INTEGRATED REPORT
ON
THE RP-JAPAN TECHNICAL COOPERATION PROJECT
FOR
THE AFFORESTATION OF THE PANTABANGAN AREA

DECEMBER 1979

JAPAN INTERNATIONAL COOPERATION AGENCY

PREFACE

Since a project for technical cooperation of afforestation at Pantabangan in the Philippines was set in 1977, it has attained the third year, shifting form the first phase of the development of individual afforestation technology to the second phase to systematize for the management of it.

The profect is the first technical cooperation one for the Japan International Cooperation Agency in forestry sector. It has been bringing about its fine results by making various efforts in close cooperation with personnel concerned in Japan and the Philippines.

This report was compiled in November, 1979, by Mr. Osamu Takasawa who reterned to Japan after the expiration of his term for 2 years and three months. It is sumary and analysis on the performance of activities of the project for past three years.

Dispite the project faced difficulties to afforest on the bald area where is in severe conditions, valuable date were prepared, conducting the profect even in frequent confusion. The analysis of the project findings has been examined in the view of forest management.

In order to promote smoothly the project hereafter, we hope the report will contribute, as a reference one, to personnel concerned.

December 1979

Kenji Hori
Director of Forest Development Cooperation Department,
Japan International Cooperation Agency

ACKNOWLEDGEMENT

I would like to thank the following individuals who made my stay in the Philippines happy, memorable and highly rewarding:

1. Director Edmundo V. Cortes, Bureau of Forest Development, for his deep interest to the project and for the valuable assistance he has extended to me during my stay.
2. Mr. Rogelio B. Baggayan, Project Director and Chief of the Reforestation and Afforestation Division, BFD, who had assisted me in coordinating and arranging many of my duties and project studies regarding the RP-Japan Project.
3. Mr. Jose L. Lechoncito, Assistant Project Director and Assistant Chief of the Reforestation and Afforestation Division, BFD, who has helped in making this report and also gave me personal suggestions and advice.
4. Mr. Felipe D. Buenaflor and Mr. Juanito P. Regadio, Section Chiefs, Reforestation and Afforestation Division, BFD, who have guided me to various places in the Philippines during observation study and tour.
5. Mr. Manuel H. Zambrano, Project Leader, Assistant District Forester, Maringalo Forest District Office, who has assisted me in my work and has closely coordinated all project activities effectively throughout my stay in the project, thereby making everything easy to manage. And also to Mrs. Zambrano for her kindness and friendliness.
6. Miss Emily A. Taeza, Stenographer, BFD Central Office, for typing this report and for extending to me kind services in the office.
7. Mr. Senshi Namba, Project Chief Adviser, and all Japanese Experts, who have worked with me during my stay and for giving me valuable official and personal advice.
8. Officers and Staff of the Japanese Embassy and the JICA Manila Office for making my stay fruitful and comfortable.
9. To all Filipino Counterparts who are my best "kaibigan", and to all members, to the staff and personnel of the project, with whom I have several experiences with hiking together in the mountains and discussed problems of the project including their solutions which often-times would make us awake very late in the night.
10. Mrs. Joy Cruz Millare, personal friend of mine and my wife, who taught us the Filipino way of life and the national language.

11. And, finally, the hundreds of people whom I met here in this country who gave me their time to acquaint myself with forestry practices in the Philippines and for their being hospitable. And to all those whom I cannot acknowledge because of lack of time and space but have in one way or the other help me during my stay in this country, I owe them a debt of gratitude.

November 1979

Osamu Takasawa
Expert on Forest Management
The RP-Japan Technical Cooperation
Project for the Afforestation of
the Pantabangan Area.

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I. INTRODUCTION

1. Objective

This technical cooperation project aims at the development of various technqiues in forestry so as to contribute to the successful afforestation of open grassland and other denuded lands of nearly 50,000 hectares in the Pantabangan Area which is one of the most important watershed in the Republic of the Philippines.

