

## 資 料

1. 調査団員・氏名
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# 資料

## 1 . 調査団員・氏名

ミャンマー国中央乾燥地植林計画基本設計調査  
調査団員氏名

官団員

第1次現地調査

- (1) 総括・計画管理 睦好 絵美子  
国際協力事業団無償資金協力部業務第一課副参事
- (2) 技術参与 飯島 康夫  
林野庁森林整備部治山課森林土木専門官

第2次現地調査

- (1) 総括 山田 好一  
国際協力事業団無償資金協力部業務第三課課長
- (2) 技術参与 酒井 彰  
林野庁国有林林野部経営企画課
- (3) 計画管理 大竹 茂  
国際協力事業団無償資金協力部業務第一課

第3次現地調査

- (1) 総括 大竹 茂  
国際協力事業団無償資金協力部業務第一課
- (2) 技術参与 北村 昌三  
林野庁森林整備部研究普及課技術開発推進室課長補佐

コンサルタント団員

- (1) 業務主任 / 運営維持管理計画 中村 謹也  
国際航業株式会社
- (2) 造林計画 下総 忠義  
国際航業株式会社
- (3) 土地利用調査 / GIS 柴田 健一  
国際航業株式会社
- (4) 社会調査 / 住民参加計画 吉田 裕紀子  
国際航業株式会社
- (5) 施設・機材計画 / 施工調達計画  
/ 積算 山崎 秀人  
国際航業株式会社
- (6) 水源調査 松本 俊幸  
国際航業株式会社
- (7) 業務調整 浅利 祐美子  
国際航業株式会社

## 2 . 調查行程

調査日程 1

現地調査 I

2001年5月14日(月)～7月2日(月)柴田

2001年5月22日(火)～6月2日(木)官団員(睦好、飯島)

2001年5月22日(火)～7月20日(金)中村、下総、浅利

2001年6月1日(金)～7月20日(金)吉田

2001年6月21日(木)～7月20日(金)松本

日数	日付	曜日	移動・ 宿泊	行動計画				
				官団員 睦好/飯島	コンサルタント			
					A 中村/下総/浅利	B 柴田	C 吉田	D 松本
1	5/14	月	ヤゴン			東京 ヤゴン		
2	5/15	火	ヤゴン			再委託社		
3	5/16	水	ヤゴン			〃		
4	5/17	木	ヤゴン			〃		
5	5/18	金	ヤゴン			〃		
6	5/19	土	ヤゴン			〃		
7	5/20	日	ヤゴン			〃		
8	5/21	月	ヤゴン			〃		
9	5/22	火	ヤゴン	東京 ヤゴン		〃		
10	5/23	水	ヤゴン	JICA、日本大使館、対外経済関係局長(FERD)、林業省森林局		〃		
11	5/24	木	バガン	ヤゴン マダレ-(6T-401) DZGD マダレ- ニヤウ-(車)		〃		
12	5/25	金	バガン	DZGD、ミインゲ ユイ、読売サ イト		〃		
13	5/26	土	バガン	現場視察：オイス		〃		
14	5/27	日	ヤゴン	ニヤウ- ヤゴン(6T-401)				
15	5/28	月	ヤゴン	団内打ち合わせ会議				
16	5/29	火	ヤゴン	森林局、DZGD 協議				
17	5/30	水	ヤゴン	森林局、DZGD 協議				
18	5/31	木	ヤゴン	10:00 M/M 署名 11:00 JICA 14:30 日本大使館				
19	6/1	金	ヤゴン	ヤゴン バ ンカ	森林局、資料収集		東京 ヤゴン	
20	6/2	土	ヤゴン	東京	団内打合せ / ECODEF と面談			

日 数	日付	曜 日	移動・ 宿泊	行動計画			
				コンサルタント			
				下総・柴田		中村・吉田・浅利	
21	6/3	日	ヤンゴン	団内打合せ			
22	6/4	月	マンガレー ヤンゴン	06:30 ヤンゴン マンダレー (飛行機)	再委託社(ﾊﾞｰｽｲﾝ、PRA)		
23	6/5	火	イエスイン ヤンゴン	マンガレー FRI(車4~5hr) FRI視察	"		
24	6/6	水	イエスイン ヤンゴン	FRI、種子センター	"		
25	6/7	木	マンガレー ヤンゴン	FRI マンダレー(車)	06:30 ヤンゴン マンダレー (飛行機)		
26	6/8	金	マンガレー	09:00 DZGDにてミーティング			
27	6/9	土	ニャウー	午前 DZGDにてミーティング 午後 マンダレー ニャウー(車)			
28	6/10	日	ニャウー	団内会議			
29	6/11	月	ニャウー	サイト調査	サイト調査		
30	6/12	火	ニャウー	"	"		
31	6/13	水	ニャウー	"	"		
32	6/14	木	ニャウー		"		
33	6/15	金	ニャウー		"		
34	6/16	土	ニャウー		"		
35	6/17	日	ニャウー/ マンガレー		吉田	中村/浅利	
					サイト調査	ニャウー マン ダレー(車)	
36	6/18	月	ニャウー/ マンガレー	サイト調査	吉田	中村/浅利	
					サイト調査	DZGD、灌 漑局	
37	6/19	火	ニャウー/ マンガレー	"	"	DZGD、灌 漑局	
38	6/20	水	ニャウー/ ヤンゴン	"	"	マンガレー ヤ ンゴン(飛行 機)	
39	6/21	木	ニャウー/ ヤンゴン	"	"	灌漑局/水道 局	東京 ヤ ンゴン
40	6/22	金	ニャウー/ ヤンゴン	"	"	資料収集	
41	6/23	土	ニャウー	"	"	ヤンゴン ニャウー(飛行機)	
42	6/24	日	ニャウー	"	"		
43	6/25	月	ニャウー	団内会議			
44	6/26	火	ニャウー	サイト調査			
45	6/27	水	ニャウー/	柴田	下総	サイト調査	サイト調査

日 数	日付	曜 日	移動・ 宿泊	行動計画				
				コンサルタント				
				下総・柴田		中村・吉田・浅利		松本
				ニャウー ヤンゴン	ヤン ゴン	サイト調査		
46	6/28	木	ニャウー/ ヤンゴン	再委託社	"	"	"	
47	6/29	金	ニャウー/ ヤンゴン	"	"	"	"	
48	6/30	土	ニャウー/ ヤンゴン	"	"	"	"	
49	7/1	日	ニャウー	ヤンゴン ハ ンコク	団内会議			
50	7/2	月	ニャウー	ハンコク 東 京	サイト調査	サイト調査	サイト調査	
51	7/3	火	ニャウー		"	"	"	
52	7/4	水	ニャウー		"	"	"	
53	7/5	木	ニャウー		"	"	"	
54	7/6	金	ニャウー		"	"	"	
55	7/7	土	ニャウー		"	"	"	
56	7/8	日	ニャウー		"	"	"	
57	7/9	月	ニャウー		"	"	"	
58	7/10	火	ニャウー		"	"	"	
59	7/11	水	ニャウー		団内会議			
60	7/12	木	マンダレー		ニャウー マンダレー(車)			
61	7/13	金	マンダレー		D Z G D と 協 議			
62	7/14	土	ヤンゴン		マンダレー ヤンゴン(飛行機)			
63	7/15	日	ヤンゴン		デ - タ 収 集			
64	7/16	月	ヤンゴン		再委託先と協議			
65	7/17	火	ヤンゴン		森林局と協議			
66	7/18	水	ヤンゴン		JICA、大使館、森林局			
67	7/19	木	ハンコク へ移動		ヤンゴン ハンコク			
68	7/20	金	成田		6:20 東京			



## 調査日程 2

### 現地調査 II

2001年10月 1日（月）～11月 9日（金）	中村、下総、山崎、浅利
2001年10月 3日（水）～10月20日（土）	吉田
2001年10月10日（水）～10月29日（月）	柴田
2001年10月28日（日）～11月 8日（木）	官団員

日数	日付	曜日	移動・ 宿泊	行動計画			
				コンサルタント			官団員 山田、酒井、大竹
				A 中村/下総/山崎/浅利	B 吉田	C 柴田	
1	10/1	月	ヤンゴン	東京 ヤンゴン			
2	10/2	火	ヤンゴン	JICA、日本大使館			
3	10/3	水	ヤンゴン	FD、DZGD	東京 ヤンゴン		
4	10/4	木	マンガレー	(午前)ヤンゴン マンダレー (午後)FD、DZGD			
5	10/5	金	ニャンウー	(午前)FD、DZGD (午後)マンガレー ニャンウー			
6	10/6	土	ニャンウー	サイト調査	サイト調査		
7	10/7	日	ニャンウー	"	"		
8	10/8	月	ニャンウー	"	"		
9	10/9	火	ニャンウー	ニャンウー ヤンゴン、資機 材調査(山崎) サイト調査(他3名)	"		
10	10/10	水	ニャンウー	ヤンゴン ニャンウー(山崎) サイト調査	"	東京 ヤンゴン	
11	10/11	木	ニャンウー	"	"	ヤンゴン ニャンウー	
12	10/12	金	ニャンウー	"	"	サイト調査	
13	10/13	土	ニャンウー	"	"	"	
14	10/14	日	ニャンウー	"	"	"	
15	10/15	月	ニャンウー	"	"	"	
16	10/16	火	ニャンウー	"	"	"	
17	10/17	水	ニャンウー	ニャンウー マンダレー、 DZGD と協議(中村) サイト調査(他3名)	"	"	
18	10/18	木	ニャンウー	DZGD と協議、マンガレー - ニャンウー(中村) サイト調査(他3名)	ニャンウー/ヤンゴン	"	
19	10/19	金	ニャンウー/ ヤンゴン	サイト調査	ヤンゴン バンコク	"	

