

Tables

Table 1.1 Detailed Activities in Phase I and II

Works/Period		Major Activities / Outputs
Phase I (Survey and formulation of the draft IMMP)		
Preparatory Work in Japan – Feb. 2002	(1)	Preparation of the Inception Report and the draft Technology Transfer Plan
First Work in Myanmar February – May, 2002	(2)	Presentation and Finalization of the Inception Report
	(3)	Presentation and Finalization of the Technology Transfer Plan
	(4)	Collection and Selection of Subcontractor for the Village Profile Survey
	(5)	Collection and Analysis of Relevant Data/Information, and Field Survey
	(6)	Review of Integrated Resource Management (IRM) of Kadonkani Reserved Forest
	(7)	Review of Community Forestry (CF) based on Community Forestry Instructions (CFI)
	(8)	Implementation of Village Profile Survey through Subcontracting
	(9)	Collection of Information on United Nations Development Program (UNDP) / Food and Agricultural Organization (FAO) Projects and Consideration of Collaborative Measures with the Study
	(10)	Literature Survey on Fauna and Flora
	(11)	Consideration of Concepts, Discussion and Selection on Revision of Geographic Information System (GIS)
	(12)	Discussion on Data Input Method for Forest Type Classification and Selection of Work Concept
	(13)	Field Reconnaissance (Present Conditions, Relations with People and Mangrove Forests)
	(14)	Understanding Changes in Land Cover and Land Use based on 1995, 2001 Land Use Map
	(15)	Aerial Photograph Interpretation (Forest Type Classification)
Second Work in Myanmar Sept- Dec, 2002	(16-1)	Implementation of village profile survey (2)
	(16-2)	Procurement of subcontractor for Rapid Rural Appraisal (RRA) (Understanding Needs and Problems of Local People)
	(17)	Local Workshop
	(18)	Digitization of Forest Type Classification to GIS
	(19)	Field Reconnaissance
	(20)	Field Survey and Interviews on Fauna and Flora
	(21)	Consideration of Fauna and Flora Conservation Guideline
	(22)	Socioeconomic Evaluation of Mangrove Forests
	(23)	Additional Data Input to GIS, Revision of Database, and Customize Software
	(24)	Implementation of Cost-Benefit Survey and Marketing Survey for Candidate Priority Projects
	(25)	Consideration of Basic Concepts for the IMMP
	(26)	Presentation and Discussion on Basic Concepts for the IMMP
	(27)	Initial Environmental Evaluation (IEE) and Feedback to the Draft IMMP
	(28)	Zoning for Mangrove Forestry Operation
	(29)	Formulation of draft IMMP
	(30)	Preparation of Management-planning Map
	(31)	Preparation and Discussion on Project Report
First Work in Japan Dec. 2002 - Jan. 2003	(32)	Formulation of the IMMP
	(33)	Preparation of draft Mangrove Forest Rehabilitation Manual for FD
	(34)	Preparation of draft Mangrove Forest Rehabilitation Manual for Community
	(35)	Preparation of draft Pilot Project Implementation Plan
	(36)	Preparation, Presentation and Discussion on Interim Report and Pilot Project with JICA

Works/Period	Major Activities / Outputs
Third Work in Myanmar Feb. – March, 2003	(37) Presentation and Discussion on Interim Report with the Counterpart agency (38) Discussion and Selection on Theme for the Pilot Project (39) Local Workshop with Agencies Concerned with Pilot Project (40) Preparation of Subcontractor Procurement for Implementation of Pilot Project (41) Field Survey and Preparatory Work of the Selected Pilot Project Site (42) Translation of draft Mangrove Forest Rehabilitation Manual for Community into Burmese
Phase II Implementation of the pilot project and revision of the IMMP	
Fourth Work-I in Myanmar April, 2003 – February 2004 (intermittent)	(43) Procurement of Subcontractor for Implementation of the Pilot Project (44) Workshop for Preparation of Action Plan for Pilot Project (45) Implementation of the subcontracted Pilot Project (46) Implementation of the direct operation Pilot Project (47-1) Operation, management and supervision of the Pilot Activities (48-2) Mid-term Evaluation of the Pilot Project (49) Mid-term Report of the Pilot Project
Fourth Work-II in Myanmar Feb. – March 2004	(50) Termination of subcontracted Pilot Project (51) Termination and transfer of direct operation Pilot Project (52) Consideration on Continuation Methods of Pilot Project after the Termination (53) Preparation, Presentation and Discussion of the Field Report
Fifth Work in Myanmar May – Nov. 2004 (intermittent)	(54-1) Implementation of PP 2004 (54-2) Operation, management and Supervision of PP 2004 (54-3) Local Workshop 2 at Myaung Mya district and Laputta township (54-4) Summary of application results and comments on the draft mangrove rehabilitation manual for FD and Local Community (54-5) Evaluation of Pilot Project 2003 and 2004 for Completion (55) Preparation of guideline for pilot project continuation (56) Discussion on Concepts on the Technology Transfer Seminar and Field Report 2
Second Work in Japan Nov. – Dec. 2004	(57) Revision and finalization of the IMMP (58) Completion of Mangrove Forest Rehabilitation Manual for the FD Frontline Staff of the Ayeyawady Delta and for Mangrove Forest Rehabilitation Manual for the Community of the Ayeyawady Delta (59) Preparation of the Draft Final Report (60) Preparation of the Materials for Technology Transfer Seminar
Sixth Work in Myanmar Jan. – Feb. 2005	(61) Completion of supporting pilot project 2004 continuation activities (62) Presentation and Discussion on Draft Final Report (63) Translation of Mangrove Forest Rehabilitation Manual for Community
Third Work in Japan Feb. – March 2005	(64) Revision and Finalization of Draft Final Report

Table 2.1 Mean Maximum and Minimum Temperature in Myaung Mya

Year	Mean Temperature (°C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1999	Maximum	31.1	34.5	35.0	35.2	31.0	-	-	30.3	30.7	31.2	31.2	-
	Minimum	13.0	18.9	17.2	19.1	14.1	-	-	15.9	17.1	16.7	15.7	-
2000	Maximum	31.0	33.3	35.1	35.0	31.4	30.8	31.4	32.4	31.1	31.1	31.4	30.5
	Minimum	15.7	17.5	20.8	15.6	16.8	16.5	15.7	17.9	16.4	16.0	15.3	11.9
2001	Maximum	30.1	32.4	34.3	37.3	32.9	32.3	30.9	31.0	30.7	31.3	31.9	31.3
	Minimum	11.1	15.5	22.5	23.7	20.9	21.2	19.7	15.4	20.2	21.1	18.3	17.9

note: “-“ no data

Source: Meteorological Department of Myanmar, 2002

Table 2.2 Humidity, Rainfall and Evaporation in Myaung Mya in 1991

Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Humidity (%)	65	60	68	63	62	86	91	92	84	84	73	63
Rainfall (mm)	0	0	0	2	24	790	731	695	198	210	8	43
Evaporation (mm)	3.7	4.3	5.9	5.9	6.0	4.9	4.5	4.4	4.6	4.3	4.0	3.4

Source: Meteorological Department of Myanmar, 1991

Table 2.3 Rainfall in Bogalay and Laputta (1998-2000)

Township	Year R	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Bogalay	1998	0	0	0	0	477	343	398	615	312	135	26	0	2,306
	1999	0	0	0	0	0	340	811	664	322	465	44	0	2,646
	2000	0	0	89	37	130	658	590	363	333	279	0	0	2,479
Laputta	1998	0	0	0	0	273	346	536	670	250	97	4	0	2,176
	1999	0	0	0	316	578	1482	815	681	511	95	107	0	4,585
	2000	0	0	0	50	158	921	715	675	368	404	9	0	3,300

Source: Meteorological Department of Myanmar, 2002

Table 2.4 Relationship between Myanmar Dates and Nature of Tides

No	Day, Waxing or Waning	Myanmar-Term	Nature of the Tides
1	First	Yehta	High rise
2	Second	Yehta	High rise
3	Third	Gaungye	Highest rise, spring tide
4	Fourth	Yesahmi	Almost as high as gaungye
5	Fifth	Yethe-u	Beginning of the low rise, medium rise lower each day
6	Sixth	Yethe-u	medium rise
7	Seventh	Yethe-u	medium rise
8	Eighth	Yethe	low rise
9	Ninth	Yethe	low rise
10	Tenth	Yesinsin-the	lowest rise, neap tide
11	Eleventh	Yenuhta	small rise
12	Twelfth	Yenuhta	small rise
13	Thirteenth	Yenuhta	small rise
14	Fourteenth	Yethe-u	Beginning of the rise, medium rise higher each day
15	Fifteenth	Yethe-u	medium rise

Source: Working Plan for Delta Forest Division (1947-1956)

Table 2.5 Water Salinity during Dry and Rainy Seasons

Location/Distance (along Patheingyi River)	Salinity (%)	
	During dry season April 1991	during rainy season July 1992
Towards river mouth		1‰
100 km from river mouth, near Patheingyi	2 ‰	-
25 km from river mouth	28‰	-
Center of Sarkyin Creek.	14‰	-
At Laputta Town	10‰	-

Source: Kogo, 1993

Table 2.6 Seasonal Change of Soil Moisture at different Ground Level

Month	J	F	M	A	M	J	J	A	S	O	N	D	Legend
Ground Level													
Low													Extremely wet
Medium													Wet
High													Dry
Extremely high													Extremely high

Note 1: Low: flooded by all high tides and medium high tides; Medium: flooded by normal and spring high tides; High: flooded by equinoctial tides; Extremely High: flooded only in the rainy season)

Note 2: Extremely wet; the soil particles of spaces are saturated by water because of daily tidal inundation.

Wet; the soil particle contains sufficient moisture but its spaces are relatively dry (above 35 %)

Dry; soil particles contain 5 - 35 % moisture

Extremely dry; soil particles contain less than 5 % moisture

Source: Kogo 1993

Table 2.7 List of Mammals in Study Area

No.	Family	Scientific Name	English Name	Source					
				I	II	III	IV	V	VI
1	Pteropodidae	<i>Pteropus</i> sp.	Flying Fox				○		
2	Cercopithecidae	<i>Macaca fascicularis</i>	Crab-eating Macaque				○		
3	Cercopithecidae	<i>Macaca mulatta</i>	Rhesus Macaque				○		
4	Cercopithecidae	<i>Macaca</i> spp.	Macaque						○
5	Canidae	<i>Canis aureus</i>	Asiatic Jackal				○		
6	Canidae	<i>Cuon</i> sp.	Wild Dog						○
7	Mustelidae	<i>Aonyx cinerea</i>	Small-clawed Otter		○	○	○		
8	Mustelidae	<i>Lutra perspicillata</i>	Smooth-coated Otter		○	○	○		
9	Mustelidae	<i>Mustelidae</i> sp.	Otter					○	○
10	Viverridae	<i>Viverricula indica</i>	Small Indian Civet				○		
11	Felidae	<i>Felis bengalensis</i>	Leopard Cat		○	○	○		
12	Felidae	<i>Felis chaus</i>	Jungle Cat		○	○	○		
13	Felidae	<i>Felis viverrina</i>	Fishing Cat		○	○	○		
14	Felidae	<i>Felis</i> sp.	Wild Cat						○
15	Felidae	<i>Panthera pardus</i>	Leopard				○		○
16	Herpestidae	<i>Herpestes autropunctatus</i>	Small Indian Mongoose				○	○	
17	Elephantidae	<i>Elephas maximus</i>	Asiatic Elephant		○		○	○	○
18	Suidae	<i>Sus Scrofa</i>	Wild Pig		○	○	○	○	○
19	Cervidae	<i>Cervus porcinus</i>	Hog Deer		○	○	○		
20	Cervidae	<i>Cervus unicolor</i>	Sambar Deer		○	○	○		
21	Cervidae	<i>Cervus</i> sp.	Deer						○
22	Sciuridae	<i>Callosciurus finlaysoni</i>	Finlays Squirrel		○	○	○	○	
23	Delphinidae	<i>Orcaella brevirostris</i>	Ayeyarwady Dolphin	○			○		
-	12 families	19 species*		1	10	9	18	4	9

source: I : List of identified species of Fauna in Mangrove (2001) JICA

II : List of Manmalls in Mangrove -Bogalay- (2002) Forest Department

III : List of Manmalls in Mangrove -Laputta- (2002) Forest Department

IV: Manmalls list of Meinmahla Kyun and Adjacent Regions (1999) Wildlife Conservation Society

V: Identified on Field Survey

VI : Identified on Interview Survey

note:* : sp. is not counted when the species of same genus is listed.

Table 2.8 List of Birds in Study Area

No.	Family	Scientific Name	English Name	Source					
				I	II	III	IV	V	VI
1	Phasianidae	<i>Gallus gallus</i>	Red Junglefowl		○			○	
2	Anatidae	<i>Dendrocygna javanica</i>	Lesser Tree Duck	○	○	○	○	○	
3	Anatidae	<i>Tadorna ferruginea</i>	Ruddy Shelduck		○	○			
4	Picidae	<i>Picus myamecophoneus</i>	Slreak Throated Green woodpecker		○				
5	Picidae	<i>Dinopium javanense</i>	Common Goldenback					○	
6	Upupidae	<i>Anthraceroceros albirostris</i>	Indian Pied Hornbill		○			○	
7	Alcedinidae	<i>Alcedo atthis</i>	Common Kingfisher		○	○		○	○
8	Alcedinidae	<i>Alcedo meninting</i>	Blue Cored Kingfisher		○	○			
9	Alcedinidae	<i>Ceyx rufidorsus</i>	Red Backed Kingfisher		○	○			
10	Alcedinidae	<i>Halcyon pileata</i>	Black Capped Kingfisher	○	○	○	○	○	
11	Alcedinidae	<i>Halcyon coromanda</i>	Ruddy Kingfisher		○	○			
12	Alcedinidae	<i>Halcyon smyrnensis</i>	White Throated Kingfisher	○			○	○	
13	Meropidae	<i>Merops orientalis</i>	Green Bee-eater	○	○	○	○	○	○
14	Cuculidae	<i>Centropus sinensis</i>	Greater Coucal		○		○	○	
15	Cuculidae	<i>Centropus toulou</i>	Lesser Coucal		○				
16	Cuculidae	<i>Phoenicophaeus tristis</i>	Green-billed Malkoha					○	
17	Psittacidae	<i>Psittacula alexandri</i>	Red-breasted Parakeet		○	○	○	○	
18	Psittacidae	<i>Psittacula eupatria</i>	Large Parakeet				○		
19	Psittacidae	<i>Loriculus vernalis</i>	Bernal Hanging Parrot					○	
20	Apodidae	<i>Cypsiurus batasiensis</i>	Asian palm-swift					○	
21	Tytonidae	<i>Tyto alba</i>	Barn Owl				○		
22	Strigidae	<i>Ketupa ketupu</i>	Buffy Fish-Owl		○	○			
23	Strigidae	<i>Strix seloputo</i>	Spotted Wood Owl				○		
24	Strigidae	<i>Athene brama</i>	Spotted Owlet				○		
25	Podargidae	<i>Batrachostomus sp.</i>	Frogmouth					○	
26	Caprimulgidae	<i>Caprimulgus sp.</i>	Nightjar					○	
27	Columbidae	<i>Chalcophaps indica</i>	Emerald Dove	○			○		
28	Columbidae	<i>Streptopelia chinensis</i>	Spotted Necked Dove	○			○	○	
29	Rallidae	<i>Rallus plateni</i>	Platen's Rail		○	○			
30	Rallidae	<i>Gymnocrex pulmbeiventris</i>	Bare-eyed Rail		○	○			
31	Rallidae	<i>Amaurornis phoenicurus</i>	White-breasted Water Hen		○	○		○	
32	Rallidae	<i>Porphyrio porphyrio</i>	Purple Swampphen		○	○			
33	Scolopacidae	<i>Limosa limosa</i>	Black-tailed Godwit		○			○	
34	Scolopacidae	<i>Numenius madagascariensis</i>	Eurasian Curlew		○			○	
35	Scolopacidae	<i>Tringa tetanus</i>	Common Redshank	○	○		○	○	
36	Scolopacidae	<i>Tringa hypoleucos</i>	Common Sandpiper	○	○		○	○	
37	Scolopacidae	<i>Philomachus pugnax</i>	Ruff					○	
38	Scolopacidae	<i>Croicethra alba</i>	Sanderling					○	
39	Recurvirostridae	<i>Himantopus himantopus</i>	Black winged stilt	○			○		
40	Charadriidae	<i>Charadrius alexandrinus</i>	Kentish Plover		○			○	
41	Charadriidae	<i>Charadrius leschenaultii</i>	Greater Sand Plover		○			○	
42	Charadriidae	<i>Charadrius mongolus</i>	Mongolian Plover		○			○	
43	Dromadidae	<i>Dromas ardeola</i>	Crab Plover		○				
44	Glarcolidae	<i>Glareola lacteal</i>	Small Pratincole	○			○		
45	Laridae	<i>Larus argentatus</i>	Herring Gull	○	○		○		○
46	Laridae	<i>Larus brunnicephalus</i>	Brown-headed Gull		○		○	○	
47	Laridae	<i>Larus ichthyaeus</i>	Great Black-headed Gull					○	
48	Laridae	<i>Sterna albifrons</i>	Little Tern		○		○		
49	Laridae	<i>Chlidonias hybridus</i>	Whiskered Tern		○			○	
50	Accipitridae	<i>Elanus caeruleus</i>	Black Shouldered Kite					○	
51	Accipitridae	<i>Milvus Migrans</i>	Pariach Kite	○	○	○	○	○	

No.	Family	Scientific Name	English Name	Source					
				I	II	III	IV	V	VI
52	Accipitridae	<i>Haliastur Indus</i>	Brachming Kite	○	○	○	○	○	○
53	Accipitridae	<i>Circus melanoleucos</i>	Pied Harrier		○			○	○
54	Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle					○	
55	Falconidae	<i>Falco tinnunculus</i>	Eurasian Kestrel					○	
56	Anhingidae	<i>Anhinga melanogaster</i>	Oriental Darter		○			○	
57	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	Great Cormorant				○		○
58	Phalacrocoracidae	<i>Phalacrocorax niger</i>	Little Cormorant		○	○		○	
59	Ardeidae	<i>Egretta alba</i>	Great Egret		○	○		○	
60	Ardeidae	<i>Egretta eulophotes</i>	Chinese Egret		○	○			
61	Ardeidae	<i>Egretta garzetta</i>	Little Egret	○	○	○	○	○	○
62	Ardeidae	<i>Egretta intermedia</i>	Intermediate Egret	○			○	○	
63	Ardeidae	<i>Ardea purpurea</i>	Purple Heron		○	○		○	
64	Ardeidae	<i>Ardea cinerea</i>	Grey Heron	○	○	○	○	○	
65	Ardeidae	<i>Ardeola bacchus</i>	Chinese Pond Heron		○	○			
66	Ardeidae	<i>Ardeola speciosa</i>	Javan Pond Heron	○	○	○	○		
67	Threskiornithidae	<i>Threskiornis melanocephalus</i>	Black-headed Ibis		○	○		○	
68	Threskiornithidae	<i>Pseudibis papillosa</i>	Red-naped Ibis	○			○		
69	Ciconiidae	<i>Ciconia episcopus</i>	Woolly-Necked Stork		○	○			
70	Ciconiidae	<i>Leptoptilos javanicus</i>	Lesser Adjutant Stork	○	○	○	○		
71	Ciconiidae	<i>Leptoptilos dubius</i>	Greater Adjutant Stork		○	○		○	
72	Oriolidae	<i>Oriolus chinensis</i>	Black Naped Oriole	○			○		
73	Dicruridae	<i>Dicrurus aeneus</i>	Bronzed Drongo	○			○		
74	Dicruridae	<i>Dicrurus macrocerus</i>	Black Drongo	○	○		○	○	
75	Chloropseidae	<i>Aegithina tiphia</i>	Common Iora					○	
76	Campephagidae	<i>Tephrodornis pondicerianus</i>	Common Wood-shrike					○	
77	Turdidae	<i>Copsychus saularis</i>	Magpie Robin		○				
78	Laniidae	<i>Lanius cristatus</i>	Brown shrike					○	
79	Corvidae	<i>Corvus splendens</i>	House Crow					○	
80	Corvidae	<i>Corvus macrorhynchos</i>	Large-billed Crow					○	
81	Corvidae	<i>Crypsirina temia</i>	Racket-tailed Treepie					○	
82	Sturnidae	<i>Acridotheres tristis</i>	Common Myna	○			○	○	
83	Paridae	<i>Parus major</i>	Great Tit					○	
84	Hirundinidae	<i>Hirundo concolor</i>	Dusky Crag Martin	○	○	○	○		
85	Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	○	○	○	○	○	○
86	Pycnonotidae	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul					○	
87	Pycnonotidae	<i>Pycnonotus finlaysoni</i>	Striped Throated Bulbul		○			○	
88	Zosteropidae	<i>Zosterops sp.</i>	white-eye					○	
89	Sylviidae	<i>Phylloscopus sp.</i>	Leaf warbler					○	
90	Sylviidae	<i>Prinia subflava</i>	Tawny-flanked Prinia					○	
91	Nectariniidae	<i>Nectarinia jugularis</i>	Olive-backed Sunbird					○	
92	Nectariniidae	<i>Anthreptes singalensis</i>	Ruby-checked Sunbird		○	○		○	
93	Nectariniidae	<i>Aethopyga siparaja</i>	Crimson Sunbird		○				
94	Ploceidae	<i>Passer montanus</i>	Eurasian Tree-sparrow					○	
95	Motacillidae	<i>Dendronanthus indicus</i>	Forest wagtail					○	
-	44 families	95 species		25	54	31	34	63	8

source: I : List of identified species of Fauna in Mangrove (2001) JICA

II : List of Birds in Mangrove -Bogalay- (2002) Forest Department

III : List of Birds in Mangrove -Laputta- (2002) Forest Department

IV: Birds list of Meinmahla kyun Wildlife (2001) Forest Department

V: Birds list of Meinmahla Kyun and Adjacent Regions (1999) Wildlife Conservation Society

VI : Identified on Field Survey

Table 2.9 List of reptiles in Study Area

No.	Family	Scientific Name	English Name	Source			
				I	II	III	IV
1	Crocodylidae	<i>Crocodylus porosus</i>	Estuarine Crocodile	○	○	○	○
2	Boidae	<i>Python reticulatus</i>	Reticulated Python		○	○	
3	Boidae	<i>Python molurus</i>	Rock Python		○	○	
4	Varamodae	<i>Varanus species</i>	Monitor Lizards		○	○	
5	Emydidae	<i>Morenia ocellata</i>	Burmese Eyed Turtle				○
6	Cheloniidae	<i>Lepidochelys olivacea</i>	Olive Ridley				○
7	Cheloniidae	<i>Chelonia mydas</i>	Green Turtle				○
8	Cheloniidae	<i>Caretta caretta</i>	Loggerhead Turtle				○
-	5 families	8 species		1	4	4	5

Source: I : List of identified species of Fauna in Mngrove (2001) JICA

II : List of reptiles in Mangrove -Bogalay- (2002) Forest Department

III : List of reptiles in Mangrove -Laputta- (2002) Forest Department

IV: Ecological Reconnaissance of Meinmahla Kyun Wildlife Sanctuary and Vicinity, Southern Ayeyawady Delta, Myanmar (1999) Wildlife Conservation Society

Table 2.10 List of Plants in Study Area

No.	Family	Scientific Name	Myanmar Name	Source			
				I	II	III	IV
1	Pteridaceae	<i>Acrostichum aureum</i>	Hnget Kyi Daung	○	○	○	○
2	Pteridaceae	<i>Acrostichum speciosum</i>	Hnget Kyi Daung	○	○		○
3	Dilleniaceae	<i>Dillenia indica</i>	Thabyu	○	○		○
4	Annonaceae	<i>Polyalthia simiaru</i>	Taw thabut	○	○		
5	Menispermaceae	<i>Alamirta paniculata</i>	Kyitay	○	○		
6	Capparidaceae	<i>Crataeva religiosa</i>	Kadet	○	○		
7	Guttiferae	<i>Calophyllum inophyllum</i>	Ponnyet	○	○		
8	Malvaceae	<i>Hibiscus tiliaceus</i>	Thinban	○	○		○
9	Malvaceae	<i>Thespesia populnea</i>	Sabu bani	○	○		
10	Meliaceae	<i>Amoora cuculata</i>	Pantha Kha	○	○		○
11	Meliaceae	<i>Swietenia macrophylla</i>	Mahogany	○			
12	Meliaceae	<i>Xylocarpus gangeticus</i>	Pinle or			○	
13	Meliaceae	<i>Xylocarpus granatum</i>	Kyana	○	○		○
14	Meliaceae	<i>Xylocarpus moluccensis</i>	Pinle on	○	○	○	○
15	Bombacaceae	<i>Samalia malabarica</i>	Letpan	○	○		
16	Sterculiaceae	<i>Brownlowia tersa</i>	Yethinban	○			○
17	Sterculiaceae	<i>Heritiera fomes</i>	Kanazo (kone)	○	○	○	○
18	Sterculiaceae	<i>Heritiera littoralis</i>	Kanazo (lay)		○		○
19	Rutaceae	<i>Merope angulata</i>	Taw shauk	○	○	○	○
20	Hippocrateaceae	<i>Salacia prinoidea</i>	Bu	○	○		○
21	Vitaceae	<i>Cayratia trifolia</i>	Yinaungnwe	○	○		
22	Anacardiaceae	<i>Buchanania lanzan</i>	Lun	○	○		
23	Anacardiaceae	<i>Spondias pinnata</i>	Gwe			○	
24	Papilionaceae	<i>Crotalaria juncea</i>	Paiksan	○	○		
25	Papilionaceae	<i>Millettia pachycarpa</i>	Migyaungnwe				○
26	Papilionaceae	<i>Sesbania grandiflora</i>	Pauk pan byu	○			○
27	Papilionaceae	<i>Sesbania bispinosa</i>	Nyan			○	
28	Caesalpiniaceae	<i>Bauhinia variegata</i>	Bwe gyin	○	○		
29	Leguminosae	<i>Albizia procera</i>	Sit	○	○	○	
30	Leguminosae	<i>Albizia lebbek</i>	Kokko	○	○	○	○
31	Leguminosae	<i>Albizia lucida</i>	Thanthat			○	
32	Leguminosae	<i>Bauhinia acuminata</i>	Shwe daw	○	○		

No.	Family	Scientific Name	Myanmar Name	Source			
				I	II	III	IV
33	Leguminosae	<i>Caesalpinia bonducella</i>	Ka Lein	○	○		
34	Leguminosae	<i>Caesalpinia crista</i>	Alolay	○	○		○
35	Leguminosae	<i>Cassia angustifolia</i>	Pwegaing	○	○		
36	Leguminosae	<i>Cassia glauca</i>	Pyiban nyo	○	○		
37	Leguminosae	<i>Cynometra ramiflora</i>	Myinga	○	○		○
38	Leguminosae	<i>Cynometra mimosoides</i>	Myinka			○	
39	Leguminosae	<i>Dalbergia pinnata</i>	Yema Kyi nwe	○	○		
40	Leguminosae	<i>Dalbergia spinosa</i>	Byaik	○	○		○
41	Leguminosae	<i>Derris scandens</i>	Migyaungnwe	○	○		
42	Leguminosae	<i>Derris trifoliata</i>	New net	○	○		○
43	Leguminosae	<i>Erythrina indica</i>	Pinle Kathit	○	○		
44	Leguminosae	<i>Erythrina subumbrans</i>	Ye Kathit			○	
45	Leguminosae	<i>Intsia bijuga</i>	Yemanay	○	○		
46	Leguminosae	<i>Mucuna gigantea</i>	Khwe Lay new	○	○		
47	Leguminosae	<i>Mucuna prurita</i>	Khweleya			○	
48	Leguminosae	<i>Pongamia pinnata</i>	Thinwin pyu	○	○		○
49	Mimosaceae	<i>Acacia auriculiformis</i>	Sha	○			○
50	Rhizophoraceae	<i>Bruguiera cylindrica</i>	Hnan Byu				○
51	Rhizophoraceae	<i>Bruguiera gymnorhiza</i>	Byu u talone	○	○	○	○
52	Rhizophoraceae	<i>Bruguiera parviflora</i>	Byu War Kyaing Laing				○
54	Rhizophoraceae	<i>Bruguiera sexangula</i>	Byu shwewah	○	○		○
55	Rhizophoraceae	<i>Ceriops decandra</i>	Madama	○	○	○	○
56	Rhizophoraceae	<i>Ceriops targa</i>	Madama myaw	○	○	○	
57	Rhizophoraceae	<i>Kandelia candel</i>	Byu Baingdaung-she	○	○	○	○
58	Rhizophoraceae	<i>Rhizophora apiculata</i>	Byuchidauk (apo)	○	○	○	○
59	Rhizophoraceae	<i>Rhizophora mucronata</i>	Byuchidauk (ama)	○	○	○	○
60	Combretaceae	<i>Calycotris floribunda</i>	Kywetnwe	○	○		
61	Combretaceae	<i>Combretum trifoliatum</i>	Saukpyar	○	○		
62	Combretaceae	<i>Lumnitzera racemosa</i>	Pyan Shar, Aikemathwe	○	○		○
63	Combretaceae	<i>Terminalia catappa</i>	Banda	○	○		○
64	Myrtaceae	<i>Eucalyptus camaldulensis</i>	Eucalyptus, Yukalys	○			○
65	Myrtaceae	<i>Melaleuca</i> spp.	Malarluca	○			○
66	Barringtoniaceae	<i>Barringtonia racemosa</i>	Ye Kyi	○	○		○
67	Lythraceae	<i>Lagerstroemia speciosa</i>	Pyinma	○	○	○	
68	Connaraceae	<i>Crestis ramiflora</i>	Gwe dauk			○	
69	Sonneratiaceae	<i>Sonneratia alba</i>	Lame	○	○	○	○
70	Sonneratiaceae	<i>Sonneratia apetala</i>	Kanbala	○	○	○	○
71	Sonneratiaceae	<i>Sonneratia caseolaris</i>	Lamu	○	○	○	○
72	Sonneratiaceae	<i>Sonneratia griffithi</i>	Laba	○	○	○	○
73	Passifloraceae	<i>Coccinia cordifolia</i>	Kin bon	○	○		
74	Rubiaceae	<i>Mussaenda macrophylla</i>	Lelu	○	○		
75	Compositae	<i>Blumea balsamifera</i>	Hpon mathein	○	○		
76	Compositae	<i>Blumea virens</i>	Kadu				○
77	Compositae	<i>Eupatorium odoratum</i>	Bizat	○	○		○
78	Compositae	<i>Eclipta alba</i>	Kyeik hman	○			
79	Compositae	<i>Enhydra fluctuans</i>	Kana hpaw				○
80	Compositae	<i>Pluchea indica</i>	Kayu	○	○		○
81	Myrsinaceae	<i>Aegiceras corniculatum</i>	Ye Kaya	○	○	○	○
82	Ebenaceae	<i>Diospyros embryopteris</i>	Te	○	○		
83	Ebenaceae	<i>Diospyros ferrea</i>	Myinganat	○	○		
84	Jasminum	<i>Jasminum pubescens</i>	Taw Sabe	○	○		
85	Olacaceae	<i>Erythralium scandem</i>	Lelu			○	
86	Apocynaceae	<i>Cerbera odollam</i>	Zalat	○	○		