2. Background

In the Philippines, forests have long been one of the most important sources of livelihood for the people. In fact, people have benefited from rich forest resources where they derive construction materials, fuel and various other products. Besides, forest products have consistently been a major source of foreign exchange. Therefore, logging activities have also been developed in proportion to the increase of world wood demand. On the other hand, the regeneration techniques of the tropical forest such as those obtaining in the Philippines has barely started and have not been fully established. Until recently, the forest was considered a hindrance to agricultural development that it had to be cleared as fast as possible. It was a process that the logged-over area had been turned to open land by kaingineros which will become eventually agricultural lands, pasture lands and others turned into wastelands. The decrease of forest land had resulted in the decrease of forest resources production.

Lately, however, the influence of the forest on the environment, aside from its being the source of timber and other forest products, have slowly gained recognition so that there is now public awareness on the importance of the forest on human life. In particular, the deterioration of forests in the important watersheds has become a public concern as one of the causes for the frequent occurrence of floods and draughts. It is, also, feared that the overall devastation of the forest land may threaten the sustained productivity of forests in the near future. Thus, the government adopted the afforestation and reforestation of open and grassland as one of the most important policies from the viewpoint of the land conservation and forest resources management.

In these circumstances, the Philippine Government made a request to the

Japanese Government for the cooperation and assitance in the technical and financial aspects in the field of afforestation, in 1973. In response to the request, the Japanese Government concluded with the Philippine Government to establish the RP-Japan Technical Cooperation Project after dispatching survey teams several times, and the Pantabangan area was selected for the project site because of its immediate necessity of rehabilitation aiming at the development of afforestation techniques which could be replicated in other watershed areas of the country.

3. Outline of the Project

To attain the objective set forth, the project is managed following the master plan appended in the Record of Discussions.

The first step is to develop the various individual techniques for afforestion through the establishment of the trial plantations. Subsequent step is to establish the large scale pilot plantations.

In the pilot plantations, studies will be carried out for the systematization of various afforestation techniques including the forest management on a large scale, the establishment of forest protection system and other necessary activities in forest management. At the same time, the training of Filipino foresters is conducted for the application of those techniques developed. Training grant to Japan were also extended to Filipino foresters to afford them the opportunity to train and adopt afforestation, erosion control and forest management techniques of that country.

For the implementation of this project, it has a Central Office in Bureau of Forest Development, Quezon City, and a Technical Cooperation Center located in the project site. Actual implementation of the project activities is executed at the Technical Cooperation Center. A Joint Committee is organized to discuss, review and approve plans and programs pertaining to project implementation. The project activities have started in November, 1976, upon the arrival of two Japanese Experts. The Five-Year Work Program of the project, which was expected to be completed by 1982 was approved on the first Joint Committee Meeting on June 1977. However, it was recently found out that nationwide price hike caused by increase in the price of oil, coupled with the existence of pasture in the proposed project site would have brought about a difficulty to pursue the present five-year program. Therefore, it was deemed necessary to revise the program for the smooth implementation of the project.

II. PRESENT STATUS OF THE AREA

1. Natural Environment

1.1 Location

The project site is located at the northeastern part of Nueva Ecija province and adjoins Cagayan River watershed by a branch of the Sierra Madre Mountains. It is embraced by the Upper Pampanga River Basin which supports Pantabangan and Talavera River draining to the vast Pampanga Plain. Geographical location of the project site is 16° of north latitude and 121° of east longitude. The area is covered by two municipalities - Pantabangan and Caranglan, all within Nueva Ecija Province. It is also under the jurisdiction of BFD Forest District 3, known as Upper Pampanga River Basin Multiple Use Management District, and District 9, known as the Pantabangan District under Regional Office No.3 located at San Fernando, Pampanga.