日数	日付	曜日	移動・ 宿泊	行動計画			
				コンサルタント			官団員 山田、酒井、大竹
				A 中村/下総/山崎/浅利	B 吉田	C 柴田	
20	10/20	土	ニャウー/ バンコク	"	東京	"	
21	10/21	日	ニャウー	ニャウー ヤゴン、DZGD と協議、資機材調査 (中村、山崎) サイト調査(他3名)		"	
22	10/22	月	ニャウー	DZGD と協議、資機材調査(中村、山崎) サイト調査(他3名)		"	
23	10/23	火	ニャウー	ヤゴン ニャウー(中村、山崎) サイト調査(他3名)		"	
24	10/24	水	ニャウー	サイト調査		"	
25	10/25	木	ニャウー	"		"	
26	10/26	金	ニャウー	"		"	
27	10/27	土	ニャウー	"		ニャウー ヤゴン	
28	10/28	日	ニャウー	ニャウー ヤゴン(中村) サイト調査(他3名)		ヤゴン バンコク	東京 ヤゴン (酒井、大竹)
29	10/29	月	ヤゴン	DZGD と協議(中村) サイト調査(他3名)		東京	DZGD と協議
30	10/30	火	ヤゴン	DZGD と協議(中村) サイト調査(他3名)			DZGD と協議
31	10/31	水	ヤゴン	ヤゴン ニャウー(酒井、大竹、中村) サイト視察			
32	11/1	木	ヤゴン	サイト視察			
33	11/2	金	ヤゴン	DZGD と協議			
34	11/3	土	ヤゴン	資料整理			
35	11/4	日	ヤゴン	資料整理 東京 ヤゴン(山田)			
36	11/5	月	ヤゴン	DZGD と協議			
37	11/6	火	ヤゴン	DZGD と協議			
38	11/7	水	ヤゴン	M/M 署名、JICA、日本大使館 ヤゴン バンコク(酒井、大竹)			
39	11/8	木	バンコク	ヤゴン バンコク(コンサルタント)			東京 (酒井、大竹)
40	11/9	金	東京	バンコク 東京(コンサルタント)			

### 調査日程 3

現地調査 III

2002年2月26日（火）～3月9日（土） コンサルタント（中村、下総、山崎）

2002年3月3日（日）～3月9日（土） 官団員（大竹、北村）

日数	日付	曜日	移動・宿泊	行動計画	
				コンサルタント 中村/下総/山崎/浅利	官団員 大竹 / 北村
1	2/26	月	ヤンゴン	東京 ヤンゴン	
2	2/27	火	ヤンゴン	9:00 JICA 事務所打合せ 11:00 日本大使館表敬 14:00 FD、DZGD 表敬	
3	2/28	水	マンガレー	(午前) ヤンゴン マンダレー (午後) DZGD 表敬	
4	3/1	木	マンガレー	DZGD 協議	
5	3/2	金	マンガレー	資料整理	
6	3/3	土	マンガレー	マンガレー ヤンゴン	東京 ヤンゴン
7	3/4	日	ヤンゴン	JICA 事務所打合せ FD・DZGD 協議	
8	3/5	月	ヤンゴン	CFTDC 視察	
9	3/6	火	ヤンゴン	FD・DZGD 協議	
10	3/7	水	ヤンゴン	FD・DZGD 協議	
11	3/8	木	機内(官) バンコク(コンサル)	10:00 M/M 署名 11:00 JICA 事務所報告 14:00 大使館報告 ヤンゴン バンコク	
12	3/9	金	ニャンウー	バンコク 東京	東京

### 3. 面会者リスト

## 面会者リスト

- (1) 在ミャンマー日本国大使館  
伊藤 直樹 参事官  
古川 和弘 二等書記官  
橋本 雅道 二等書記官
- (2) JICA ミャンマー事務所  
青木 利道 所長  
小塚 英治 所員  
佐藤 俊也 所員  
木滝 真之 企画調整員  
U Kyaw Lwin Oo Programme Assistant
- (3) 林業省 Ministry of Forestry  
U Soe Tint Director General, Planning and statistics Dept  
U Hla Htwe Director, Planning and Statistics Dept.  
U Kyaw Win Deputy Director, Planning and statistics Dept  
U Tin New Assistant Director, Planning and statistics Dept  
U Thein Win Deputy Director
- (4) 林業省乾燥地緑化局 Dry Zone Greening Department ( DZGD )  
【ヤンゴン】  
U Thiri Tin Deputy Director  
U Maung Maung Kyans Deputy Director  
U Min Aung Min Assistant Director  
U San Myint Tun Range Officer  
【マンダレー】  
U Tun Tun Director General  
U Hla Myint Deputy Director General  
U Soe Myint Ex-Deputy Director General  
U Maung Maung Htwe Director, Planning  
U Tin Aye Deputy Director, Director General Office  
U Myint Swe Director, Engineer  
U Zaw Win Director, Mandalay Div.  
U Kyi Han Director (ADMIN)  
U Tun Myint Assistant Director, Planning  
U Aung Kyaw Staff Officer  
U Moe Thu Range Officer  
【ニャンウー】  
U Mya Assistant Director  
U Way Myo Hla Staff Officer  
U Bo Bo Winn Staff Officer  
U Tun Nyunt Tin Range Officer  
U Myint Win Thu Range Officer  
U Aung Maw Oo Range Officer  
Saw Si La Range Officer  
U Win Bo Range Officer

【その他】

- |      |   |   |
|------|---|---|
|      | U Than Soe  | District Officer, Pakkoku District                                  |
|      | U Aung Kyaw Lin   | Township Officer, Yezagyo Township                                  |
| (5)  | ニャンウー市  |   |
|      | U Kyaw Tint   | Chairman of township officer  |
| (6)  | 林業省森林局 Forest Department ( FD )   |   |
|      | U Shwe Kyaw   | Director General  |
|      | U Soe Win Hlaing  | Deputy Director General   |
|      | U Kyi Maung   | Director, Planning & Statistics Div.                                |
|      | U Saw Eh Dah  | Director, Training & Research Development Div.                      |
|      | U Oakkar  | Staff Officer, DG's Office  |
|      | U Thein Win   | Deputy Director, Planning and Statistics Div                        |
|      | U Zaw Win   | Township Officer, Nyaung Oo Township                                |
|      | U Chit Hlaing   | Director, Watershed Management                                      |
| (7)  | 対経済関係局 ( FERD )   |   |
|      | Daw Myat Myat So  | Director  |
|      | U Khin Naung Htay   | Ass. Director   |
|      | U Soe Lin   | Director General  |
| (8)  | 国家環境委員会 National Commission for Environmental Affairs (NCEA)  |   |
|      | Daw Yin Yin Lay   | Director  |
|      | U Kyi Thin  | Joint Secretary   |
|      | U Nay Win   | Head of Branch  |
| (9)  | 農業灌漑省水資源利用局 Water Resource Utilization Department, Ministry of Agriculture and Irrigation (WRUD)  |   |
|      | 【ヤンゴン】  |   |
|      | U Hla Myint Maung   | Deputy Director General   |
|      | U Myint Than  | Deputy-Director, Ground water                                       |
|      | 【ニャンウー】   |   |
|      | U Myint Thein   | Senior Assistant Engineer   |
|      | U Mya Nyut  | Member of WRUD, Pumping Station 3, Letpande                         |
| (10) | 農業灌漑省土地登記局 Land Record and Settlement Department ( ニャンウー )  |   |
|      | U Thein Luin  | Staff Officer   |
| (11) | 国境、少数民族及び開発省開発局 Department of Developments Affairs, Ministry of Progress of Border areas and National Races and Development Affairs (DDA) |   |
|      | Daw Phyu Phyu Sein  | Staff Officer, DDA Nyaung Oo  |
| (12) | Forest Research Institute (FRI) ( イエジン )  |   |
|      | U Win Kyi   | Director  |
|      | U Khin Maung Oo   | AD, Forest Department Division                                      |
|      | U Win Maung   | AD, Forest Management & Silviculture sub Div                        |
|      | U Htun Wai  | AD, Forest Resource sub Division                                    |
|      | Daw Yin Yin Kyi   | Assistant Director, Forest Botany and Tree Improvement sub Division |
|      | Daw Wai Wai Than  | Forest Pathologist  |
|      | Daw Thein Kyi   | Seed Laboratory, Forest Management & Silviculture sub Division      |

- |      |   |   |
|------|---|---|
|      | U Thein Htwe  | Staff Officer, Silviculture Section   |
|      | U Aung Aung Myint   | Staff Officer, Forest Management & Silviculture Section   |
|      | U Myint Lwin  | Staff Officer, Forest Management & Silviculture Section   |
|      | U Myint Lwin  | Staff Officer, Natural Resources  |
| (13) | Institute of Forestry ( イエジン )  |   |
|      | U Win Kyi   | Pro-Rector  |
|      | U San Lwin  | Pro-Rector  |
|      | U Zaw Win   | Professor   |
|      | U Ohn Win   | Professor   |
|      | U Min Thant Zin   | Assistant Lecturer  |
| (14) | FAO (Environmentally Suitable Food Security and Micro-income Opportunities in the Dry Zone) |   |
|      | David G. Kahan  | Agency Project Manager  |
| (15) | UNDP  |   |
|      | U David Dallah  | Programme Manager   |
|      | Hla Myint Hpu   | Programme Manager   |
|      | Khin Maung Wynn   | Administrative Officer  |
| (16) | JICA 開発調査 ( 給水 ) 調査団 ( マンダレー )  |   |
|      | 田口 雅行   | 団長：協和コンサルタンツ/国際事業部 マネージャー   |
|      | Gonohe Nobuyuki   | Pacific Consultants International/Registered Consulting Engineer (Water Supply and Sewerage) Project Manager Environmental Management Department, Consulting division |
|      | 原田 陽夫   | 三井金属資源開発株式会社/資源事業部 資源調査部 部長補佐   |
| (17) | JICA プロ技調査団 / 専門家   |   |
|      | 斉藤 克郎   | 団長/JICA 森林・自然環境協力部 森林環境協力課 課長   |
|      | 清水 俊二   | 協力政策/外務省経済協力局技術協力課 課長補佐   |
|      | 佐藤 隆幸   | 訓練計画/農林水産省林野庁国有林部情報管理室 課長補佐   |
|      | 甲賀 大吾   | 協力計画/JICA 森林・自然環境協力部 森林環境協力課 職員   |
|      | 田邊 眞次   | 乾燥地造林/社団法人日本林業技術協会国際事業部参事   |
|      | 阪本 日出雄  | 計画分析/株式会社パデコ シニアコンサルタント   |
|      | 酒井 彰  | 専門家   |
|      | 佐藤 朗  | 専門家   |
|      | 井芹 信之   | 専門家   |
| (18) | OISCA プロジェクトサイト視察   |   |
|      | 岡村 郁男   | ミャンマー開発団・団長   |
|      | 水口 知香   | 技術員   |
| (19) | BAJ (Bridge Asia Japan)   |   |
|      | 【ヤンゴン事務所】   |   |
|      | アライ マサロ   | Secretary General   |
|      | ミナガ ケンイチ  | Country Representative  |
|      | 氏家 陽子   | Assistant Coordinator   |

【ニャンウー事務所】

束村 康文	東京事務所シニアプログラムオフィサー、理学博士
U Win Tun	Administrator
Myo Min Htun	Well-drilling Co-Ordinator
Hlaing Hlaing	Secretary

- (20) SUNTAC Tecologies  
U Maung Maung Khin      Director, Technical and Business Development
- (21) ECODEV Group  
U Win Myo Thu      Senior Strategist
- (22) FREDA(Forest Resource Environment Development and Conservation Association)  
U Sein Maung Wint      Chairman  
U Ohn      General Secretary  
U Myint Than      Secreatry
- (23) カラモジア・インターナショナル(KARAMOSIA INTERNATIONAL)  
伊藤 みちこ      Resident Coordinator



## 4 . 討議議事録

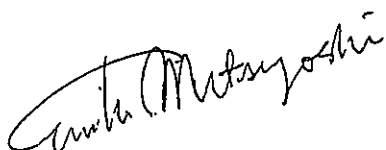
MINUTES OF DISCUSSIONS  
ON  
THE BASIC DESIGN STUDY ON THE PROJECT FOR AFFORESTATION  
IN CENTRAL DRY ZONE  
IN THE UNION OF MYANMAR

Based on the results of the Preparatory Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Afforestation in Central Dry Zone (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent the Basic Design Study Team (hereinafter referred to as "the Team") to the Union of Myanmar, which is headed by Ms. Emiko Mutsuyoshi, First Project Management Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from May 22 to July 20, 2001.

