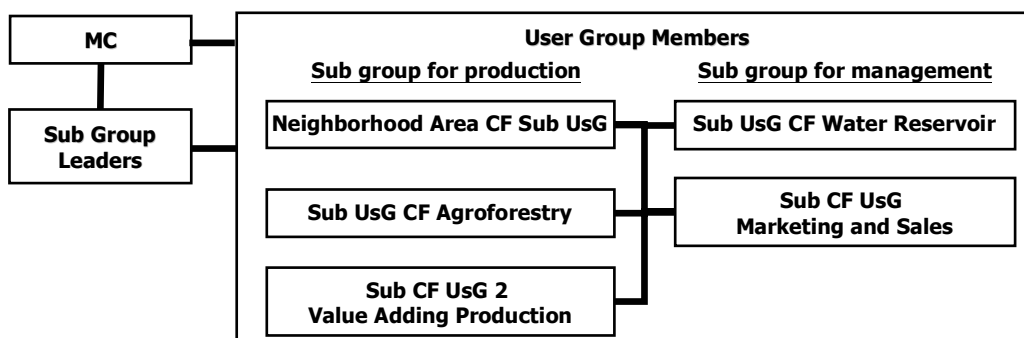
Rules for the Formulation

- MC members shall be selected by villagers own-selection
- Registration of CF user group members based on village level and by villagers
- Selection of UsG members from all village strata (farmers, labors, fishermen, traders, etc)

Sample Component of UsG Bylaw

1. Objectives
2. Member lists of UsG and MC
3. Duty of CF UsG MC members and CF User members
4. Joining of new members and withdrawal of existing members
5. Activities
6. Procedures for Planning and Preparation of Progress Report
7. Benefit sharing and Payment procedures
8. Information sharing for technology, market, and other necessary information
9. Accounting and auditing
10. Monitoring and evaluation procedures

Sample Organization of UsG



FD Volume III: CF Management III-1 CF Management Preparatory Stage

CF Prototypes- Towards Sustainable CF activities-

Key points

1. Rational

- Consider appropriate CF activities to match the natural and socio economic conditions of the CF area
- Consider the FD management and capacity to support CF based on the CF promotion plan prepared by the FD district office
- CF prototypes are for the diversification of CF activities
- CF prototypes mediate conflicts with existing non-forestry land uses in reserved forests

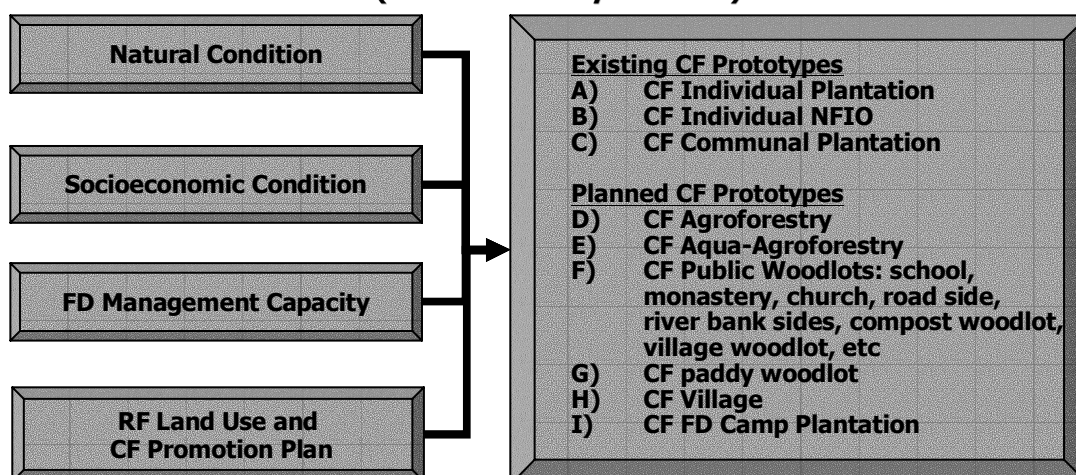
2. Survey to find CF activities appropriate to the area;

- Diversification of CF activity enables matching of needs with appropriate CF activities
- Survey socioeconomic conditions such as population density, land availability, number of workers per household, needs to wood products, production of NTFP, agroforestry, etc
- Survey natural conditions to know about soil fertility, soil erosion, existing species, etc., for selecting the matching CF activity to the area
- CF prototypes enables combination of non-forestry activities and forestry activities in the forest land