No.	Family	Scientific Name	Myanmar Name	Source			
				I	II	III	IV
87	Asclepiadaceae	<i>Calotropis gigantea</i>	Mayogyi	○	○		
88	Asclepiadaceae	<i>Finlaysonia maritima</i>	ByauKnwe	○	○		○
89	Asclepiadaceae	<i>Sarcolobus carinatus</i>	Khamohn	○	○		
90	Asclepiadaceae	<i>Sarcolobus globosus</i>	Shothethwaynwe	○	○		
91	Asclepiadaceae	<i>Dregea volubilis</i>	Gwe dauk nwe	○	○		
92	Boraginaceae	<i>Cardia cochinchinesis</i>	Yethanat	○			
93	Boraginaceae	<i>Cardia dichotoma</i>	Thanat			○	
94	Boraginaceae	<i>Dolichondrone spathacea</i>	Tha Khut	○	○	○	○
95	Convolvulaceae	<i>Ipomoea maxima</i>	Taw Kazun	○	○		
96	Convolvulaceae	<i>Ipomoea pescaprae</i>	Pinle Kazun	○	○		
97	Convolvulaceae	<i>Ipomoea tuba</i>	Bon Seinnwe	○	○		
98	Convolvulaceae	<i>Convolvulus arvensis</i>	Kaukyo new	○	○		
99	Acanthaceae	<i>Acanthus ebracteatus</i>	Kaya (White)	○	○		
100	Acanthaceae	<i>Acanthus ilicifolius</i>	Kaya (Blue)	○	○	○	○
101	Acanthaceae	<i>Acanthus volubilis</i>	Kaya (climber)	○	○		
102	Acanthaceae	<i>Hygrophila obovata</i>	Michaung Kyunpat	○	○		
103	Acanthaceae	<i>Hygrophila spinosa</i>	Laipadu	○	○		
104	Avicenniaceae	<i>Avicennia alba</i>	Thame Kyet Tet	○	○		○
105	Avicenniaceae	<i>Avicennia marina</i>	Thame Phyu	○	○		○
106	Avicenniaceae	<i>Avicennia officinalis</i>	Thame Gyi	○	○	○	○
107	Verbenaceae	<i>Clerodendrum inerme</i>	Taw Kyaung Pan	○	○		○
108	Verbenaceae	<i>Premna obtusifolia</i>	Taw taung tan gyi	○			
109	Verbenaceae	<i>Petunga roxburghii</i>	Pinle Kyetyo	○	○		
110	Verbenaceae	<i>Vitex ovata</i>	Kyaung pan gyi	○	○		
111	Polygonaceae	<i>Polygonum chinese</i>	Boketaung	○	○		
112	Loranthaceae	<i>Viscum album</i>	Kyibaung	○	○		
113	Euphorbiaceae	<i>Excoecaria agallocha</i>	Thayaw	○	○	○	○
114	Euphorbiaceae	<i>Glochidion assamicum</i>	Tamasok			○	
115	Euphorbiaceae	<i>Sapium indicum</i>	Na Khaung pu	○	○		
116	Moraceae	<i>Artocarpus heterophyllus</i>	Peinne	○	○		
117	Moraceae	<i>Ficus obtusifolia</i>	Nyaung Lan	○	○		
118	Moraceae	<i>Streblus asper</i>	Okhne	○	○		
119	Casuarinaceae	<i>Casuarina equisetifolia</i>	Pinlaikavie, Kabwi	○			○
120	Fagacea	<i>Quercus Serrata</i>	Nyan	○	○		
121	Salicaceae	<i>Salix tetrasperma</i>	Momaka	○	○		
122	Plumbaginaceae	<i>Aegialitis rotundifolia</i>	Sarthar				○
123	Orchidaceae	<i>Dendrobium moschatum</i>	Warsopan	○	○		
124	Zingiberaceae	<i>Alpinia conchigera</i>	Padegaw gyi	○	○		
125	Zingiberaceae	<i>Curcuma amada</i>	Taw sanwin	○	○		
126	Zingiberaceae	<i>Costus speciosus</i>	Palan taung hmwe	○	○		
127	Amaryllidaceae	<i>Criman astaticum</i>	Ko yan gyi	○	○		
128	Flagellariaeae	<i>Flagellaria indica</i>	Myauk Kyane	○	○	○	○
129	Palmaceae	<i>Calamus arborescens</i>	Danone	○	○		
130	Palmaceae	<i>Caryota urens</i>	Ka zaung	○	○		
131	Palmaceae	<i>Licuala peltata</i>	Salu	○	○	○	
132	Palmaceae	<i>Nipa Fruticans</i>	Dani	○	○	○	○
133	Palmaceae	<i>Oncosperma tigillarum</i>	Kazaung	○	○		
134	Palmaceae	<i>Phoenix paludosa</i>	Thinbaung	○	○	○	○
135	Pandanaceae	<i>Pandanus odoratissinus</i>	Setthapu	○	○		
136	Pandanaceae	<i>Pandanus foetidus</i>	Thapot	○	○	○	○
137	Pandanaceae	<i>Pandanus odoratissinus</i>	Sat tha pu	○	○		
138	Gramineae	<i>Coix lachrymal</i>	Kyeik	○	○		
139	Gramineae	<i>Eriochloa procea</i>	Myet kya	○	○		

No.	Family	Scientific Name	Myanmar Name	Source			
				I	II	III	IV
140	Gramineae	<i>Imperata cylindrica</i>	Thet Ke	○	○		
141	Gramineae	<i>Leptochloa liformis</i>	Myet	○	○		
142	Gramineae	<i>Phragmites karka</i>	Kyu			○	
143	Gramineae	<i>Spinifex littoreus</i>	Thone daunk Myet	○	○		
-	53 families	143 species		124	114	40	57

source: I : List of Plants in Mangrove -Bogalay- (2002) Forest Department

II : List of Plants in Mangrove -Laputta- (2002) Forest Department

III : Plants list of Meinmahla Kyun and Adjacent Regions (1999) Wildlife Conservation Society

IV : Identified on Field Survey

Table 2.11 Important Wildlife

No.	Taxonomical group	Scientific Name	English Name	Criteria	
				SourceI	SourceII
1	Manmalls	<i>Macaca fascicularis</i>	Crab-eating Macaque	LR	2
2		<i>Macaca mulatta</i>	Rhesus Macaque	LR	2
3		<i>Cuon sp.</i>	Wild Dog	-	2
4		<i>Aonyx cinerea</i>	Small-clawed Otter	-	1
5		<i>Lutra perspicillata</i>	Smooth-coated Otter	-	1
6		<i>Viverricula indica</i>	Small Indian Civet	-	1
7		<i>Panthera pardus</i>	Reopard	-	1
8		<i>Herpestes autropuncatatus</i>	Small Indian Mongoose	-	2
9		<i>Elephas maximus</i>	Asiatic Elephant	-	1
10		<i>Cervus porcinus</i>	Hog Deer	-	3
11		<i>Cervus unicolor</i>	Sambar Deer	-	2
12		<i>Orcaella brevirostris</i>	Ayeyarwady Dolphin	DD	1
13	Birds	<i>Gallus gallus</i>	Red Junglefowl	-	1
14		<i>Dendrocygna javanica</i>	Lesser Tree Duck	-	1
15		<i>Tadorna ferruginea</i>	Ruddy Shelduck	-	1
16		<i>Picus myamecophoneus</i>	Slreak Throated Green Woodpecker	-	1
17		<i>Alcedo atthis</i>	Common Kingfishier	-	2
18		<i>Alcedo meninting</i>	Blue Cored Kingfishier	-	2
19		<i>Ceyx rufidorsus</i>	Red Backed Kingfishier	-	2
20		<i>Halcyon pileata</i>	Black Capped Kingfishier	-	2
21		<i>Halcyon coromanda</i>	Ruddy Kingfishier	-	2
22		<i>Halcyon smyrnonsis</i>	White Throated Kingfishier	-	2
23		<i>Phoenicophaeus tristis</i>	Green-billed Malkoha	-	2
24		<i>Tyto alba</i>	Barn Owl	-	1
25		<i>Ketupa ketupu</i>	Buffy Fish-owl	-	1
26		<i>Strix seloputo</i>	Spotted Wood Owl	-	1
27		<i>Athene brama</i>	Spotted Owlet	-	1
28		<i>Batrachostomus sp.</i>	Frogmouth	-	2
29		<i>Caprimulgus sp.</i>	Nightjar	-	3
30		<i>Chalcophus indice</i>	Emerald Dove	-	3
31		<i>Streptopelia chinensis</i>	Spotted Necked Dove	-	3
32		<i>Rallus plateni</i>	Platen's Rail	-	1
33		<i>Gymnocrex pulmbeiventris</i>	Bare-eyed Rail	-	1
34		<i>Porphyrio porphyrio</i>	Purple Swamphen	-	3
35		<i>Limosa limosa</i>	Black-tailed Godwit	-	1
36		<i>Numenius madagascariensis</i>	Eurasian Curlew	-	1
37		<i>Tringa totarues</i>	Redshank	-	1

No.	Taxonomical group	Scientific Name	English Name	Criteria	
				SourceI	SourceII
38		<i>Tringa hypoleucos</i>	Common Sandpiper	-	1
39		<i>Philomachus pugnax</i>	Ruff	-	1
40		<i>Croicethra alba</i>	Sanderling	-	1
41		<i>Himantopus himantopus</i>	Black winged stilt	-	1
42		<i>Charadrius alexandrinus</i>	Kentish Plover	-	1
43		<i>Charadrius leschenaultii</i>	Greater Sand Plover	-	1
44		<i>Charadrius mongolus</i>	Mongolian Plover	-	1
45		<i>Dromas ardeola</i>	Crab Plover	-	1
46	Birds	<i>Glareola lacteal</i>	Small Pratincole	-	1
47		<i>Larus argentatus</i>	Herring Gull	-	1
48		<i>Larus brunnicephalus</i>	Brown-headed Gull	-	1
49		<i>Larus ichthyæetus</i>	Great Black-headed Gul	-	1
50		<i>Sterna albifrons</i>	Little Tern	-	1
51		<i>Chidonias hybridus</i>	Whiskered Tern	-	1
52		<i>Elanus caeruleus</i>	Black Shouldered Kite	-	1
53		<i>Milvus Migrans</i>	Pariach Kite	-	1
54		<i>Haliastur Indus</i>	Brachming Kite	-	1
55		<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	-	1
56		<i>Anhinga melanogaster</i>	Oriental Darter	LR	1
57		<i>Phalacrocorax carbo</i>	Great Cormorant	-	2
58		<i>Egretta alba</i>	Great Egret	-	2
59		<i>Ardea purpurea</i>	Purple Heron	-	2
60		<i>Ardea cinerea</i>	Grey Heron	-	2
61		<i>Ardeola bacchus</i>	Chinese Pond Heron	-	2
62		<i>Ardeola speciosa</i>	Javan Pond Heron	-	2
63		<i>Threskiornis melanocephalus</i>	Black-headed Ibis	LR	1
64		<i>Lseudibis papillosa</i>	Red-naped Ibis	-	1
65		<i>Ciconia episcopus</i>	Woolly-necked Stork	-	1
66		<i>Leptoptilos jacanicus</i>	Lesser Adjutant Stork	VU	1
67		<i>Leptoptilos dubius</i>	Greater Adjutant Stork	-	1
68		<i>Oriolus chinensis</i>	Black Naped Oriole	-	2
69		<i>Dicrurus aeneus</i>	Bronzed Drongo	-	3
70		<i>Dicrurus macrocerus</i>	Black Drongo	-	3
71		<i>Aegithina tiphia</i>	Common Iora	-	3
72		<i>Crypsirina temia</i>	Racket-tailed Treepie	-	2
73		<i>Parus major</i>	Great Tit	-	2
74		<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	-	3
75		<i>Pycnonotus finlaysoni</i>	Striped Throated Bulbul	-	3
76		<i>Zosterops sp.</i>	White-eye	-	2
77		<i>Nectarinia jugularis</i>	Olive-backed Sunbird	-	2
78		<i>Anthreptes singalensis</i>	Ruby-checked Sunbird	-	2
79		<i>Aethopyga siparaja</i>	Crimson Sunbird	-	2
80	Reptiles	<i>Crocodylus porosus</i>	Estuarine Crocodile	-	2
81		<i>Python molurus</i>	Rock Python	LR	2
82		<i>Python reticulatus</i>	Reticulated Python	-	1
83		<i>Varanus species</i>	Monitor Lizards	-	2
84		<i>Morenia ocellata</i>	Burmese Eyed Turtle	VU	-
85		<i>Lepidochelys olivacea</i>	Olive Ridley	EN	1
86		<i>Chelonia mydas</i>	Green Turtle	EN	1

No.	Taxonomical group	Scientific Name	English Name	Criteria	
				SourceI	SourceII
87		<i>Caretta Caretta</i>	Loggerhead Turtle	EN	1
88	Plants	<i>Intsia bijuga</i>	-	VU	-

SourceI : The 2000 IUCN Red List of Threatened Species (2000) IUCN. EN: Endangered VU: Vulnerable
LR: Lower Risk DD: Data Deficient

SourceII: Protection Animal List of the Myanmar (1994) Forest Department.

1: Completely Protected Wild Animals 2: Protected Wild Animals 3: Seasonally Protected Wild Animals

Table 2.12 List of Herbal and Medicinal Plants in Mangroves

No.	Scientific Name	Myanmar Name	Part Used	Uses
1	<i>Criman astaticum</i>	Ko Yan Gyi	Leaf	Oedema
2	<i>Dregea volubilis</i>	Gwe Dauk	Leaf	Anti -rabies, emetic, Urinary infections
3	<i>Crataeva religiosa</i>	Kadet	Seed	Eye sight
4	<i>Cassia glauca</i>	Pyiban Nyo	Leaf	Itchiness, Carminative
5	<i>Blumea balsamifera</i>	Hpon ma thein	Leaf, root	Dyspepsia, cold, infantile ailments
6	<i>Calotropis gigantea</i>	Ma Yo Gyi	Root, leaf	Tooth ache, relieg poisons, leprosy
7	<i>Merope angulata</i>	TawShauk	Leaf,roof,fruit	Epilepsy,cough,carminative,asthma
8	<i>Acanthus ilicifolius</i>	Kaya	Leaf, root	Rheumatism , Snack bite
9	<i>Premna obtusifolia</i>	Taw Taung Tangyi	Wood, Resin	Skin tonic, Stomachic, Carminative
10	<i>Cynometra ramiflora</i>	Myin ga	Root	Purgative
11	<i>Jasminum pubescens</i>	Taw Sabe	Leaf, root	Ulcers, snake bite
12	<i>Rhizophora mucronata</i>	Byu Chidauk (Ma)	Bark	Hematuria
13	<i>Sonneratia caseolaris</i>	Lamu	Fruit	Poultices
14	<i>Terminalia catappa</i>	Banda	Bark, Juice	Astringent, scables, skin disease
15	<i>Xylocarpus granatum</i>	Pinle- on	Bark	Cholera
16	<i>Cassia angustifolia</i>	Pwegaing	Leaf	Purgative
17	<i>Erythrina indica</i>	Pinle Kathit	Bark, leaves	Fever, Sores
18	<i>Eupatorium odoratum</i>	Bizat	Leaf	Cuts & bruises
19	<i>Dendrobium moschatum</i>	Warso Pan	Bulb	Relief poisons
20	<i>Ceriops tagal</i>	Madama myaw	Bark	Haemostatic
21	<i>Mucuna gigantea</i>	Khwe Lay New	Pods, seed	Anthelmintic, Astringent
22	<i>Barringtonia recemosa</i>	Ye Kyi	Fruit, Root	Bitter and astringent, suitable for quinine
23	<i>Excoecaria agallocha</i>	Ta Yaw	Leaf	Epilepsy
24	<i>Avicennia officinalis</i>	Thame	Root, seeds	Aphrodisiac, Poultices
25	<i>Pluchea indica</i>	Kayu	Leaf	Dysentery
26	<i>Pongamic Pinnata</i>	Thin win phyu	Seed, Root, Bark	Skin disease, Ulcers, piles

Source: Herbal and Medicinal Plants in Bogalay (2002) Forest Department.

**Table 2.13 Relation between Identification Key for Interpretation of
Aerial Photo and Land Use/Forest Type Category**

Identification key		Land use and Forest Type category
Code	Definition	
CM1	Close Mangrove High Stature Height: more than 12 m Crown density: more than 70%	Closed Mangrove Forest
CM2	Close Mangrove Medium Stature Height: 6 ~ 12 m Crown density: more than 70%	
CM3	Close Mangrove Low Stature Height: less than 6 m Crown density: more than 70%	
SM1	Sparse Mangrove High Stature Height: more than 12 m Crown density is 40% ~ 70%	Sparse Mangrove Forest
SM2	Sparse Mangrove Medium Stature Height: 6 ~ 12 m Crown density: 40% ~ 70%	
SM3	Sparse Mangrove Low Stature Height: Less than 6 m Crown density: 40% ~ 70%	
OPEN	Opening/Clearing area	Open/Barren land
CP	Cultivated Paddy	Cultivated land
UP	Uncultivated Paddy	
SP	Salt Pan	Saltpan/Fish Pond
FP	Fish/Shrimp Pond Enclosure	
NIS	Nipa stand	Plantation/woodlot
CF	Community Forestry Plantation	
WL	Wood lots	
VL/HG	Village Settlement/Home garden	Village settlement
MDF	Mudflats/tidal flats	Mud flats

Source Remote Sensing and GIS Section, FD

Table 2.14 Chief of State and Cabinet Members of Myanmar

1. Chairman, State Peace and Development Council
2. Vice Chairman, State Peace and Development Council
3. Prime Minister
4. Secretary 1, State Peace and Development Council
5. Secretary 2, State Peace and Development Council
1. Ministry for Agriculture & Irrigation
2. Ministry of Commerce
3. Ministry of Communications, Post, & Telegraph
4. Ministry of Construction
5. Ministry for Cooperatives
6. Ministry of Culture
7. Ministry of Defense
8. Ministry of Education
9. Ministry of Electric Power
10. Ministry of Energy
11. Ministry of Finance & Revenue
12. Ministry of Foreign Affairs
13. Ministry of Forestry
14. Ministry of Health
15. Ministry of Home Affairs
16. Ministry of Hotels & Tourism
17. Ministry of Immigration & Population
18. Ministry of Industry 1
19. Ministry of Industry 2
20. Ministry of Information
21. Ministry of Labor
22. Ministry of Livestock Breeding, & Fisheries
23. Ministry of Military Affairs
24. Ministry of Ministries
25. Ministry of National Planning & Economic Development
26. Ministry of Progress of Border Areas, National Races, & Development Affairs
27. Ministry of Rail Transport
28. Ministry of Religious Affairs
29. Ministry of Science & Industry
30. Ministry of Social Welfare, Relief, & Resettlement
31. Ministry of Sports
32. Ministry for Transport
33. Ministry in the Office of the Prime Ministry.
1. Governor, Central Bank of Myanmar
2. Ambassador to the US
3. Permanent Representative to the UN, New York

Table 2.15 Summary of Macro-economic Indicators

Indicator	Unit	1980/81	1985/86	1990/91	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
<Production>										
GDP	mil kyat	38,609	55,989	15,194	604,729	791,989	1,119,509	1,609,776	2,190,320	2,552,723
Population	Million	33.61	37.07	40.78	44.74	45.57	46.4	48.16	49.13	50.13
Per Capita GDP	Kyat	1,149	1,510	3,725	13,515	17,381	24,127	33,426	44,579	50,927
Annual Nominal GDP Growth	%	7.9	2.9	2.8	6.9	6.4	5.7	5.8	10.9	13.4
Annual Population Growth	%	2.03	1.96	1.88	1.87	1.84	1.84	2.02	2.02	2.02
Agriculture	%	12.6	2.2	2	5.5	3.8	3	3.5	10.5	17.8
Livestock & Fishery	%	4	2	-0.6	3	11.9	7.1	9.3	16.8	17.8
Forestry	%	1.9	-0.1	8.3	-4.5	2.1	2.8	3.2	4.6	3.3
Energy	%				-6.5	-2.1	2.3	53.6	66.5	30.8
Mine	%	-3.4	3.9	-1.2	18.5	12.5	29.7	7.0	30.0	25.5
<Trade>										
Export (FOB)	Million Kyat	3,176	2,566	2,953	5,033	5,488	6,447	6,728	7,043	12,422
Import (C.I.F)	Million Kyat	4,635	4,802	5,528	10,302	11,779	14,366	16,872	16,265	15,041
Trade Balance	Million Kyat	-1,459	-2,236	-2,575	-5,269	-6,291	-7,919	-10,144	-9,222	-2,618
Terms of Trade	1985=100	135.1	100	74.5	55.9	64.1	48.8	37.3	34.1	32.5
<Monetary>										
Money Supply	Million Kyat	7916	11612	32333	131800	n.a.	n.a	n.a	n.a.	n.a.
Central Bank rate	%/annum	4.0	4.0	11.0	12.5	15.0	15.0	15.0	12.0	10.0
Consumer Price Index	1996=100	n.a.	n.a.	n.a.	n.a	100	102.63	133.51	154.4	151.74
Retail Price										
Rice	Kyat/Pyi	4.31	7.2	14.36	65.97	78.15	89.2	115.18	160.53	147.37
Sesamum Oil	Kyat/viss	36.36	38.68	63.55	217.84	223.03	357.75	575.58	648.33	544.53
Gram	Kyat/viss	7.53	8.77	27.83	106.72	97.57	139.55	273.28	322.25	319.55
Wholesale Price										
Rice	Kyat/50kg bag	50	50	323	1417	2002	2063	2718	3608	3360
Sesamum Oil	Kyat/viss	3468	3708	5850	20732	20263	32284	55672	62742	52199
Gram	Kyat/100Bkts	10,026	12,368	37,826	169,402	154,050	217,351	479,307	549,835	509,004
<Public Finance>										
Total receipt	Million Kyat	7,190	8,997	14,837	40,370	55,253	88,695	118,034	107,666	n.a.
Total Expenditure	Million Kyat	5,830	8,014	21,708	65,527	80,439	98,462	124,751	145,403	n.a.
Surplus/Deficit	Million Kyat	1,360	983	(6,871)	(25,157)	(25,186)	(9,767)	(6,717)	(37,737)	n.a.
% of Tax and Revenues	%	51.6%	51.4%	63.5%	56.1%	56.8%	55.7%	48.0%	46.4%	n.a.
% of Foreign and Grants	%	12.8%	14.3%	1.7%	1.9%	0.8%	2.2%	0.9%	0.6%	n.a.
% of Surplus/deficit vs GDP	%	3.5%	1.8%	45.2%	4.2%	3.2%	0.9%	0.4%	1.7%	

Source: Statisticcal Yearbook 2001

Table 2.16 Fuelwood and Charcoal Production

(unit: cubic ton)

Year	Fuelwood (,000)	Charcoal
92-93	17,964	772,678
93-94	17,976	394,658
94-95	18,018	257,547
95-96	17,453	184,417
96-97	17,733	128,902
97-98	17,275	72,724
98-99	17,616	145,113
99-2000	18,388	222,702
2000-01	18,580	181,879
2001-02	18,972	223,296
2002-03	19,385	259,657
2003-04	19,787	278,850

Source: Planning and Statistic Division, Forest Department, Ministry of Forestry

Table 2.17 Rice Production in Myanmar

State/Division	Rice Production (ton)	
	Amount	%
1. Kachin State	314,595	1.8
2. Kayah State	76,229	0.4
3. Kayin State	454,379	2.6
4. Chin State	65,923	0.4
5. Sagaing Division	156,4405	9.0
6. Tanintharyi Division	230,799	1.3
7. Bago Division	2,929,752	16.8
8. Magway Division	576,051	3.3
9. Mandalay Division	912,878	5.2
10. Mon State	888,779	5.1
11. Yakhine State	924,702	5.3
12. Yangon Division	1,622,530	9.3
13. Shan State	941,758	5.4
14. Ayeyawady Division	5,894,183	33.9
Union total	17,396,960	100.0

Source: Central Statistic Organization, "Statistical Year Book 2001".

Table 2.18 Fishery Production in Myanmar

State/Division	Fish & Prawn (viss)	
	Amount	%
1. Kachin State	4,371	0.6
2. Kayah State	5	0.0
3. Kayin State	1,999	0.3
4. Chin State	50	0
5. Sagaing Division	15,809	2.0
6. Tanintharyi Division	309,205	39.4
7. Bago Division	37378	4.8
8. Magway Division	3034	0.4
9. Mandalay Division	15450	2.0
10. Mon State	26124	3.3
11. Yakhine State	59,858	7.6
12. Yangon Division	40,163	5.1
13. Shan State	1,745	0.2
14. Ayeyawady Division	270,306	34.4
Union total	785,495	100.0

Note: 1 viss = 3.6 pound = 1.64 kg

Source: Central Statistic Organization, "Statistical Year Book 2001".

Table 2.19 Computation of Value of Mangrove

1) Use Value

The present value for fuelwood production has been calculated at 219.8 million kyat per year comprising 88.0 million kyat for Laputta Township and 131.8 million kyat for Bogalay Township.

Fuelwood Production

Reserved Forest	Area (ha)	Stand Volume (m ³)	Fuelwood (10 ³ bundles)	Farm-gate Price (kyat/bundle)	Gross Sales (kyat/year)	Net Value (kyat/year)
Laputta Township:						
Kyakankwinpauk	10,987	277,532	71,162	5.0	355,810,000	32,022,900
Pyinalan	19,199	484,967	124,351	5.0	621,755,000	55,957,950
Sub-total	30,186	762,499	195,513	-	977,565,000	87,980,850
Bogalay Township:						
Kadonkani	18,285	461,879	118,431	5.0	592,155,000	53,293,950
Pyindaye	22,022	556,276	142,635	5.0	713,175,000	64,185,750
Meinmahla	4,905	123,900	31,769	5.0	158,845,000	14,296,050
Sub-total	45,212	1,142,055	292,835	-	1,464,175,000	131,775,750
Total	75,398	1,904,554	488,348	-	2,441,740,000	219,756,600

- Notes: (1) The average stand volume has been estimated at 25.26 m³.
 (2) One bundle of fuelwood accounts for 0.0039 m³ in volume.
 (3) Gross and net values have been estimated based on a 10-year clear cut of mangrove trees.
 (4) The production cost has been assumed to be 10% of the gross value of the product.

- Sources: (1) Interview survey, 2002.
 (2) Field reconnaissance survey, 2002.

The present value of fishery production has been calculated at 3,033.5 million kyat per year comprising 970.1 million kyat for Laputta Township and 2,063.4 million kyat for Bogalay Township.

Fish and Shellfish Production

Item	Fish	Shrimp/prawn	Crab	Total
Landing volume (tons & number)	528	134	248 (827,000)	910
Laputta Township	1,761	162	124 (413,000)	2,047
Bogalay Township	2,289	296	372 (1,240,000)	2,957
Total				
Gross value (million kyat/year)	691.7	414.6	279.5	1,385.8
Laputta Township	2,306.9	501.2	139.6	2,947.7
Bogalay Township	2,998.6	915.8	419.1	4,333.5
Total				
Net value (million kyat/year)				
Laputta Township	484.2	290.2	195.7	970.1
Bogalay Township	1,614.8	350.9	97.7	2,063.4
Total	2,099.0	641.1	293.4	3,033.5

- Notes: (1) Applied unit price (kyat/kg) are; 1) fish: 1,390k/kg, 2)shrimp/prawn 3,094k/kg, and 3)crab 338k/kg.
 (2) Figures in parenthesis indicate number of crabs.
 (3) Calculation has been made on the basis of medium-sized fish and shellfish.
 (4) The fishery cost has been assumed to be 30% of the gross value of the products.

Source: Interview survey, 2002.

(2) Non-Use Value

The present value of biodiversity conservation (medicinal plant seed production) has been calculated at 83.7 million kyat per year comprising 38.8 million kyat for Laputta Township and 44.9 million kyat for Bogalay Township.