The Team held discussions with the officials concerned of the Government of Myanmar and conducted a field survey in the study area.

As a result of discussions and field survey, both parties have confirmed the main items described on the attached sheets. The Team will proceed to further works and prepare the Basic Design Study Report.



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Ms. Emiko Mutsuyoshi  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency



Yangon, May 31

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For U Tun Tun, Director General  
U Soe Myint  
Deputy Director General  
Dry Zone Greening Department  
Ministry of Forestry



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For U Kyaw Tint, Director General  
U Saw Eh Dah  
Director, Training and Research  
Development Division  
Forest Department  
Ministry of Forestry

## ATTACHMENT

### 1. Objective of the Project

The objective of the Project is to establish model plantations to support the Dry Zone Integrated Plan that aims at greening, enhancing soil productivity, restoring the environmental services, and providing basic needs for local people in the Dry Zone Area in the Central Myanmar.

### 2. Project Area

The project area is located in and around the Myethindwin Protected Public Forest area, Nyaung Oo District, Mandalay Division and indicated as Annex-1.

### 3. Responsible and Implementing Agency

Dry Zone Greening Department (DZGD) is responsible as implementing agency for establishment, maintenance and protection of the plantations under the Project until the plantations are transferred to Forest Department (FD). Forest Department, in collaboration with DZGD, will take responsibility for the future management of the plantations.

### 4. Main Items Requested by the Government of Myanmar

After discussions with the Team, the items described in 4-1 and 4-2 below were confirmed as the request. JICA will assess the appropriateness of the request and will recommend to the Government of Japan for approval.

#### 4-1. Plantation Establishment

Raising of seedlings, planting and tending works are requested for the establishment of the plantations approximately 3,000 ha.

#### 4-2. Facilities and Equipment

Main facilities and equipment necessary for the establishment of the plantations, maintenance and management are indicated as Annex-2.

### 5. Japan's Grant Aid Scheme

#### 5-1. Japan's Grant Aid Scheme

Myanmar side understood the Japan's Grant Aid Scheme explained by the Team, as described in Annex-3.

#### 5-2. Major Undertakings to be Taken by Each Government

Both sides agreed that each government would take the necessary measures as described in Annex-4 for smooth implementation of the Project, as a condition for the Japan's Grant Aid implementation.

### 6. Schedule of the Study

6-1. The consultant members of the Team will proceed to further studies as Field

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Survey I in Myanmar until July 20, 2001 .

- 6-2. Based on the study results, JICA will prepare the interim report in English and dispatch the study team in order to explain the results of Field Survey I and to conduct further study as Field Survey II in September, 2001.
- 6-3. Based on the study results, JICA will prepare the draft report of the Basic Design Study in English and dispatch a mission in order to explain its contents in January 2002.
- 6-4. In case that the contents of the report is accepted in principle by the Government of Myanmar, JICA will complete the final report and send it to the Government of Myanmar by April 2002.

## 7. Other Relevant Issues

### 7-1. Selection of Plantation Sites

Based on the map of the project area shown in Annex-1, the Team will conduct survey to select appropriate plantation sites within the project area. Those area which are adjacent to and situated out side the boundary of the Myethindwin Protected Public Forest land will also be considered to be taken in selection of plantation sites according to the terrain and land use status to be more effective in land acquisition for plantation establishment.

### 7-2. Planning of Plantation Area

#### (1) Land Classification

It is important to make land classification in planning plantation area in the Myethindwin Protected Public Forest land. The categories should include Protection Forests, multipurpose forests, grazing land and permanent cultivation. The planning will be done to include the formation of the protection forests with the objective of greening and soil conservation. The multipurpose forests will also be established to provide fuelwood for the local people. The pasture land will be demarcated for the permanent grazing as well as grazing forest. Some part of cultivation land will be formed for the agroforestry practices.

#### (2) Criteria for site selection according to land use status

The following classes of land will be excluded from selection of sites for plantation.

- a. Residential area
- b. Cultivated land which are permitted by the authority concerned
- c. The certain portion of pasture land which would be set aside for continuous use as grazing area

The newly established plantation area will be closed from grazing for a certain period during which, if necessary, DZGD will take responsibility to provide the local

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people with the alternative pasture land with the consultation of the villagers concerned.

### (3) Community Forestry Development

The multipurpose plantations which would be established under the project must be formed as community forests to provide the basic needs of the rural community according to the Community Forest Instructions (CFI). The user groups will be formed as the potential candidate to implement the community forestry activities in collaboration with DZGD so as to have opportunities for capacity building in management of forest resources as well as taking responsibility in application of CFI. The user groups should be formed with the potential users of forest resources including landless households and livestock farmers. The community forestry practices should be introduced as early as possible to give the user groups the opportunity in the participation of the plantation establishment and capacity building.

### (4) The Potential Villages

The following villages will be considered to take part in the planning process of multipurpose forest formation. These are Aungtha of the Se village tract, Chaukkan of the Chaukkan village tract, Letpande, Myethindwin, and Zio of the Myethindwin village tract, Nyaunggyi of the Kabani village tract, and Wetlu of the Kannigyi village tract.

### 7-3. Strengthening of DZGD

The organization of DZGD is necessary to be strengthened for effective management for the Project, in terms of nursery operation, planting, patrolling, and extension services including training of local residents.

### 7-4. Maintenance and Management of the Plantations

#### (1) Staff Assignment

The project staff from DZGD should be assigned with special duties exclusively for the project area. The staffs with the rank of forest guard should also be assigned to the villages which are included in the project area as the extension workers.

#### (2) CFI

It is desirable to practice the CFI activities so as to be able to formulate the management plans by the user groups in cooperation with the department concerned for the long time management of plantations and participation in formulation of demonstration forests and provision of forestry extension services for model forests.

### 7-5. Soft Component

Both sides agreed that "the Soft Component" under the Japan's Grant Aid is

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necessary to support DZGD for effective maintenance and management of the plantations such as formulation of the Action Plan and activities based on the plan in extension services and training of DZGD staffs and local residents.

#### 7-6. Facilities

The following facilities are considered to be important for the effective implementation of the project activities:

- (1) Forest Nurseries which can raise the quality seedlings to the sufficient quantity
- (2) The establishment of water supply system
- (3) The construction of fencing for the protection of plantation

The details for the locations and functions of the facilities will be planned after due consideration of various factors such as participation of residents, distance from the plantation areas, conditions of the village infrastructures, and water availability. DZGD will obtain the permit for use of the existing tube wells for water supply to nursery and plantation areas, after consultation with local residents and other authority concerned.

#### 7-7. Survival rate

DZGD will collect and inform the Basic Design Study team of the record of survival rate of the planted seedlings in December and May in the forest area in the dry zone. It is necessary to estimate seedlings requirement in planning of plantation for the Project.

#### 7-8. Cooperation with the Project Type Technical Assistance

For strengthening extension services in community forestry, it is considered to be important that the Project collaborate with the Project Type Technical Assistance which is under planning.

#### 7-9. Activities Implemented Jointly (AIJ)

Both side agreed that DZGD, as the implementing agency of the Project, would coordinate concerned government offices in order to recognize the Project under Activities Implemented Jointly (AIJ) and to initiate a process for a mutual approval to be reported to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) at the earliest convenience.

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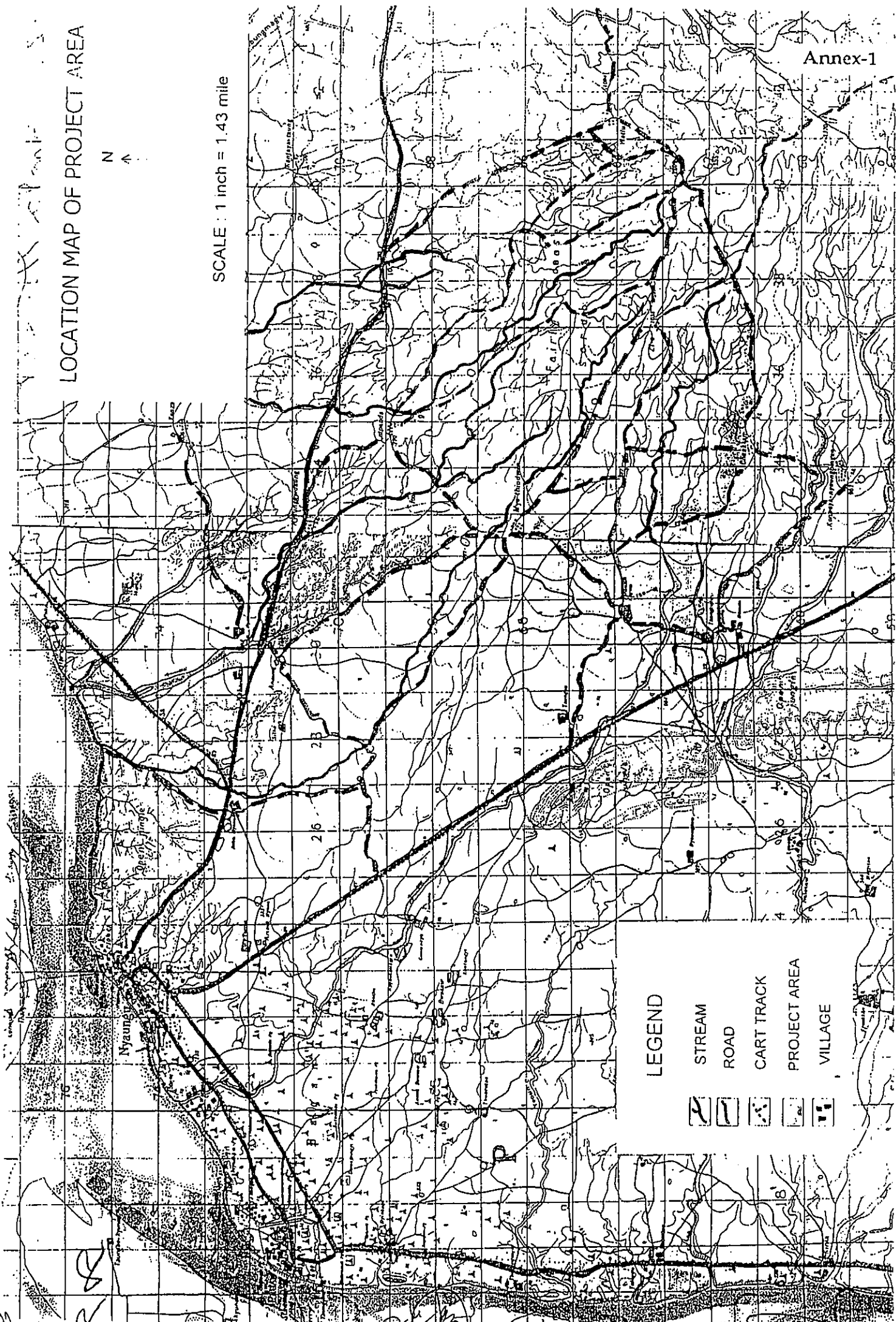
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LOCATION MAP OF PROJECT AREA