3. Procedure

- Based on the survey results, the FD starts supporting the preparation of proposals for the CF management plan
- To guide the preparation of proposals and CF management plan, CF prototypes should be considered and applied based on needs and existing situations
- FD extension staffs shall explain about natural and socioeconomic conditions and CF prototypes considers appropriate for the concerned CF area
- Then, based on CF UsG selection of their appropriate CF prototypes, CF management plans and proposals can be prepared

Samples of CF Prototypes possible to apply in the delta (Lessons from Pyinalan RF)



FD Volume III: CF Management III-1 CF Management Preparatory Stage

Preparation of Proposal

Key points

- FD CF charged staffs shall support making the CF management plan that is proposal of CF
- Support MC member and enable them to take initiative for preparation of a proposal
- Participatory (bottom up) approaches have to be taken for preparation of the proposal. The decision maker is CF UsG members
- For picking up wide range of CF UsG member's opinion, sub-group discussions of UsG are recommended

Procedure

- FD is responsible to supply free materials (paper, base maps, and writing instrument)
- Step 1; Support MC for preparation of a proposal
- Step 2; Support holding workshops for confirmation of the contents by UsG members
- Step 3; Support signing a member list by UsG members
- Step 4; Support MC for submission of the proposal

Rules

- Prepare proposal in accordance with CFI
- Prepare free services for the support to UsG members including direct cost such as transportation cost, lodging

Four Components of the Ideal Proposal
1) Proposal, 2) CF Map, 3) Member list with signature 4) Meeting Minutes

Sample Form of Proposal: CFI Attachment (1)
Application for Establishment of the CF
Through the Township Forest Officer of _____ Township **Date:** _____
To
The District Forest Officer
Myaungmya District, Ayeyawady division

1. User group mentioned in paragraph 2 from ____ Township, ____ Village comprising of households, hereby apply for the establishment of the Community Forest in the following forest land in accordance with the announcement made by the Director General of the Forest Department, Please find the enclosed map.

(a) Township: _____
 (b) Village: _____
 (c) Name of Forest/location: _____
 (d) Boundary East: ` ` ", West: ` ` ", South: ` ` ", North: ` ` "
 (e) Area: ____ acre
 (f) Type of forest: Plantation, NFIO/RIF, Agroforestry
 (g) Land ownership: FD

2. Member of the user group are as follow:

No	Name	Father's name	NRC No	Signature
1.				
2.				

3. If it is approved, user group hereby declare to follow the community forestry rules, regulations and instructions and forest laws and acts issued, and strive for the long term benefit of the village populace and the development of the Community Forest.

Signature of the chairman of user group _____
 Name of the chairman of the user group _____
 Date _____

FD Volume III: CF Management III-1 CF Management Preparatory Stage

Preparation of CF Management Plan, Drawing CF Maps

Key points for CF Management Plan and CF Maps

- FD has to support UsG with preparation of CF management plans and drawing CF maps
- CF maps have to be prepared based on CF activities (select CF prototypes)
- Prepare maps of individual CF activities for each CF UsG member.
- Stock maps that enable harvesting plan shall preparation be prepared

Procedure for preparation of the CF Management Plan (MP)

- **First step: Selection of CF prototypes**
- **Second step: Allotment of CF lands that enable implementation of selected CF prototypes (installation of permanent stakes around 1ha CF area along with demarcation lines)**
- **Third Step: Drawing management maps (planning) and, source (stock) maps,**
- **Preparation of MP**
 - Prepare the first 5 years MP including planting, tending and harvesting plan
 - Then prepare whole 30-years MP based on the instruction of the CFI
 - UsG pledges to practice the same activities for the succeeding 25 years

Base map

- FD has to supply free base maps for preparation of location and management maps (or needs to approve base maps for usage as CF maps by UsG)
- FD has to provide free service for submission of the MP

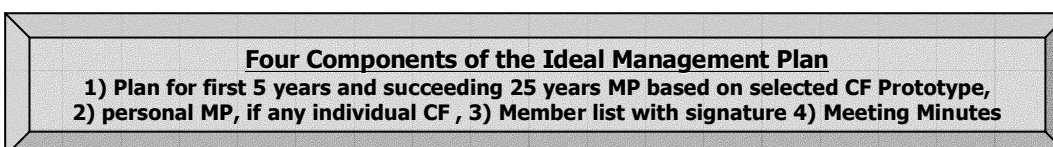
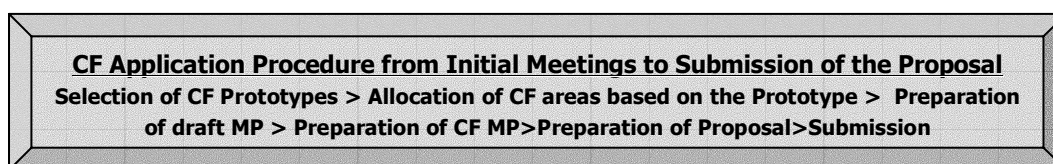