Biodiversity Conservation (Medicinal Plant Seed Use)

Reserved Forest	Seed Production (ton/year/village)	Estimated Total Production (ton/year)	Farm-gate Price (kyat/ton)	Gross Value (million kyat/year)	Net Value (million kyat/year)
Laputta Township:					
Kyakankwinpauk	2.1	21.0	825,000	17.3	12.1
Pyinalan	2.1	46.2	825,000	38.1	26.7
Sub-total	-	67.2	-	55.4	38.8
Bogalay Township:					
Kadonkani	2.1	37.8	825,000	31.2	21.8
Pyindaye	2.1	39.9	825,000	32.9	23.0
Sub-total	-	77.7	-	64.1	44.9
Total	-	144.9	-	119.5	83.7

- Notes:
- (1) The total production has been estimated based on the number of mangrove forest-dependent villages in each reserved forest.
 - (2) The production cost has been assumed to be 30% of the gross value of the product.
 - (3) The Meinmahla reserved forests are excluded due to lack of information on medicinal plant distribution.

Sources: Village profile site survey, 2002.

The present value of coastal and river erosion and flood protection has been calculated at 222.5 million kyat per year comprising 112.9 million kyat for Laputta Township and 109.6 million kyat for Bogalay Township.

Coastal Erosion and Flood Protection

Reserved Forest	Estimated Paddy Cropped Area (ha)	Agricultural Land Price (kyat/ha)	Land Value (million kyat)	Damaged/Lost Land Value (million kyat/year)
Laputta Township:				
Kyakankwinpauk	13,200	54,000	712.8	71.3
Pyinalan	7,700	54,000	415.8	41.6
Sub-total	20,900	-	1,128.6	112.9
Bogalay Township:				
Kadonkani	10,700	54,000	577.8	57.8
Pyindaye	9,600	54,000	518.4	51.8
Sub-total	20,300	-	1,096.2	109.6
Total	41,200	-	2,224.8	222.5

Note: The damaged and lost land value has been estimated under flooding with a return period of 10 years.

The present value of coastal and river erosion and flood protection has been calculated at 222.5 million kyat per year comprising 112.9 million kyat for Laputta Township and 109.6 million kyat for Bogalay Township.

Coastal Erosion and Flood Protection

Reserved Forest	Estimated Paddy Cropped Area (ha)	Agricultural Land Price (kyat/ha)	Land Value (million kyat)	Damaged/Lost Land Value (million kyat/year)
Laputta Township:				
Kyakankwinpauk	13,200	54,000	712.8	71.3
Pyinalan	7,700	54,000	415.8	41.6
Sub-total	20,900	-	1,128.6	112.9
Bogalay Township:				
Kadonkani	10,700	54,000	577.8	57.8
Pyindaye	9,600	54,000	518.4	51.8
Sub-total	20,300	-	1,096.2	109.6
Total	41,200	-	2,224.8	222.5

Note: The damaged and lost land value has been estimated under flooding with a return period of 10 years.

The present value of global warming prevention has been calculated at 1,280.5 million kyat per year comprising 512.7 million kyat for Laputta Township and 767.9 million kyat for Bogalay Township.

Carbon Sequestration

Reserved Forest	Area (ha)	Carbon sequestration (ton-carbon/year)	Carbon Transaction Price in 2002 (kyat/ton-carbon)	Net Value (million kyat/year)
Laputta Township:				
Kyakankwinpauk	10,987	71,086	2,625	186.6
Pyinalan	19,199	124,218	2,625	326.1
Sub-total	30,186	195,304	-	512.7
Bogalay Township:				
Kadonkani	18,285	118,304	2,625	310.5
Pyindaye	22,022	142,482	2,625	374.1
Meinmahla	4,905	31,735	2,625	83.3
Sub-total	45,212	292,521	-	767.9
Total	75,398	487,825	-	1,280.5

Notes: (1) Unit carbon sequestration has been estimated at 6.47 ton-carbon/ha.
(2) The carbon transaction price of US\$ 3.50 is equivalent to 750 kyat (an average of the official rate at 450 kyat/US\$ and the free market rate at 1,000 kyat/US\$).

Sources: (1) Field reconnaissance survey, 2002.

Table 2.20 Annual Farm Household Income

Item	Kyakankwinpauk		Pyinalan		Kadonkani		Pyindaye	
	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer
Land holding size (ha)	1.2 (3ac)	9.5 (23.5ac)	1.2 (3ac)	6.8 (16.8ac)	1.2 (3ac)	4.1 (10.1ac)	1.2 (3ac)	2.0 (4.9ac)
Average yield (kg/ha)	2,200	2,200	2,200	2,200	2,299	2,299	1,800	1,800
Production (kg)	2,673	20,939	2,673	14,969	2,793	9,403	2,187	3,572
Home consumption (kg)	851	851	925	925	962	962	981	981
Procurement by MAPT (kg)	462	3,619	462	2,587	396	1,333	396	647
Sales to MAPT (kyat)	6,514	51,028	6,514	36,477	6,019	20,262	6,019	9,834
Procurement by private traders (kg)	1,360	16,469	1286	11,457	1,435	7,108	810	1,944
Sales to private Traders (kyat)	68,000	823,450	64,300	572,850	58,835	291,428	33,210	79,704
Annual farm income (kyat)	74,514	874,478	70,814	609,327	64,854	311,690	39,229	89,538
Land productivity (kyat/ha)	61,328	91,881	58,284	89,553	53,378	76,198	32,286	45,119

Note: 1) Average family sizes for the Kyakankwinpauk, Pyinalan, Kadonkani and Pyindaye Reserved Forests are 4.6, 5.0, 5.2 and 5.3, ppr household respectively.

2) Per head annual rice consumption is estimated at 120 kg which is equivalent to 185 kg in terms of paddy.

Source: 1) Village profile site survey, 2002. 2) Interview survey, 2002.

Table 2.21 Annual Farm Household Expenditure

Item	Kyakankwinpauk		Pyinalan		Kadonkani		Pyindaye	
	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer	Small/ Marginal Farmer	Average Farmer
Land holding Size (ha)	1.2 (3 ac)	9.5 (23.5ac)	1.2 (3ac)	6.8 (16.8ac)	1.2 (3ac)	4.1 (10.1ac)	1.2 (3ac)	2.0 (4.9ac)
Annual farm income (kyat)	74,514	874,478	70,814	609,327	64,854	311,690	39,229	89,538
Taxation for Farming (kyat/year)	300	2,350	300	1,680	300	1,010	300	490
Production cost (kyat/year)	45,000	352,500	45,000	252,000	22,500	75,750	22,500	36,750
Annual net farm Income (kyat)	29,214	519,628	25,514	355,647	42,054	234,930	16,429	52,298

Sources: 1) Village profile site survey, 2002. 2) Interview survey, 2002.

Table 3.1 The Objectives of Myanmar Fisheries Federation

<p>The Myanmar Fisheries Federation has been supporting the members on the following subjects:</p> <ol style="list-style-type: none"> 1) Supporting application of the members to DOF for undertaking fisheries and aquaculture. 2) Supporting application of the members for borrowing loans from the Livestock and Fisheries Bank 3) Supporting trading of the members by means of group formulation regarding fish and shrimp production 4) Supporting the members by distribution of government supplied goods for fishery business.
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Table 3.2 Ten Environmental Conservation Special Task Force

<ol style="list-style-type: none"> 1) Environmental conservation special task implementation group 1. (along Chin Twin River), 2) Environmental conservation special task implementation group 2. (along Ayeyawady River), 3) Environmental conservation special task implementation group 3. (along Sit Town River), 4) Environmental conservation special task implementation group 4. (along Than Lwin River), 5) Environmental conservation special task implementation group 5. (along Coastal Side), 6) Environmental conservation special task implementation group 6. (North Forest Region), 7) Environmental conservation special task implementation group 7. (West Forest Region), 8) Environmental conservation special task implementation group 8. (Middle Forest Region), 9) Environmental conservation special task implementation group 9. (East Forest Region), and 10) Environmental conservation special task implementation group 10. (South Forest Region)
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**Table 3.3 Organization of Environmental Conservation Special Task Implementation
Group National Environmental Conservation Committee, 2004**

(Provisional translation)

Groups Focused to River	
1)	<p>Environmental Conservation Special Task Implementation Group 1. (along Chin Twin river)</p> <ol style="list-style-type: none"> Chairman: Deputy Minister- Ministry of Transport Representative member: <ul style="list-style-type: none"> Myanmar Gems & Jewelry Trading Water Resources & River & creek development Department Ministry of Forestry General Administrative Department Myanmar Police Force National Environmental Conservation Commission
2)	<p>Environmental Conservation Special Task Implementation Group 2. (along Ayeyawady River)</p> <ol style="list-style-type: none"> Chairman: Deputy Minister- Ministry of Mining Representative member: <ul style="list-style-type: none"> Department of Mines Myanmar Gems & Jewelry Trading Ministry of Forestry Water Resources & River & creek development Department General Administrative Department Myanmar Police Force National Environmental Conservation Commission
3)	<p>Environmental Conservation Special Task Implementation Group 3. (along Sit Town river)</p> <ol style="list-style-type: none"> Chairmen: Deputy Minister- Ministry of Electric Power Representative member: <ul style="list-style-type: none"> Department of Mines Myanmar Gems & Jewelry Trading Ministry of Forestry Water Resources & River & creek development Department General Administrative Department Myanmar Police Force National Environmental Conservation Commission
4)	<p>Environmental Conservation Special Task Implementation Group 4. (along Than Lwin River)</p> <ol style="list-style-type: none"> Chairman: Deputy Minister- Ministry of Agriculture & Irrigation Representative member: <ul style="list-style-type: none"> Department of Mines Myanmar Gems & Jewelry Trading Ministry of Forestry Water Resources & River & creek development Department Ministry of Electric Power General Administrative Department Myanmar Police Force Representative member: National Environmental Conservation Commission
Groups Focused to Coastal Side	
5)	<p>Environmental Conservation Special Task Implementation Group 5. (along coastal side)</p> <ol style="list-style-type: none"> Chairmen : Deputy Minister- Ministry of Livestock & Fishery Representative member <ul style="list-style-type: none"> Ministry of Livestock & Fishery Marine Biology Department, Maw La Mying University Environmental Studies, Yangon University National Environmental Conservation Commission

6)	Environmental Conservation Special Task Implementation Group 6. (North Forest Region)
1.	Chairman: Deputy Minister- Ministry of Home Affair (Major General Phone Swe)
2.	Representative member
-	Department of Mines
-	(Ministry of Forestry
-	General Administrative Department
-	Myanmar Police Force)
-	National Environmental Conservation Commission
7)	Environmental Conservation Special Task Implementation Group 7. (West Forest Region)
1.	Chairman: Deputy Minister- Ministry of Information(Major General Aung Thein)
2.	Representative member
-	Department of Mines
-	Ministry of Forestry
-	General Administrative Department
-	Myanmar Police Force
-	National Environmental Conservation Commission
8)	Environmental conservation special task implementation group 8. (Middle Forest Region)
1.	Chairman: Deputy Minister- Ministry of Information (Major General Tin Naing Thein)
2.	Representative member
-	Department of Mines
-	Ministry of Forestry
-	General Administrative Department
-	Myanmar Police Force
-	National Environmental Conservation Commission
9)	Environmental Conservation Special Task Implementation Group 9. (East Forest Region)
1.	Chairmen : Deputy Minister- Ministry of Progress of board areas & National Races and Development Affairs (Major General Than Htun)
2.	Representative member
-	Department of Mines
-	Ministry of Forestry
-	General Administrative Department
-	Myanmar Police Force
-	National Environmental Conservation Commission
10)	Environmental Conservation Special Task Implementation Group 10. (South Forest Region)
1.	Chairman: Deputy Minister- Ministry of Hotel & Tourism (Major General Aye Myint Kyu)
2.	Representative member
-	Department of Mines
-	Ministry of Forestry
-	General Administrative Department
-	Myanmar Police Force
-	National Environmental Conservation Commission
Remarks	
1.	Environmental Special Task Implementation Group can extend the organization based on necessity of new member by Chairman's commend and committee member agreement.
2.	A chairman has have to choose the secretary & co-secretary for their group.
3.	Director General of Mines Department shall be a representative of chairman of the group 2 within absence of the chairman.
4.	Chairmen of the Environmental Conservation Special Task Implementation Group have to appoint representative of the chairman for absence to one of the Director General of the group member

Table 3.4 Responsibility of the Environmental Conservation Special Task Implementation Groups (National Environmental Conservation Committee, 2004)

(provisional translation)

<p>1) Responsibility of Along river side groups</p> <ul style="list-style-type: none"> - Management and protection of the river from bank erosion attaining sustainability of river and long time utilization. - Control of water pollution from disposal of waste and discharge of polluted water into the river. - Conservation of seed of aqua animal from catching. - Implementation of environmental assessment of economic development plan and activity, and preparation of improvement plan for environmentally neglected plan and activities. - Works instructed by the NECC.
<p>2) Responsibility of along with coastal side group</p> <ul style="list-style-type: none"> - Conservation of the natural beauty and environment. - Implementation of environmental analysis for building construction and economic development plan and activities near the costal side, and preparation of improvement plan for environmentally neglected plan and activities. - Protection of coastal area and beach from pollution. - Control of the big size production activity along costal side. - Protection and conservation of the coastal bank erosion and destroying of mangrove forest. - Works instructed by the NECC.
<p>3) Responsibility of forest region group</p> <ul style="list-style-type: none"> - Protection of clear felling and forest fire for maintaining adequate shifting cultivation method. - Protection of top soil from destroying and erosion. - Protection and conservation of the watershed and wet land such as marsh, delta, etc. - Protection of ecological system from destroying activity. - Protection of soil deterioration for prevention of air and water pollution. - Implementation of environmental assessment of economic development plan and activity, and preparation of improvement plan for environmentally neglected plan and activities. - other work receiving from committee is have to do.
<p>4) Planning and Report</p> <ul style="list-style-type: none"> - Special Task implementation Group shall submit the detail implementation plan. - Special Task implementation group shall submit report of the environmental conservation implementation activities to the committee - Special Task Implementation group shall be engaged in a responsibility in cooperation and discussion with the local authority. - Special Task Implementation group shall report juridical matter to Ministry of Home Affair and related local authority organization for enforcement of the law. - Special Task Implementation Group shall submit report to the NECC of the progress of the implementation activities at least once a month and special report on requirement.

Table 3.5 Prohibition in Reserved Forests

1) Trespassing and encroaching in a reserved forest; 2) Pasturing domestic animals or permitting domestic animals to trespass in a reserved forest; 3) Breaking up any land, clearing, digging or causing damage to the original condition of the land without a permit in a reserve forest; 4) Causing damage to a water-course, poisoning the water, using chemicals or explosives in the water in a reserved forest; 5) Catching animals, hunting or fishing in a reserved forest; 6) Kindling, keeping and carrying any fire or leaving any fire burning which may set fire to the forests in a reserved forest.

Table 3.6 Suggested Strategic Management Action of Local Supply Reserved Forests

1) Areas with good Natural Forest Cover - Protection against encroachment - Applying open and closed cycles of cutting/felling the plots - Coppicing to allow natural regeneration - Formation of interested user groups and establishment of CF	2) Forest Plantations established by FD or community - Conduct of field surveys, data collection, and research - Demarcation of boundaries - Maintaining plantation records - Permission to extract forest products from the FD plantation wood lots; maintenance and protection of plantation, and transfer of FD plantation to the community as appropriate - Extensive establishment of CF and field demonstrations
3) Severely degraded areas due to over exploitation - Open forest with 10 to 40% canopy cover to be defined as severely degraded forest that requires rehabilitation - Field surveys on location and area of degraded forests - Inventory and delineation of areas for systematic extraction of forest products for households by open and closed cycles of cutting, if warranted - Public awareness to establish CF; cooperation between FD and communities for setting temporary boundaries for closed and open plots; growing coppice for quick regeneration and site clearing activities - Plantation establishment with multi-purpose trees or fruit trees in suitable sites.	4) Encroached farmland areas - Field survey and recording of paddy fields with good yield capacity and issue of temporary permits for paddy cultivation - Survey of paddy fields with salinity problems or low yields in mangrove reserves and organizing CF establishment for mangrove regeneration - Survey of abandoned land for low fertility and establishment of FD plantation or CF with proper management planning - Land surveys for proper land-use mapping, map drawing and recording, and public communication for community participation.

Source: National Forestry Sector Master Plan (2001/02 –2030/31)

**Table 3.7 Format of the District Forest Management Plan on the Format and Guidelines for
District Forest Management Plan 1996**

MANAGEMENT PLAN FORMAT	
<p>PLAN SUMMARY</p> <p>Summary of the Plan provided in about 2-5 pages containing an essence of the plan as a whole. It should include:</p> <ul style="list-style-type: none"> - Plan name, term, administering authority; - Objectives; - Essential forestry, socioeconomic and demographic information; - Benefit of the plan in social and financial terms. 	
<p>TITLE, TERM AND AUTHORITY</p> <ul style="list-style-type: none"> - Title - Plan Period - Administering Authority 	
PART I. CURRENT SITUATION	
1. INTRODUCTION	
2. BASE-LINE INFORMATION	
<p>2.1. Biophysical Information</p> <ul style="list-style-type: none"> 2.1.1 Location, Area and Legal Status 2.1.2 Topography 2.1.3 Geology and Soils 2.1.4 Climate 2.1.5 Hydrology, Drainage and Water Supply 2.1.6 Flora 2.1.7 Fauna 2.1.8 Infrastructure <ul style="list-style-type: none"> 2.1.8.1 Buildings and Roads 2.1.8.2 Communications 2.1.8.3 Machinery and Equipment 2.1.9 Forest-based Industry 	
<p>2.2. Land Use</p> <ul style="list-style-type: none"> 2.2.1 Current Land Use 2.2.2 Status of Forest Cover 2.2.3 Land Use Changes 	
<p>2.3. Forest Resource Base</p> <ul style="list-style-type: none"> 2.3.1 Type of Forests and Areas <ul style="list-style-type: none"> 2.3.1.1 Natural Forests 2.3.1.2 Planted Forests 2.3.1.3 Others 2.3.2 Growing Stock <ul style="list-style-type: none"> 2.3.2.1 Reserved Forests <ul style="list-style-type: none"> 2.3.2.1.1 Production Forests <ul style="list-style-type: none"> 2.3.2.1.1.1 Natural Forests <ul style="list-style-type: none"> 2.3.2.1.1.1.1 Rate of Growth 2.3.2.1.1.1.2 Rate of Mortality 2.3.2.1.1.1.3 Regeneration 2.3.2.1.1.1.4 Stand Table 2.3.2.1.1.1.5 Stock Table 2.3.2.1.1.2 Planted Forests <ul style="list-style-type: none"> 2.3.2.1.1.2.1 Rate of Growth 2.3.2.1.1.2.2 Rate of Mortality 	

MANAGEMENT PLAN FORMAT	
	<ul style="list-style-type: none"> 2.3.2.1.1.2.3 Stand Table 2.3.2.1.1.2.4 Stock Table 2.3.2.1.2 Watershed Forests 2.3.2.1.3 Local Supply Forests 2.3.2.1.4 Community Forests 2.3.2.1.5 Others 2.3.2.2 Protected Public Forests <ul style="list-style-type: none"> 2.3.2.2.1 Production Forests <ul style="list-style-type: none"> 2.3.2.2.1.1 Natural Forests <ul style="list-style-type: none"> 2.3.2.2.1.1.1 Rate of Growth 2.3.2.2.1.1.2 Rate of Mortality 2.3.2.2.1.1.3 Regeneration 2.3.2.2.1.1.4 Stand Table 2.3.2.2.1.1.5 Stock Table 2.3.2.2.1.2 Planted Forests <ul style="list-style-type: none"> 2.3.2.2.1.2.1 Rate of Growth 2.3.2.2.1.2.2 Rate of Mortality 2.3.2.2.1.2.3 Stand Table 2.3.2.2.1.2.4 Stock Table 2.3.2.2.2 Watershed Forests 2.3.2.2.3 Local Supply Forests 2.3.2.2.4 Community Forests 2.3.2.2.5 Others 2.3.2.3 Non-wood Forest Products <ul style="list-style-type: none"> 2.3.2.3.1 Bamboos 2.3.2.3.2 Rattans 2.3.2.3.3 Others 2.3.3 Protected Areas <ul style="list-style-type: none"> 2.3.3.1 Ecosystems Management 2.3.3.2 Wildlife Management
3.	DEMOGRAPHIC INFORMATION
	<ul style="list-style-type: none"> 3.1. Population 3.2. Employment by Sectors
4.	PAST MANAGEMENT
	<ul style="list-style-type: none"> 4.1. Production <ul style="list-style-type: none"> 4.1.1 Wood Products 4.1.2 Non-Wood Forest Products 4.2. Silviculture and Management 4.3. Organization and Administration 4.4. Training, Research and Development 4.5. Revenue and Expenditure
5.	REVIEW OF PAST EFFORTS
	<ul style="list-style-type: none"> 5.1. Achievement of Objectives 5.2. Social and Community Issues 5.3. Management Practices 5.4. Institutional Arrangements 5.5. External Impacts 5.6. Demand and Supply 5.7. Revenue and Expenditure 5.8. Constraints and Limitations
6.	CONCLUSION

Table 3.8 CFDTTC Training Course and Contents for Participatory Development

Training Program No. / Title		Contents	Item
Participatory Extension System (PES) training Course			
PES-1	Orientation	1.Objective	1.1 Expectation form participant
			1.2 Expectation from COMFORT Project
		2. Methodology	2.1Experience Participatory Training
			2.2 Expected outputs
			2.3 Evaluation
			2.4 Presentation
PES-2	CF Concept based on Forest Policy and Law	1. Introduction	1.1 Evaluation
		2.Review (Comparison of Concepts)	2.1 Forestry Policy
			2.2 Forest Law
			2.3 30 Year Master plan
			2.4 CFI
		3. Case Study	3.1 Neighboring Countries
			3.2 FAO/UNDP experience in Myanmar
		4. Conclusion-Definition of Community Forest Management	4.1Community
4.2 Forest			
4.3 Management			
PES-3	Participator y Principles	1. Introduction	1.1 Type of Participation
			1.2 Definition and Principles
			1.3 Learning by Experience
		2. Demonstration of Tools for Participation	2.1 Sharing Information
			2.2 Sharing Resources
			2.3 Visualization
			2.4 Learning Process
			2.5 Group Dynamics
3. Apply to the CF implementation	3.1 When		
	3.2 Where		
	3.3 Who		
	3.4 How		
PES-4	Extension Concept, Theory and Practice	1. Concept	1.1 Image of Extension
			1.2 Background history
		2. Theory of Extension	2.1 Diffusion of Innovations (Everett M. Rogers)
			2.2 Extension as Education
			2.3 Extension as Communication
3. Practice	1.1 Variety of Extension Method		
PES-5	CF Advantage	1. Review of CFI	
		2. Case Study	2.1 UNDP/FAO Project previous experiences
			2.2 FD's own experiences
		3. Compare it by matrix	3.1 Advantage vs. disadvantage
			3.2 Direct vs. Indict
			3.3 Tangible vs. Intangible
			3.4 Social vs. Environmental vs. economic
		4. Discussion	4.1 Specific advantage for Dry Zone
5. Planning	5.1 Promotion for advantage		
	5.2 Countermeasures for disadvantage		
PES-6	Com- munication Skills	1. Introduction	1.1 Communication analysis
			1.2 Verbal & Non-verbal Communication
		2. Practice of basic communication skills	2.1 Active Listening skill
			2.2 Questioning skill
2.3 Presentation skill			

Training Program No. / Title		Contents	Item
		3. Facilitation skills	3.1 Define ice breaking
			3.2 4 stages of learning cycle
		4. Action Plan	4.1 Design Presentation
			4.2 Keep It Simple and Short (KISS)
			4.3 Presentation
PES-7	Conflict Resolution	1. Sharing experience from participants	1.1 Conflict analysis with 4 steps approach
		2. Theory	2.1 Define emotion and conflict
			2.2 Measure with SMART criteria
		3. Discussion	3.1 Consultation with Margoli's wheel method
			3.2 Check list of dealing with conflict
		3.3 List of expected question related to CF establishment	
PES-8	Extension Management	1. Introduction	1.1 Analysis of Management
			1.2 Check list for Extension Planning
			1.3 Resource allocation
		2. Implementation planning	2.1 Check list of implementation
		3. Evaluation methods	3.1 Project Cycle Management
			3.2 Plan-Do-See
		3.3 Participatory evaluation	
PES-9	Evaluation	1. Practice various type of participatory evaluation methods	1.1 Worksheet by individual
			1.2 pair consultation
			1.3 one word by each
		2. Aspects for evaluation of effectiveness	2.1 Awareness
			2.2 Knowledge
			2.3 Skills
		3. Consolidation for presentation	3.1 My Learning
Participatory Extension Method (PEM) Training Course			
PEM-1	Operation	1. Objective	1.1 Expectation from participants
			1.2 Expectation from COMFORT Project
		2. Methodology	2.1 Experience Participatory Training
			2.2 Expected outputs
			2.3 Evaluation
			2.4 Presentation
		3. Schedule	
MPE-2	Awareness Building	1. Awareness	1.1 Define awareness
			1.2 Six imperatives of Myanmar Forest Policy
		2. Changing	2.1 Change and Change Agent
			2.2 Resistant to Change
			2.3 Sharing and Discussion
		3. Power and Personalities	3.1 Position and Personal Power
			3.2 Big V personalities
4. Time Management	4.1 Put first thing first		
PEM-3	Participatory Principles	1. Introduction	1.1 Type of Participation
			1.2 Definition and principles
			1.3 Learning by Experience
		2. Demonstration of Tools for Participation	2.1 Sharing Information
			2.2 Sharing Resources
			2.3 Visualization
			2.4 Learning Process
	2.5 Group Dynamics		

Training Program No. / Title		Contents	Item
		3. Apply to the CF implementation	3.1 When
			3.2 Where
			3.3 Who
			3.4 How
		4. Reflection and Sharing	
PEM-4	Extension concept, Theory and Practice	1. Concept	1.1 Image of Extension
			1.2 Background history
		2. Theory of Extension	2.1 Diffusion of Innovations (Everett M. Rogers)
			2.2 Extension as Education
			2.3 Extension as Communication
		3. Practice	3.1 Variety of Extension Methods
			3.2 Reflection
PEM-5	CF concept based on Forest Policy and Law	1. Introduction	1.1 Evaluation
		2. Review (Comparison of Concepts)	2.1 Forest Policy
			2.2 Forest Law
			2.3 30 Years Master Plan
			2.4 CFI
		3. Case Study	3.1 Neighboring Countries
			3.2 FOUND experience in Myanmar
		4. Conclusion-Definition of Community Forest Management	4.1 Community
			4.2 Forest
			4.3 Management
PEM-6	CF Planning and Management	1. Review of CFI	
		2. Case study	2.1 UNDP/FAO project previous experiences
			2.2 FD's own experiences
		3. Compare it by matrix	3.1 Advantage vs. disadvantage
			3.2 Direct vs. Indirect
			3.3 Tangible vs. Intangible
			3.4 Social vs. Environmental vs. economic
		4. Discussion	4.1 Specific advantage for Dry Zone
		5. Planning	5.1 Promotion for advantage
			5.2 Countermeasures for disadvantage
PEM-7	Group work skills	1. Group analysis	1.1 Voluntary - Compulsory
			1.2 Official - Personal
		2. Expected function of the Group	2.1 Information sharing
			2.2 Problem Solving
			2.3 Decision Making
			2.4 Consensus Building
			2.5 Group Dynamics
			2.6 Learning Organization
		3. Leadership	
		4. Reflection	
		5. Sharing	
PEM-8	Com-munication Skills	1. Introduction	1.1 Communication analysis
			1.2 Verbal & Non-verbal Communication
		2. Practice of basic communication skills	2.1 Active Listening skill
			2.2 Questioning skill
			2.3 presentation skill
		3. Facilitation skills	3.1 Define ice breaking
			3.2 4 stage of learning cycle
		4. Action plan	4.1 Design presentation
			4.2 Keep It Simple and Short (KISS)

Training Program No. / Title		Contents	Item
			4.3 Presentation
PEM-9	Research Methodology (PRA)	1. What is PRA ?	1.1 3 main points
			1.2 Attitude of Extension staffs
		2. Contents of PRA (Main Analytical Tools)	2.1 Semi- Structured interview
			2.2 Triangulation
			2.3 Sabotage
			2.4 Time-line (Community history)
			2.5 Community map
			2.6 Needs Ranking
		3. Practice	
		4. Reflection	4.1 Difficulties and limitation
PEM-10	CFI Procedure	5. Presentation	
		1. Level of understanding CF (Benchmark)	
		2. Demonstration of CFI Guide for villagers	2.1 Critique with Worksheet
			2.2 Logistics analysis with Worksheet (resource allocation)
		3. Confirmation of each steps	3.1 CF steps from villagers side
			3.2 CF steps from Extension Staff side
		4. Presentation	
		5. Evaluation	
PEM-11	Media Production	1. Media Analysis	1.1 Definition
			1.2 Types of media
			1.3 Important of colors in visual media production
		2. Media production	
		3. Steps of media production	
PEM-12	Social Marketing	4. Media critique	
		1. Social Marketing	1.1 Definition
			1.2 Concept
			1.3 4P: Product, Price, Place, Promotion
		2. Case study	2.1 Local Products
		3. Practice	3.1 Planning: Social Marketing in the CF content
		4. Presentation	4.1 Sharing information
PEM-13	Agroforestry	1. Concept of agroforestry	
		2. Define agroforestry	
		3. Type of agroforestry	
		4. Type of income generation	
		5. Advantage and disadvantage (limitation)	
		6. Consideration of Agroforestry system	
PEM-14	Income Generation	1. Gender issue	
		2. Women in development	
		3. Traditional & local cottage industry	
		4. Advantage and Disadvantages (Limitation)	
PEM-15	Conflict Resolution	1. Sharing experience from participants	1.1 Conflict analysis with 4 steps approach
		2. Theory	2.1 Define emotion and conflict
			2.2 Measure with SMART criteria
		3. Discussion	3.1 Consultation with Margi's wheel method
			3.2 Check list of dealing with conflict

Training Program No. / Title		Contents	Item
			3.3 List expected question related to CF establishment
PEM-16	Ground Survey	1. Basic ground survey	1.1 Theory
			1.2 Basic concept
		2. Using survey equipment	2.1 Measuring
			2.2 Drawing/mapping
			2.3 Area calculating
		3. Ground checking	
		4. Limitations and countermeasures	
PEM-17	Extension Management	1. Introduction	1.1 Analysis of Management
			1.2 Check list for Extension Planning
		2. Implementation planning	1.3 Resource allocation
		3. Evaluation methods	2.1 Check list of implementation
			3.1 Project Cycle Management
			3.2 Plan-Do- See
			3.3 Participatory evaluation
PEM-18	CF Establish-ment	1. Identifying the difficulties of CF establishment	1.1 Problem finding
			1.2 Information sharing
		2. Case study	1.3 Problem solving
		3. Drawing CF Management Plan	3.1 Planning the steps
			3.2 Getting the villager's participation
			3.3 Implementation
			3.4 Generalization
		4. Consolidation	
PEM-19	Evaluation	1. Practice various type of participatory evaluation methods	1.1 worksheet by individual
			1.2 pair consultation
			1.3 one word by each
		2. Aspects for evaluation of effectiveness	2.1 Awareness
			2.2 Knowledge
			2.3 Skills
		3. Consolidation for presentation	3.1 My Learning

Table 3.9 Plantation by FD inside the IRM Area

(unit: ha)

Mangrove Species	Year Established					Total
	1997-98	1998-99	1999-2000	2000-2001	2001-2002	
1. <i>Avicenia officinalis</i>	335	348	464	437	458	2,042
2. <i>Sonneratia apetala</i>	23	24	-	28	10	85
3. <i>Heritiera fomes</i>	-	5	8	4	1	18
4. <i>Bruguiera gymnorhiza</i>	17	20	12	16	15	80
5. <i>Aegiceros corniculatum</i>	3	4	1	-	2	10
6. <i>Ceriops decandra</i>	6	4	1	-	-	11
7. <i>Excocaria agallocha</i>	-	-	-	-	-	0
8. <i>Xylocarpus mollucensis</i>	-	-	-	-	-	0
9. <i>Rhizophora apiculata</i>	-	-	-	-	0.4	0.4
10. <i>Amoora cucullata</i>	-	-	-	-	0.4	0.4
Sub-total	384	405	486	485	486	2,246
Non-Mangrove Species						
11. <i>Eucalyptus camaldulensis</i>	17	-	-	-	-	17
12. <i>Acacia auriculiformis</i>	4	-	-	-	-	4
13. <i>Sesbania grandiflora</i>	-	-	-	-	-	-
Sub-total	21	0	0	0	-	21
Total	405	405	486	485	486	2,267

Source: FD, 2002.