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SCALE : 1 inch = 1.43 mile

Annex-1



LEGEND

-  STREAM
-  ROAD
-  CART TRACK
-  PROJECT AREA
-  VILLAGE

LIST OF MAIN FACILITIES AND EQUIPMENT  
NECESSARY FOR THE ESTABLISHMENT OF  
PLANTATION AND EXTENSION WORKS

	Description	Quantity
1	Nursery Works	
	Water pump 4 H.P.	20
	Generator	20
	Compressor	10
	Sprinkler set with pipe and nozzle	20
2	Plantation Works	
	Water bowser (1200 Gal)	3
	Utility track (6.5t)	2
	Fuel bowser	2
	Seedling container track	5
	Fire fighting equipment & Accessories	4
	Farm tractor with accessories	10
	Crawler tractor(160 H.P)	2
	Dump track (5t)	4
	Inspection vehicles(4X4)	5
3	Camp Construction	
	Generator (5 Kv/ A)	10
	Water pump (4 H.P)	10
	Spare Parts for Heavy Machine	1 lot
4	Buildings	
	Permanent nursery office	
	Staff Office	
	Rest house	
5	Extension Works	
	Audio visual equipment	
	Field survey equipment	
	Water supply system	

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## JAPAN'S GRANT AID SCHEME

### 1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

- Application: Request made by a recipient country
- Study: Basic Design Study conducted by JICA
- Appraisal & Approval: Appraisal by the Government of Japan and Approval by Cabinet
- Determination of Implementation: The Notes exchanged between the Governments of Japan and the recipient country

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

### 2. Basic Design Study

#### 1) Contents of the Study

The aim of the Basic Design Study (hereafter referred to as "the Study"), conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

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- a) Confirmation of the background, objectives, and benefits of the requested Project and also

institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.

b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.

c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.

d) Preparation of a basic design of the Project

e) Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

## 2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA select (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

## 3. Japan's Grant Aid Scheme

### 1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant

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laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

## 2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

## 5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

## 6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior

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to commencement of the construction.

(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.

(3) To secure buildings prior to the procurement in case the installation of the equipment.

(4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.

(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.

(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(9) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

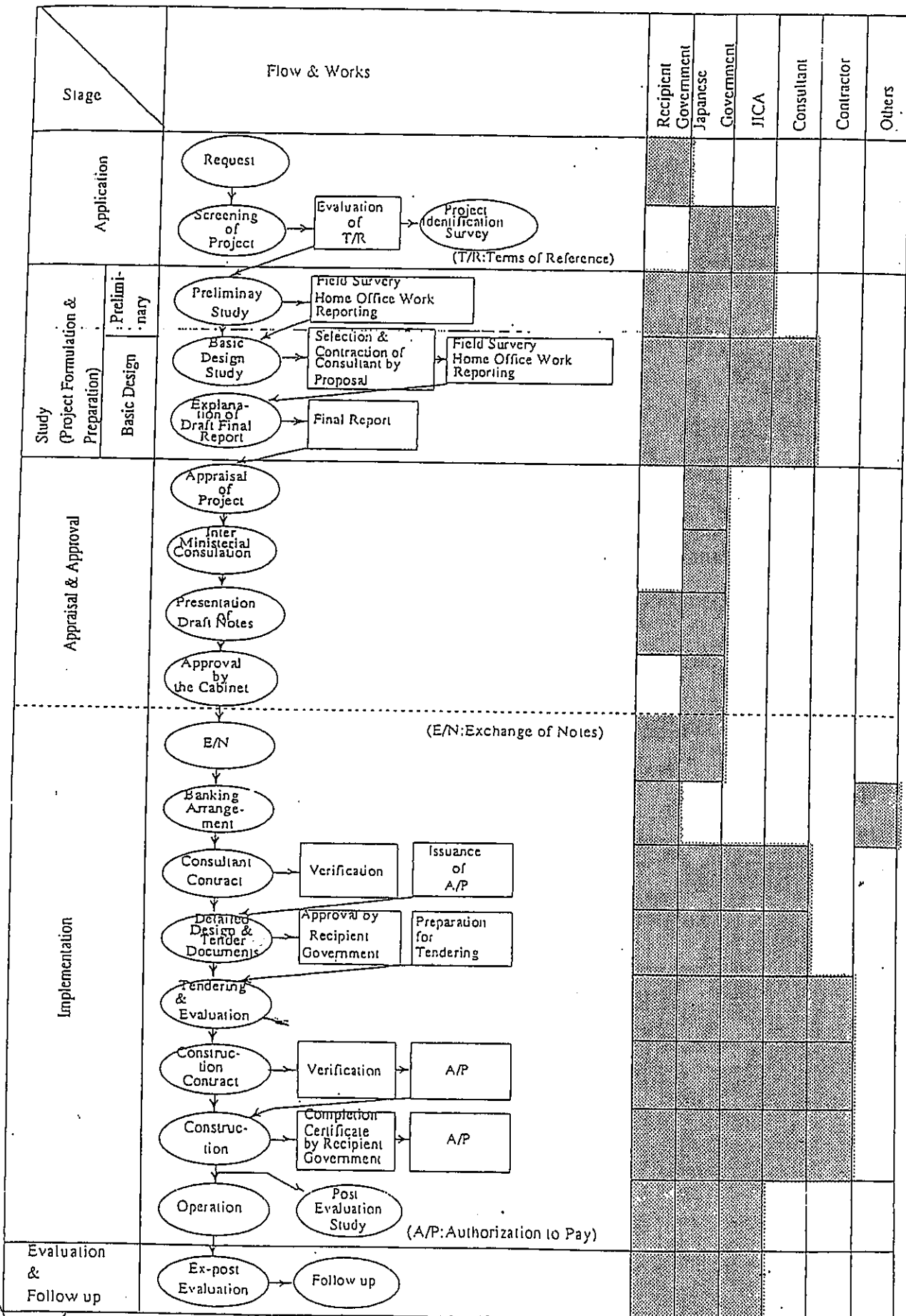
b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

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# Flow Chart of Japan's Grant Aid Procedures



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## MAJOR UNDERTAKINGS TO BE TAKEN BY EACH GOVERNMENT

No	Items	To be covered by Japanese side	To be covered by Myanmar side
1	To secure land for afforestation, nursery, and other facilities under the project.		X
2	To bear the cost for planting works	X	
3	To bear the cost for nursing works including production and purchase of planting stocks	X	
4	To bear the cost for tending works	(X)	(X)
5	To bear the cost for maintenance and management, of the established plantation and extension activities		X
6	To bear the cost for access roads 1) Construction of operation roads inside of the project area 2) Maintenance of the existing roads to access the project area	X	X
7	To bear the following commissions to a bank of Japan for the banking services based upon the Banking Arrangement (B/A) 1) Advising commission of the Authorization to Pay (A/P) 2) Payment commission		X X
8	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country 1) Marine(Air) transportation of the products from Japan to the recipient country 2) Tax exemption and customs clearance of the products at the port of disembarkation 3) Internal transportation from the port of disembarkation to the project site	X  (X)	  X (X)
9	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		X
10	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		X
11	To bear all the expenses necessary for the project implementation, other than those to be borne by the Grant Aid		X

MINUTES OF DISCUSSIONS  
ON  
THE BASIC DESIGN STUDY ON THE PROJECT FOR AFFORESTATION  
IN CENTRAL DRY ZONE  
IN THE UNION OF MYANMAR

Based on the results of the Preparatory Study, the Government of Japan decided to conduct a Basic Design Study on the Project for Afforestation in Central Dry Zone (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (JICA).

In May 2001, JICA sent the Basic Design Study Team (Field Survey I) to the Union of Myanmar. JICA sent the Basic Design Study Team (Field Survey II) (hereinafter referred to as "the Team") to the Union of Myanmar, which is headed by Mr. Yoshikazu Yamada, Director of Third Project Management Division, Grant Aid Management Department, JICA, and is scheduled to stay in the country from October 1 to November 9, 2001.

The Team held discussions with the officials concerned of the Government of Myanmar and conducted a field survey in the study area.

In the course of discussions on the Interim Basic Design Study Report and field survey, both parties noted the main items described on the attached sheets. The Team will proceed to further works and prepare the Draft Final Basic Design Study Report.

Yangon, November 7, 2001



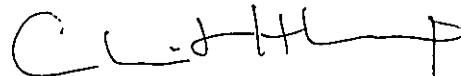
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Mr. Yoshikazu Yamada  
Leader  
Basic Design Study Team  
Japan International Cooperation Agency



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For Director General  
U Soe Myint  
Deputy Director General  
Dry Zone Greening Department  
Ministry of Forestry



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For Director General  
U Chit Hlaing  
Director, Watershed Management Division  
Forest Department  
Ministry of Forestry

## ATTACHMENT

### 1. Components of the Interim Report

The Government of the Union of Myanmar (GOM) agreed and accepted in principle the components of the interim report explained by the Team.