Table of Contents of MP, Personal MP for Forestry and Agroforestry (Sample)

MP	Personal MP (Forestry)	Personal MP (Agroforestry)
1. Introduction	1. Nursery	1. Crop selection
1.1 bylaw	2. Site preparation	2. Land preparation
- Member of UG and MC	3. Planting	3. Planting
- Objectives	4. Weeding	4. Watering
- Activities	5. Tending	5. Harvesting
- Patrolling	6. Rotation plan	6. Processing
- Monitoring and Evaluation	7. Felling	7. Distribution
2. Location and Area	8. Processing	
3. Natural conditions	9. Distribution	

FD Volume III: CF Management
 III-2 CF Management Implementation Stage
Monitoring, Regular Meeting, Preparation of Pr/R, Line Management

III-6

Key points

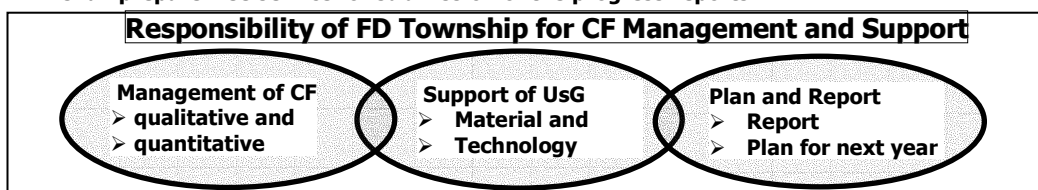
- FD shall manage and support CF activities during CF implementation stage, otherwise CF will not be sustainable.
- Objectives of the CF management and support; confirmation of progress, technology and management support, problem solving, patrolling, planning for succeeding year's activity
- Checking of the land mark every year to confirm CF boundary (boundary management)
- Line management to be a part of annual progress check and monitoring
- FD shall visit CF activity sites at least twice a month for monitoring and to provide support

Procedure of the monthly and annual progress meeting

- FD shall support MC for preparation of monthly and annual Progress Report of CF UsG
- FD shall guide MC to hold monthly regular meetings concerning CF activities
- Confirm of progresses of CF activities with MC and Sub-group leaders of UsG

Rules

- Periodic monitoring at sites and regular meetings are essential
- Practical boundary management shall be practiced (new stakes, marks, etc) every year by participation of concerned UsG members
- FD shall prepare free service for submission of the progress reports



Sample Form of Progress Reports

Monthly UG Pr/R	Annual UG Pr/R	Contents of Annual Action Plan
1. NFIO/RIF	1. NFIO/RIF	1. NFIO/RIF
- Area (UG total): acre	- Area (UG total): acre	- Area (UG total): acre
- Tree species present:	- Tree species present:	- Tree species present:
- Cultural techniques:	- Cultural techniques:	- Cultural techniques:
- Condition:	- Condition:	- Condition:
2. Forest plantation	2. Forest plantation	2. Forest plantation
- Area: acre	- Area (UG total): acre	- Area (UG total): acre
- Tree species planted:	- Tree species planted:	- Tree species planted:
- Cultural techniques:	- Cultural techniques:	- Cultural techniques:
- Condition:	- Condition:	- Condition:
3. Agroforestry	3. Agroforestry	3. Agroforestry
- Area (UG total): acre	- Area (UG total): acre	- Area (UG total): acre
- Species practicing:	- Species practicing:	- Species practicing:
4. Forest Production (amount)	4. Forest Production (amount)	4. Working schedule:
5. Distribution of products (price)	5. Distribution of products (price)	5. Forest Production (amount)
- within the UG: ks	- within the UG: ks	6. Distribution of products (price)
- within the village: ks	- within the village: ks	7. Needs of support: seedling, training, patrolling, etc
- outside the village: ks	- outside the village: ks	
6. Needs of support	6. Condition of UG and member	

III-7

FD Volume III: CF Management
III-2 CF Management Implementation Stage

**Marketing & Sales of CF Products, Sales Voucher,
Removal Pass, Value-added Products**

Key points

- CF activities cannot be without production-benefit from the CF activities
- Individual CF UsG can not produce and sell the CF products without support of FD
- FD has to support issuing "Sales Voucher" based on stock maps and management plans
- FD shall conduct necessary support in collaboration with the Fishery Dept., Myanma Agriculture Services, based on necessity of CF activities
- FD has to support UsG for "Value Adding Production" and Sales of CF products

Marketing and Sales

- Selection of products/species for CF activities considering marketability and productivity
- Selection of products with different production periods, such as daily, seasonal and long term
- An example combination of CF products is daily/biweekly fishery products, seasonal products from agroforestry, and long-term wood products.