Table 3.10 CF Plantation and RIF of Kadonkani Reserved Forest

Village Name	No. of User Members	Plantation (ha)	RIF/ NFIO (ha)	IRM Area
1. Kyun Tha Yan	70	99.6	0.0	
2. Kyet Phay	60	9.6	0.0	
3. Balu Ma	38	85.3	0.0	
4. Ah Ma Khan	79	95.8	0.0	
5. Khu Nit Sin Ngu	15	25.1	0.0	
6. Ta Yoke Chaung	27	49.4	0.0	
7. Ta Bot Kyun	64	13.8	0.0	
8. Ta Za Lone	31	32.8	0.0	
9. Put Lone Taing	56	6.9	0.0	○
10. Tha Yaw Chaung	37	20.3	0.0	○
11. Chaung Bye Gyi	70	18.2	24.7	○
12. Nge Thu Myit Tan	24	1.9	0.0	
13. La Wine Kyun (East)	40	13.0	0.0	
14. Tatt Bay Lay	31	20.6	0.0	
15. Khing Shue Wan	22	8.1	0.0	○
16. Sa Laung Kyi	37	12.2	0.0	
17. Sein Tone Hla	19	2.0	0.0	
18. Lamu Oke Ka Lay	105	23.1	0.0	
Total	925	624.2	24.7	

Source: the forest department, 2002.

Table 4.1 Species Recorded in Vegetation Transect Survey

Species		Species	
1	<i>Acanthus ilicifolius</i>	24	<i>Diospyros embryopteres</i>
2	<i>Acrostichum aureum</i>	25	<i>Eupatorium odonatum</i>
3	<i>Aegialitis rotundifolia</i>	26	<i>Excoecaria agallocha</i>
4	<i>Aegiceras corniculatum</i>	27	<i>Ficus spp</i>
5	<i>Amoora cucullata</i>	28	<i>Flagellaria indica</i>
6	<i>Antidesma pentandrum</i>	29	<i>Heritiera fomes</i>
7	<i>Avicennia alba</i>	30	<i>Heritiera littoralis</i>
8	<i>Avicennia marina</i>	31	<i>Hibiscus tiliaceus</i>
9	<i>Avicennia officinalis</i>	32	<i>Instia bijuga</i>
10	<i>Barringtonia acutangula</i>	33	<i>Kandelia candle</i>
11	<i>Barringtonia racemosa</i>	34	<i>Merope angulata</i>
12	<i>Brownlowia tersa</i>	35	<i>Nipa fruticans</i>
13	<i>Bruguiera gymnorhiza</i>	36	<i>Phoenix paludosa</i>
14	<i>Bruguiera parviflora</i>	37	<i>Pongamia pinnata</i>
15	<i>Bruguiera sexangula</i>	38	<i>Pongamia pinnata</i>
16	<i>Caesalpinia cristae</i>	39	<i>Rhizophora apiculata</i>
17	<i>Cerbera manghas</i>	40	<i>Rhizophora mucronata</i>
18	<i>Cerbera odollum</i>	41	<i>Sonneratia alba</i>
19	<i>Ceriops decandra</i>	42	<i>Sonneratia apetala</i>
20	<i>Clerodendrum inerme</i>	43	<i>Sonneratia caseolaris</i>
21	<i>Cynometra ramiflora</i>	44	<i>Sonneratia griffithii</i>
22	<i>Dalbergia spinosa</i>	45	<i>Xylocarpus granatum</i>
23	<i>Derris scandens</i>	46	<i>Xylocarpus moluccensis</i>

Table 4.2 Growth Structure of Plantation Established in Bogalay and Laputta

TS	RF	FC No.	Species	Established Year	Plot	Stand Volume (SV) (m3/ha)	Stand Stock (N) (#/ha)	Mean Diameter (Dg) (cm)	Stand Dominant Height (Ho) (m)	Mean Dia. of Dominant Height (Dho) (cm)	Stand Mean Height (H) (m)	Stand Basal Area (G) (m2/ha)
Bogalay	Kadonkani	47	<i>Aegiceras corniculatum</i>	1993	1	3.00	4775	3.42	3.63	5.03	2.35	4.71
	Kadonkani	36	<i>Aegiceras corniculatum</i>	1998	1	4.64	9700	3.83	2.20	5.33	1.51	11.71
	Kadonkani	48	<i>Avicennia officinalis</i>	1992	1	20.90	2800	6.16	8.50	14.03	4.37	12.20
	Kadonkani	47	<i>Avicennia officinalis</i>	1993	1	33.15	3625	6.81	11.70	18.17	5.05	17.62
	Kadonkani	48	<i>Avicennia officinalis</i>	1994	1	18.31	1088	9.68	11.00	12.77	7.67	8.96
				1994	2	19.85	2238	8.61	6.87	14.10	5.29	14.17
				1998	1	7.30	7800	4.10	4.60	6.17	2.38	11.01
	Kadonkani	48	<i>Bruguiera gymnorhiza</i>	1998	2	23.60	4900	6.43	6.92	8.53	5.18	17.34
				1992	1	165.82	6275	4.48	9.10	7.77	5.24	11.73
				1992	2	11.89	300	12.26	12.00	20.00	8.79	4.34
	Kadonkani	49	<i>Ceriops decandra</i>	1992	1	11.24	5875	4.35	5.00	4.97	2.44	9.34
	Kadonkani	36	<i>Ceriops decandra</i>	1998	1	25.44	3700	3.51	3.30	3.47	1.78	3.81
	Kadonkani	49	<i>Excoecaria agallocha</i>	1992	1	6.64	1446	6.26	8.10	12.60	3.96	5.19
	Kadonkani	47	<i>Heritiera fomes</i>	1993	1	5.07	9900	2.98	4.93	3.67	2.29	8.29
				1993	2	10.43	6200	4.57	5.40	6.90	3.31	11.83
	Kadonkani	36	<i>Heritiera fomes</i>	1998	1	0.11	2100	2.05	0.91	2.10	0.60	0.76
	Kadonkani	49	<i>Lumnitzera racemosa</i>	1999	1	4.43	2700	4.25	5.27	5.60	4.04	4.05
	Kadonkani	36	<i>Rhizophora apiculata</i>	1998	1	39.28	5400	3.40	4.20	4.43	3.29	5.16
			<i>Rhizophora mucronata</i>									
	Kadonkani	49	<i>Sonneratia apetala</i>	1994	1	71.86	1825	9.72	16.33	23.33	8.03	20.95
	Kadonkani	49	<i>Sonneratia apetala</i>	1998	1	32.18	1700	10.01	10.16	10.80	8.89	13.89
	TOTAL AVE.					24.00	4062	5.65	6.86	9.36	4.15	9.58
	TOTAL					515.14	84346	116.87	140.12	189.77	86.43	197.06
Laputta	Kyakankwinpauk	20	<i>Sonneratia apetala</i>	1995	1	86.75	5875	8.32	13.33	13.60	6.23	41.51
	Kyakankwinpauk	20	<i>Rhizophora apiculata</i>	1995	1	62.14	13500	4.11	6.90	6.70	3.53	21.52
				1995	2	106.50	14100	4.26	5.83	5.00	4.43	21.04
	Kyakankwinpauk	20	<i>Avicennia officinalis</i>	1995	1	8.02	7214	3.81	5.33	6.43	2.96	9.56
				1995	2	8.95	4714	4.33	5.87	10.90	3.00	8.75
				1995	3	8.31	7071	3.97	4.37	5.73	3.12	9.60
				1995	4	6.13	5347	3.87	4.70	6.70	3.04	6.99
	Pyinalan	75	<i>Amoora cucullata</i>	1997	1	3.29	21300	1.93	2.77	2.57	1.83	6.79
	Pyinalan	76	<i>Avicennia officinalis</i>	1997	1	10.06	8900	3.77	5.47	7.23	3.05	11.10
	Pyinalan	71	<i>Sonneratia apetala</i>	1997	1	12.69	1900	7.35	6.47	9.20	5.39	8.81
	Pyinalan	71	<i>Avicennia officinalis</i>	1998	1	9.64	19200	2.80	4.63	5.17	2.66	13.31
	Kyakankwinpauk	20	<i>Albizia lebbek</i>	1998	1	14.12	11662	3.80	5.75	14.97	1.86	16.20
	TOTAL AVE.					28.61	11090	4.52	1.25	1.65	3.50	15.97
	TOTAL					336.58	120783	52.31	71.41	94.21	41.08	175.20

Source: JICA Study Team

Table 4.3 Mangrove Plantation from 1980-2004 in Bogalay and Laputta Township

Year	Bogalay Township			Laputta Township			Total (ha)
	RF	No. of compartment	Area (ha)	RF	No. of compartment	Area (ha)	
1980-81	Kadonkani	11	30	Pyinalan	75	30	61
1981-82	Kadonkani	10	30	Pyinalan	72	30	61
1982-83	Kadonkani	10, 11	41	Pyinalan	72	41	81
1983-84	Kadonkani	10	41	Pyinalan	72	41	81
1984-85	Kadonkani	10	162	Pyinalan	72 & 75	203	365
1985-86	Kadonkani	9	101	Pyinalan/ Kyakankwinpauk	6 / 71	142	243
1986-87	Kadonkani	10	41	Kyakankwinpauk	6	81	122
1987-88	Meinmahla	10, 11	41	Kyakankwinpauk	6	81	122
1988-89	Meinmahla	7	41	Kyakankwinpauk	6	101	142
1989-90	Meinmahla	7	20	Kyakankwinpauk	6	61	81
1990-91	Meinmahla	11	81	Kyakankwinpauk/ Kakayan	6 /33	284	365
1991-92	Meinmahla	7 & 10	81	Kyakankwinpauk/ Kakayan	6 /33	284	365
1992-93	Kadonkani	49	162	Kyakankwinpauk	4	324	486
1993-94	Kadonkani	47,48, 50, 61	324	Kyakankwinpauk/ Pyinalan	5, 6 / 66	608	932
1994-95	Kadonkani	47, 48	365	Kyakankwinpauk	5, 6 / 67	608	972
1995-96	Kadonkani	32, 33	385	Kyakankwinpauk	7, 8, 6,9, 19	587	972
1996-97	Kadonkani	29,30, 31	446	Kyakankwinpauk/ Pyinalan	19/65, 67	648	1,094
1997-98	Kadonkani	12	405	Kyakankwinpauk Pyinalan	4, 6, /26, 42, 41	608	1,013
1998-99	Kadonkani	36	405	Kyakankwinpauk	18, 19, 20	608	1,013
1999-2000	Kadonkani	37,39, 40	486	Kyakankwinpauk	18, 25 31, 32	608	1,094
2000-2001	Kadonkani	50, 51, 60, 61 ,62	486	Kyakankwinpauk	27 & 28	527	1,013
2001-2002	Kadonkani	36 , 45	486	Kyakankwinpauk	6,25,27,28 &31	527	1,013
2002-2003	Kadonkani	63, 64, 65, 67, 68	486	Kyakankwinpauk	6, 19, 27, 28, 29	527	1,013
2003-2004	Kadonkani	42,55, 57, 58	486	Kyakankwinpauk Pyinalan	6, 26, 27 57, 58, 61, 75	527 (324 +203)	1,013
Total	-	-	5,632	-	-	8,086	13,718

Source: FD 2004

Table 4.4 FD Annual Schedule of the Plantation Activities

No.	Work Item	Month											
		J	F	M	A	M	J	J	A	S	O	N	D
1	Site preparation												
2	Seed collection												
3	Nursery establishment												
4	Staking												
5	Transportation of seedlings												
6	Planting												
7	Patching												
8	Weeding												
9	Fire protection												
10	Collection of Camp construction Material												
11	Camp construction												
12	Transportation of laborer												

Source: FD, 2002.

**Table 4.5 Survival Rate and Mean Tree Height of
Avicennia officinalis in Three Classified Ground Level**

Ground levels	Survival rate (%)	Mean Tree Height (cm)
1.0 Low Ground Level	82	118
2.0 Medium Ground Level		
2.1 near shallow creek	73	101
2.2 near extremely shallow creek	57	100
3.0 High ground level		
2.1 at the bank of creek	64	64
2.2 landward, slope gradually increases	38	75

Source: Kogo, 1993.

Table 4.6 Standard Cost for Establishing Plantation by FD

(unit: kyat)

Sr No.	Work item/ Year	Year of Standard per ha						
		1997	1998 1999	2000	2001	2002	2003	2004
1	Site preparation	890	1,330	1,330	1,560	2,540	3,048	4,826
2	Seed collection	150	150	300	490	508	1,016	1,016
3	Nursery establishment	1,110	1,110	1,360	1,790	1,842	3,302	3,302
4	Staking	300	370	370	490	762	3,048	3,048
5	Transportation of seedling	370	490	490	740	762	1,524	2,286
6	Planting	890	1,780	1,480	1,480	1,524	3,048	4,572
7	Patching	150	150	220	220	229	559	965
8	Weeding (for two times)	370	740	1,230	1,230	1,270	3,048	4,572
9	Fire Protection	70	120	120	120	127	254	762
10	Collection of Camp Construction material	60	60	90	50	51	-	-
11	Camp construction	50	70	120	70	76	508	508
12	Transportation of labour	-	-	40	60	64	381	381
13	Construction of Check Path					-	254	381
	Total	4,410	6,370	7,150	8,300	9,755	19,990	26,619

Source: FD, 2004.

Table 4.7 Vegetables, Fruits and other Species from the Site Survey

Vegetable			Fruits			Others		
1	Indian Rhubarb	+++	1	Banana	+++	1	<i>Hygrophila obovata</i> (Chinese medicine)	+++
2	Okra	+++	2	Mango	+++	2	Bawskys (<i>Leucaena glauca</i>): edible, fodder, etc	+++
3	Chile	++	3	Guava	++	3	Garden croton (Zaw Lome)	+++
4	Water Cress	++	4	Lemon	++	4	Turmeric (spice / medicine)	++
5	Betel leaves	++				5	Aster (flower)	++
6	Cucumber	++				6	Pepper (spice)	++
7	Wax Gourd	++				7	Sunflower	+
8	Roselle	++						
9	Bitter Gourd	+						
10	Aroid	+						
11	Egg plant	+						
12	Bitter Gourd	+						
13	String bean	+						

Note: Appearance frequencies are referred as many: +++, medium: ++, low: +.

Source: Village Profile Survey 2002, Field Survey by the study team.

Table 4.8 Retail Price of Vegetables in the study area

Crop	Approx weight (kg)	Price in Late Rainy Season (Sep. 2002)	Price in Summer Season (Feb 2004)	Price in Rainy Season (Jul 2004)	Price in Nov. 2004
Water Cresson	1.0	500	150	100	100
Rhubarb	1.0	700	200	150	150
Cucumber	0.4	400	200	100	200
Cabbage	0.3	500	450	500	100
String beans	0.5	600	250	200	170
Cauliflower	0.2	800	600	-	550
Chile	1.0	400	150	100	350
Pumpkin	0.4	600	700	550	500
Bean sprout	1.0	200	200	100	100

Source: Field survey at Thit Poke village in the Pyinalan Reserved Forest by the study team (2002, 2004).

Table 4.9 Livestock Breeding Conditions in the Study Area

1. Duck
Duck egg production is popular among villagers in reserved forests. The egg trade centers in reserved forests are for egg trading and also for duck hatcheries. There is a private duck hatchery in Bogalay for distribution of ducklings. The main foods for ducks are broken rice, rice bran, and some green weeds. Egg prices vary from season to season. In 2002, egg prices per piece at the trade center were 32 kyat during the dry season and 30 kyat for the rainy season.
2. Cattale and Buffalo
Draught cattle and buffalo are mainly used for paddy cultivation. Rice straw is the main feed for these animals. Use of rice bran for feeding draught animals is rare in the reserved forests. Several buffalo herders operate in the reserved forests and farmers rent them for cultivation. In 2002, rental price of a pair of buffalos is 60 baskets of paddy per year.
3. Pig
Pig rearing is common in all areas. Villagers operate small-scale commercial pig breeding for pigs & piglets for local village demands. A combination of kitchen scraps, rice bran, and green feed is common fodder in the area. Markets for pigs and piglets are in Yangon. Villagers are raising pigs in small pig houses with shade. Depend on the expert engaged in the HDI project, pig rearing is popular and a common activity among the villagers in the study area.

Table 4.10 Major Dieases of Livestocks in Study Area

Livestock	Disease
Cattle / Buffalo	Hemorrhagic Septicemia Foot & Mouth Disease
Pig	Hog cholera Viral pneumonia
Duck	Avian Pasteurellosis
Chicken	Newcastle

Table 4.11 Approximate Composition of Animal Dung

Species	Nitrogen N ₂	Phosphorus P ₂ O ₅	Potash K ₂ O
Cattle	3.00-4.00	1.00-2.00	1.00-3.00
Cow	5.10	1.40	4.50
Bull	6.80	2.70	3.60
Pig	2.72	2.27	1.82
Chicken/ Duck	9.50	7.45	4.60

note: 1) Depend on feed the compositions vary

Source: Homestead gardening (2nd edition), MOLE, 1974

Table 4.12 List of Gear

Gear	Size of Fishing Area			Impact on Fisheries Resources		
	Small	Medium	Large	Small	Medium	Large
Trawl net			X			X
Large fish Stow net, coastal area			X			X
Stow net, coastal area			X			X
Stow net, river area			X			X
Gar (local name)			X		X	
Gaw (local name)			X		X	
Hilsa Trammel Gill Net			X		X	
Pomfret Gill net, inshore coastal waters			X		X	
Two man Hand Operated Seine Net, Creeks		X			X	
Fence Net, nylon, rivers and creeks		X			X	
Push Net, Hand Operated		X			X	
Cast Net	X			X		
Fish Trap, twine	X			X		
Prawn Trap, twine	X			X		
Crab Trap, twine	X			X		
Shrimp Trap, split bamboo	X			X		
Crab Traps, woven reed and bamboo	X			X		
Long lines	X			X		

Source: Seilert (1998)

Table 4.13 The type and number of boats used for fishing in Laputta Township

Three kinds of fishing boats were found in the study area. Small boats (canoes) of 4-6 m length without motors are used by artisanal fishermen in the area. Coastal fishing boats are defined as less than 9 m (30 ft) in length and with engines less than 12 hp, whereas offshore boats are defined as more than 9 m in length and with engines greater than 12hp. The number of boats registered under those categories in Laputta Township is listed below. It clearly shows that there is a high number, 5,000, of small boats in the region compared to the other two types. The number of boats in Bogalay was not available.

Number of Fishing Boats in Laputta Township (2001)

Category	Number of boats
Small boat without motor <200kg	5,000
Coastal fishing boat < 12hp, 30ft	82
Offshore fishing boat > 12hp & 30ft	31
Offshore boat with freezing machine	None

Source: Fishery Department, Laputta Township

Table 4.14 Processing of Fishery Products in the Study Area

1) Dried Fish

In areas influenced by seawater, most of the fish caught are salted and dried under the sun, then they are preserved with salt and ammonium chloride. The main fish species are small mackerel, hilsa and sharks. The whole processing takes about 14 days and it takes about one month before the products reach the markets in Yangon.

2) Fish Paste

The method of producing fish paste is to dry and mince the fish and shrimp caught by stow nets with some chemicals as a preservative being added during the production process. The product is stored in plastic bags of about 60 kg and sent to Yangon. The lack of hygienic conditions when these products are produced may cause health hazards to the consumers. The dried fish and minced fish were exposed to roaming animals in the area, and workers producing these products were not trained in hygienic practices.

3) Crab Fattening and Transport

The field survey revealed that Mud crab (*Scylla serrata*) are stored in bamboo cages for about 2 weeks with all the crab scissors being wrapped together. Transport of crabs is made in densely packed wooden boxes about 50 x 40 x 40 cm and sent to the Chinese border. The crabs can survive this transport up to 10 days provided that the boxes are watered from time to time.

4) Other Types of Processing

The dried swim bladder of Croakers (*Scianidae*) is a highly priced product for local consumption.

Table 4.15 Considerations and Recommendations for Fishery in the Study Area

<p>i) Importance of Fisheries and Aquatic Resources for the Villagers</p> <p>Most landless people engage in fishing or agriculture in the study area. Those who are relying on the fisheries resources as income sources and daily food would be significantly affected if the fisheries resources keep declining in the area as the FAO report (1999) indicated that these people are under increasing pressure to earn their livelihood. This situation would lead villagers to ignore the fisheries regulations and to engage in illegal mangrove cuttings in the area. Therefore, it is vital to ensure their income and daily food source in order to prevent them from engaging these activities.</p>
<p>ii) Improvement of the Existing System</p> <p>In order to improve the current situation for artisanal fishermen and the fisheries resources in the study area, it is essential to implement the following activities.</p> <ul style="list-style-type: none"> a) Introduction of aqua-agroforestry (aqua-silviculture) with the CF activities b) Promotion of crab cage culture c) Alteration of the fishing lot system d) Establishment of fishermen's groups e) Strengthening of public awareness related to fisheries resources conservation f) Control of the number of fishermen g) Improvement of fisheries statistical data
<p>iii) Required System for Fisheries Activities in the Reserved Forest Area</p> <p>To encourage the people participating in CF activities, it is crucial to consider the short and long term income generation incentives which encourage the participants to engage in the CF activities. The frame of the incentive activities can be varied from agriculture to fisheries.</p> <p>When the CF participants are interested in engaging in fisheries activities, some legal frame is required to ensure the mangrove rehabilitation. The legal reinforcement of CF activities would be essential to introduce aqua-agroforestry in the CFI areas, because, as forest land, the CF area cannot be altered to other land use such as aquaculture shrimp ponds. Moreover, conflicts on the issue of fishing rights between the people practicing aqua-agroforestry in CF areas and the fishing license holders on fishing grounds near CF areas should be avoided. Present fisheries law allows those persons to exploit fisheries resources in the area as far as the water in rivers and creeks can reach.</p> <p>Besides, it is important to improve the existing market route for the CF participants to sell their shrimps and fish harvested in CF areas, and to ensure more profits compared with the current situation of selling their catch to the tenderers who control the prices of products in the area. Prior to introduction of aqua-agroforestry or other fisheries activities, it is necessary to provide relevant training courses/support from concerned authorities for them to ensure that they are practicing these fishing activities in a valid manner.</p>
<p>iv) Cooperation between the Forest Department and the Fishery Department</p> <p>Encouragement of CF activities by FD would contribute to conserving mangrove forests as a result of reduction of illegal deforestation of mangroves in the study area. It, in turn, will save precious fisheries resources in the area as it is well recognized that the mangrove conservation is essential to save fisheries resources. This would also benefit the Fishery Department, as they are also concerned about the mangrove conservation, which ensures the sustainability of fisheries in the long term. FD will have to monitor the CF activities on a regular basis to confirm the provided lands are used in an appropriate manner.</p> <p>Cooperation between the two departments is crucial to develop the CF activities efficiently. The contents of Fishery Department's cooperation are considered as three fold. The first is that if the CF participants illegally alter the designated areas to become aquaculture ponds, except for the area that is certified as aqua-agroforestry, the Fishery Department should not register these pond areas as aquaculture farms and not issue licenses. The second is that the Fishery Department should be able to provide technical support to fishing activities related to CF, such as aqua-agroforestry and cage culture. The third is that the Fishery Department can support CF, by the abolition or alteration of the fishing lot system near the CF areas and the abolition or relaxation of the present ban on collecting aquatic juveniles, particularly the post larvae of shrimps (<i>Penaeus</i> spp.), in Laputta Township. Upon the alteration of the fishing lot system, it is also recommended that the existing Freshwater Fisheries Law on leasable fisheries be reviewed in a manner to oblige leaseholders to conserve mangroves in the allocated areas.</p>
<p>v) Appropriate System of Taxation and Law Enforcement in CF Area</p> <p>The items subject to be taxed are a) the harvested fish, crabs and shrimps from CF areas and b) the crabs harvested from cages. Tax imposed on aqua-agroforestry should be levied on the water channels specifically excluding the mangrove planted areas, because most cultured species in the system will move to the water body during the low tides and another tax will be imposed on the area of mangroves planted when they are harvested. The tax rate should be reduced from the current rate of 200 kyats/acre, as the crops of these aquatic animals may not be guaranteed because of unexpected flood and disease strikes. Moreover, the crops of these aquatic animals may not be large enough to cover the invested labour and expenses required to engage in this fishery. The responsible agency for collecting these taxes should be FD, as they have initiated CF activities in the regions in order to conserve mangroves. The FD should also enact regulations regarding CF land use, which prohibits land alteration and allows FD to confiscate the land if the participants violate the permitted land uses. The regulation should allow land alteration for aqua-agroforestry as an exception.</p>

Table 4.16 Fishery Activities Implication to Mangrove Forest Management (1/3)