### 2. Selection of Afforestation Area

#### (1) Land Classification

Both sides agreed that the afforestation area in the Myethindwin Protected Public Forest Land shall be classified into two main categories. The categories should include multipurpose forests and community forest (CFI forest). The multipurpose forest consist of the protection forest, the fuel wood forest and the common grazing forest (silvo-pastorial forest).

#### (2) Project site

Both sides agreed that the following territory will be considered to be the project site.

These are Aungtha, Letpande, Myethindwin, Zio, Nyaunggyi, Wetlu, Indaing and Yanzan.

Chaukan is excluded from the project because of having only registered cultivated land.

### 3. Items requested by the GOM

After discussions with the Team, the following items were finally requested by the Myanmar side.

However, plantation area and final items to be constructed and procured under Japan's Grant Aid will be decided after further studies in Japan

#### (1) Plantation

- |                     |               |
|---------------------|---------------|
| - Protection forest | approx. 750ha |
| - Fuel wood forest  | approx. 750ha |
|                     | Total 1,500ha |

The plantation area in respective village is attached in Annex1.

Silvo-pastorial forest is excluded. In total, actual planting area will be estimated less than 1,500ha, because river, road, residential areas, etc. are to be excluded.

#### (2) Construction of the facilities

- Administration and extension office, workshop and storage (Myethindwin)
- Temporary nurseries (Myethindwin and Lepande)



- Tube well and elevated water basin (Myethindwin and Lepande)
- Rehabilitation of the existing cart road

(3) Procurement of the equipment

Details of Items are listed in Annex 2.

(4) Local community participatory and extension services

Myanmar side requested the technical assistance for the establishment of the community forest of 65ha and extension service for DZGD Nyaung Oo district office and local community participation. Community forest will be established according to CFI.

(5) Establishment for common grazing forest

Myanmar side agreed that common grazing forest which will be situated in the area where villagers of surrounding villages totally used for free grazing the whole year around on which the plantations will be established by DZGD only in the 6th year after commencement of the project implementation. Myanmar side also requested the facilities and equipment necessary for the establishment of common grazing forest (silvo-pastorial forest).

4. Japan's Grant Aid Scheme

Myanmar side understood the Japan's Grant Aid Scheme explained by the Team, as described in Annex-3 of the Minutes of Discussions signed by both parties on May 31, 2001.

Myanmar side understood the necessary measures to be taken by the GOM as described in Annex-4 of the Minutes of Discussions signed by both parties on May 31, 2001 for smooth implementation of the Project, as a condition for the Japan's Grant Aid implementation.

5. Schedule of the Study

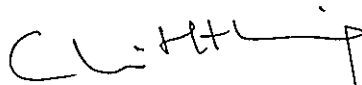
5-1. Based on the study results, JICA will prepare the draft report of the Basic Design Study in English and dispatch a mission in order to explain its contents in February 2002.

5-2. In case that the contents of the report is accepted in principle by the GOM, JICA will complete the final report and send it to the GOM by April 2002.

6. Other Relevant Issues

6-1. Request of the additional equipment

Myanmar side requested additional equipment to the Japanese side as shown in Annex 2. The operational plan of heavy machine was submitted as shown in Annex 3.







## 6-2. Soft Component program

Both sides understood that soft component program is necessary concerning with the request for the technical assistance for the establishment of the community forest and the extension service for formulating Action Plan to be extended to Nyaung Oo district office and local community participatory.

Both sides also agreed that the coordination is necessary in order to make clear of the demarcation between this project and the Project-type Technical Cooperation Project.

## 6-3 Necessary Measures to be taken by the Myanmar side

### 1) Explanation of the Component of the Project

DZGD will hold the workshop and/or seminar for the capacity building of the organization concerned and local people for promotion of effective participation after receiving the final report.

### 2) Clarification of boundary

Demarcation of boundaries between the project area and the land owned by the individual farmer by the legal issuance of cultivation permit from Settlement and Land Record Department shall be conducted by DZGD in the presence of concerned villagers. Plantation sites shall be free from restriction and compensation.

### 3) Condition of the local people access to the protection forest and fuel wood forest

DZGD will restrict the access to the protection forest by the local people. The condition of the access to the fuel wood forest will be set according to the consensus gained by mutual agreement between DZGD and villagers.

### 4) Coordination and cooperation among the ministries concerned of the GOM

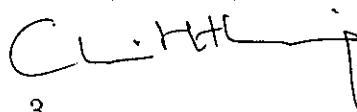
Ministry of Forestry will coordinate the Government Ministries concerned, especially Ministry of National Planning and Economic Development, Ministry of Finance and Revenue, Ministry of Foreign Affairs, Ministry of Border Area and National Races and Development Affairs, Ministry of Agriculture and Irrigation and Ministry of Commerce for the implementation of the project.

### 5) Project Management

DZGD will assign the staff for the implementation, operation and maintenance for the Project as shown in Annex 4.

### 6) Committee for the multipurpose forest

Myanmar side will establish the committee (Annex 4) for the coordination with the



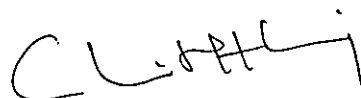


organizations concerned and the rural communities in the project area in order to operate and maintain the multipurpose forest. After the completion of the project, the multipurpose forests established under the project will be managed by the committee in accordance with the Action Plan for the long term effective management.

7) Undertaking by Ministry of Forestry

On condition that the Grant Aid Program by the Government of Japan is extended to the project, Ministry of Forestry shall be responsible for promptly securing the following necessary permissions from authorities concerned for the implementation of the project.

- a) Permission for afforestation of the project site
- b) Permission for construction of all facilities (Administration and extension office in Myethindwin, Nursery and tube well in Myethindwin and Lepande, road rehabilitation in the project site)
- c) Permission for importing equipment from Japan and the third country, and exemption of tax, custom duties and other duties may be levied on importing equipment
- d) Tax and duties exemption on Japanese consultant and Japanese contractor engaged in the project
- e) Acquisition and permission of borrow pit near by the project site and acquisition of necessary place for construction materials to be put in the sites
- f) Permission for transportation of equipment and materials from port to the project site



## Annex 1.

## The Plantation Area

(ha)

Village Name	Village Area	Multipurpose Forest				CFI	Total
		Protect/ F	Silvo-pastorial/ F	Fuel-w/ F	Sub-Ttl	Com./ F	
Myethindwin	700.49	0	0	0	0	15	15
Zio	1128.52	143	0	237	380	0	380
Letpande	1979.81	212	334	319	865	13	878
Aungtha	462.01	0	0	139	139	0	139
Wetlu	336.28	0	0	0	0	12	12
Nyaunggyi	165.59	0	0	28	28	25	53
Indaing	855.40	302	47	0	349	0	349
Yanzan	613.73	92	100	0	192	0	192
Total	6241.83	749	481	723	1,953	65	2,018
<b>Plantation</b>		<b>749</b>	<b>0</b>	<b>723</b>	<b>1,472</b>	<b>65</b>	<b>1,537</b>

Note: Silvo-pastorial forest is excluded. In total, actual planting area will be estimated less than 1,500ha, because river, road, residential areas, etc. are to be excluded.

## Annex 2.

## List of Equipment to be procured

No.	Item	Mandalay	Nyaung Oo	Myethindwin	Total
<b>A</b>	<b>For Nursery Works</b>				
A-1	Water Pump (submergible)			1	1
A-2	Generator			1	1
A-3	Compressor		1		1
<b>B</b>	<b>For Plantation Works</b>				
B-1	Water Bowser			1	1
B-2	Truck			3	3
B-3	Fuel Bowser		1		1
B-4	Backpack shooter			30	30
B-5	Hand tools for fir fighting			15	15
B-6	Farm Tractor with trailer			9	9
B-7	Crawler tractor			2	2
B-8	Pick up		1	1	2
B-9	Wagon type 4X4		1		1
<b>C</b>	<b>For Camp Construction</b>				
C-1	Generator		5	5	10
C-2	Water pump		5	5	10
<b>D</b>	<b>For Extension Works</b>				
D-1	Television		1		1
D-2	Video		1		1
D-3	Video camera		1		1
D-4	Pocket compass		2		2
D-5	Pole		5		5
D-6	Tape measure		2		2
D-7	Portable GPS		1		1
D-8	Audio Video Van		1		1
<b>E</b>	<b>Additional Request</b>				
E-1	Weather observation set			1 set	1 set
E-2	Personal computer	1	1	1	3
E-3	Printer	1	1	1	3
E-4	Portable water tank 2m3			7	7
E-5	Portable water tank 8m3			3	3
E-6	Seedling container			120	120
E-7	Shovel (small)			50	50
E-8	Shovel (medium)			50	50
E-9	Hoe			30	30
E-10	Watering Pot			40	40
E-11	Water bucket			20	20
E-12	Portable radio communication system		2	2	4
E-13	Locker			1	1
E-14	Back hoe		1		1
E-15	Bulldozer with ripper			1	1
E-16	Nursery net			1 set	1 set
E-17	Seedling Vinyl pot (small)			250,000	250,000
E-18	Seedling Vinyl pot (large)			50,000	50,000
E-19	Facsimile	1 (Yangon Branch)	1		2
E-20	Knock-Down Nursery for 400m <sup>2</sup>			1 set	1 set
E-21	Motor Cycle		1	2	3

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## The Operation and Maintenance Plan of heavy Machinery

The DZGD prepares the operation and maintenance plan of heavy machinery provided by the JICA project to be used in the rehabilitation and restoration activities of the dry zone environment .

### 1 . The list of heavy machinery to be used are as follow;-

a . Bulldozer with ripper	1 no.
b . Back hoe	1 no.
c . Crawler tractor	2 no.
d . Farm tractor with trailer	9 no.
e . Fuel bowser	1 no.
f . Water bowser	1 no.
g . Truck .	3 no.
h . Pick up	2 no.

### 2 . The Project Area

The project area will be situated inside Mandalay Division where the Dry Zone Afforestation project is going to be carried out .

### 3 . The Project Activities

The DZGD had formulated and adopted the 30 years comprehensive plan to realize the four main tasks such as the plantation establishment , the protection and rehabilitation of the degraded natural forests, development of woodfuel substitutes and development of water resources .

The plan will be phased out with six 5 years short term plans.

Basing on these four main tasks , the following activities will be carried out during the first five years plan.