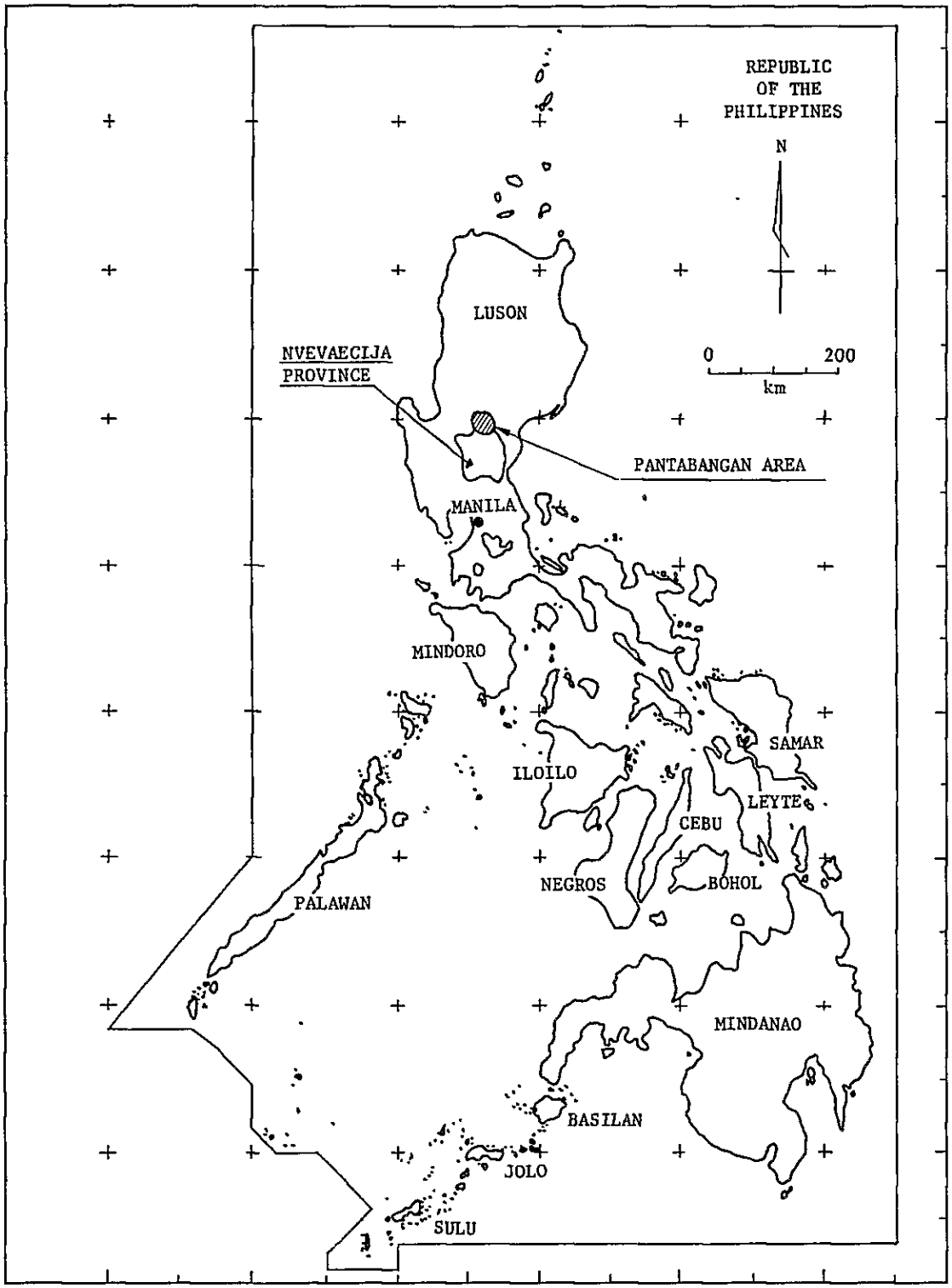
The Technical Cooperation Center which is located in the project area is situated 189 kilometers from Manila passing along Manila-Cagayan highway.

1.2 Soil Cover

The area consists of 115,000 hectares forest land, 12,900 hectares alienable and disposable land, and 8,900 hectares of lake and rivers. The forest land compose the forested area which covers 51% or 58,500 hectares and 49% or 55,900 hectares are the grassland.

1.3 Climate

Mean temperature of the area is 27°C with an average annual rainfall of around 2,000 mm obtained in the Pantabangan area for the past years. Range of daily temperature is almost similar throughout the year and average maximum temperature is 30.1°C and 22.2°C is the average minimum temperature. Dry season and rainy season is quite obvious and the period from November to April is very severe dry season. The area is located near the border of climatic zones, and rainfall is abundant throughout the year just in the east of divide (Pacific coast of Luzon Island). Therefore, the peaks of the divide (1,000 a.s.l.) are covered with clouds even during dry season.