1. Aqua-agroforestry (Aqua silivculture)																							
(1) Potential of Aqua-agroforestry in the Study Area																							
<p>The most suitable species for aqua-agroforestry appear to be the giant tiger shrimp (<i>Penaeus monodon</i>) and barramundi (<i>Lates calcarifer</i>) because these 2 species are regularly harvested in the delta area and they fetch high market prices. The species have a wide range of salinity tolerance (0–40 ppt). It is better to separate the 2 species in different ponds, since barramundi is carnivorous, feeding on other shrimps and fish. The expected production yield would be about 20 kg/ha/year in a pond of 2 ha. compared to the other form of extensive shrimp aquaculture which can yield 55 kg/ha/year in a pond of 2 ha.</p> <p>The study area appears to still be abundant with larvae of fish and shrimps because some people practicing extensive aquaculture in the area are easily collecting these larvae from the wild. For instance, the villagers actually collect 400 to 500 specimens of post larvae of giant tiger shrimp in 2-3 hours by two persons from the wild in the flooded reservoirs or small creeks nearby their aquaculture ponds. Not only this area but also the entire country has been almost free from diseases, such as the white spotted disease, causing high mortality rates to fish, shrimps and crabs.</p>																							
(2) Setting Conditions																							
<p>In order to introduce and promote the proposed aqua-agroforestry in the study area, the following investments and conditional improvements would be required;</p> <p>a) Initial Cost</p> <p>Although the total investment cost for the aqua-agroforestry is fairly low compared with the intensive aquaculture, it will require at least 213,000 Kyats in the initial year of commencement.</p>																							
<table border="1"> <thead> <tr> <th>Item</th><th>unit</th><th>Cost(kyat)</th></tr> </thead> <tbody> <tr> <td>1. Initial cost</td><td></td><td>93,000</td></tr> <tr> <td>a) construction of ponds and waterways</td><td>2 ha pond</td><td>85,000</td></tr> <tr> <td>b) facilities such as push and mesh net</td><td>2 ha pond</td><td>8,000</td></tr> <tr> <td>2. Operation cost</td><td></td><td></td></tr> <tr> <td>a) operation and maintenance</td><td>10,000 Kyat/month</td><td>120,000</td></tr> <tr> <td>Grand total</td><td></td><td>213,000</td></tr> </tbody> </table>			Item	unit	Cost(kyat)	1. Initial cost		93,000	a) construction of ponds and waterways	2 ha pond	85,000	b) facilities such as push and mesh net	2 ha pond	8,000	2. Operation cost			a) operation and maintenance	10,000 Kyat/month	120,000	Grand total		213,000
Item	unit	Cost(kyat)																					
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a) operation and maintenance	10,000 Kyat/month	120,000																					
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b) Collection of Larvae																							
<p>Free collection of larvae from the wild without any charge is essential for practicing aqua-agroforestry in the area. If the CF members have to rely only on the larvae, which naturally flow into the ponds, it would not be enough to earn the expected income of 50,000 Kyats/ha.</p>																							
c) Change of Fishing Lot System																							
<p>Unless MOLF alters or abolishes the existing fishing lot system in Bogalay Township, there may be some conflicts between the people practicing this culture and the persons holding fishing licenses in the area nearby.</p>																							
d) Improvement of Facilities																							
<p>Lack of a transport system to the markets and ice facilities to keep harvested animals would be another constraint for introduction of the aqua-agroforestry in the area. Strategic improvement and development of the current system and facilities will be required.</p>																							
e) Further Research and Development																							
<p>Inoue et al., (1999) reported that aqua-agroforestry operations are not profitable if <i>Rhizophora</i> are planted inside ponds because of the low survival rate of giant tiger prawns, but <i>Avicennia</i> can be suited since the leaves can increase pond fertility, and regulate pH during the rainy season. There are not many articles that describe details related to techniques, production, appropriate mangrove species cultured with prawns, and appropriate size. Further research is necessary to clarify these constraints.</p>																							
(2) Techniques																							
<p>The operation of aqua-agroforestry starts with the selection of the species to be cultured in the ponds. Selection of the suitable species is subjected to the salinity. In the saline areas the most suitable species is the giant tiger prawn (<i>Penaeus monodon</i>), whereas in the freshwater areas, the species are barramundi (<i>Lates calcarifer</i>) and the other fish and prawns flowing into the ponds when the gates are opened.</p>																							

Table 4.16 Fishery Activities Implication to Mangrove Forest Management (2/3)

<p>When designing of ponds, it is essential to select appropriate places for the culture. The criteria of selecting appropriate places are a) to protect against flood effects, and b) to be free from contamination by domestic wastewater. The design factors for ponds include, size of excavated area, dikes, sluice gates, and pipes which connect the ponds and channels. Construction of a guardhouse along the dikes is also required.</p> <p>After construction, management of dikes and water control are necessary. Regularly check that the dikes are in required order to avoid cracks or holes. Controlling of water by opening the sluice gates is essential to get seedlings from the wild. Open the sluice gate completely during spring tides from April to August in order to let the desirable species flow into the ponds, then close the gate made of mesh to prevent the species caught inside from swimming away. The entrance of the sluice should not be closed completely in order to avoid the water being kept inside. Regularly check for fragments and sticks around the mesh of sluice to ensure the smooth water flow.</p> <p>Management of predatory fish is important to ensure a high survival rate of seedlings inside ponds. Regularly check for the existence of predatory fish such as, barramundi (<i>Lates calcalifer</i>) by carefully listening for the noise of splashing water made by the fish feeding on shrimps.</p> <p>The appropriate month to harvest the prawns in saline areas is December. It requires drying the ponds when the tides are around low tides in order to get complete water flush from the ponds. After the harvesting, open the sluice gates completely for a few consecutive months to let fish and prawns flow into the ponds, and harvest them in March by applying the same technique. During these months, it is not necessary to eradicate the predatory fish inside ponds. To harvest in fresh water areas requires the same techniques as for the prawns. The desirable month to harvest is March.</p> <p>2. Other Aquaculture Development in Conjunction with CF Activities</p> <p>(1) Potentials</p> <p>One of the biggest constraints for aquaculture development is the lack in the area of transport facilities to the markets and ice to keep harvested animals. The ideas of aquaculture listed below are based on the existence of a market for the CF participants' products. There are two kinds of aquaculture that have good potential in the study area. One is a crab fattening, and the other is fish culture. There could be some potential for oyster and bivalve culture since they are available in the area. However, an actual market could not be found, thus this constraint dismisses the possibility of introducing these cultures.</p> <p>a) Crab fattening</p> <p>Crab fattening requires only a small plot of land, yielding favorable income in about 3-4 weeks. People catching mud crab (<i>Scylla serrata</i>) in the area consume recently molted ones (soft shell) because they have very low market value. These crabs can be held in ponds, pens or cages and fed trash fish until their shells harden and they fill out with flesh. Also the female crabs can be kept in those places to have their roe mature. Crab fattening can be done by three methods; in small ponds, pens, and compartmentalized floating cages. Seedlings are available almost all year round though freshwater inhibits their shell hardening.</p> <p>The FAO report (1997) warned about the uncertain sustainability of this culture. The culture practice employs mainly small female crabs, many of which have not matured to reproduce. The fishery also takes immature crabs in large quantities. Since crab fattening and culture are very profitable and well suited to small scaled aquaculture methods, it will not take much time for people in the area to start this fishery in large numbers which could affect the crab population adversely and significantly. Unless the government implements appropriate management, the crab fishery will collapse. Thus, introduction of crab fattening culture as a CF activity is not recommended.</p> <p>Important technical matters for crab fattening are, design of ponds or cages, selection of suitable crabs, management of water level, and harvesting. The required items of designing ponds are, excavated channels, fences made of bamboo, sluice gates, and a guardhouse. The criteria of selecting appropriate places are the same as aqua-agroforestry. Crabs cultured in the ponds are recently molted ones (soft shell), which have a low market value. Prior to accommodating those crabs in the ponds, water has to be let inside the ponds by opening the sluice gates. Management of the water level and quality is not necessary if the sluice gates have mesh to ensure the water flows the ponds easily. It takes 10-14 days to harvest the crabs.</p> <p>b) Fish Culture</p> <p>Angell (1997) documented the potential for and constraints of fish culture in the delta area identifying barramundi (<i>Lates calcalifer</i>) as a suitable aquaculture fish species in brackish water. Barramundi inhabits the coastal area, brackish water and freshwater areas, which suggest that this species has a wide range of salinity tolerance. However, the optimum growth rate is in a more narrow range of salinity. The interview survey revealed that juvenile barramundi could be caught from August to October throughout nearly the entire study area. They are about 10 cm in length, ideal for stocking in pens, cages, and ponds.</p>

Table 4.16 Fishery Activities Implication to Mangrove Forest Management (3/3)

<p>Juveniles' survival rate is high and predators are less of a problem with a top fish eater like barramundi. Small barramundi are actually sold in fish markets but have very low prices. Juveniles purchased for 18-20 kyats can be reared to an 800 g fish with a harvested value of 200 kyats.</p> <p>Most of CF participants will be able to culture barramundi in small ponds, whereas some group efforts will be necessary to engage in pen culture. The pond area ranges from 47 to 5,000 m², with stocking rates from 0.06 to 1.5 specimens per square meter. Locally available trash fish and small shrimps are fed to the fish. The trash fish costs about 20-30 kyats/kg, while the small shrimps cost about 600 kyats/kg. These prices were reported by Angell, 1997, and said that these costs can vary depending on availability, and they would cost more than these prices considering the time gaps between 1997 and 2002. Since sluice gates are primitive, many of the other species of small fish and shrimps that can enter the ponds with the tide are probably fed on by barramundi in the ponds. It takes 4 months for the fish to reach market size of about 800 g per fish.</p> <p>The techniques required for barramundi culture are, design of ponds, getting seedlings from the water into the ponds, management of water level and dikes, and harvesting. The design of ponds, selection of places and management of water level are the same as for aqua-agroforestry. It requires excavated channels, sluice gates, dikes and a guardhouse. To get seedlings of barramundi, it is necessary to open the sluice gates during spring tides for a few months from June to August to ensure the fry can freely flow into the ponds. To harvest the fish, it requires drying the ponds when the tides are around low in order to get a complete water flush from the ponds. The desirable month to harvest is just before the monsoon when the new recruitment of the species occurs.</p> <p>3. Sports Fishery</p> <p>There is a high potential for introducing sport fishery in the study area because of the existence of large size barramundi. It is one of the most popular game fish in the world, and still appears to be abundant enough to invite sport fishermen from foreign countries such as Australia, Japan, Thailand, Singapore, Malaysia, and the USA. Sports fishery is normally lucrative; for instance, hiring a speedboat for barramundi angling in Australia costs 200-300 US\$/day/boat. These anglers stay in accommodations costing around 30-50 US\$/person/day. The techniques required for barramundi angling are, searching good fishing grounds, getting clients from the foreign countries, boat handling and safety.</p> <p>However, there are substantial constraints to introduce this fishery to the study area. The biggest constraint is a lack of appropriate boats, such as, fiberglass speedboats with engines together with electric motors. The lack of proper accommodations, which offer hygienic foods and beverages as well as experienced staff who understand the nature of this angling and individuals with skill in handling of boats and knowledge of good fishing grounds, are other constraints. Moreover, the prohibition of motorised boats for fishing by the Fishery Department and the existence of the fishing lot system in Bogalay are certainly other constraints as well as accessibility to this area.</p>
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Table 6.1 Components of Action Plan for Pilot Project 2003

Pilot Project	Component	Item	Area/ Quantity
Thar Yar Kone Village CF	1. CF	- Plantation	12.73 ha
		- Natural Forest Improvement Operation (NFIO)	28.97 ha
		- School Wood Lot (the CF intensification)	1.00 ha
	2. Agroforestry	- Nursery	0.50 ha
		- Home Garden	0.50 ha
	3. CF Intensification	- School Renovation	1 l.s.
		- Water Filtration Material	1 l.s.
		- School Agroforestry (fruit seedlings)	1 l.s.
4. Capacity Development	- Group Leader Training	1 l.s.	
	- Boat tour for mutual understanding	1 l.s.	
Nyaung Ta Pin Village CF	1. CF	- Plantation	5.49 ha
		- Demo Plantation	2.00 ha
		- NFIO	52.06 ha
		- the Demo NFIO	0.00 ha
		- School Woodlot	0.50 ha
	2. Agroforestry	- Homestead/woodlot	1.00 ha
		- Demonstration Farm	0.08 ha
3. Capacity Development	- Group Leader Training	1 l.s	
	- Boat tour for mutual understanding	1 l.s	
Thar Yar Kone FD Integrated Mangrove Nursery Pilot Project	Nursery Construction	Nursery Area	1.5 ha
		1. Nursery Bed	
		- FD type nursery	7,200m2
		- Natural nursery	200m2
		- Germination bed	72m2
		- Non-mangrove (shading facility)	162m2
			1,900m2
		2.Nursery Road	
		- Main road	210m
		- Access road	410m
		- Nursery road	720m
		3. Jetty	1 set
		4. Water Reservoir	
		- Freshwater Pond (80m3)	1
		- Water Tank (concrete / overhead plastic)	2/2
		5. Stack Yard	
		- Seedling stack yard	72m2
		- Soil Yard (stock pile / mixed soil)	72/ 72m2
		6. Temporary Building	- Nursery office
	- Residence 1 / Residence 2		36/72 m2
	- Workers hut (x10)		36m2 x 10
	- Warehouse 1 / Warehouse 2		72/ 36 m2
	- Generator house/Fuel storage,		18 m2
	- Seed storage		36 m2
	- Rest shade for workers		36 m2 x2
	- Incinerator		1 set

Pilot Project	Component	Item	Area/ Quantity
Thar Yar Kone FD Integrated Mangrove Nursery Pilot Project	Nursery Construction	7. Demonstration and Monitoring - River bank stabilization fence - Water gage station 8. Renovation - Thar Yar Kone CF Extension Center	200m 2 set 1 l.s.
	Nursery Operation	1. Seedling Production 2. Materials & Equipment for Seedling Production	625,000 1 l.s.
	Procurement of Nursery Equipment	1. For Nursery Operation - Generator, - Pumps (engine/ tread) - Rechargeable battery - Inverter - Seedling transportation boat 2. For Demonstration & Extension - Portable salinity meter/ pH meter - Binoculars	1 1/1 1 1 1 2/2 2
Pilot Project	Component	Item	Area/ Quantity
FD Capacity Development Pilot Project		1. Training of the FD frontline staff at Thar Yar Kone Extension Center	1 l.s.
		2. Training at Central Forest Development and Training Center (CFDTC)	1 l.s.

Table 6.2 Achievement of Equipment Procurement in Thar Yar Kone FD Integrated Mangrove Nursery Pilot Project

	Item	W/Q in A/P		Finished Components as of 15 Feb	Completion % by 15 Feb:
1	Nursery Equipment				
	Seive (200mm sieve)	6	set	(6)	100%
	Spray (plastic, ~10liter/unit)	3	set	2	67%
	Cart barrow (one wheel) (for soil transportation v: 0.1m3~ or w:30kg~)	6	set	(6)	100%
	cart barrow (two wheel) (for seedling container 0.1m3 v: 0.1m3~ or w:30kg~)	5	set	0	0%
	Garden trowel (Handle length: 150mm, blade: ~50mm)	29	set	(8)	28%
	Plastic bucket (approx. 5 liters)	20	set	20	100%
	Tray (290x330x45 mm)	9	set	0	0%
	Watering can (plastic, 3~6liter/unit)	10	set	2	20%
	Shovel (Handle length: ~100cm, blade: ~20 x 30 cm)	17	set	2	12%
	Container (plastic container for seedling transportation)	720	set	368	51%
	Weed hoe (blade: ~150mm, Handle length: ~40cm)	9	set	0	0%
	Weed cutter (sickle) (Handle length: ~120cm)	9	set	0	0%
	Scale (5kg x 50g measure)	2	set	0	0%
	Retractable tape (measure length ~2m)	2	set	0	0%
	Hand pruner (blade: ~50mm)	2	set	0	0%
	Caliper (measure diameter ~20cm)	2	set	0	0%
	Hand ax	2	set	0	0%
	Ladder (5 m)	2	set	0	0%
	Machete	2	set	0	0%
	Saw	3	set	2	67%
	Rake	3	set	2	67%
	Measuring tape (30 m) (metric/English reading, plastic)	3	set	1	33%
	measuring tape (50 m) (metric/English reading, plastic)	3	set	0	0%

	Item	W/Q in A/P		Finished Components as of 15 Feb	Completion % by 15 Feb:
	Lining tape (100 m) (metric/English reading, plastic)	3	set	0	0%
	Levelling rake	3	set	0	0%
	Carpentary set (nail puller, hammer, nipper, jigsaw, whetstone, knife, screw driver set, file, level)	1	set	0	0%
2 Equipment for Nursery					
	Generator (diesel engine 13 H.P , 5 KW dynamo & frame)	1	set	1	100%
	Fuel tank (10 gal tank)	5	pc	0	0%
	Generator spare parts	1		1	100%
	Rechargeable battery (150 amp , 12 V)	1	pc	(1)	100%
	Inverter (800 W-)	1	set	(1)	100%
	5 H.P engine , 3"pump & 20' pipe	1	set	1	100%
	Tread pump	1	set	0	0%
	Boat ("Pharr Ku" Type 45 ft x 12ft, loading capacity 16 t (12' x 20 ' x 6 ')	1	no.	1	100%
	Furniture				
	12'x 20' desk 2 nos.	2	set	0	0%
	Chair 2 nos.	2	set	0	0%
	Table 1 no.	1	set	0	0%
	Chair 4 nos.	4	set	0	0%
	Book shelf 2 nos.	2	set	0	0%
	Desk lamp 2 nos.	2	set	0	0%
3 Material and Equipment for Extension and Monitoring					
	Black board	1	pc	0	0%
	Water gauge (scale 0 to 500 cm)	2	set	0	0%
	Record book	12	ls	0	0%
	Binoculars	2	pc	0	0%
	Portable salinity meter	2	set	2	100%
	Portable PH meter	2	set	2	100%

**Table 6.3 Achievement of Construction in Thar Yar Kone FD Integrated Mangrove Nursery
Pilot Project**

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
1		Nursery Construction					
1	1	Nursery Bed Construction				52.2%	
	1	Nursery bed 1 (FD nursery) Block 1	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling 3. Completion of side embankment cutting
	2	Nursery bed 1 (FD nursery) Block 2	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling 3. Bed frame construction 4. Completion of side embankment cutting
	3	Nursery bed 1 (FD nursery) Block 3	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling 3. Bed frame construction 4. Completion of side embankment cutting 5. Adjustment of shade nets 6. Removal of dead pots
	4	Nursery bed 1 (FD nursery) Block 4	900	m2	900	Partial	ditto
	5	Nursery bed 1 (FD nursery) Block 5	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling 3. Bed frame construction 4. Completion of side embankment cutting
	6	Nursery bed 1 (FD nursery) Block 6	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling 3. Completion of side embankment cutting
	7	Nursery bed 1 (FD nursery) Block 7	900	m2	900	Partial	ditto
	8	Nursery bed 1 (FD nursery) Block 8	900	m2	900	Partial	1. Leveling which critically affects the growth of seedlings. 2. Some compaction after leveling
	9	Nursery bed 2 (natural bed)	576	m2	578	O.K.	
	10	Non mangrove nursery	194	m2	220	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	11	(Shading Facility)	1755		2,020	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
	12	Water gate	1	pc	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	13	Main Channel	130	m	130	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	14	Water Way (Main Channel - Bed) 2 no per block	8	set	8	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
1	2	Nursery Road Construction				98.9%	
	1	Nursery main road 1	165	m	163	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	2	Nursery main road 2	130	m	118	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	3	Access road	370	m	370	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	4	Nursery road 1 (soil mounding)	90	m m	90	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	5	Nursery road 2 (soil mounding)	70	m	70	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	6	Nursery road 3 (soil mounding)	70	m	70	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	7	Nursery road 4 (soil mounding)	90	m	90	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	8	Nursery road 5 (soil mounding)	130	m m	130	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	9	Nursery road 6 (soil mounding)	130	m	130	Partial	Deduction from contract amount for unacceptable quality and function under the Contract

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
	10	Nursery road 7 (soil mounding)	95	m	95	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	11	Wooden bridge	1	set	1	O.K.	
	12	Culvert 4 nos.	4	set	4	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
1	3	Jetty Construction				100.0%	
		Reinforced concrete jetty	1	set	1	O.K.	
1	4	Water reservoir				(0.0%)	
		Water reservoir	1	set	0	No	Overall reconstruction. Compaction from the beginning
1	5	Stack Yard Construction				98.4%	
	1	Seedling stack yard	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	2	Soil yard (stock pile)	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	3	Mixed soil yard	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	4	Work place for potting	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
1	6	Temporary Building Construction				95.8%	
	1	Nursery office	84	m2	84	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	2	Residence 1	36	m2	36	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
	3	Residence 2	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	4	Workers hut	360	m2	360	Partial	1. Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	5	Ware house 1	72	m2	72	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	6	Ware house 2	36	m2	36	No	Construction
	7	Generator house & fuel storage	18	m2	18	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	8	Seed storage	36	m2	36	Partial	
	9	Rest shades for workers (1)	36	m2	36	O.K.	
	10	Rest shades for workers (2)	36	m2	36	O.K.	
	11	Sanitary facility (septic tank)	1		1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	12	Incinerator	1		0	No	Material procurement and construction
1	7	Water Storage for Daily Use				96.7%	
	1	Water storage (brick wall)	2	set	2	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	2	Over head plastic water tank	1	set	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	3	Plumbing facility	1	set	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	4	Sanitary facility (toilet1)	1	set	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
	5	Sanitary facility (toilet2)	1	set	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
1	8	For BZ Management					
1	9	For Demonstration and Monitoring				84.1%	
	1	River bank stabilization fence	200	m	200	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	2	Water gauge 2 nos.	2	set	0	No	Material procurement and construction of water gauges
1	10	For Renovation of TYK CF Center				100.0%	
	1	Renovation CF centre (Jetty)	1	l.s.	1	O.K.	
	2	Renovation CF centre (Timber floor repair and guest house facilities)	1	l.s.	1	O.K.	
	3	Renovation CF centre (water tank & water supply)	1	l.s.	1	O.K.	
	4	Renovation CF centre (CGI sht roofing)	1	l.s.	1	O.K.	
	5	Renovation CF centre (pipe fittings & valves)	1	l.s.	1	O.K.	
	6	Renovation CF centre (Kitchen floor upgrading)	1	l.s.	1	O.K.	
	7	Renovation CF centre (Fix septic tank 2 nos.)	1	l.s.	1	O.K.	
	8	Renovation CF centre (Replacing lighting and generator)	1	l.s.	1	O.K.	
	9	Renovation CF centre (Wall Painting)	1	l.s.	1	O.K.	
	10	Renovation CF centre (Jetty connection road)	1	l.s.	1	O.K.	
1	11	Other Works				96.7%	
	1	Pluming Work	1	l.s.	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check

		W/Q in Action Plan			Final Conclusion		Incomplete Work
					W/Q	Completion % & Acceptance	Major Remaining parts and to be deducted from the Contract
	2	Electric wiring works	1	l.s.	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	3	Carpenting Work	1	l.s.	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check
	4	Maintinace and Repair	1	l.s.	1	Partial	Deduction from contract amount for unacceptable quality and function under the Contract based on the additional completion check

**Table 6.4 Achievement of Seedling Production in Thar Yar Kone FD Integrated Mangrove
Nursery Pilot Project**

Species	FD Plan (A)	FREDA Record (B)	Acceptable Quantity (C)	Completion % (D)=C/A	Balance2 (E)=C-A	Balance 3 (J)=C-B
Mangrove species						
<i>Heritiera littoralis</i>	5,000	1,164	1,044	21%	-3,956	-120
<i>Heritiera fomes</i>	10,000	6,381	5,781	58%	-4,219	-600
<i>Xylocarpus moluccensis</i>	5,000	1,496	0	0%	-5,000	-1,496
<i>Xylocarpus granatum</i>	5,000	1,058	377	8%	-4,623	-681
<i>Amoora cuculata</i>	5,000	0	0	0%	-5,000	0
<i>Lumnitzrea racemosa</i>	50,000	4,159	3,883	8%	-46,117	-276
<i>Bruguiera gymnorrhiza</i>	30,000	57,692	51,484	172%	21,484	-6,208
<i>Bruguiera sexangula</i>	5,000	0	0	0%	-5,000	0
<i>Bruguiera parviflora</i>	5,000	731	644	13%	-4,356	-87
<i>Bruguiera cylindrica</i>	5,000	1,768	1,592	32%	-3,408	-176
<i>Rhizophora mucronata</i>	10,000	225	140	1%	-9,860	-85
<i>Rhizophora apiculata</i>	10,000	2,916	1,846	18%	-8,154	-1,070
<i>Kandelia candel</i>	5,000	0	0	0%	-5,000	0
<i>Ceriops decandra</i>	10,000	6,800	2,138	21%	-7,862	-4,662
<i>Excoecariaaria agallocha</i>	10,000	3,183	612	6%	-9,388	-2,571
<i>Avicennia alba</i>	30,000	0	0	0%	-30,000	0
<i>Avicennia marina</i>	30,000	6,534	6,209	21%	-23,791	-325
<i>Avicennia officinalis</i>	200,000	192,333	187,302	94%	-12,698	-5,031
<i>Sonneratia graffithii</i>	20,000	0	0	0%	-20,000	0
<i>Sonneratia apetala</i>	150,000	6,000	0	0%	-150,000	-6,000
Sub total	600,000	292,440	263,052	44%	-336,948	-29,388
Non mangrove species						
<i>Samanea saman</i>	10,000	500	0	0%	-10,000	-500
<i>Malaluca leucadandra</i>	10,000	10,000	7,800	78%	-2,200	-2,200
<i>Albizzia procera (lebbek)</i>	1,500	0	343	23%	-1,157	343
<i>Terminalia beleria</i>	1,000	0	0	0%	-1,000	0
<i>Swietenia macrophylla</i>	1,000	0	0	0%	-1,000	0
<i>Xylia do la brifomis</i>	1,500	0	0	0%	-1,500	0
<i>Sesbania groundiflora</i>	0	5,500	0	-	0	-5,500
<i>Leucaena leucocephala</i>	0	5,500	0	-	0	-5,500
Subtotal	25,000	21,500	8,143	33%	-16,857	-13,357

Table 6.5 Components of Action Plan for Pilot Project 2004

Pilot Project	Component	Item	Area/ Quantity
FD Capacity Developme nt	1. Establishment of the FD organization for CF	- Formulation of TOR for CF task force	-
	1.1 Establishment of Myaung Mya FD CF Task Force	- Assignment of CF task force personnel	-
		- Maintenance of office facility	1 l.s.
		- Activity of CF task force	-
		- Monitoring	-
	1.2 Establishment of the CF supporting organization for Laputta FD office	- Formulation of CF promotion plan	-
		- Formulation of CF promotion implementation plan	-
		- Assignment of extension staff	-
		- Maintenance of office facility	-
		- Training of extension staff at CFDTC	1 l.s.
		- OJT of staff at site	1 l.s.
		- Monitoring	-
	2. Institutional Development of FD CF support		
	2.1 Institutional development of the CF task force	- Evaluation and decision for CF production management regulation	-
		- New CF activities evaluation, coordination with higher offices, granting CF certificates	-
		- Preparation of FD operation and management format for CF support	-
	2.2 Institutional development of the CF supporting organization (Laputta)	-Application of CF production management regulation	-
		-Planning, application, support for new CF activities	-
		- Utilization of FD operation and management format for CF support	-
	3. Community Forestry Training and Extension Project in Dry Zone (COMFORT) / Mangrove Study Team Counterpart Joint Training	1. Joint training in TYK integrated mangrove nursery	1 l.s.
		2. Joint training in CFDTC sub-center	1 l.s.
	4. TYK FD integrated mangrove nursery 2004		
	4.1 Nursery operation	1. Preparation of 2004 nursery operation plan	1 l.s.
		2. Nursing of seedlings produced in FY 2003	1 l.s.
		3. Measurement and recording of water salinity and tide level	1 l.s.
		4. Nursery management	1 l.s.
		5. Monitoring	1 l.s.
	4.2 Uncompleted components of pilot project 2003	1. Renovation / finishing work of nursery facilities	1 l.s.
		2. Completion of uncompleted construction from 2003	1 l.s.
		3. Seedling production of remaining work from 2003	155,000 sdl
		4. Procurement of un-procured nursery equipment	1 l.s.
	4.3 Mangrove areas forest management strengthening project	1. Diversification of mangrove species seedling production	50,000 sdl
		2. Production of non-mangrove species	65,000 sdl
		3. Establishment and operation of mangrove garden for demonstration	1 l.s.
		4. Construction and operation of aqua-agroforestry for demonstration	1 l.s.
		5. Construction and operation of seed production area	1 l.s.
	4.4 White charcoal production		n.a.
	4.5 Patrolling	1. Formulation of user group patrolling system	1 l.s.
		2. Implementation and monitoring of patrolling	1 l.s.
		3. Public awareness	1 l.s.

Pilot Project	Component	Item	Area/ Quantity
Thar Yar Kone and Nyaung Ta Pin CF	1. Planning		
	1.1 Update of action plan of management plan prepared under pilot project 2003	1. Preparation of action plan 2004	1 l.s.
	1.2 Update of TYK and NTP forest management plan	1. Updating of user group members	1 l.s.
		2. Land allocation and confirmation of border lines	1 l.s.
		3. Preparation of revised CF management plan	1 l.s.
		4. Application and permission of revised forest management	1 l.s.
	1.3 Application and trial of sales voucher and license for value added products	1. Improvement of the CF map and harvest plan 2. Application of sales voucher 3. Preparation and application of license for value adding production	1 l.s. 1 l.s. 1 l.s.
	2. Implementation		
	2.1 Continuation activities of pilot project 2003	1. Plantation 2. NFIO 3. Technology support (seedlings)	20.3ha 146.4 ha 126,810sdl
	2.2 New activities under pilot project 2004	1. the CF Aqua-agroforestry 2. the CF FD Camp 3. the CF village woodlot 4. the CF church woodlot	8 l.s. 1 l.s. 2. 1.s. 2. 1.s.
	2.3 Capacity building of user groups and user group members	1. CF water reservoir construction and operation 2. Training of the CF user group extension workers 3. the CF user group women's group 4. Support monitoring and preparation of progress report of the CF UsG	1 l.s. 1 l.s. 1 l.s. 1 l.s.