Sales Voucher/Removal Pass

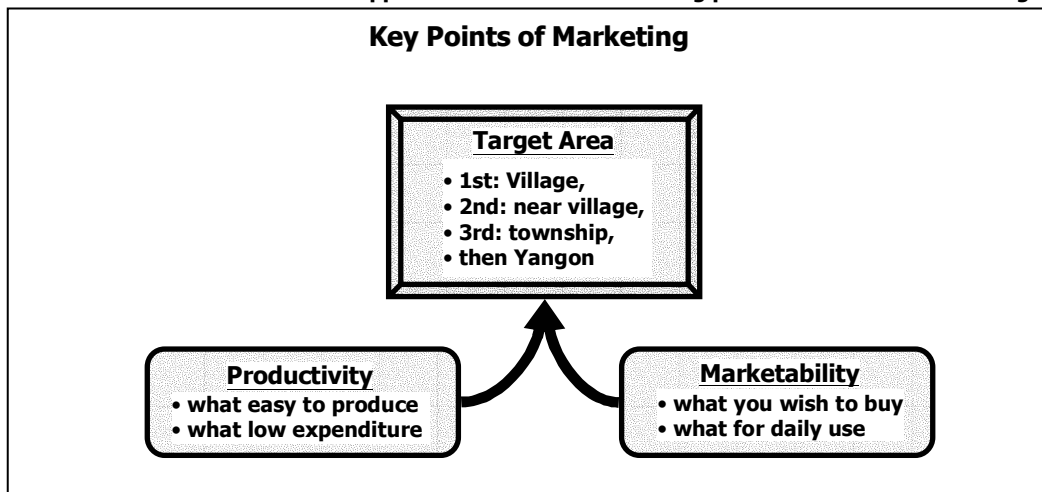
- FD shall support UsG by means of issuing sales voucher as official permit for selling CF products
- FD shall register the sales voucher based on harvest plans in the CF management plan
- FD shall support CF product traders for printing necessary documents and its registration

License for Value Adding Production

- Value Adding Production is efficient use of natural resources, so restart charcoal production and start other productions
- FD should obtain permission for value added production from the concerned authorities and then promote the production
- FD shall issue the license to UsG interested in the production
- FD should support and manage the production and sales of value added products

Rules

- Patrol to identify illegal activities by FD in collaboration with UsG and local authorities and supports UsG
- FD shall maintain continuous support for CF activities including production and official selling



FD Volume III: CF Management III-2 CFI Management Implementation Stage Harvesting Plan

Key points

- Forest department supports user groups to prepare harvesting plan as a part of CF management plan and annual plan under community forestry activities.
- Based on the harvesting plan, user groups prepare sales vouchers.
- In principle, selection-felling, no clear-felling

Procedure for preparation of harvesting plan by user groups

- **Step1: Preparatory work**
 - ✓ Grasp existing stocks of trees within CF areas
 - ✓ Consider efficient felling methods and rotations
 - ✓ Study needs of CF (forest) products in a market
 - ✓ Prepare harvesting plans using sample format such as shown below
 - ✓ Estimate target selection-felling volume
- **Step2: Preparation of a harvesting map based on management maps and stock maps**
- **Step3: Field survey for selection, marking and inventory of all candidate felling trees**
- **Step4: Estimation of harvesting volume of the marked candidate felling trees**
- **Step5: Preparation and finalization of harvesting plan based on the estimation**

Step 1 Preparatory work

Sample format of a harvesting plan (summary)

Harvesting plan in 20XX

Name of Village _____
 Name of user group : _____
 No/Name of sub-group : _____
 Harvesting Area (acre): _____
 Prepared by : _____
 Date of preparation : _____

1. Number of target felling trees and estimation of felling volume by species

Name of species _____ A _____ : usage _____ : _____ trees : _____	_	cu.ft.
Name of species _____ B _____ : usage _____ : _____ trees : _____		cu.ft.
Name of species _____ B _____ : usage _____ : _____ trees : _____		cu.ft.
.....		