REPUBLIC
OF THE
PHILIPPINES
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km
LUSON
NVEVAECIJA
PROVINCE
PANTABANGAN AREA
MANILA
MINDORO
ILOILO
SAMAR
LEYTE
CEBU
NEGROS
BOHOL
PALAWAN
MINDANAO
BASILAN
JOLO
SULU

N N O N

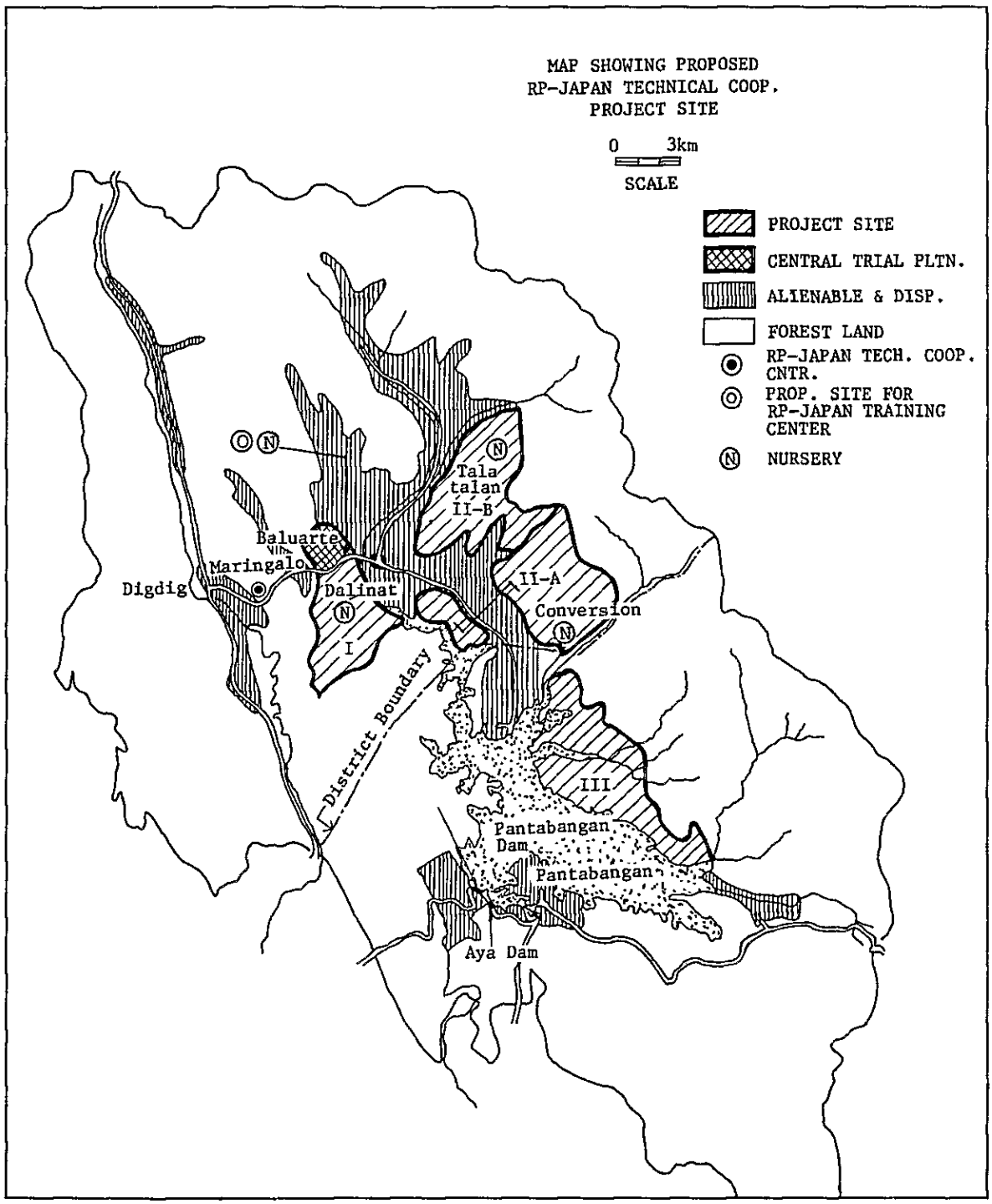

MAP SHOWING PROPOSED
RP-JAPAN TECHNICAL COOP.
PROJECT SITE
0 3km
SCALE
PROJECT SITE
CENTRAL TRIAL PLTN.
ALIENABLE & DISP.
FOREST LAND
RP-JAPAN TECH. COOP. CNTR.
PROP. SITE FOR RP-JAPAN TRAINING CENTER
NURSERY
Tala talan
II-B
Baluarte
Maringalo
Digdig
Dalinat
I
II-A
Conversion
District Boundary
III
Pantabangan Dam
Pantabangan
Aya Dam

Table II-1 Land Classification

1. FOREST LAND		
Forested area		58,523.0 has.
Grassland		55,883.0 "
Cultivated area		511.5 "
Barren land		55.0 "
House lot		19.0 "
Eroded area		18.4 "
	Sub-Total	115,009.9 has.
2. ALIENABLE AND DISPOSABLE LAND		12,906.7 "
3. LAKE AND RIVER		
Lake (Reservoir)		7,568.0 has.
River		1,344.0 "
	Sub-Total	8,912.0 has.
	TOTAL	136,828.6 has.

1.4 Topography

The whole catchment area may be classified into the following topographic types: Alluvial, plateau, rolling hills, mountains with little undulations, mountains with abundant undulations, and steep mountains. However, the areas proposed for pilot forests (grasslands) consists roughly of rolling hills and mountains with little and abundant undulations. Topography of grasslands is classified into summit and uplands, hillside slope and deposit and erosion. Those grassland is distributed in the elevation range of 230 to 800 meters above sea level and average gradient is 7-10 degrees.