Table 6.6 Summary of Results on the FD Capacity Development Pilot Project

Component	Result																														
1. Establishment of the FD organization for CF																															
1.1 Establishment of Myaung Mya FD CF Task Force																															
Summary	Myaung Mya FD CF monitoring team was established in June 2004, and three members were assigned. The Terms of Reference (TOR) of the team was not formulated, and its activity was limited to accompanying the study team to the pilot project site and attending workshops. Recording and monitoring systems had not been established, either. Office facilities and equipment for the CF monitoring team were procured. Currently, reinforcement of the CF monitoring team to district CF task force is conducted by district FD office for implementation of IMMP phase I.																														
a) TOR of the CF monitoring team is established by FD Ayeyawady and Myaung Mya offices	CF monitoring team was established in June in FD Myaung Mya district, but TOR was not established at the final completion check time. The Myaung Mya district FD office is currently under preparation for upgrading the CF monitoring team as the district CF Task Force																														
b) Staff members of FD Myaung Mya are assigned to CF monitoring team for CF management and support.	One staff officer, one range officer and one deputy ranger are assigned to CF monitoring team. Assigned persons got verbal order to collect the information about CF of 2 pilot project villages by assistant director without written appointment. All of them are assigned to their ordinal duties and monitoring team at the same time and they mainly work for their ordinary duties. Currently assignment of staff is on-going for the CF task force at district and reserved forest levels.																														
c) Maintenance of FD CF Monitoring Team Office Facility	The following facilities and training were provided. The CF monitoring team members and office staff started using computer for recording. <table><tr><th>Item</th><th>Quantity</th><th>Unit</th></tr><tr><td>Laptop/ portable printer</td><td>1</td><td>set</td></tr><tr><td>Office table</td><td>1</td><td>no.</td></tr><tr><td>Office chair</td><td>1</td><td>no.</td></tr><tr><td>Long table</td><td>2</td><td>no.</td></tr><tr><td>Wooden chair</td><td>10</td><td>no.</td></tr><tr><td>Computer desk</td><td>1</td><td>no.</td></tr><tr><td>Plywood room partion</td><td>1</td><td>no.</td></tr><tr><td>150A Battery & 1000W inverter</td><td>1</td><td>set</td></tr><tr><td>Basic computer training</td><td>5</td><td>person</td></tr></table>	Item	Quantity	Unit	Laptop/ portable printer	1	set	Office table	1	no.	Office chair	1	no.	Long table	2	no.	Wooden chair	10	no.	Computer desk	1	no.	Plywood room partion	1	no.	150A Battery & 1000W inverter	1	set	Basic computer training	5	person
Item	Quantity	Unit																													
Laptop/ portable printer	1	set																													
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Plywood room partion	1	no.																													
150A Battery & 1000W inverter	1	set																													
Basic computer training	5	person																													
d) Practice of CF management and support according to TOR.	CF management and support is not practiced during the pilot project implementation period. Only activity was to accompany the JICA study team to the pilot project site. Currently the district FD office is in preparation for training and establish CF management and support.																														
e) Recording of FD Myaung Mya CF charged Personnel's Activities	Recording system and monitoring system has not been established.																														
1.2 Establishment of the CF supporting organization for Laputta FD office																															
Summary	Laputta CF task force was established in June 2004 and four members were assigned. The reserved forest CF promotion, management, support plan, and the CF implementation plan had not been formulated. Equipment and furniture were procured to the Laputta FD office. Currently, in preparation of reserved forest CF task force in accordance with instruction from the district level.																														
a) Formulation of CF Promotion, Manage and Support Plan for the reserved forests	CF promotion, management and support plan for reserved forests has not formulated by the final completion check tim.																														

Component	Result																								
b) Establishment of CF task force	The CF task force was established in June 2004 with four members. All members of the CF task force worked not only for task force, but also for their ordinary duties. Actually, 70% to 80% of their working time was allocated to the ordinary duties such as forestry administration (range officer), revenue collection and nursery plantation (foresters).																								
c) CF Promotion Plan (organization, format preparation, budget)	CF promotion plan was not formulated. Neither TOR nor budget for task force was prepared. So, the CF task force members were not sure of the detail of their roles. What they understood was that they should support user groups and collect information from user groups and beat officers.																								
d) Maintenance of CF supporting organization facilities	<p>The following facilities and training were provided. The CF task force members and office staff started using computer for recording.</p> <table><tr><th>Item</th><th>Quantity</th><th>Unit</th></tr><tr><td>Laptop/ portable printer</td><td>1</td><td>set</td></tr><tr><td>Office table</td><td>1</td><td>no.</td></tr><tr><td>Plastic chair</td><td>6</td><td>no.</td></tr><tr><td>Long table</td><td>1</td><td>no.</td></tr><tr><td>File rack</td><td>2</td><td>no.</td></tr><tr><td>150A Battery & 800W inverter</td><td>1</td><td>Set</td></tr><tr><td>Basic computer training</td><td>5</td><td>Person</td></tr></table>	Item	Quantity	Unit	Laptop/ portable printer	1	set	Office table	1	no.	Plastic chair	6	no.	Long table	1	no.	File rack	2	no.	150A Battery & 800W inverter	1	Set	Basic computer training	5	Person
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Long table	1	no.																							
File rack	2	no.																							
150A Battery & 800W inverter	1	Set																							
Basic computer training	5	Person																							
e) Assignment of Extension Staff (under CF task force)	No person was assigned as extension staff. Beat officers were instructed by the township officer for supporting and monitoring of CF activities in their assigned areas.																								
f) Training of extension staff at CF DTC	Four staff received training of participatory extension at the CF DTC sub center by October, 2004.																								
g) Technology Transfer of Extension Staff (LPT CF task force) on the pilot project site	Technologies such as diversification of the mangrove species, application of the non-mangrove species, and water reservoir construction adaptable to the delta area were transferred from the study team during the implementation of the pilot project 2003 and 2004.																								
h) Effect of the technology transfer	The transferred technologies were not effectively extended to other staff, because of the insufficinet recording and reporting system.																								
2. Institutional Development of the FD CF support																									
2.1 Institutional development of the CF task force																									
a) Rules of CF management and support of Myaung Mya FD office	Rules to manage and support CF for CF monitoring team was not established.																								
b) Preparation of the form for CF management and supporting activities	No form of CF management and support activities was prepared.																								
c) Application of CF Production Management Regulation (sales voucher, removal pass)	CF production management regulation (sales voucher, removal pass) was not applied. Information and documents concerning application of CF production management regulation were not collected and accumulated at the Myaung Mya FD office.																								
d) Collection of information and reports concerning harvest and sales voucher	Information and reports concerning the application of CF production management regulation were not collected yet. So, there was no accumulation of concerning documents at the Myaung Mya FD office																								
2.2 Institutional development of the CF supporting organization (Laputta)																									
a) Evaluation and decision for CF production management regulation, coordination with higher offices	Preparation for the regulation for the CF production management and coordination with higher offices was not implemented. Registration of CF production using the sales vouchers, issue of removal passes, and monitoring of the results of the sales were planned as works of the CF task force, but were not started yet.																								

Component	Result																				
b) Activities of the CF task force member for supporting user group	Activities of the CF task force members at the final completion check point were: Range officer (leader of the task force): the duty was collecting reports related to CF from beat officers, but reports were seldom submitted from the beat officers). Deputy ranger: the duty was collecting information from the frontline foresters. When he visited the villages, he collected data. Forester: As the frontline staff of FD , two foresters participated in the workshops and meetings of user groups of Thar Yar Kone and Nyaung Ta Pin, accompanied user group patrolling, transferred documents to the range officer, and distributed seedlings to user groups.																				
c) Application from user group of proposal for new type CF activities such as CF aqua-agroforestry, CF water reservoir, etc	User groups prepared proposal for CF aqua-agroforestry and the CF church woodlot, CF school wood lot, and CF agroforestry and submitted to forester in Thar Yar Kone FD camp.																				
d) Granting CF certificates of new CF activities	The certificates of the new CF activities such as the CF aqua-agroforestry and the CF church woodlot, CF school wood lot, and CF agroforestry were not granted, though proposals of some components were submitted from user groups.																				
e) Preparation of FD CF management and support system	The management and support system of user groups was not fully established yet,																				
f) Support to the user group in planning, application of new CF activities	User group were supported in planning and application of proposal for new CF activities with Laputta FD CF task force foresters, and submitted proposals to Thar Yar Kone FD camp																				
g) Formulation of the system of supporting CF management Committee and CF User Group	The system of supporting management committee and CF the user group was not formulated.																				
h) Distribution of seedling of first rotation to the CF user group	Seedlings were distributed by FD to user groups based on the revised action plan (2004) in Thar Yar Kone (14,360 seedlings) and the original management plan (2003) in Nyaung Ta Pin (23,750 seedlings). However, there is difference understanding of numbers of distributed seedlings between user group and FD.																				
i) Utilization of the FD operation and management format for CF support.	Format for the FD operation and management was prepared by neither the CF task force nor the township FD. Monitoring, recording and reporting were not done regularly.																				
3. COMFORT/Mangrove Study Team Counterpart Joint Training																					
1. Joint training in TYK integrated mangrove nursery	1. Training held from October 18 to 22, 2004: 5 counterparts from COMFORT and 6 counterparts from mangrove study participated																				
2. Joint training in CFDTC sub-center	Training held from September. 26 to October. 1, 2004: 7 counterparts from COMFORT and 6 counterparts from mangrove study participated																				
Learning form the training	Following subjects were discussed in the training: FD 's participation, CF promotion, different operations according to different natural conditions. In Thar Yar Kone, FD 's activity through the pilot project was main subject of discussion.																				
4. TYK FD integrated mangrove nursery 2004																					
4.1 Nursery operation																					
a) Preparation of 2004 FD TYK Nursery Operation Plan	The Thar Yar Kone nursery seedling production and operation plan of 2004 was not prepared in a written form but discussed and decided by FD.																				
b) Nursing of seedlings produced in FY 2003	Remaining seedlings (FY2003) were kept in the Thar Yar Kone nursery and distributed to CF user groups and FD direct plantations. Some seedlings were distributed for CF prototype activities. FD started seedling production for FY 2005. The following is achievement as of January 2005 <table><tr><td>Species</td><td>Quantity</td><td>Unit</td><td>Remarks</td></tr><tr><td>19 species</td><td>250,000</td><td>pots</td><td></td></tr><tr><td>Avicenna officinalis</td><td>120,000</td><td>Pots</td><td></td></tr><tr><td>Bruguiera gymnorhiza</td><td>30,000</td><td>pots</td><td></td></tr><tr><td>A. officinalis</td><td>600,000</td><td>seedlings</td><td>bare-root</td></tr></table> Note: some seedlings of 19 species produced were transplanted from the previous year seedling production.	Species	Quantity	Unit	Remarks	19 species	250,000	pots		Avicenna officinalis	120,000	Pots		Bruguiera gymnorhiza	30,000	pots		A. officinalis	600,000	seedlings	bare-root
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Bruguiera gymnorhiza	30,000	pots																			
A. officinalis	600,000	seedlings	bare-root																		

Component	Result																																																		
c) Plan of measurement and recording of water salinity and tide level	Equipment was provided by the study team, but FD did not prepare an action plan for measurement and recording. For tide level, forester started to record twice daily.																																																		
d) Management of the facilities for nursery management	Facilities and equipment for seedling production were procured but nursery facilities management rules were not prepared in a written form..																																																		
e) Establishment and practice of monitoring	Monitoring form integrating all activities such as two weeks report, technology, seedling distribution, CF promotion, management, support, and accounting, was not prepared.																																																		
f) Regular monitoring of the Thar Yar Kone nursery	Thar Yar Kone nursery was monitored daily by a forester (nursery in charge), as a part of his original duty.																																																		
g) Transmission of reports of the result of monitoring of the seedling production to Laputta Township FD office	Reports of monitoring result were not submitted to Laputta Township FD office regularly and timely.																																																		
4.2 Uncompleted components of pilot project 2003																																																			
1. Renovation/ finishing work of nursery facilities																																																			
(1) Nursery Bed Renovation	Re-excavation and leveling of nursery beds were conducted at 8 blocks (including renovation of water gate and main channel) <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Re excavation</td><td>1,704</td><td>m³</td><td>1,704</td><td>100%</td></tr><tr><td>Side embankment finishing</td><td>976</td><td>m</td><td>976</td><td>100%</td></tr></table>	Activity	Target	Unit	Result	Rate	Re excavation	1,704	m ³	1,704	100%	Side embankment finishing	976	m	976	100%																																			
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Re excavation	1,704	m ³	1,704	100%																																															
Side embankment finishing	976	m	976	100%																																															
(2) Nursery Facility Renovation	Following components were constructed or renovated at the Thar Yar Kone nursery. <table><tr><th>Component</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Nursery main road 1 (mounding and leveling around the road)</td><td>91.5</td><td>m</td><td>91.5</td><td>100%</td></tr><tr><td>Nursery road 1,2,3,4,5,6,7 (side embankment finishing)</td><td>610</td><td>m</td><td>610</td><td>100%</td></tr><tr><td>Seedling stack yard (floor backfilling)</td><td>27.61</td><td>m³</td><td>27.61</td><td>100%</td></tr><tr><td>Potting yard (floor backfilling)</td><td>27.61</td><td>m³</td><td>27.61</td><td>100%</td></tr><tr><td>Warehouse 2 (construction)</td><td>30.13</td><td>m²</td><td>30.13</td><td>100%</td></tr><tr><td>Worker hut construction (29.3m²x 10)</td><td>293.00</td><td>m².</td><td>293.00</td><td>100%</td></tr><tr><td>Worker hut renovation (30.13m²x 10)</td><td>301.30</td><td>m²</td><td>301.30</td><td>100%</td></tr><tr><td>Incinerator construction (outer dimension 1.22m x 1.53m x 1.22m with 1.83 chimney)</td><td>1</td><td>no</td><td>1</td><td>100%</td></tr><tr><td>Concrete (brick) water storage (outer dimension 1.22m x 1.53m x 1.22m)</td><td>1</td><td>no</td><td>1</td><td>100%</td></tr></table>	Component	Target	Unit	Result	Rate	Nursery main road 1 (mounding and leveling around the road)	91.5	m	91.5	100%	Nursery road 1,2,3,4,5,6,7 (side embankment finishing)	610	m	610	100%	Seedling stack yard (floor backfilling)	27.61	m ³	27.61	100%	Potting yard (floor backfilling)	27.61	m ³	27.61	100%	Warehouse 2 (construction)	30.13	m ²	30.13	100%	Worker hut construction (29.3m ² x 10)	293.00	m ² .	293.00	100%	Worker hut renovation (30.13m ² x 10)	301.30	m ²	301.30	100%	Incinerator construction (outer dimension 1.22m x 1.53m x 1.22m with 1.83 chimney)	1	no	1	100%	Concrete (brick) water storage (outer dimension 1.22m x 1.53m x 1.22m)	1	no	1	100%
Component	Target	Unit	Result	Rate																																															
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Concrete (brick) water storage (outer dimension 1.22m x 1.53m x 1.22m)	1	no	1	100%																																															
(3) Water Reservoir Construction	One embankment type water reservoir with two steps was constructed at Thar Yar Kone nursery. <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Water reservoir construction (16.78 m x 13.73m x ht. 1.83m, 396t capacity)</td><td>1</td><td>set</td><td>1</td><td>100 %</td></tr></table>	Activity	Target	Unit	Result	Rate	Water reservoir construction (16.78 m x 13.73m x ht. 1.83m, 396t capacity)	1	set	1	100 %																																								
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Water reservoir construction (16.78 m x 13.73m x ht. 1.83m, 396t capacity)	1	set	1	100 %																																															
(4) Water Gage Construction	Of targeted two water gage, one water gage was constructed at Thar Yar Kone nursery. The remaining water gage was not constructed due to lack of available site. <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Water gage construction (reinforced concrete, up to 5 m measurement)</td><td>2</td><td>set</td><td>1</td><td>50%</td></tr></table>	Activity	Target	Unit	Result	Rate	Water gage construction (reinforced concrete, up to 5 m measurement)	2	set	1	50%																																								
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Component	Result																																																																																																																								
(5) CF Center Renovation	Overhaul of generator was conducted. <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Overhaul of generator (PP2003 procurement)</td><td>1</td><td>set</td><td>1</td><td>100%</td></tr></table>	Activity	Target	Unit	Result	Rate	Overhaul of generator (PP2003 procurement)	1	set	1	100%																																																																																																														
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Overhaul of generator (PP2003 procurement)	1	set	1	100%																																																																																																																					
2. Seedling production of remaining work from 2003	Of targeted 155,000 seedlings, the following number of seedlings was produced. <table><tr><th>Species</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Avicennia officinalis</td><td>73,000</td><td>pots</td><td>78,621</td><td>107.7%</td></tr><tr><td>Bruguiera gymnorrhiza</td><td>30,000</td><td>pots</td><td>40,515</td><td>135.1%</td></tr><tr><td>Ceriops decandra</td><td>20,000</td><td>pots</td><td>12,540</td><td>62.7%</td></tr><tr><td>Heritiera fomes</td><td>10,000</td><td>pots</td><td>9,504</td><td>95.0%</td></tr><tr><td>Rhizophora mucronata</td><td>1,000</td><td>pots</td><td>588</td><td>58.8%</td></tr><tr><td>Rhizophora apiculata</td><td>1,000</td><td>pots</td><td>588</td><td>58.8%</td></tr><tr><td>Sonneratia apetala</td><td>20,000</td><td>pots</td><td>35,436</td><td>177.2%</td></tr><tr><td>Total</td><td>155,000</td><td>pots</td><td>177,792</td><td>115.0%</td></tr></table>	Species	Target	Unit	Result	Rate	Avicennia officinalis	73,000	pots	78,621	107.7%	Bruguiera gymnorrhiza	30,000	pots	40,515	135.1%	Ceriops decandra	20,000	pots	12,540	62.7%	Heritiera fomes	10,000	pots	9,504	95.0%	Rhizophora mucronata	1,000	pots	588	58.8%	Rhizophora apiculata	1,000	pots	588	58.8%	Sonneratia apetala	20,000	pots	35,436	177.2%	Total	155,000	pots	177,792	115.0%																																																																											
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Rhizophora mucronata	1,000	pots	588	58.8%																																																																																																																					
Rhizophora apiculata	1,000	pots	588	58.8%																																																																																																																					
Sonneratia apetala	20,000	pots	35,436	177.2%																																																																																																																					
Total	155,000	pots	177,792	115.0%																																																																																																																					
3. Procurement of un-procured nursery equipment	Following equipments for seedling production were procured. <table><tr><th>Component</th><th>Quantity</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Spray</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>cart barrow (one wheel)</td><td>8</td><td>no</td><td>8</td><td>100%</td></tr><tr><td>cart barrow (two wheel)</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Tray for transplanting germinates</td><td>10</td><td>no</td><td>10</td><td>100%</td></tr><tr><td>Watering can</td><td>8</td><td>no</td><td>8</td><td>100%</td></tr><tr><td>Shovel</td><td>15</td><td>no</td><td>15</td><td>100%</td></tr><tr><td>Container</td><td>350</td><td>no</td><td>350</td><td>100%</td></tr><tr><td>Weed hoe</td><td>10</td><td>no</td><td>10</td><td>100%</td></tr><tr><td>Weed cutter (sickle)</td><td>10</td><td>no</td><td>10</td><td>100%</td></tr><tr><td>Scale</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Retractable tape</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Hand pruner</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Caliper</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Hand ax</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Ladder (5 m)</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Machete</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Saw</td><td>1</td><td>no</td><td>1</td><td>100%</td></tr><tr><td>Rake</td><td>1</td><td>no</td><td>1</td><td>100%</td></tr><tr><td>Measuring tape (30 m)</td><td>2</td><td>no</td><td>2</td><td>100%</td></tr><tr><td>Measuring tape (50 m)</td><td>3</td><td>no</td><td>3</td><td>100%</td></tr><tr><td>Lining tape (100 m)</td><td>3</td><td>no</td><td>0</td><td>0%*</td></tr><tr><td>Leveling rake</td><td>3</td><td>no</td><td>3</td><td>100%</td></tr><tr><td>Carpentry set</td><td>1</td><td>no</td><td>1</td><td>100%</td></tr></table> <p>* Not procured based on agreement between FD and Study Team</p>	Component	Quantity	Unit	Result	Rate	Spray	2	no	2	100%	cart barrow (one wheel)	8	no	8	100%	cart barrow (two wheel)	2	no	2	100%	Tray for transplanting germinates	10	no	10	100%	Watering can	8	no	8	100%	Shovel	15	no	15	100%	Container	350	no	350	100%	Weed hoe	10	no	10	100%	Weed cutter (sickle)	10	no	10	100%	Scale	2	no	2	100%	Retractable tape	2	no	2	100%	Hand pruner	2	no	2	100%	Caliper	2	no	2	100%	Hand ax	2	no	2	100%	Ladder (5 m)	2	no	2	100%	Machete	2	no	2	100%	Saw	1	no	1	100%	Rake	1	no	1	100%	Measuring tape (30 m)	2	no	2	100%	Measuring tape (50 m)	3	no	3	100%	Lining tape (100 m)	3	no	0	0%*	Leveling rake	3	no	3	100%	Carpentry set	1	no	1	100%
Component	Quantity	Unit	Result	Rate																																																																																																																					
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Carpentry set	1	no	1	100%																																																																																																																					

Component	Result				
	Equipments for seedling production and nursery management were procured. Also, overhaul of equipment was conducted				
	Component	Quantity	Unit	Result	Rate
	Fuel tank (10 gal tank)	5	no	10	100%*
	Furniture for Nursery Office				
	Office desk	2	no	2	100%
	Office chair	2	no	2	100%
	Dinning table	1	no	1	100%
	Dinning chair	6	no	6	100%
	Book shelf	2	no	2	100%
	Desk lamp	2	no	2	100%
	Overhaul of Water Pump	1	ls	1	100%
	Overhaul of Seedling Transportation Boat	1	ls	1	100%
	Black board	1	no	1	100%
	Sign board	1	no	0	0%**
	Record book	12	no	12	100%
	Binoculars	2	no	2	100%
	* changed to 10 5gal fuel tank (plastic) for easier handling				
** Not procured based on agreement between FD and Study Team					

Component	Result																																																																																
4.3 Mangrove areas forest management strengthening project																																																																																	
1. Diversification of mangrove species seedling production	<p>The production plan was developed by FD and the study team. Production of 14 mangrove species with a total of 55,000 seedlings started from July 2004 and the final achievement is as follows.</p> <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td><i>Aegiceras corniculatum</i></td><td>7,000</td><td>pots</td><td>5,132</td><td>73.3%</td></tr><tr><td><i>Avicennia alba</i></td><td>13,000</td><td>pots</td><td>17,102</td><td>131.6%</td></tr><tr><td><i>Avicennia marina</i></td><td>15,500</td><td>pots</td><td>13,214</td><td>85.3%</td></tr><tr><td><i>Bruguiera sexangula</i></td><td>1,000</td><td>pots</td><td>1,602</td><td>160.2%</td></tr><tr><td><i>Bruguiera parviflora</i></td><td>500</td><td>pots</td><td>1,076</td><td>215.2%</td></tr><tr><td><i>Bruguiera cylindrica</i></td><td>500</td><td>pots</td><td>1,260</td><td>252.0%</td></tr><tr><td><i>Excoecaria agallocha</i></td><td>8,000</td><td>pots</td><td>4,374</td><td>54.7%</td></tr><tr><td><i>Heritiera littoralis</i></td><td>1,000</td><td>pots</td><td>1,116</td><td>111.6%</td></tr><tr><td><i>Kandelia candel</i></td><td>500</td><td>pots</td><td>306</td><td>61.2%</td></tr><tr><td><i>Lumnitzera racemosa</i></td><td>6,000</td><td>pots</td><td>7,540</td><td>125.7%</td></tr><tr><td><i>Sonneratia griffithii</i></td><td>500</td><td>pots</td><td>1,188</td><td>237.6%</td></tr><tr><td><i>Sonneratia caseolaris</i></td><td>500</td><td>pots</td><td>1,854</td><td>370.8%</td></tr><tr><td><i>Xylocarpus moluccensis</i></td><td>500</td><td>pots</td><td>1,585</td><td>317.0%</td></tr><tr><td><i>Xylocarpus granatum</i></td><td>500</td><td>pots</td><td>403</td><td>80.6%</td></tr><tr><td>Total</td><td>55,000</td><td>pots</td><td>57,752</td><td>105.0%</td></tr></table>	Activity	Target	Unit	Result	Rate	<i>Aegiceras corniculatum</i>	7,000	pots	5,132	73.3%	<i>Avicennia alba</i>	13,000	pots	17,102	131.6%	<i>Avicennia marina</i>	15,500	pots	13,214	85.3%	<i>Bruguiera sexangula</i>	1,000	pots	1,602	160.2%	<i>Bruguiera parviflora</i>	500	pots	1,076	215.2%	<i>Bruguiera cylindrica</i>	500	pots	1,260	252.0%	<i>Excoecaria agallocha</i>	8,000	pots	4,374	54.7%	<i>Heritiera littoralis</i>	1,000	pots	1,116	111.6%	<i>Kandelia candel</i>	500	pots	306	61.2%	<i>Lumnitzera racemosa</i>	6,000	pots	7,540	125.7%	<i>Sonneratia griffithii</i>	500	pots	1,188	237.6%	<i>Sonneratia caseolaris</i>	500	pots	1,854	370.8%	<i>Xylocarpus moluccensis</i>	500	pots	1,585	317.0%	<i>Xylocarpus granatum</i>	500	pots	403	80.6%	Total	55,000	pots	57,752	105.0%
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Total	55,000	pots	57,752	105.0%																																																																													
2. Production of non-mangrove species	<p>The production plan was prepared by the study team. Production of 8 non-mangrove species with a total of 65,000 seedlings started from July 2004 and the achievement is as follows.</p> <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td><i>Samanea saman</i></td><td>5,000</td><td>pots</td><td>4,500</td><td>90.0%</td></tr><tr><td><i>Melaleuca leucadendra</i></td><td>8,000</td><td>pots</td><td>12,362</td><td>154.5%</td></tr><tr><td><i>Melaleuca alternifolia</i></td><td>10,000</td><td>pots</td><td>15,270</td><td>152.7%</td></tr><tr><td><i>Melaleuca viridiflora</i></td><td>10,000</td><td>pots</td><td>7,416</td><td>74.2%</td></tr><tr><td><i>Melaleuca cajuputi ssp. patyphylla</i></td><td>10,000</td><td>pots</td><td>13,622</td><td>136.2%</td></tr><tr><td><i>Albizzia procera (lebbek)</i></td><td>11,000</td><td>pots</td><td>8,658</td><td>78.7%</td></tr><tr><td><i>Casuarina equistifolia</i></td><td>10,000</td><td>pots</td><td>8,855</td><td>88.6%</td></tr><tr><td><i>Terminalia beleria</i></td><td>1,000</td><td>pots</td><td>120</td><td>12.0%</td></tr><tr><td>Total</td><td>65,000</td><td>pots</td><td>70,803</td><td>108.9%</td></tr></table>	Activity	Target	Unit	Result	Rate	<i>Samanea saman</i>	5,000	pots	4,500	90.0%	<i>Melaleuca leucadendra</i>	8,000	pots	12,362	154.5%	<i>Melaleuca alternifolia</i>	10,000	pots	15,270	152.7%	<i>Melaleuca viridiflora</i>	10,000	pots	7,416	74.2%	<i>Melaleuca cajuputi ssp. patyphylla</i>	10,000	pots	13,622	136.2%	<i>Albizzia procera (lebbek)</i>	11,000	pots	8,658	78.7%	<i>Casuarina equistifolia</i>	10,000	pots	8,855	88.6%	<i>Terminalia beleria</i>	1,000	pots	120	12.0%	Total	65,000	pots	70,803	108.9%																														
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3. Establishment and operation of mangrove garden for demonstration	<p>The construction and management plan of a mangrove garden was formulated by FD and the study team. Material procurement and the construction were started from October 2004 and completed in January 2005.</p> <table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Total area (24 acre)</td><td>9.72</td><td>ha</td><td>9.72</td><td>100%</td></tr><tr><td>Focal garden x 6, Terrace garden x1</td><td>0.24</td><td>ha</td><td>0.24</td><td>100%</td></tr><tr><td>Wooden walking board (30ft)</td><td>9.15</td><td>m</td><td>9.15</td><td>100%</td></tr><tr><td>Water drainage (250ft)</td><td>76.3</td><td>m</td><td>76.3</td><td>100%</td></tr><tr><td>Renovation of nursery office for demonstration (compartment adding and walling for demonstration)</td><td>1</td><td>l.s.</td><td>1</td><td>100%</td></tr><tr><td>Sapling planting</td><td>300</td><td>sdl</td><td>300</td><td>100%</td></tr><tr><td>Wooden boundary pillars</td><td>10</td><td>pc</td><td>10</td><td>100%</td></tr><tr><td>Sign boards (6’ x 3’ size)</td><td>6</td><td>set</td><td>6</td><td>100%</td></tr><tr><td>Sign boards (2’ x 3’ size)</td><td>20</td><td>pc</td><td>20</td><td>100%</td></tr><tr><td>Species board (6” x 18” size)</td><td>150</td><td>pc</td><td>150</td><td>100%</td></tr></table> <p>* Sapling was provided from TYK FD Integrated mangrove nursery</p>	Activity	Target	Unit	Result	Rate	Total area (24 acre)	9.72	ha	9.72	100%	Focal garden x 6, Terrace garden x1	0.24	ha	0.24	100%	Wooden walking board (30ft)	9.15	m	9.15	100%	Water drainage (250ft)	76.3	m	76.3	100%	Renovation of nursery office for demonstration (compartment adding and walling for demonstration)	1	l.s.	1	100%	Sapling planting	300	sdl	300	100%	Wooden boundary pillars	10	pc	10	100%	Sign boards (6’ x 3’ size)	6	set	6	100%	Sign boards (2’ x 3’ size)	20	pc	20	100%	Species board (6” x 18” size)	150	pc	150	100%																									
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Component	Result																																																																																																			
4. Construction and operation of aqua-agroforestry for demonstration	The construction, management and production plan and procurement plan were prepared, by the study team. Material procurement and the construction were started from September 2004 and completed in January 2005. 400m ² x 2 ponds =800m ² (water body 220m ² , land 580m ²)																																																																																																			
	Activity	Target	Unit	Result	Rate	Pond excavation (1,080 ft ³)	286.27	m ³	286.27	100%	Inlet and waterway excavation (525 ft ³)	14.91	m ³	7.46	50%	Canal and waterway excavation to mangrove garden terrace garden	-	m ³	7.45	(50%)	Creek excavation (4,290ft ³)	120.12	m ³	120.12	100%	Water gate	2	no.	2	100%	Aquaculture related procurement	1	l.s.	1	100%	Agriculture related procurement	1	l.s.	1	100%	Wooden boundary pillars	6	pc	6	100%	Sign boards (6' x 3' size)	2	set	2	100%	Species board (6'' x 18''' size)	50	pc	50	100%																																													
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	Item	Target	Unit	Result	Rate	Feeding Tray	10	pc	10	100%	Plastic Bucket	4	pc	4	100%	plastic screen(2M x 5 M)	2	pc	2	100%	Crow bar	2	pc	2	100%	Hoe	2	pc	2	100%	Spade	2	pc	2	100%	Lime 15 viss	20	bag	20	100%	Bamboo Screen (7ft x 12ft)	4	Pc	4	100%																																																							
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	Item	Target	Unit	Result	Rate	Coconut	18	pc	18	100%	Mango	13	pc	13	100%	Arecanut	9	pc	9	100%	Lemon	8	pc	8	100%	Lime	9	pc	9	100%	Black papper	30	pc	30	100%	Zawlonge	600	pc	600	100%	Long Bean	0.5	kg	0.5	100%	Cucumber	50.0	gm	50.0	100%	Pumkin	0.8	kg	0.8	100%	Bottle gourd	0.1	kg	0.1	100%	Roselle	1.0	kg	1.0	100%	Watercress	1.0	kg	1.0	100%	Okra	0.5	kg	0.5	100%	Chilli	200	pc	200	100%	Egg Plant	200	pc	200	100%	Top Soil	1,000	cuft	1,000	100%	Cow Manure(25Kg)	60	bag	60	100%	Chicken Manure(25Kg)	20	bag	20	100%
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Component	Result																																								
5. Construction and operation of seed production area	The site was selected and demarcated by FD in September 2004. Material procurement and the construction were started from October 2004 and completed in January 2005.																																								
	<table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Total area (5 acre)</td><td>2.03</td><td>ha</td><td>2.03</td><td>100%</td></tr><tr><td>Wooden walking board (125ft)</td><td>38.13</td><td>m</td><td>38.13</td><td>100%</td></tr><tr><td>Temporary hut for observation and storage (324ft²)</td><td>30.13</td><td>m²</td><td>30.13</td><td>100%</td></tr><tr><td>Sapling planting</td><td>150</td><td>sdl.</td><td>150</td><td>100%*</td></tr><tr><td>Wooden boundary pillars</td><td>6</td><td>pc</td><td>6</td><td>100%</td></tr><tr><td>Sign boards (6’ x 3’ size)</td><td>2</td><td>set</td><td>2</td><td>100%</td></tr><tr><td>Species board (6” x 18” size)</td><td>50</td><td>pc</td><td>50</td><td>100%</td></tr></table>	Activity	Target	Unit	Result	Rate	Total area (5 acre)	2.03	ha	2.03	100%	Wooden walking board (125ft)	38.13	m	38.13	100%	Temporary hut for observation and storage (324ft ²)	30.13	m ²	30.13	100%	Sapling planting	150	sdl.	150	100%*	Wooden boundary pillars	6	pc	6	100%	Sign boards (6’ x 3’ size)	2	set	2	100%	Species board (6” x 18” size)	50	pc	50	100%
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* Sapling was provided from TYK FD Integrated mangrove nursery																																									
4.4 White charcoal production																																									
	At the final completion check time, the application for the charcoal production was under preparation by the FD officer in charge of the pilot project.																																								
4.5 Patrolling																																									
1. Formulation of user group patrolling system	The patrolling system was set up in both Thar Yar Kone and Nyaung Ta Pin. The action plan was formulated, and demonstration patrolling was practiced by the user groups and FD.																																								
2. Implementation and monitoring of patrolling	The user group implemented patrolling by themselves using their boats accompanied by the CF task force members twice. Recording and reporting systems were not prepared and conducted by either user groups or the CF task force.																																								
3. Public awareness	1. Public awareness local workshops were conducted 18 times at 2 districts, 2 townships, 13 villages and Bogalay FD office.																																								
	<table><tr><th>Activity</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Public awareness local workshop</td><td>27</td><td>time</td><td>18</td><td>-</td></tr></table>	Activity	Target	Unit	Result	Rate	Public awareness local workshop	27	time	18	-																														
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	2. A handout for public awareness was prepared by the study team and FD and distributed the handout in collaboration with local authorities.																																								
<table><tr><th>Component</th><th>Quantity</th><th>Unit</th></tr><tr><td>Public Awareness pamphlet</td><td>50,000</td><td>copies</td></tr><tr><td>Public Awareness poster</td><td>500</td><td>copies</td></tr></table>	Component	Quantity	Unit	Public Awareness pamphlet	50,000	copies	Public Awareness poster	500	copies																																
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Table 6.7 Summary of Results of Thar Yar Kone and Nyang Ta Pin CF Pilot Project