1. Plantation establishment	10000 ha
2. Natural forest protection	360000 ha
3. Construction of pond	245 no
4. Construction of check dam	400 no
5. Road construction	416 km
6. Fire line construction	500 km

### 5. The Annual Plan of Operation

The annual plan will be carried out as follow;-

work	unit	y 1	y2	y3	y4	y5
plantation	ha	2000	2000	2000	2000	2000
natural forest prot.	ha	72000	72000	72000	72000	72000
pond construction	no	49	49	49	49	49
check dam	no	80	80	80	80	80
road construction	km	85	85	85	85	76
fire line construction	km	100	100	100	100	100

### 6. The Use of Machinery

Machine type	work	duration
Bulldozer Crawler tractor	Ground surface breaking and trench making , road up grading and maintenance, construction of outer and inner fire brake lines	the whole year
Back hoe	Trench construction	December to March
Farm tractor	Transport of seedlings , labour and materials	May to August
Water bowser	Transport of water to plantations and nurseries	the whole year

Fuel bowser	Transport of diesel and M.S from depot to project site	the whole year
Truck	Transport of seedlings , labour , soil and materials	the whole year

### 7. The maintenance of machinery

The long term viability of the machinery is to be prioritised by implementation of the maintenance procedures and instructions . So the following procedures are to be followed .

1. The skilled and qualified machinists will be hired for regular maintenance and repair works.
2. The regular maintenance day will be adopted and practised.
3. The procedure and instructions will be formulated and adopted.
4. The maintenance team headed by a foreman will be formed to carry out the instructions .
5. The regular inspection of the viability of machinery will be done by the responsible official .
6. The work shop facility will be set up at the project site .

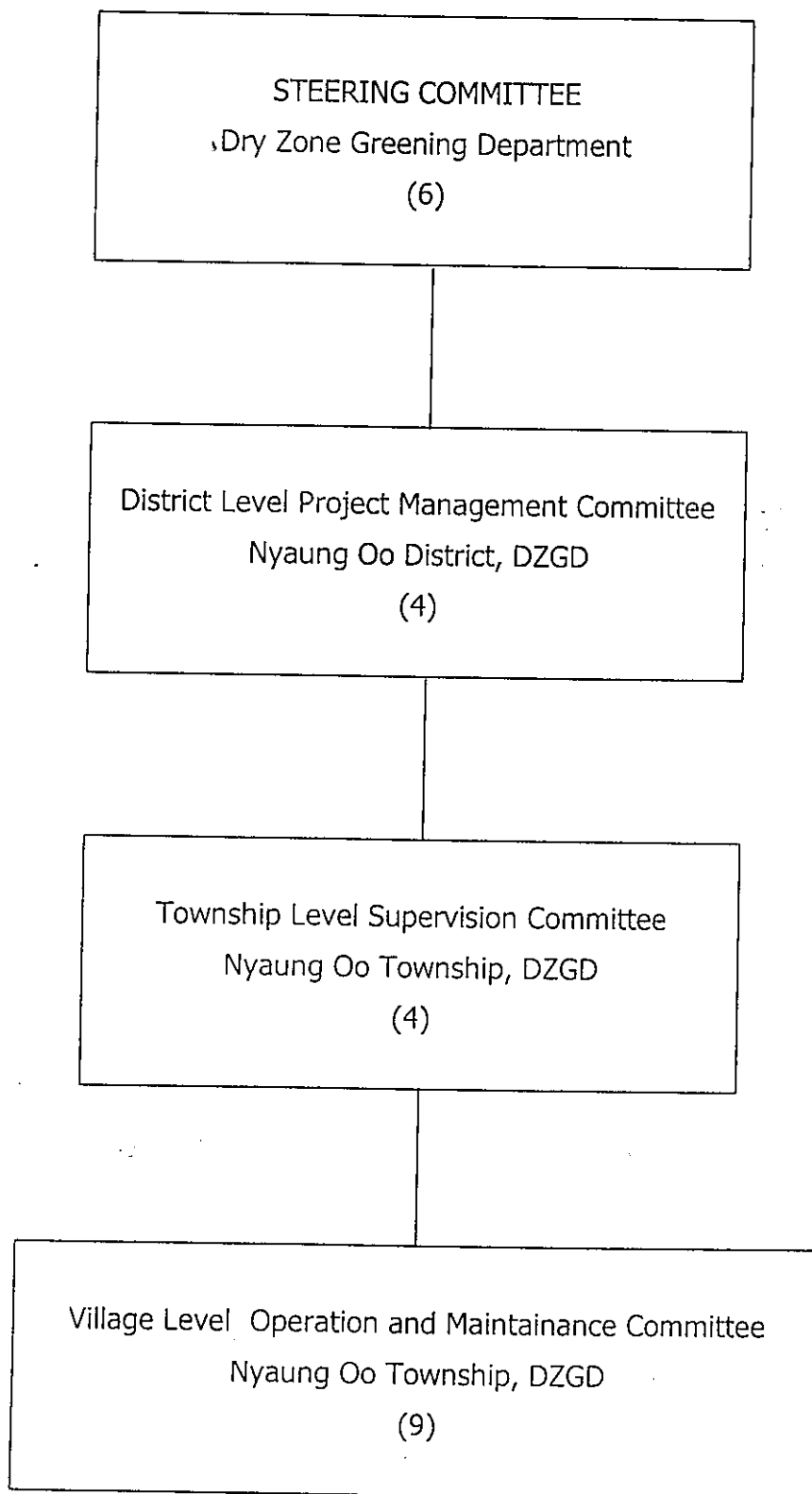
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**ORGANIZATIONAL FRAME WORK OF DRY ZONE AFFORESTATION PROJECT  
MANAGEMENT**



Member lists of different committee, here attached with.

<sup>1</sup>  
*Chitthi*

### **Steering Committee**

<u>Serial No:</u>	<u>Desination</u>	<u>Position</u>
1.	Director General	Chairman
2.	Deputy Director General	Vice- Chairman
3.	Director ( Admin)	Member
4.	Director ( Engineer )	Member
5.	Director ( pLanning )	Secretary
6.	Director ( Mandalay Division )	Joint Secretary

### **District Level Project Management Committee**

1.	Assistant Director ( Nyaung Oo District )	Chairman
2.	Assistant Director ( Mandalay Division )	Member
3.	Staff Officer ( Project )	Member
4.	Staff Officer ( Township )	Secretary

### **Township Level Supervision Committee**

1.	Staff Officer ( Project )	Chairman
2.	Range Officer ( 1)	Member
3.	Range Officer (2)	Member
4.	Range Officer (3)	Secretary

### **Village Level Operation and Maintainance Committee**

1.	Range Officer ( DZGD )	Chairman
2.	Village Representatives ( One from each Village )	(7) Members
3.	Range Officer ( FD )	Secretary

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MINUTES OF DISCUSSIONS  
ON  
THE BASIC DESIGN STUDY ON THE PROJECT FOR AFFORESTATION  
IN CENTRAL DRY ZONE  
IN THE UNION OF MYANMAR  
(EXPLANATION ON DRAFT REPORT)

In May 2001, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a Basic Design Study Team (Field Survey I) to the Union of Myanmar (hereinafter referred to as "Myanmar") and in November 2001, JICA dispatched the Basic Design Study Team (Field Survey II) to Myanmar. And through discussion, field survey and technical examination of the results in Japan, JICA prepared a draft report of the study.

In order to explain and to consult the Myanmar on the components of the draft report, JICA sent to Myanmar the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Shigeru Otake, staff, First Project Management Division, Grant Aid Management Department, JICA, from 26 February to 8 March, 2002.

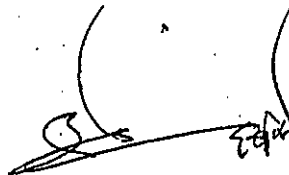
As a result of discussions, both parties confirmed the main items described on the attached sheets.

Yangon, March 8, 2002

大竹 茂

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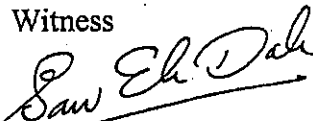
Mr. Shigeru Otake  
Leader  
Draft Explanation Report Team  
Japan International Cooperation Agency



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For Director General  
U Hla Myint  
Deputy Director General  
Dry Zone Greening Department  
Ministry of Forestry

Witness



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U Saw Eh Dah  
Director, Training and Research  
Development Division  
Forest Department  
Ministry of Forestry

## ATTACHMENT

### 1. Components of the Draft Report

The Myanmar side agreed and accepted in principle the components of the draft report explained by the Team.

### 2. Japan's Grant Aid Scheme

The Myanmar side understands the Japan's Grant Aid Scheme and the necessary measures to be taken by the Government of Myanmar as explained by the Team and described in Annex 3 and Annex 4 of the Minutes of Discussions signed by both parties on 31 May 2001.

### 3. Schedule of the Study

JICA will complete the Final Report in accordance with the confirmed items and send it to the Government of Myanmar by the beginning of April, 2002.

### 4. Other Relevant Issues

#### 4-1. Outline of the Project

##### (1) Plantation

- Protection forest                      approx. 750ha
- Fuel wood forest                      approx. 750ha
- Total 1,500ha

##### (2) Construction of the facilities

- Administration and extension office, workshop and storage (Myethindwin)
- Temporary nursery
- Tube wells and elevated water basins (Myethindwin and Lepande)
- Rehabilitation of the existing cart roads

##### (3) Procurement of the equipment

- Necessary equipment for operation and maintenance of afforestation site

(4) Soft component program

- Technical assistance for the establishment of the community forest of 65ha
- Technical assistance to establish the operation and maintenance system for the areas forested by the Project

Both sides agreed the purpose, output, activities and inputs of soft component program as shown in Annex 1.

However, plantation area and final items to be constructed and procured under Japan's Grant Aid will be decided after further studies in Japan

4-2. Clarification of boundary

DZGD will hold the meetings or seminars with the organizations concerned and local people for better understanding of the project and promotion of effective participation by the end of May, 2002. Then demarcation of boundaries between the project area and the land owned by the individual local people by the legal insurance of cultivation permit from Settlement and Land Record Department shall be conducted by DZGD in the presence of concerned villagers by the beginning of October, 2002. Plantation sites shall be free from restriction and compensation.

4-3. Establishment of Committees

Myanmar side will establish the committees described in Annex 4 of the Minutes of Discussions signed by both parties on 7 November 2001 in order to operate and maintain the multipurpose forests by the beginning of October, 2002.

4-4. Title of the Project

Regarding the title of the Project; "The Project for Afforestation in Central Dry Zone", Myanmar side explained that "Central Dry zone" is not appropriate, because they usually use "Dry Zone". Myanmar side requested that the title



would be "the Project for Afforestation in the Dry Zone".