Table II-2. Monthly Temperature (1978)

Carranglan, N.E.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Maximum temperature	28.4	29.0	31.8	32.7	32.8	31.1	31.1	27.7	29.1	29.7	29.0	29.3	30.1
Minimum temperature	21.7	20.8	21.6	22.1	22.9	22.4	23.1	22.5	22.3	22.5	21.9	22.0	22.2

Note: Monthly average (°C)

Table II-3. Monthly Rainfall

Carranglan, N.E.

Year		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1977	Rainfall (mm)					168.1	93.3	428.6	287.1	475.5	25.3	169.2	0
	No. of rainy days					13	11	18	20	25	3	4	0
1978	Rainfall (mm)	0	0	1.8	27.4	102.4	169.8	477.1	835.0	374.9	536.4	63.7	0
	No. of rainy days	0	0	1	3	9	17	20	26	22	19	5	0
1979	Rainfall (mm)	0	7.4	1.0	25.2	258.0	199.6	291.1	248.6	292.8			
	No. of rainy days	0	1	1	3	15	16	19	20	22			

Prepared by Angelita Velasques

Table II-4 Soil Temperature

Temp.:°C; Hum.: %

TIME	SOIL TEMPERATURE (Depth) (30 cm)	(15 cm)	(5 cm)	TEMPERATURE	HUMIDITY
5:00 A.M.	31.1	31.1	29.0	22.0	90
5:30	31.1	31.1	29.0	22.0	90
6:00	31.0	31.0	28.7	22.2	95
6:30	31.0	31.0	28.5	23.0	90
7:00	31.0	31.0	28.4	24.8	85
7:30	31.0	31.0	28.4	27.0	75
8:00	31.0	31.0	28.5	28.3	75
0:00 P.M.	31.3	31.3	36.5	35.5	50
0:30	31.3	31.5	37.7	36.0	50
1:00	31.3	31.6	39.0	36.8	45
1:30	31.4	32.0	40.0	37.0	45
2:00	31.3	32.0	41.2	37.0	45
2:30	31.3	32.1	41.1	37.0	50
3:00	31.4	32.6	41.7	35.8	55
3:30	31.4	33.1	42.0	34.9	55
4:00	31.4	33.1	42.0	34.4	55