Component	Item
1. Planning	
1.1 Update of action plan of management plan prepared under pilot project 2003	
1. Preparation of action plan 2004	
a) Necessity of update is understood by the user groups	The management committee understood and agreed for the activities needed for the update, but not all of the user group members understood.
b) Preparation and submission of action plan	The action plan for the management plan prepared under the pilot project 2003 was updated by the two user groups. The Thar Yar Kone user group submitted the updated action plan to FD but the Nyaung Ta Pin user group, did not submit the updated action plan to FD, because they misunderstood that FD should take care of the updated action plan. There was no written record by the user group about the submission of the updated action plan.
1.2 Update of TYK and NTP forest management plan	
1. Updating of user group members and allocation of CF area for new members	
	<p>The management plans of Thar Yar Kone and Nyaung Ta Pin village were updated by the user groups.</p> <ul style="list-style-type: none"> - In Thar Yar Kone village, one member dropped out because of a lack of labor force to implement CF. The CF area was reallocated as the CF church woodlot by the verbal agreement between the user group and FD. - In Nyaung Ta Pin village, 13 members dropped out mainly due to a migration to other villages, but 8 members joined the user group. The 8 newcomers took over the CF areas of the dropped out 8 members.
2. Land allocation and confirmation of border lines	
Summary	The update of the CF management map was completed by the user group, the CF task force, and the Geographic Information System (GIS) section of FD. The updated CF management maps including new and dropped out user group members, and the new CF activities, were submitted to the CF task force. However, the update CF management map was not authorized by the Myaung Mya District FD office yet.
a) Confirmation of delineation method	Confirmed by the user groups. The user group confirmed the delineation method integrating the chain survey, the boarder line management by clear-cutting the boarder line, and the GPS recording. The user group recognized the survey in 2004 itself was not so different from the previous one in 2003.
b) Delineated line confirmation (sub-group boundary) in Thar Yar Kone and Nyaung Ta Pin.	Thar Yar Kone: completed for all sub-groups (1~6) Nyaung Ta Pin: completed for all sub-groups (1~9)
c) Delineated line confirmation (individual boundary) in Thar Yar Kone and Nyaung Ta Pin	Thar Yar Kone: not completed except sub-group 6 Nyaung Ta Pin: completed for all individual community forestry area
d) Understanding about border line management	Through the confirmation activity of the CF area border line, both the CF user groups and the CF task force understood about the importance of the border line management.
e) Preparation of revised CF management map	Preparation of updated CF management map by the GIS section based on the GPS data collected at the field.
f) Map distribution	The GIS section itself did not distribute any map and data. The JICA study team distributed to front line office at Thar Yar Kone camp in September 2004.
g) Budget allocation for mapping	The GIS section consumed an ordinary budget for necessary procurement. There

Component	Item																																																						
and printing for preparation of CF management map	is no budget allocation for the community forestry mapping at present.																																																						
3. Preparation of the revised CF management plan																																																							
	The 8 new comers in Nyaung Ta Pin submitted the management plan to FD in August. The CF user groups prepared the rules and regulations regarding the border line management through holding workshops by the user group and FD. The rules and regulations will be confirmed by the user group in writing in November 2004.																																																						
4. application and permission of revised forest management plan																																																							
	Though FD understood the necessity of the update in order to secure CF rights, the official procedure for amendment to the management plan has not proceeded yet.																																																						
1.3 Application and trial of sales vouchers and licenses for value added products																																																							
1. Improvement of the CF map and harvest plan																																																							
	The user group members did not have any experience and knowledge about the stock estimation of their area, and it was difficult for them to prepare a harvesting plan. In the workshop, FD suggested the user group measure girth and height of trees in their area.																																																						
2. Application of sales voucher																																																							
	The management committee members and subgroup leaders understood how to use the draft sales voucher. The trial of the sales voucher was not implemented by January 2005 by the user groups and FD.																																																						
	Removal pass was not issued.																																																						
3. Preparation and application of license for value adding production																																																							
	The license for value added products was not applied by the user group members in the pilot project 2004.																																																						
2. Implementation																																																							
2.1 Continuation activities of pilot project 2003																																																							
	The user groups implemented the plantation and NFIO activities. The seedling distribution from FD was based on the updated action plan in Thar Yar Kone. On the other hand, in Nyaung Ta Pin the distribution was based on the original management plan prepared in 2003. The total seedling distribution by FD was about 40,000 seedlings. The achievement of the CF plantations and NFIO was 15 to 23% in both villages except for 105% achievement for the plantation in Nyaung Ta Pin.																																																						
1. Plantation																																																							
a) Implementation	<div>Areas under CF Plantation</div> <table><tr><th>UsG</th><th>Target (2003)</th><th>Target (2004)</th><th>Unit</th><th>Result</th><th>Rate (2004)</th></tr><tr><td>TYK</td><td>3.48</td><td>13.42</td><td>ha</td><td>3.78</td><td>28.1%</td></tr><tr><td>NTP</td><td>1.95</td><td>1.89</td><td>ha</td><td>1.98</td><td>104.8%</td></tr><tr><td>Total</td><td>5.43</td><td>15.31</td><td>ha</td><td>5.76</td><td>37.5%</td></tr></table> <div>Required and Planted Seedlings</div> <table><tr><th>UsG</th><th colspan="2">Target</th><th colspan="3">Result</th></tr><tr><th></th><th>(2003)</th><th>(2004)</th><th>By FD</th><th>By UsG</th><th>Total</th></tr><tr><td>TYK</td><td>14,840</td><td>49,510</td><td>5,360</td><td>3,400</td><td>8,760</td></tr><tr><td>NTP</td><td>15,400</td><td>1,000</td><td>2,550</td><td>1,000</td><td>3,550</td></tr><tr><td>Total</td><td>30,240</td><td>50,510</td><td>7,910</td><td>4,400</td><td>12,310</td></tr></table>	UsG	Target (2003)	Target (2004)	Unit	Result	Rate (2004)	TYK	3.48	13.42	ha	3.78	28.1%	NTP	1.95	1.89	ha	1.98	104.8%	Total	5.43	15.31	ha	5.76	37.5%	UsG	Target		Result				(2003)	(2004)	By FD	By UsG	Total	TYK	14,840	49,510	5,360	3,400	8,760	NTP	15,400	1,000	2,550	1,000	3,550	Total	30,240	50,510	7,910	4,400	12,310
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2.2 New activities under pilot project 2004																																																																												
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	Subgroups for the CF aqua-agroforestry were formulated in each village. The subgroups prepared the management plan, and the rules and regulations, and submitted them to FD. The land allocation was not yet done because Laputta FD understood that permission from the divisional FD office was necessary.																																																																											
a) Formulation of subgroups	The subgroup was formed and the rules and regulations were formulated in each village.																																																																											
b) Allocation of CF areas	Aqua-agroforestry was planned in the already allocated community forestry land.																																																																											
c) Preparation and submission of CF management plan	Management plan was formulated and submitted to FD. Submitted management plan was not yet authorized. Demonstration aqua-agroforestry was permitted in each village.																																																																											
d) Construction	<div>The construction was started but still on going by both user group as of January 2005.</div> <div>1set of CF aqua-agroforestry 400m² x 2 ponds =800m² (water body 220m², land 580m²)</div> <table><tr><th>UsG</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>TYK</td><td>2</td><td>set</td><td>1</td><td>Under construction</td></tr><tr><td>NTP</td><td>2</td><td>ste</td><td>1</td><td>Under construction</td></tr><tr><td>Total</td><td>4</td><td>set</td><td>2</td><td>50%</td></tr></table>	UsG	Target	Unit	Result	Rate	TYK	2	set	1	Under construction	NTP	2	ste	1	Under construction	Total	4	set	2	50%																																																							
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Component	Item																																																																						
e) Procurement of construction material	Procurement of necessary construction materials was completed by the end of January 2005. The following materials were procured.																																																																						
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	<table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Brick</td><td>1,137</td><td>pc</td><td>1,418</td><td>125%</td></tr><tr><td>Broken brick</td><td>17</td><td>cft</td><td>-</td><td>*</td></tr><tr><td>Sand</td><td>28</td><td>cft</td><td>50</td><td></td></tr><tr><td>Cement</td><td>6</td><td>bag</td><td>6</td><td></td></tr><tr><td>Coconut fibre</td><td>634</td><td>viss</td><td>634</td><td></td></tr><tr><td>Shingle</td><td>1</td><td>cft</td><td>-</td><td>*</td></tr><tr><td>Timber</td><td>8</td><td>cft</td><td>-</td><td>**</td></tr><tr><td>Poles</td><td>12</td><td>pc</td><td>12</td><td>100%</td></tr><tr><td>Wire nails</td><td>1</td><td>lb</td><td>-</td><td>**</td></tr><tr><td>Nylon net</td><td>60</td><td>sft</td><td>-</td><td>**</td></tr><tr><td>10" concrete pipe</td><td>6</td><td>pc</td><td>6</td><td>100%</td></tr><tr><td>Ready made water gate x 2</td><td>-</td><td>set</td><td>1</td><td></td></tr><tr><td>Ready made screen gate x 2</td><td>-</td><td>set</td><td>1</td><td></td></tr></table>	Item	Target	Unit	Result	Rate	Brick	1,137	pc	1,418	125%	Broken brick	17	cft	-	*	Sand	28	cft	50		Cement	6	bag	6		Coconut fibre	634	viss	634		Shingle	1	cft	-	*	Timber	8	cft	-	**	Poles	12	pc	12	100%	Wire nails	1	lb	-	**	Nylon net	60	sft	-	**	10" concrete pipe	6	pc	6	100%	Ready made water gate x 2	-	set	1		Ready made screen gate x 2	-	set	1	
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<table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Brick</td><td>1,137</td><td>pc</td><td>1,418</td><td>125%</td></tr><tr><td>Broken brick</td><td>17</td><td>cft</td><td>-</td><td>*</td></tr><tr><td>Sand</td><td>28</td><td>cft</td><td>50</td><td></td></tr><tr><td>Cement</td><td>6</td><td>bag</td><td>6</td><td></td></tr><tr><td>Coconut fibre</td><td>634</td><td>viss</td><td>634</td><td></td></tr><tr><td>Shingle</td><td>1</td><td>cft</td><td>-</td><td>*</td></tr><tr><td>Timber</td><td>8</td><td>cft</td><td>-</td><td>**</td></tr><tr><td>Poles</td><td>12</td><td>pc</td><td>12</td><td>100%</td></tr><tr><td>Wire nails</td><td>1</td><td>lb</td><td>-</td><td>**</td></tr><tr><td>Nylon net</td><td>60</td><td>sft</td><td>-</td><td>**</td></tr><tr><td>10" concrete pipe</td><td>6</td><td>pc</td><td>6</td><td>100%</td></tr><tr><td>Ready made water gate x 2</td><td>-</td><td>set</td><td>1</td><td></td></tr><tr><td>Ready made screen gate x 2</td><td>-</td><td>set</td><td>1</td><td></td></tr></table>	Item	Target	Unit	Result	Rate	Brick	1,137	pc	1,418	125%	Broken brick	17	cft	-	*	Sand	28	cft	50		Cement	6	bag	6		Coconut fibre	634	viss	634		Shingle	1	cft	-	*	Timber	8	cft	-	**	Poles	12	pc	12	100%	Wire nails	1	lb	-	**	Nylon net	60	sft	-	**	10" concrete pipe	6	pc	6	100%	Ready made water gate x 2	-	set	1		Ready made screen gate x 2	-	set	1		
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f) Procurement of aquaculture/ agriculture material	Procurement of necessary materials was completed by the end of January 2005.																																																																						
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	g) CF agroforestry	<p>The Thar Yar Kone CF agroforestry subgroup established in 2003 continued their activity by themselves, and submitted the management plan to the CF task force.</p> <p>TYK Agronursery</p> <table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Tarro</td><td>5</td><td>kg</td><td>0</td><td>0%</td></tr><tr><td><i>Sesbania grandiflora</i> (seed)</td><td>1</td><td>kg</td><td>1</td><td>100%</td></tr><tr><td>Pomelo</td><td>10</td><td>pc</td><td>10</td><td>100%</td></tr><tr><td>Jack fruit</td><td>5</td><td>pc</td><td>5</td><td>100%</td></tr><tr><td>Drum stick (seed)</td><td>1</td><td>kg</td><td>1</td><td>100%</td></tr><tr><td>Tomato</td><td>1</td><td>kg</td><td>1</td><td>100%</td></tr><tr><td>Soap pod</td><td>100</td><td>pc</td><td>0</td><td>0%</td></tr><tr><td>Water melon</td><td>1</td><td>kg</td><td>1</td><td>100%</td></tr><tr><td>Ginger (seed)</td><td>5</td><td>kg</td><td>5</td><td>100%</td></tr><tr><td>Rambutan</td><td>10</td><td>pc</td><td>5</td><td>100%</td></tr></table> <p>TYK Agroproduction (by CF member)</p> <table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Pomelo</td><td>10</td><td>pc</td><td>10</td><td>100%</td></tr><tr><td>Pomelo</td><td>10</td><td>pc</td><td>10</td><td>100%</td></tr><tr><td><i>Sesbania grandiflora</i></td><td>206</td><td>pc</td><td>206</td><td>100%</td></tr><tr><td>Drum stick (seedling)</td><td>204</td><td>pc</td><td>410</td><td>201%</td></tr><tr><td>Cashew</td><td>50</td><td>pc</td><td>50</td><td>100%</td></tr></table>	Item	Target	Unit	Result	Rate	Tarro	5	kg	0	0%	<i>Sesbania grandiflora</i> (seed)	1	kg	1	100%	Pomelo	10	pc	10	100%	Jack fruit	5	pc	5	100%	Drum stick (seed)	1	kg	1	100%	Tomato	1	kg	1	100%	Soap pod	100	pc	0	0%	Water melon	1	kg	1	100%	Ginger (seed)	5	kg	5	100%	Rambutan	10	pc	5	100%	Item	Target	Unit	Result	Rate	Pomelo	10	pc	10	100%	Pomelo	10	pc	10	100%	<i>Sesbania grandiflora</i>	206	pc	206	100%	Drum stick (seedling)	204	pc	410	201%	Cashew	50	pc	50	100%																																
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NTP Agroproduction (by CF member)																
Item	Target	Unit	Result	Rate												
Mango	-	pc	20													
2. CF FD Camp																
	<p>The Laputta township FD officers and laborers organized the user group for the CF FD camp. FD allocated 526.5 ha (1,300 acre) in the forest compartment No. 61 in the Pyinalan Reserve Forest. The management plan and the rules and regulations were prepared in November and December 2004.</p> <p>In October, approximately 30,000 seedlings were distributed from the Thar Yar Kone FD integrated nursery for plantation.</p> <p>For CF FD camp, following items were procured in January 2005</p> <table><tr><th>Item</th><th>CF FD Camp</th></tr><tr><td>Boundary pillars</td><td>34</td></tr><tr><td>Signboards</td><td>8</td></tr></table>	Item	CF FD Camp	Boundary pillars	34	Signboards	8									
Item	CF FD Camp															
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Component	Item																																																
3. CF village woodlot																																																	
a) Formulation of subgroups	The subgroup was formed and the rules and regulations were formulated.																																																
b) Allocation of CF areas	The land was allocated for communal woodlots except the school woodlot in Thar Yar Kone.																																																
c) Preparation and submission of CF management plan	Management plan was formulated and submitted to FD. Submitted management plan was not yet authorized.																																																
d) Implementation	<div>Areas under CF Village woodlot<table><tr><th>UsG</th><th>Target (All)</th><th>Target (2004)</th><th>Unit</th><th>Result</th><th>Rate (2004)</th></tr><tr><td>TYK school woodlot</td><td>0.81</td><td>0.81</td><td>ha</td><td>0.20</td><td>24.7%</td></tr><tr><td>NTP village woodlot</td><td>1.94</td><td>1.94</td><td>ha</td><td>1.82</td><td>93.8%</td></tr><tr><td>Total</td><td>2.75</td><td>2.75</td><td>ha</td><td>2.02</td><td>73.5%</td></tr></table></div> <div>Survival rate of the planted seedling (sampling survey)<table><tr><th>Species</th><th>Survival %</th><th>Spacing</th></tr><tr><td>NTP village wood lot</td><td></td><td></td></tr><tr><td><i>Heritiera fomes</i></td><td>40%</td><td>6 x 6 ft (1.83 x 1.83m)</td></tr><tr><td><i>Excoecaria agallocha</i></td><td>60%</td><td>6 x 6 ft (1.83 x 1.83m) 4.5 x 4.5 ft (1.37 x 1.37m)</td></tr><tr><td>TYK school wood lot</td><td></td><td></td></tr><tr><td><i>Avicennia officinalis</i></td><td>90%</td><td>6 x 6 ft (1.83 x 1.83m)</td></tr></table></div>	UsG	Target (All)	Target (2004)	Unit	Result	Rate (2004)	TYK school woodlot	0.81	0.81	ha	0.20	24.7%	NTP village woodlot	1.94	1.94	ha	1.82	93.8%	Total	2.75	2.75	ha	2.02	73.5%	Species	Survival %	Spacing	NTP village wood lot			<i>Heritiera fomes</i>	40%	6 x 6 ft (1.83 x 1.83m)	<i>Excoecaria agallocha</i>	60%	6 x 6 ft (1.83 x 1.83m) 4.5 x 4.5 ft (1.37 x 1.37m)	TYK school wood lot			<i>Avicennia officinalis</i>	90%	6 x 6 ft (1.83 x 1.83m)						
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2.3 Capacity building of user groups and user group members																																																	
1. CF Water Reservoir Construction and Operation																																																	
Formulation of CF user group water reservoir subgroup and the rules and regulations	The water reservoir subgroup was formulated in both Thar Yar Kone and Nyaung Ta Pin villages in May 2004. The draft rules and regulations were also formulated																																																
Action plan for the construction is formulated	The action plan was formulated based on the work quantity and updated based on the user group members' availability																																																
Construction of water reservoir	The construction was started by both user groups at the end of October 2004 and																																																

Component	Item																																																																																
	still on going by both user group as of January 2005 CF Water Reservoir : 15.25 m x 15.25 m x ht. 1.83m, 396t water capacity																																																																																
Procurement of construction material	Procurement of necessary construction materials was completed by the end of January 2005. The following materials were procured. Thar Yar Kone <table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Silt</td><td>328</td><td>cft</td><td>0</td><td>0%</td></tr><tr><td>Lime (30 viss)</td><td>157</td><td>bag</td><td>157</td><td>100%</td></tr><tr><td>coconut fibre(1 viss)</td><td>1,082</td><td>bag</td><td>1,082</td><td>100%</td></tr><tr><td>Brick</td><td>1,350</td><td>pc</td><td>1,062</td><td>79%</td></tr><tr><td>Sand</td><td>28</td><td>cft</td><td>100</td><td>357%</td></tr><tr><td>Cement</td><td>6</td><td>bag</td><td>6</td><td>100%</td></tr><tr><td>Ready made wooden step x2</td><td>-</td><td>set</td><td>1</td><td>100%</td></tr></table> Nyang Ta Pin <table><tr><th>Item</th><th>Target</th><th>Unit</th><th>Result</th><th>Rate</th></tr><tr><td>Silt</td><td>328</td><td>cft</td><td>0</td><td>0%</td></tr><tr><td>Lime (30 viss)</td><td>157</td><td>bag</td><td>157</td><td>100%</td></tr><tr><td>coconut fibre(1 viss)</td><td>1,082</td><td>bag</td><td>1,082</td><td>100%</td></tr><tr><td>Brick</td><td>1,350</td><td>pc</td><td>1,062</td><td>79%</td></tr><tr><td>Sand</td><td>28</td><td>cft</td><td>100</td><td>357%</td></tr><tr><td>Cement</td><td>6</td><td>bag</td><td>6</td><td>100%</td></tr><tr><td>Ready made wooden step x2</td><td>-</td><td>set</td><td>1</td><td>100%</td></tr></table> Minor changes in design have resulted in changes in the procurement amount.	Item	Target	Unit	Result	Rate	Silt	328	cft	0	0%	Lime (30 viss)	157	bag	157	100%	coconut fibre(1 viss)	1,082	bag	1,082	100%	Brick	1,350	pc	1,062	79%	Sand	28	cft	100	357%	Cement	6	bag	6	100%	Ready made wooden step x2	-	set	1	100%	Item	Target	Unit	Result	Rate	Silt	328	cft	0	0%	Lime (30 viss)	157	bag	157	100%	coconut fibre(1 viss)	1,082	bag	1,082	100%	Brick	1,350	pc	1,062	79%	Sand	28	cft	100	357%	Cement	6	bag	6	100%	Ready made wooden step x2	-	set	1	100%
Item	Target	Unit	Result	Rate																																																																													
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Ready made wooden step x2	-	set	1	100%																																																																													
2.Training of the CF user group extension workers																																																																																	
a) Selection of extension workers	Totally, 2 trainees each from Thar Yar Kone, Nyaung Ta Pin, Kanbala Ta Pin,, Thauung Lay were selected by the management committee and / or the village authority.																																																																																
b) Lecture related to the pilot project 2004 is implemented.	Lectures on plantation, NFIO, aqua-agroforestry, monitoring, agroforestry, agro-nursery, rules and regulations, efficient stove were implemented from May to October 2004, two weeks per month on average.																																																																																
c) On-the-job training through the pilot project 2004 is implemented.	On-the-job trainings on action planning, delineation, management planning , implementation of plantation and NFIO, aqua-agroforestry, agroforestry, women group activities were implemented from May to October 2004, two weeks per month on average.																																																																																
d) Study tour and phoenix heart marketing	A study tour was conducted in January 2005 for extension workers for observation of aquaculture production, agricultural production in Yangon areas. Also attended the technology transfer seminar.																																																																																
3. CF user group women's group																																																																																	
	The CF women subgroup was formulated with 20 members. The rules and regulations and the processing manual for phoenix was also prepared by the subgroup and the study team.																																																																																
a) Formulation of women group is formed and rules and regulations for the women group are formulated.	Women group was formed with 20 members in Thar Yar Kone and its rules and regulations are formulated.																																																																																
b) The method of processing phoenix shoots	The method was summarized as the manual and the women group learned the method. . The subgroup arranged the 4 working groups and produced about 300 bottles of phoenix shoots																																																																																
c) The sample tasting for the marketing of the phoenix shoot.	The trial tasting was held twice in Yangon. And also served to participants of the technology transfer seminar in January 2005																																																																																
e) Consideration for further	The phoenix resource was estimated enough for the sustainable production. The																																																																																

Component	Item
production of the phoenix shoot	production plan was prepared. However, the bottle procurement for the production was difficult within the pilot project duration.
4. Support monitoring and preparation of progress report of the CF UsG	
	The annual progress report for 2003 was prepared by the user groups, by support and supervision of the study team. The management committee submitted the annual progress report for 2003 to FD in August 2004.
	The extension workers supported the user groups to monitor and record the activity for 2004. The interim achievement was shared with the user groups in the wrap up meeting on 20th October 2004.

Table 8.1 Ideal Forest Management System

Ideal Multi-layer/Function Forest Management System	
<ul style="list-style-type: none">• Protection – production – regeneration functions can be provided through protection – harvesting – regeneration operations conducted simultaneously in mangrove forests. The three tiers silvicultural management can be applied to both natural forests and plantations. Such can be attained through regular forest operations which will be conducted in the proposed mangrove management system under the IMMP. Moreover, monitoring compliance is quite easy as it only requires confirming the continued presence of the upper canopy trees and of adequate regeneration.• In natural forests, the tiered silviculture can be done in following operations: 1) selection and marking of mother trees (including potential trees); 2) assisted natural regeneration or enrichment planting if there are no sufficient regeneration; 3) intermediate harvest (selective cutting) and/or thinning of non-marked trees for domestic or commercial use; 4) final harvest of mature trees; and 5) natural regeneration or artificial regeneration by coppicing and/or planting in the area where harvest operation had been done.• In plantations, the tiered silviculture starts from the establishment of seedlings in site to the development of the protection tier through following operations: 1)plantation establishment, maintenance and protection; 2) first thinning; 3)second thinning/ intermediate harvesting; and 4) final harvest, including selection and marking of protection/ mother trees. Mixed species planting shall be introduced to generate multiple function forest stands.• The three tiers silvicultural management can be applied to both FD operations and CF operations. Especially, it will be advantageous for CF operations since the tier silviculture enables self reliance operations in terms of seedling production and supply of forest products for domestic use in the long run.	