The Team understood and agreed to convey the request from Myanmar side to the Japanese authorities concerned and to inform the title of the Project to Myanmar side before implementation of the Project.

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## Project Design Matrix for the Soft Component Program

Name of the project : The Project for Afforestation in the Dry Zone in the Union of Myanmar Term : 5 years  
 Target area : Afforestation site for the project Target group : Staff of DZGD and the people around the project site

Narrative Summary	Objectively Verifiable Indicator	Means of Verification	Important Assumptions
<b>Overall Goal</b> To afforest the target area (fuel wood forest, protected forest, community forest) and ensure adequate O&M* by DZGD of the afforested area upon completion of the project.	Illegal logging in afforested areas ceases.	Records of trees in afforested areas	The Greening Policy in the central dry zone is not revised.
<b>Project Purpose</b> To establish an O&M system for the areas forested by the project.	All of the concerned staff and residents understand afforested land management	Records of activities.	There is no change in the basic strategy of afforested land management.
<b>Outputs</b> 1. The formation and implementation of an Action Plan for the O&M of fuel wood and protected forests. 2. The establishment and effective maintenance of community forest (65ha). 3. The training of DZGD staff and residents in the skills required to effectively maintain fuel wood forest, protected forest and community forest. 4. A reduction in the demand for forest resources.	<ul style="list-style-type: none"> <li>Greater understanding by DZGD and the residents in the region of the Action Plan</li> <li>65 ha of community forest is established.</li> <li>All of staff and residents concerned the project will understand the skills required to effectively maintain fuel wood forest, protected forest and community forest.</li> <li>Fuel wood demand is cut by 10 %</li> </ul>	<ul style="list-style-type: none"> <li>Action Plan</li> <li>Area of community forest</li> <li>Records of logging</li> <li>Records of training</li> </ul>	The residents in the region cooperate in management of afforested land.
<b>Activities</b> 0-1. <u>DZGD will establish a Central Committee, a District Level Project Management Committee, and an Action Plan Control Committee. (After Minutes are recorded, before project implementation)</u> 0-2. <u>Upon receiving the report, DZGD will hold a meeting for the residents to explain the project. (After Minutes are recorded, before project implementation)</u> 0-3. <u>DZGD will organize village committees. (Year 1)</u> 1-1. <u>DZGD and the residents will form and effectively implement an Action Plan for fuel wood forest.</u> 1-1-1. DZGD and the residents will form an Action Plan. (Year 1) 1-1-1-1. Guidelines will be established for residents' use of fuel wood, based on their opinions obtained through DZGD workshops, and will be incorporated in the Action Plan. 1-1-1-2. The village committees will form a management plan for O&M of fuel wood and incorporate it in the Action Plan. 1-1-2. DZGD and the residents will implement the Action Plan. (From Year 2) 1-1-2-1. DZGD will put rules for fuel wood forest use into effect and conduct monitoring. 1-1-2-2. The village committees will implement the plan and conduct monitoring. 1-2. <u>DZGD will form and effectively implement an Action Plan for protected forest.</u> 1-2-1. DZGD will form an Action Plan. (The Year 1) 1-2-2. DZGD will implement the Action Plan. (From Year 2) 1-2-2-1. DZGD will make sure residents have an understanding of O&M of protected forests. 1-2-2-2. DZGD will monitor O&M of protected forests. 2-1. <u>The User Group (Residents) will form a forest management plan for the community forest and carry out CFI** registration. (Year 1)</u> 2-1-1. DZGD will explain to the residents about CFI. 2-1-2. Residents will form a User Group along with selecting an area for the community forest. 2-1-3. The User Groups will form a CFI forest management plan. DZGD will give technical guidance. 2-1-4. The User Groups will make a CFI request. DZGD will give guidance on the required documentation. 2-2. <u>The User Groups will sufficiently manage the community forest. (From Year 2)</u> 2-2-1. The Users will build the community forests. 2-2-2. The User Groups will implement the forest management plan and conduct monitoring. 3-1. <u>DZGD staff will receive training in the Resident Participatory Development Approach (Combined with project type technical cooperation training. (Year 1)</u> 3-1-1. DZGD will form a Resident Participatory Development Approach Manual. 3-1-2. DZGD will introduce the Resident Participatory Development Approach in the workshops. 3-2. <u>Residents will receive technical training in nursery management, tree planting, forest management, etc. (Year 1)</u> 3-2-1. DZGD will make pamphlets for the residents on forest management. 3-2-2. DZGD will instruct residents on methods of nursery management. 3-2-3. DZGD will instruct residents on cultivating saplings 3-2-4. DZGD will instruct residents on tree planting 4-1. <u>Improved stoves will be popularized. (Year 1)</u> 4-2. <u>Residents will be instructed on agroforestry (Year 1)</u>	<b>Inputs</b> Japanese Side [Personnel] Consultant (Participatory Management) :5M/M×2yrs (Years 1,2) :2M/M×2yrs (Years 3,4) Consultant (Afforestry) : 6.5M/M×2yrs (Years 1,2) : 2M/M×2yrs (Years 3,4)  [Costs] Japanese consultant/DZGD staff activities Training of DZGD staff/residents Local NGO services  [Materials] Materials and equipment for community forest Materials for activities and training Improved stove Saplings for agroforestry  [Project Type Technical Cooperation] Training  Myanmar Side [Personnel] Central committee, District Level Project Management Committee, Activities Committee, Township Control Committee, and Village Committee members (DZGD and FD staff, etc.) Staff from Nyaung Oo District Offices  DZGD will cover the following costs: Meeting to explain the Project Workshops  Creation of activities materials Personnel training Personnel Miscellaneous	Preconditions: Residents in the region do not oppose afforestation activities	

\*O&M: Operation and Maintenance  
 \*\*CFI: Community Forest Instruction

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## 5. 事前評価表



## 事業事前評価表

1. 協力対象事業名
ミャンマー連邦 中央乾燥地植林計画
2. 我が国が援助することの必要性・妥当性
<p>(1) ミャンマー連邦は、独立後一貫して親日国であり、我が国と緊密で友好的関係を有しているとともに、同国の大きな開発ニーズを踏まえ、他の東南アジア諸国と並んで我が国援助の重点国の一つとして位置付けられていた。しかし、1988年の政変以降は、一定の分野を除いてミャンマーへの経済協力が事実上停止されていた。1995年7月のスー・チー女史の自宅軟禁解除等に見られる事態の進展を受け、日本政府は、方針を一部見直し、同国の民主化及び人権状況の改善を見守りつつ、既往継続案件や民衆に直接裨益する基礎生活分野の案件を中心に協力が実施されてきた。</p> <p>(2) 同国では森林が国土の約50%を占め、木材輸出が重要な産業であり、国のエネルギー消費量の約80%を薪炭材に頼っているが、輸出用木材及び薪炭材等の過度の伐採により、森林資源の減少と土壌流出・荒廃地化が進み、深刻な問題となっている。特に、アラカン山脈の東側に位置している中央乾燥地においては、全人口(約4,500万人)の約3分の1が居住しており、人口増加に伴う薪炭材の需要拡大が原因となり、森林減少が激しい。また、同地域は乾燥が著しく、減少した森林が天然更新によって回復することが困難である。このため、同国政府は、中央乾燥地における緑化推進を重視し、1994年から3年間で約2.1万haの植林を実施するとともに、緑化推進の実施機関として1997年に乾燥地緑化局(以下「DZGD」)を新設した。また、乾燥地緑化5カ年計画を策定し、2005年度までに約4.2万haの植林を行うとしている。しかし、これまで中央乾燥地において植林が行われてきた地域は、技術的に植林の比較的容易な地域であり、緊急度が高い劣悪な環境の地域における植林は、小規模な試験造林に留まっているにすぎない。このため、今後中央乾燥地における植林を拡大していくためのモデルとなる植林事業を実施することが急務となっている。その際、造成される植林地を将来にわたって維持管理していくためには地域住民の協力が必要不可欠であることから、モデルとなるような住民参加型の植林地造成を行うとともに、住民参加型維持管理計画を策定することが必要とされている。</p>
3. 協力対象事業の目的(プロジェクト目標)
対象地域において保護林、薪炭林、放牧林及び共有林が造成される。
4. 協力対象事業の内容
<p>(1) 対象地域：マンダレー管区ニャンウー郡ミティンデュイン森林保護区及びその北部に隣接した地区のうち約2,000ha</p> <p>(2) アウトプット 対象地域において約2,000haの植林がなされる。</p> <p>(3) インプット</p> <p>【日本側】</p> <ol style="list-style-type: none"> <li>1) 約1,500haの植林</li> <li>2) 森林管理用施設の建設 <ul style="list-style-type: none"> <li>・管理・普及事務所(64m<sup>2</sup>、1ヶ所)</li> <li>・作業場(70m<sup>2</sup>、1ヶ所)</li> <li>・給水施設(井戸及び給水棟、2式)</li> </ul> </li> <li>3) 森林造成用機材及び植林地管理用機材の整備</li> <li>4) 住民参加型の植林地造成及び維持管理計画策定に係る技術支援</li> </ol> <p>【「ミ」国側】</p> <ol style="list-style-type: none"> <li>1) 約500haの植林</li> <li>2) アクションプラン作成</li> </ol>

- (4) 総事業費  
概算事業費 15.45 億円 (日本側 15.40 億円、ミャンマー側 0.05 億円)
- (5) スケジュール  
【日本側】  
実施設計期間を含め 63 ヶ月の工期を予定  
【「ミ」国側】  
36 ヶ月の工期を予定
- (6) 実施体制  
ミャンマー連邦 林業省 乾燥地緑化局

#### 5. プロジェクトの成果

- (1) プロジェクトにて裨益を受ける範囲及び規模  
1) 直接裨益人口：対象地域及びその周辺に居住する約 285,000 人  
2) 間接裨益人口：マングレー管区植林予定地に居住する約 6,000,000 人  
(DZGD が本プロジェクトにおいて住民参加型の植林地造成及び維持管理計画策定の技術を習得することにより、今後マングレー管区植林予定地において約 11,000ha の植林地が造成されることが期待されるため)
- (2) 事業の目的 (プロジェクト目標) を示す成果指標  
対象地域を含むミティンデュイン森林保護区及びその北部に隣接した地区約 8,000ha において以下の表に示すとおり、森林面積が増加する。

表 1

	2001 年 (実施前)	2010 年 (終了時)	
保護林面積	約 200ha	約 200ha	約 750ha
薪炭林面積			約 750ha
放牧林面積			約 500ha
共有林面積	0ha	約 65ha	