2. Schedule of harvesting

month	1	2	3	4	5	6	7	8	9	10	11	12
harvesting										x	x	x

Prepared by: _____ Signature _____ Approved by: _____ Signature _____

Name of user group, village
(name of a responsible person)

Name of forest department office
(name of a responsible officer)

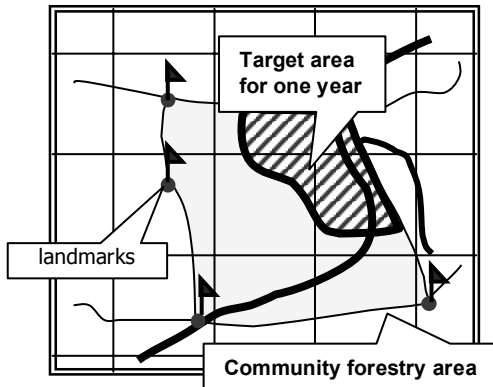
Attachment : field survey record (one copy)

FD Volume III: CF Management
 III-2 CFI Management Implementation Stage

III-9

Harvesting Plan

Step 2 Preparation of a harvesting map based on management/stock maps

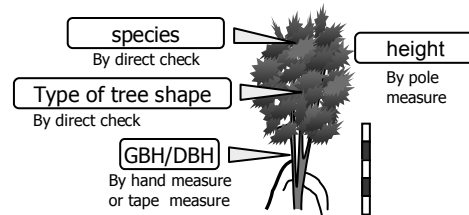


- Utilize CF management maps together with topographic map showing important information such as the boundary of management areas, creeks, access to site, etc.
- Delineate a target area on the map by hand during a discussion of UsG members
- It is not necessary to submit a harvesting map to FD, only for supplemental information for user group itself and its CF management plan.
- In field surveys, user groups can record a rough location of target trees on the map directly.
- If GPS is available, the harvesting map shall be more accurate, and GPS makes it in easy to grasp the location of the target area in the field.

Step3 Field survey for marking candidate felling trees with recording

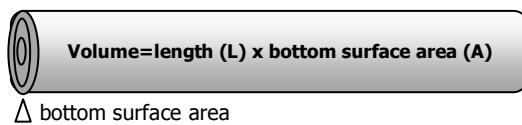
- Minimum requirement of contents of survey record for harvesting plan are as follows,

1. Species name,
2. Height (ft.),
3. Girth (or Diameter) at Breast Height (GBH/DBH) (inch), and
4. Type of tree shape (column or conical)

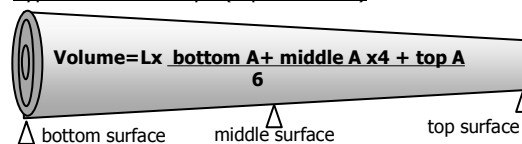


Step4 Estimation of harvesting volume by hand calculation

Type1: Column shape

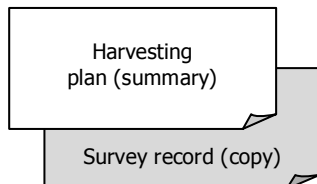


Type2: Conical Shape (top is smaller)



Note: Surface area = 0.785 x diameter x diameter = 0.080 x girth x girth

Step5 Finalization of the harvesting plan



- Estimate volumes of all candidate felling trees
- Decide final harvest trees based on not only economic aspect (quality of tree, price of tree at market etc.), but also environment aspect (sustainability of harvesting, biodiversity, density of forest etc.).
- After preparation of the harvesting plan survey records shall be attached as a reference.

FD Volume III: CF Management III-2 CFI Management Implementation Stage

Patrolling

Key points

- Performed as a collaboration among CF user groups, FD, and local authorities headed by the FD
- Purpose is to reduce illegal encroachment and trade of illegal production
- For prevention of forest fires during dry seasons and other potential damages to forests
- FD shall obtain understanding from local authorities about CFI and necessity of mangrove rehabilitation
- FD shall support UsG to initiate self patrolling activities to protect their own CF lands and resources with legal and administrative supports from FD and local authorities
- FD in collaboration with local authorities shall proceed patrols based on progress of public awareness about CF and advantages/disadvantages of illegal activities in reserved forests

Methodology

- FD shall coordinate the three groups of stakeholders for patrolling collaboration system
- FD district offices shall hold workshops in collaboration with DPDC for public awareness for distribution about the information on the mangrove critical situations and rehabilitation through CF
- FD township offices shall hold workshops in collaboration with TPDC based on the workshop at the district level for distribution of information on the mangrove critical situations and rehabilitation through CF
- FD shall support CF user group patrol plans including by operating a reporting system for reporting between user groups and FD, FD beat offices and a township office, user groups to local authorities (police), etc

Rules

- FD shall lead patrols of CF user group as watch and report
- FD shall take actions such as openly and fully reporting to CF user group about the watching report for inducing mutual understanding between CF user group and FD

Patrolling System

- Collaboration among UsG, FD, and Local Authorities -