Table 8.2 Applicable Forestry Operations for Each Operational Area

1) CM1	Wildlife habitats and other critical areas in CM1 should be strictly protected through preservation and conservation operations. Therefore, the major operation is patrolling to prevent illegal activities and fires, and no regeneration/improvement measures or harvesting shall be conducted. For the other forests under CM1, forest regeneration operations including assisted natural regeneration and/ or enrichment planting with mangrove species are the options. The forest regeneration operation is aimed to promote constant and adequate regeneration in the remaining stands. Limited extraction, such as non-timber forest products (NTFP), shall be permitted if such are available. The operation is associated with forest protection measures such as pest control, fire control, monitoring and evaluation, and patrolling.
2) CM2	Conservation operation and a forest regeneration operation similar to CM1 should also be applied to CM2. However, emphasis shall be given to the forest regeneration operation to promote the growth of higher stands in CM2 and to secure sufficient regeneration. Controlled extraction of NTFP shall be permitted. Compared to CM1, this type of forest may need stand improvement to some extents. therefore, forest improvement operations along with forest protection measures shall also be adopted. This operation is to improve the natural condition of the forest and controlled extraction of NTFP should be permitted.
3) CM3	This type of forest generally has a low stature forest of less than 6 m in height. Shrubby vegetation may dominate in this type of area. In order to improve such areas, forest improvement operations with forest protection measures shall be adopted. Similar to the improvement operations in CM2, extraction of NTFP shall be permitted. Also a forest regeneration operation shall be introduced to secure regeneration on sites where regeneration is insufficient.
4) SM1	This type of forest already attains an average height of 12m or more. However crown density is lower than 70% and considered to be low in stock compared to closed forests. Forest improvement under natural forest operations with planting/ assisted natural regeneration, are feasible options to increase the stock and improve the quality of the forest. Plantation operation shall be applied in gaps and open areas.
5) SM2	As same as SM1, forest improvement under natural forest operations with planting/ assisted natural regeneration, and plantation operation are feasible options to increase the stock and improve the quality of the forest.
6) SM3	This type of forest has a crown density of less than 70% and a stature of 6m and below, therefore, it is considered as inadequate stock mangrove forests and to be degraded to some extent by recent encroachment and exploitation. Stand improvement is necessary, therefore, forest improvement operations with forest protection measures shall be adopted. Controlled harvesting of forest products including woods should be permitted, especially for CF operations. For extremely low stature forest stands and shrubs in SM3, plantation operations (with forest protection measures and fire protection) shall be applied. On high ground levels, non-mangrove species shall be introduced as nurse tree/shade trees to promote regeneration of mangrove species and multi-purpose trees to meet the needs of local communities.
7) Barren Lands	Barren lands are normally grassland or abandoned agricultural land with dispersed mangrove stands with crown density of 40% or less. The plantation operation shall be applied in the barren land. If necessary, forest improvement operations shall be applied to existing mangrove stands.
8) Agriculture Land	The majority of land in this category is under paddy cultivation, therefore existing agricultural activities shall be maintained and improved to prevent further encroachment into remaining mangrove forests. Windbreak plantations and boundary plantations are applicable for this purpose. Also plantation operations shall be conducted in low ground level areas that are inappropriate for further agricultural activities and/or in lands chosen by local communities. If necessary, forest improvement operations shall be applied to the remaining mangrove stands.
9) Riverbanks/ coast	Riverbank re-vegetation/ stabilization should be applied where necessary to the critical riverbanks/coastlines of all of forest types and land uses within the reserved forest. Operations by both FD and CF user groups are appropriate in this type of land use.
10) Settlements	Villages, housing areas, other development areas inside the reserved forest shall be the area for forestry operation. Since, pure forest plantations are not feasible in the settlements, operations such as woodlots, agroforestry, home gardens, are eligible to avoid conflict with the current land use and to benefit the livelihood of residents. Operations under the CF are appropriate in this type of land use.

Table 8.3 Target Project area for the IMMP by zone category

(Unit:ha)																																		
Reserved Forest Zoning Category		Core							Buffer											Multi-use										Summary				
		FD operation compartment ¹⁾					CF operation compartment ²⁾	Sub-total	FD operation compartment ¹⁾					CF operation compartment ²⁾						Sub-total	FD operation compartment ¹⁾		CF operation compartment ²⁾	Total area										
Land use/Forest type Category	CM	SM	OPEN	Other *	total	All	CM		SM	OPEN	Other*	total	CM	SM	OPEN	Cultivated	Other**	total	all land use		CM	SM	OPEN		Cultivated	Other**	total	Sub-total	FD operation compartment ¹⁾	CF operation compartment ²⁾				
Kyakankwinpauk	Phase I	824	37	0	406	1,268	0	1,268	122	3	0	9	134	0	0	0	0	0	134	17	85	64	23	1,750	266	2,188	2,204	1,418	2,188	3,606				
	Phase II	57	836	255	109	1,257	0	1,257	56	163	560	286	1,063	0	6	0	1	64	71	1,134	154	153	186	48	4,271	195	4,854	5,008	2,474	7,398				
	Phase III	495	207	93	2	798	138	935	1,254	826	211	864	3,155	744	149	38	46	331	1,308	4,463	641	859	333	168	6,124	694	8,178	8,819	4,594	9,624				
Sub-total		1,376	1,080	348	517	3,322	138	3,460	1,432	991	771	1,158	4,352	744	155	38	47	395	1,379	5,731	811	1,097	583	1,908	12,146	1,156	15,220	16,031	8,486	16,736	25,222			
Pyinalan	Phase I	1,537	771	382	0	2,690	2	2,691	30	451	67	57	605	297	660	277	67	21	1,322	1,927	0	119	941	158	2,320	899	4,437	4,437	3,295	5,760	9,055			
	Phase II	391	279	92	0	762	0	762	646	965	279	45	1,935	306	1,194	703	145	70	2,418	4,352	85	47	431	238	2,957	340	4,012	4,097	2,782	6,430	9,212			
	Phase III	765	12	105	0	882	289	1,171	1,278	671	446	38	2,431	1,164	605	1,435	194	23	3,422	5,853	2,787	234	1,542	227	7,917	969	10,889	13,676	6,099	14,600	20,699			
Sub-total		2,693	1,062	579	0	4,334	291	4,625	1,953	2,087	792	139	4,971	1,767	2,459	2,415	406	114	7,161	12,132	2,872	400	2,913	622	13,194	2,208	19,337	22,209	12,176	26,790	38,966			
Kadonkani	Phase I	134	4	4	67	209	4	213	40	523	32	67	662	614	49	23	21	0	707	1,368	228	77	458	24	1,871	0	2,430	2,658	1,099	3,141	4,240			
	Phase II	969	0	0	0	969	1	971	1,301	124	38	18	1,481	1,046	297	73	469	0	1,884	3,365	280	87	547	64	5,503	5	6,205	6,486	2,731	8,091	10,822			
	Phase III	5,093	38	0	4	5,135	0	5,135	5,198	294	19	431	5,943	1,419	697	261	467	449	3,292	9,235	198	437	1,742	190	22,379	670	25,418	25,616	11,274	28,710	39,984			
Sub-total		6,196	43	4	71	6,313	5	6,318	6,540	942	88	516	8,086	3,078	1,044	356	956	449	5,883	13,968	707	602	2,746	279	29,753	674	34,054	34,760	15,104	39,942	55,046			
Meinmahla				0		0		0					0				0		0			0			0		0		0		13,224			
Pyindaye	Phase I	218	0	0	1	219	1	220	1,291	10	0	262	1,563	0	63	1	10	0	74	1,637	0	87	356	43	5,622	30	6,138	6,138	1,783	6,212	7,995			
	Phase II	199	820	159	112	1,289	1	1,290	225	125	44	216	610	9	639	93	309	1	1,051	1,661	7,327	19	651	34	11,415	94	12,212	19,539	9,226	13,265	22,491			
	Phase III	5,289	1,268	504	55	7,115	629	7,744	4,080	5,911	792	1,677	12,459	1,358	4,054	808	2,257	0	8,477	20,936	858	124	1,505	94	11,806	118	13,646	14,504	20,431	22,752	43,183			
Sub-total		5,705	2,088	662	168	8,623	631	9,254	5,596	6,047	835	2,155	14,633	1,367	4,756	902	2,575	1	9,602	24,234	8,185	229	2,512	171	28,842	242	31,996	40,181	31,440	42,229	73,669			
TOTAL	Phase I	2,713	813	385	474	4,385	6	4,391	1,483	987	99	395	2,964	911	772	301	97	21	2,102	5,066	245	368	1,818	248	11,563	1,196	15,192	15,437	7,595	17,301	24,896			
	Phase II	1,616	1,936	506	220	4,277	3	4,280	2,227	1,377	920	565	5,089	1,361	2,135	869	924	135	5,424	10,513	7,845	306	1,815	384	24,146	633	27,284	35,129	17,213	32,710	49,923			
	Phase III	11,642	1,525	702	61	13,929	1,056	14,986	11,810	7,702	1,467	3,009	23,988	4,684	5,505	2,542	2,964	803	16,499	40,487	4,484	1,654	5,122	678	48,226	2,451	58,131	62,615	42,398	75,686	118,084			
Total		15,970	4,273	1,593	756	22,592	1,065	23,657	15,521	10,066	2,485	3,969	32,041	6,957	8,413	3,711	3,985	959	24,024	56,065	12,575	2,327	8,755	1,310	83,935	4,279	100,606	113,181	67,206	125,697	206,127			
FD: Forest Department, CF: Community Forestry, CM: Closed Mangrove Forest, SM: Sparse Mangrove Forest, OPEN: Openland and Barren land, Cultivated: Cultivated land, Other*: Cultivated land, Plantation/Woodlot, Saltpan/Fish pond, Village settlement and Mud flats. Other**: Plantation/Woodlot, Saltpan/Fish pond, Village settlement and Mud flats. All: Closed Mangrove Forest,Sparse Mangrove Forest, Openland and Barren land,Cultivated land, Plantation/Woodlot, Saltpan/Fish pond, Village settlement and Mud flats.																																		

Table 8.4 Target Operation area for the IMMP by IRM, FD Action Research and Community Forestry Activity

(Unit:ha)																																
Reserved Forest Zoning Category	Core								Buffer										Multi-use										Summary			
Operation Category	FD Action Reseach					Community Forestry Activity	Sub-total	FD Action Reseach					Community Forestry Activity ²⁾					Sub-total	FD Action Research	Community Forestry Activity ³⁾						Sub-total	FD Action Research	Community Forestry Activity	Total area			
Weight ¹⁾	100%	100%	100%	100%	total	5%		100%	100%	100%	100%	total	25%	50%	100%	5%	5%		CF-total	50%	25%	50%	100%	5%	5%					CF-total		
Land use/Forest type Category	CM	SM	OPEN	Other *		All		CM	SM	OPEN	Other *		CM	SM	OPEN	Cultivated	Other **			All	CM	SM	OPEN	Cultivated	Other **						CF-total	
Kyakankwinpauk	Phase I	824	37	0	406	1,268	0	1,268	122	3	0	9	134	0	0	0	0	134	8	21	32	23	88	13	177	185	1,410	177	1,587			
	Phase II	57	836	255	109	1,257	0	1,257	56	163	560	286	1,063	0	3	0	0	3	6	102	125	48	214	10	498	575	2,397	504	2,901			
	Phase III	495	207	93	2	798	7	805	1,254	826	211	864	3,155	744	152	38	2	17	952	321	974	426	168	306	35	1,909	2,229	4,273	2,868	7,141		
Sub-total		1,376	1,080	348	517	3,322	7	3,329	1,432	991	771	1,158	4,352	744	155	38	2	20	959	5,310	406	1,097	583	1,503	607	58	2,583	2,989	8,080	3,549	11,629	
Pyinalan	Phase I	1,537	771	382	0	2,690	0	2,690	30	451	67	57	605	74	330	277	3	1	686	1,291	0	30	470	158	116	45	819	819	3,295	1,505	4,800	
	Phase II	391	279	92	0	762	0	762	646	965	279	45	1,935	300	927	703	7	3	1,940	3,875	42	101	686	238	148	17	1,189	1,231	2,739	3,129	5,868	
	Phase III	765	12	105	0	882	14	896	1,278	671	446	38	2,431	1,393	1,202	1,435	10	1	4,041	6,473	1,393	269	1,757	227	396	48	2,697	4,091	4,706	6,753	11,459	
Sub-total		2,693	1,062	579	0	4,334	15	4,348	1,953	2,087	792	139	4,971	1,767	2,459	2,415	20	6	6,667	11,638	1,436	400	2,913	622	660	110	4,705	6,141	10,740	11,387	22,127	
Kadonkani	Phase I	134	4	4	67	209	0	209	40	523	32	67	662	153	25	23	1	0	202	863	114	19	229	24	94	0	366	480	985	567	1,552	
	Phase II	969	0	0	0	969	0	969	1,301	124	38	18	1,481	722	173	73	23	0	991	2,472	140	80	502	64	275	0	921	1,062	2,591	1,912	4,503	
	Phase III	5,093	38	0	4	5,135	0	5,135	5,198	294	19	431	5,943	2,203	846	261	23	22	3,356	9,298	99	503	2,015	190	1,119	33	3,861	3,960	11,177	7,216	18,393	
Sub-total		6,196	43	4	71	6,313	0	6,313	6,540	942	88	516	8,086	3,078	1,044	356	48	22	4,548	12,634	353	602	2,746	279	1,488	34	5,148	5,501	14,753	9,695	24,448	
Meinmahla					0		0											0								0		0	0	0		
Pyindaye	Phase I	218	0	0	1	219	0	219	1,291	10	0	262	1,563	0	31	1	0	0	33	1,596	0	22	178	43	281	2	525	525	1,783	558	2,341	
	Phase II	199	820	159	112	1,289	0	1,289	225	125	44	216	610	2	351	93	15	0	461	1,071	3,663	70	504	34	571	5	1,183	4,846	5,562	1,645	7,207	
	Phase III	5,289	1,268	504	55	7,115	31	7,146	4,080	5,911	792	1,677	12,459	1,365	4,373	808	113	0	6,659	19,118	429	138	1,830	94	590	6	2,658	3,087	20,003	9,348	29,351	
Sub-total		5,705	2,088	662	168	8,623	32	8,655	5,596	6,047	835	2,155	14,633	1,367	4,756	902	129	0	7,154	21,786	4,092	229	2,512	171	1,442	12	4,366	8,459	27,348	11,551	38,899	
TOTAL	Phase I	2,713	813	385	474	4,385	0	4,385	1,483	987	99	395	2,964	228	386	301	5	1	920	3,884	123	92	909	248	578	60	1,886	2,009	7,473	2,807	10,280	
	Phase II	1,616	1,936	506	220	4,277	0	4,278	2,227	1,377	920	565	5,089	1,024	1,454	869	46	7	3,399	8,488	3,923	352	1,816	384	1,207	32	3,792	7,714	13,289	7,190	20,479	
	Phase III	11,642	1,525	702	61	13,929	53	13,982	11,810	7,702	1,467	3,009	23,988	5,705	6,573	2,542	148	40	15,008	38,996	2,242	1,883	6,029	678	2,411	123	11,125	13,367	40,159	26,185	66,344	
	Total	15,970	4,273	1,593	756	22,592	53	22,645	15,521	10,066	2,485	3,969	32,041	6,957	8,413	3,711	199	48	19,328	51,368	6,287	2,327	8,755	1,310	4,197	214	16,802	23,090	60,921	36,182	97,103	

Table 9.1 Activity of CF Prototypes

CF Prototype	Activity
1) CF Agroforestry	<ul style="list-style-type: none"> – Outline: Intensive utilization of CF areas by forestry, agriculture and animal husbandry. FD permits only forest land use and forestry with fruit trees such as palms, mangos, etc under this CF prototype. Recommend to be applied together with the CF water reservoir. – Area: Residential areas and degraded mangrove areas at high or extremely high ground levels – Method: 1 ha as a standard unit area per CF user group
2) CF Aqua agroforestry	<ul style="list-style-type: none"> – Outline: Intensive utilization of CF areas for forestry, agriculture and aquaculture. Currently, FD permits CF aqua-agroforestry only for demonstration purposes. Rules and regulations for CF are required for the planning, construction, and production of aqua-agroforestry. – Area: Residential areas and degraded mangrove areas on middle to high ground level – Method: Water surface area 1,250 sq/ft/pond x5 ponds as a standard unit per CF user group
3) CF Buffer Plantation	<ul style="list-style-type: none"> – Outline: Areas to function for protection of the CORE zone. Border management with plantations of different species from CORE and MUZ vegetations for clarification of the buffer area. Joint management between CF user groups and FD. – Area: Along with the CORE zone – Method: 5 m x 2000 m x 5 plots as a standard unit area per CF user group
4) CF Compost Woodlot	<ul style="list-style-type: none"> – Outline: Areas for planting <i>Sesbania grandiflora</i> for producing compost materials and compost making with poultry manure to be used for agri-lands (paddy, CF agroforestry, CF aqua-agroforestry, etc.) – Area: Fallow or wasted paddy fields at high or extremely high ground levels – Method: 0.25 ha x 4 compost woodlots as a standard unit area per CF user group
5) CF FD Camp Plantation	<ul style="list-style-type: none"> – Outline: CF plantations where FD officers and staff are the CF user group. The plantations are to supply fuelwood and material for value added production to contribute to budget allocation for CF management and support of the FD township office. – Areas: Degraded vegetation areas, wasted paddy fields, or barren lands – Method: 4 ha per each CF user group member or 80 ha per CF user group as a communal type woodlot as a standard unit area.
6) CF Plantation / NFIO	<ul style="list-style-type: none"> – Outline: CF plantations to supply fuelwood and material for value added production – Area: Degraded vegetation areas, wasted paddy fields, or barren lands – Method: 4 ha per each CF user group member or 80 ha per CF user group as a communal type woodlot as a standard unit area.
7) CF Paddy Woodlot	<ul style="list-style-type: none"> – Outline: Border plantations to clarify the paddy area and to obtain windbreak effects for increasing paddy yield. Species will be selected with a view to providing windbreak and raw materials for compost production – Area: Along with paddy fields – Method: At least 3 lines of different height classes with different species for developing multiple layers of paddy woodlots, 2 m x 5,000 m as a standard unit area per CF user group
8) CF River Side Woodlot	<ul style="list-style-type: none"> – Outline: Plantations/ woodlots of 100 ft wide along rivers for the protection of national land, paddy fields, and residential areas from natural disasters and soil erosion. Require rules and regulation for utilization of the woodlot at high ground level. Planting technology needed for the low ground level. – Area: along with rivers and creeks – Method: 30 m x 330 m x 5 plots as a standard unit area per CF user group
9) CF Village: CF communal woodlot	<ul style="list-style-type: none"> – Outline: Plantations for production of fuelwood to support CF user group members by mutual aid. Requires rules and regulations for work sharing and harvesting by the CF user group. – Area: 0.7 ha/household is preferable and more the better based on land availability. Calculation assumptions: <ul style="list-style-type: none"> • Fuelwood consumption: 6.9m³/household/year: • Growth: 10 m³/year/3,000 seedling/Avicennia. – Method: 15 ha per 20 household x 3 plots as a standard unit area per CF user group
10) CF public Woodlot: CF school woodlot	<ul style="list-style-type: none"> – Outline: Plantations to generate revenue to fund schools. Applicable CF prototypes are CF Plantation, CF NFIO, or CF Agroforestry. Requires formulation of school CF sub user groups and development of rules and regulations for work sharing and purpose of production. – Area: CF plantation, CF NFIO, or CF agroforestry sites – Method: 15 ha per 20 pupils as a standard unit area per CF user group.
11) CF Water Reservoir	<ul style="list-style-type: none"> – Outline: Year-round durable embankment type water reservoir without intrusion of salt water. This will be one of the foundations of CF activities and CF user groups in the delta. Applicable for either communal or individual type reservoir. Order of priority of water use: drinking > animals > daily water > irrigation water. – Area: High ground level areas located near villages – Method: Pile up silt in 1 ft high layers with compaction by buffalo for each layer. 45 ft x 45 ft x 6 ft depth as a standard unit.

Table 10.1 Indicative Project Cost Breakdown

(unit: million kyat)

	Work	Total	Phase I	Phase II	Phase III
1.0	Preparatory Work Setting the Project Implementation				
(1)	Setting the Project Implementation Organization	-	-	-	-
(2)	Confirmation of the Annual Plans of the FD	-	-	-	-
(3)	Preparation of IMMP Annual Action Plan	-	-	-	-
(4)	Budgeting	-	-	-	-
2.0	Development Core/Model CF User Group				
(1)	Preparatory Stage: Development Core/Model CF User Group	68	68	0	0
(2)	Planning Stage: Development of the Core/Model CF User Group	-	-	-	-
(3)	Implementation Stage: Development of the Core/Model CF User	3,418	156	466	2,796
(4)	Management of the Core/Model CF User Group	-	-	-	-
(5)	Extension of the Core/Model CF User Group	66	8	8	50
3.0	Capacity Development of FD for CF Management and Support				
(1)	Institutional Development of FD for CF Management and	283	283	0	0
(2)	Construction and Rehabilitation of FD Mangrove CF Extension				
1)	Kyakankwinpauk FD CF Extension Center and Nursery	105	87	1	18
2)	Kadonkani FD CF Extension Center and Nursery	111	93	1	18
3)	Pyinalan FD CF Extension Center and Nursery	59	41	1	18
4)	Pyindaye FD CF Extension Center and Nursery	136	118	1	18
(3)	CF Management and Support	0	0	0	0
(4)	Mangrove Information and Education Center Phase I	100	0	100	0
(5)	Mangrove Information and Education Center Phase II & III	598	0	0	598
4.0	Establishment of Integrated Forestry Technology in the				
(1)	Survey, Planning and Mapping	27	27	0	0
(2)	Production and Diversification of Plantation Species	-	-	-	-
(3)	Action Research Plantation	2,531	344	587	1,600
(4)	Tending	-	-	-	-
(5)	Integration of Mangrove Technology through Monitoring	-	-	-	-
5.0	Integration of the Project Impact				
(1)	Annual Meeting of the CF Activity	1,845	51	256	1,537
(2)	CF Joint Training of the FD	196	5	27	164
(3)	Annual meeting for the mangrove rehabilitation	1,845	51	256	1,537
6.0	CF Task Force including allowance (Phase I), CF MNP (Phase	1,409	50	194	1,165
7.0	Operation and Maintenance Cost (5 % of 1.0 - 5.0)	569	67	85	418
8.0	Technical Assistance	4,892	2,804	2,088	0
	Total	18,259	4,253	4,070	9,935

Table 10.2 Indicative Annual Project Cost of the IMMP phase I

(unit: 1000 kyat)

	Phase I	1	2	3	4	5
1.0 Preparatory Work Setting the Project Implementation Organization						
(1) Setting the Project Implementation Organization	-	-	-	-	-	-
(2) Confirmation of the Annual Plans of the FD	-	-	-	-	-	-
(3) Preparation of IMMP Annual Action Plan	-	-	-	-	-	-
(4) Budgeting	-	-	-	-	-	-
2.0 Development Core/Model CF User Group						
(1) Preparatory Stage: Development Core/Model CF User Group	68,032	34,016	34,016	0	0	0
(2) Planning Stage: Development of the Core/Model CF User Group	-	-	-	-	-	-
(3) Implementation Stage: Development of the Core/Model CF User Group	156,000	0	39,000	39,000	39,000	39,000
(4) Management of the Core/Model CF User Group	-	-	-	-	-	-
(5) Extension of the Core/Model CF User Group	8,280	0	2,070	2,070	2,070	2,070
3.0 Capacity Development of FD for CF Management and Support						
(1) Institutional Development of FD for CF Management and Support	283,000	203,000	25,000	25,000	13,000	17,000
(2) Construction and Rehabilitation of FD Mangrove CF Extension Center and Nursery						
1) Kyakankwinpauk FD CF Extension Center and Nursery	86,782	0	86,782	-	-	-
2) Kadonkani FD CF Extension Center and Nursery	93,030	0	0	93,030	-	-
3) Pyinalan FD CF Extension Center and Nursery	40,779	0	0	40,779	-	-
4) Pyindaye FD CF Extension Center and Nursery	117,702	0	0	0	117,702	-
(3) CF Management and Support	-	-	-	-	-	-
(4) Mangrove Information and Education Center Phase I Construction, Operation and Maintenance	0	0	0	0	0	0
(5) Mangrove Information and Education Center Phase II & III Operation and Maintenance	0	0	0	0	0	0
4.0 Establishment of Integrated Forestry Technology in the Ayeyawady Delta						
(1) Survey, Planning and Mapping	26,760	13,380	6,690	6,690	0	0
(2) Production and Diversification of Plantation Species	-	-	-	-	-	-
(3) Action Research Plantation	344,385	0	86,096	86,096	86,096	86,096
(4) Tending	-	-	-	-	-	-
(5) Integration of Mangrove Technology through Monitoring	-	-	-	-	-	-
5.0 Integration of the Project Impact						
(1) Annual Meeting of the CF Activity	51,248	0	12,812	12,812	12,812	12,812
(2) CF Joint Training of the FD	5,456	0	1,364	1,364	1,364	1,364
(3) Annual meeting for the mangrove rehabilitation	51,248	0	12,812	12,812	12,812	12,812
6.0 CF Task Force including allowance (Phase I), CF MNP	49,680	9,936	9,936	9,936	9,936	9,936
7.0 Operation and Maintenance Cost (5 % of 1.0 - 5.0)	66,635	12,520	15,332	15,983	14,243	8,558
8.0 Technical Assistance	2,804,290	542,467	664,763	664,763	507,658	424,640
Total	4,253,306	815,319	996,673	1,010,334	816,693	614,288

Table 10.3 Implementation Schedule (Phase I Formulation Period)

Table 14.1 IEE Result (Kyakankwinpauk, Pyinalan, Kadonkani, and Pyindaye)

Activities causing impacts Environmental Impact Items	Core/Model CF User Group		Capacity Development of FD			Action Research Plantation		Necessity for Environmen tal Impact Assessment
	CF Certificate	CF Production	Nursery Facility	Extension Center	Demo- Facility	Plantation	Tending	
1. Social environment								
1) Impact on ethnic minority	=/C	=/C	*	*	=/C	=/C	=/C	x
2) Resettlement	=/C	*	*	*	*	=/C	=/C	x
3) Impact on land use	++/C	*	*	*	*	++/C	++/C	x
4) Increase in traffic	*	*	*	*	*	*	*	x
5) Change of population	=/C	--/C	*	*	*	--/C	--/C	x
6) Loss of economic base	--/B	=/C	*	*	*	++/C	++/C	x
7) Change of economic activities	++/C	++/C	*	*	*	*	*	x
8) Change of income	*	++/C	*	*	*	++/C	++/C	x
9) Expansion of income differential	*	++/C	*	*	*	++/C	++/C	x
10) Adjustment of forest use right	=/C	=/C	*	*	*	*	*	x
11) Change of social structure	=/C	=/C	*	*	*	*	*	x
12) Adjustment of fishing right	++/C	*	*	*	*	*	=/C	x
13) Increase in agro & aqua chemicals	*	--/C	*	*	*	*	*	x
14) Increase in wastes	*	--/C	--/C	--/C	*	*	*	x
15) Loss of precious landscape	++/B	++/C	*	*	*	*	*	x
16) Loss of sustainability of forest resources	++/B	++/B	*	*	*	++/C	++/C	x
17) Loss of sustainability of fishing resources	++/C	*	*	*	*	*	*	x
2. Natural environment								
1) Vegetation change	++/B	++/B	--/C	--/C	--/C	++/B	++/B	x
2) Impact on precious species and ecosystem	++/B	++/B	*	*	*	++/C	++/C	x
3) Change of biodiversity	++/B	++/B	=/C	=/C	=/C	++/C	++/C	x
4) Disappearance of swamps and mangroves	++/B	++/B	++/B	++/B	++/B	++/B	++/B	x
5) Impact on national parks and protected areas	*	*	*	*	*	*	*	x
6) Soil and channel erosion	++/C	*	*	*	*	++/C	++/C	x
7) Land degradation salt damage	++/C	++/C	*	*	*	++/C	++/C	x
8) Functional fall of protection against natural disaster	++/B	++/B	*	*	*	++/B	++/B	x
9) Water quality pollution	*	++/C	*	*	*	++/C	*	x
10) Eutrophication	*	*	=/C	=/C	=/C	*	*	x
11) Micro-climate change	=/C	*	*	*	*	=/C	*	x
12) Noise and vibration	*	*	*	*	*	*	*	x
3. Comprehensive evaluation	o					++/C		

Note) --/B: The left is directivity (positive or negative) of environmental impact, the middle column is relative grade (A-C) of environmental impact.

++: positive effect, --: negative effect, =: neutral effect

A: relatively severe impact, B: relatively medium impact, C: relatively slight impact

*: No impact or not correspond to

O: Environmental Impact Assessment is required. x: Environmental Impact Assessment is unnecessary.

Table 14.2 Summary of the IEE Results

Reserved Forests Environmental Impact Items	the IMMP Target Area (Four Reserved Forests)
1. Social environment	
1) Impact on ethnic minority	=/C
2) Resettlement & compensation	=/C
3) Impact on land use	++/C
4) Increase in traffic	++/C
5) Change of population	--/C
6) Loss of economic base	=/C
7) Change of economic activities	++/C
8) Change of income	++/C
9) Expansion of income differential	++/C
10) Adjustment of forest use right	=/C
11) Change of social structure	=/C
12) Adjustment of fishing right	=/C
13) Increase in agro & aqua chemicals	--/C
14) Increase in wastes	--/C
15) Loss of precious landscape	++/B
16) Loss of sustainability of forest resources	++/B
17) Loss of sustainability of fishing resources	++/C
2. Natural environment	
1) Vegetation change	++/B
2) Impact on precious species and ecosystem	++/B
3) Change of biodiversity	++/B
4) Disappearance of swamps and mangroves	++/B
5) Impact on national parks and protected areas	*
6) Soil and channel erosion	--/C
7) Land degradation salt damage	++/C
8) Functional fall of protection against natural disaster	++/B
9) Water quality pollution	++/C
10) Eutrophication	=/C
11) Micro-climate change	=/C
12) Noise and vibration	*
3. Comprehensive evaluation	++/C

Note) --/B: The left is directivity (positive or negative) of environmental impact, the middle column is relative grade (A-C) of environmental impact.

++: positive effect, --: negative effect, =: neutral effect

A: relatively severe impact, B: relatively medium impact, C: relatively slight impact

*: No impact or not correspond to