- (3) その他の成果指標

表 2

	2001 年 (実施前)	2012 年 (終了 2 年後)
燃料収支	-2.4m <sup>3</sup> /世帯	+0.8m <sup>3</sup> /世帯

#### 6. 外部要因リスク

- (1) 旱魃などの天候不順が発生した場合、成果指標値に影響がおよぶ可能性がある。  
(2) DZGD は植林地の維持管理に住民の参加を得る必要がある。

#### 7. 今後の評価計画

- (1) 事後評価に用いる成果指標  
対象地域における保護林および薪炭林の面積  
対象地域における共有林の面積
- (2) 評価のタイミング  
事業終了後、2 年後 (2012 年) を目処に全体の事後評価予定

## 6. 参考資料／入手資料リスト

## 参考資料・入手資料リスト

番号	資料の名称	形態(図書、ビデオ、地図、写真等)	発行機関
1	DRY ZONE SPECIES, 中央乾燥地樹種の学名・現地名対応表	コピー	DZGD, (Oct. 2000)
2	中央乾燥地動植物の学名・現地名対応表	コピー	DZGD
3	Community Forestry Instruction (CFI)	コピー	DZGD
4	Forest Law	コピー	DZGD
5	乾燥地緑化5ヵ年計画(2001~2006)	コピー	DZGD
6	Record of the Handing Over of 300 Acres of Yomiuri Plantation to Polulalce of Suti and Hta-naung Area.	コピー	DZGD (27 Mar, 1999)
7	The Government of the Union of Myanmar, Ministry of Forestry, Myanmar Forest Policy, 1995 Policy Statement	コピー	MINISTRY OF FORESTRY (23 Feb, 1996)
8	The Government of the Union of Myanmar, Ministry of Forestry, Myanmar Forest Policy, 1995 Policy Statement	コピー	MINISTRY OF FORESTRY (23 Feb, 1996)
9	The Union of Myanmar, The State Law Order Restoration Council, Forest Law	コピー	MINISTRY OF FORESTRY (3 Nov, 1992)
10	STANDARD NOMENCLATURE OF FOREST PLANTS, BURMA, INCLUDING COMMERCIAL TIMBRES ('ミ'国樹種の学名・現地名対応表)	コピー	FD
11	Working Document No. 3/2, UNDP/FAO/MYA/99/006 - Environmentally Sustainable Food Security and Micro Income Opportunities in the Dry Zone Project. Terms of Partnership for Community Based Micro-Projects.	コピー	UNDP/FAO, 2001
12	Field Document No. 39, GCP/RAS/154/NET - Regional Wood Energy Development Programme in Asia. Woodfuel Flows in the Dry Zone of Myanmar - A Case Study.	コピー	FAO, 1993
13	UNITED NATIONS CONVENTION TO COMBAT DESERTIFICATION	コピー	UNDP
14	A BRIEF ACCOUNT OF FOREST RESEARCH INSTITUTE FRI概要	コピー	FRI(Mar, 1999)
15	活着率データ	コピー	FRI
16	育苗マニュアル	コピー	FRI
17	Dryland Techno Group, Capacity Building of Community Skill in Village Forest Management Plan	コピー	ECODEV GROUP (Mar. 2001)
18	Dryland Techno Group, Framework of Technical Backstopping to Forestry & Energy Sectoral Activity of Dry Zone Food Security Project	コピー	ECODEV GROUP (Dec. 2000)
19	ECODEV GROUP, FORESTRY EXTENSION SYSTEM FOR PARTICIPATRY TECHNOLOGY DEVELOPMENT FOR ENVIRONMENTALLY SUSTAINABLE FOOD SECURITY AND MICRO-INCOME OPPORTUNITIES IN THE DRY ZONE (MYA/99/006)	コピー	ECODEV GROUP (Apr. 2000)
20	AIT, SOCIO-ECONOMIC ASSESSMENT OF COMMUNITY FORESTRY A case study of the Environmentally Sustainable Food Security and Micro income Opporunitues Project, Dry Zone, Myanmar	コピー	AIT(Jun. 1999)
21	PRAパンフレット(ミャンマー語)	コピー	ECODEV GROUP
22	CFIパンフレット(ミャンマー語)	コピー	ECODEV GROUP
23	農業パンフレット(ミャンマー語)	コピー	ECODEV GROUP
24	林業パンフレット(ミャンマー語)	コピー	ECODEV GROUP
25	'ミ'国植物の学名・現地名対応表(2000年農業省発行)	コピー	ECODEV GROUP
26	Private Sector Co-operation and Participation in Solving Fuelwood Crisis in Myanmar. Paper prepared for National Training Course on Wood Energy Planning for Myanmar, 23-27 November 1999.	コピー	FREDA, 1999
27	FREDA, PROGRESS REPORT ON COMMUNITY COLLABORATION IN REFORESTATION AND FOREST CONSERVATION PROJECT FOR THE YEAR 200-2001	コピー	FREDA, April 2001

番号	資料の名称	形態(図書、ビデオ、地図、写真等)	発行機関
28	「ミ」国におけるオイスカ活動報告書	コピー	OISCA (Sep. 2000)
29	ワ地区共生開発プロジェクト(WSD)の概要	コピー	カラモジアインターナショナル
30	インレ湖流域循環型共生プロジェクト(ILSD)の概要	コピー	カラモジアインターナショナル
31	ニュースレター(中央乾燥地における活動報告)(2001年5・6月号)	コピー	BAJ
32	ニュースレター(2000年9月・10月号)	コピー	BAJ
33	TREES FOR DRYLANDS (1993年発行)	コピー	OXFORD & IBH PUBLISHING CO. PVT. LTD.

## 7. その他の資料・情報

## その他の資料

### 自然環境改良と維持

本調査は、温室効果ガスの主要因である二酸化炭素削減に寄与するものとして期待されている。

森林プロジェクトにおける二酸化炭素吸収量を把握する手法は、未だ確立されている訳ではないが、「温室効果ガス排出・吸収量マニュアル（森林・廃棄物処理プロジェクト編：(財)地球環境センター 平成 11 年 9 月）」によると、一般的に温室効果ガス吸収量の算定方法は、以下のとおりである。

森林生態系の炭素貯蔵プールは、バイオマス（地上、地下）有機堆積物および土壌であり、原則的にはこれら全てにおける炭素貯蔵量を推計する。

プロジェクトの種類によっては、森林から生産される製品についても生産量、用途、炭素吸収・排出量等を調査する。

バイオマスについての炭素貯蔵量は、次式により求める。

$$\text{炭素貯蔵量} = \text{バイオマス量（乾燥重量）} \times \text{炭素含有量}$$

森林プロジェクトの場合、バイオマス量（乾燥重量）は 1 年あたりの樹木の成長量に置き換えられる。また、炭素含有量はバイオマス年平均蓄積量に置き換えられる。

一般的に十分なデータがない場合には、IPCC ガイドラインの数値を適用してもよいことになっている。（表 1 および表 2 参照。）

プロジェクト対象地域における 1 年あたり樹木の成長量は、表 1 のアジア地域、乾燥林の樹齢 0～20 年の 4t/ha を適用する。

表 1 1 年あたり樹木の成長量（熱帯地域）

(単位 t/ha)

地域	熱帯雨林		広葉樹林		乾燥林	
	0～20	20～100	0～20	20～100	0～20	20～100
樹齢(年)						
America	8	0.9	5	0.5	4	0.25
Africa	11	1	7	0.5	4	0.25
Asia	11	1	7	0.7	4	0.25

出所： IPCC ガイドライン

注： 0～20 年のバイオマスは、森林の 70%の密度で植生されていると仮定し、以降、100 年までは 100% 植生と仮定している。

表 2 植栽によるバイオマス年平均蓄積量（熱帯）

植栽の種類	植栽によるバイオマス年蓄積量 (t /ha)
アカシア類	15.0
ユーカリ類	14.5
チーク類	8.0
松類	11.5
松・加バ <sup>®</sup> I <sup>®</sup> ( <i>Pinus Caribaea</i> ) 類	10.0
堅木 (Mixed Hardwoods)	6.8
早成長堅木 (Mixed Fast-Growing Hardwoods)	12.5
軟木 (Mixed Softwoods)	14.5

出所： IPCC ガイドライン

プロジェクト対象地域（約 2,000ha）において植林する樹種は、アカシア類が全体の 90%以上占めることから植栽によるバイオマス年平均蓄積量を 15.0t/ha-yr と仮定する。

炭素吸収量は、上記の数値を利用して植栽計画に基づき算出し、植林実施による効果を以下のとおり評価する。

**年間バイオマス炭素吸収量（ を適用）**

$$= \text{プロジェクト面積} \times (\text{1 年あたり樹木の成長量} \times \text{バイオマス年平均蓄積量})$$

$$= \text{年次別植林面積} \times 4 \text{ (t/ha)} \times 15.0 \text{ (t/ha)}$$

本プロジェクトによる年次別植林面積は、1 期目 210.1ha、2 期目 441.5ha、3 期目 399.5ha、4 期目 421.3ha、計 1,472.4ha であることから、上記の計算式より炭素吸収量は図 1 のように蓄積される。ただし、ここでは既存森林の吸収量、植林期間中の排出量、薪炭林利用による排出量は考慮していない。

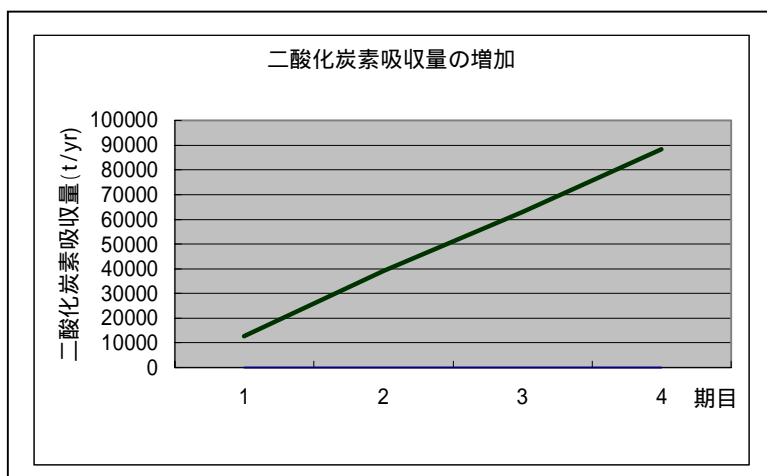


図 1 二酸化炭素吸収量の増加