Measured on: April 26, 1979

at: Maringalo, Carranglan, Nueva Ecija

by: Angelita Velasquez, Mercedes Abandor and Lodita Robasto

CHART II-1. DAILY FLUCTUATION OF TEMPERATURE AND HUMIDITY CRAINY SEASONJ

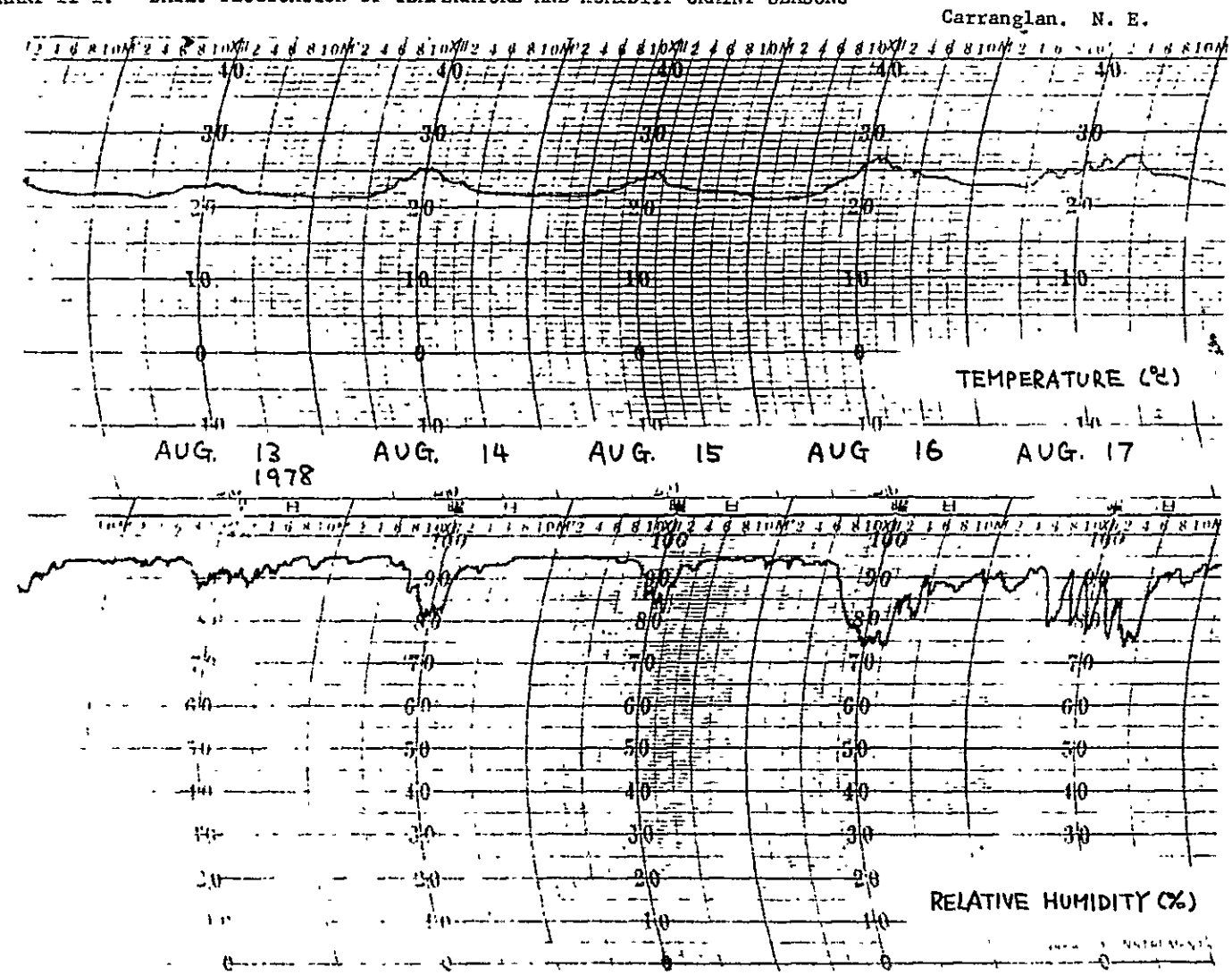


CHART II-2. DAILY FLUCTUATION OF TEMPERATURE AND HUMIDITY (DRY SEASON)

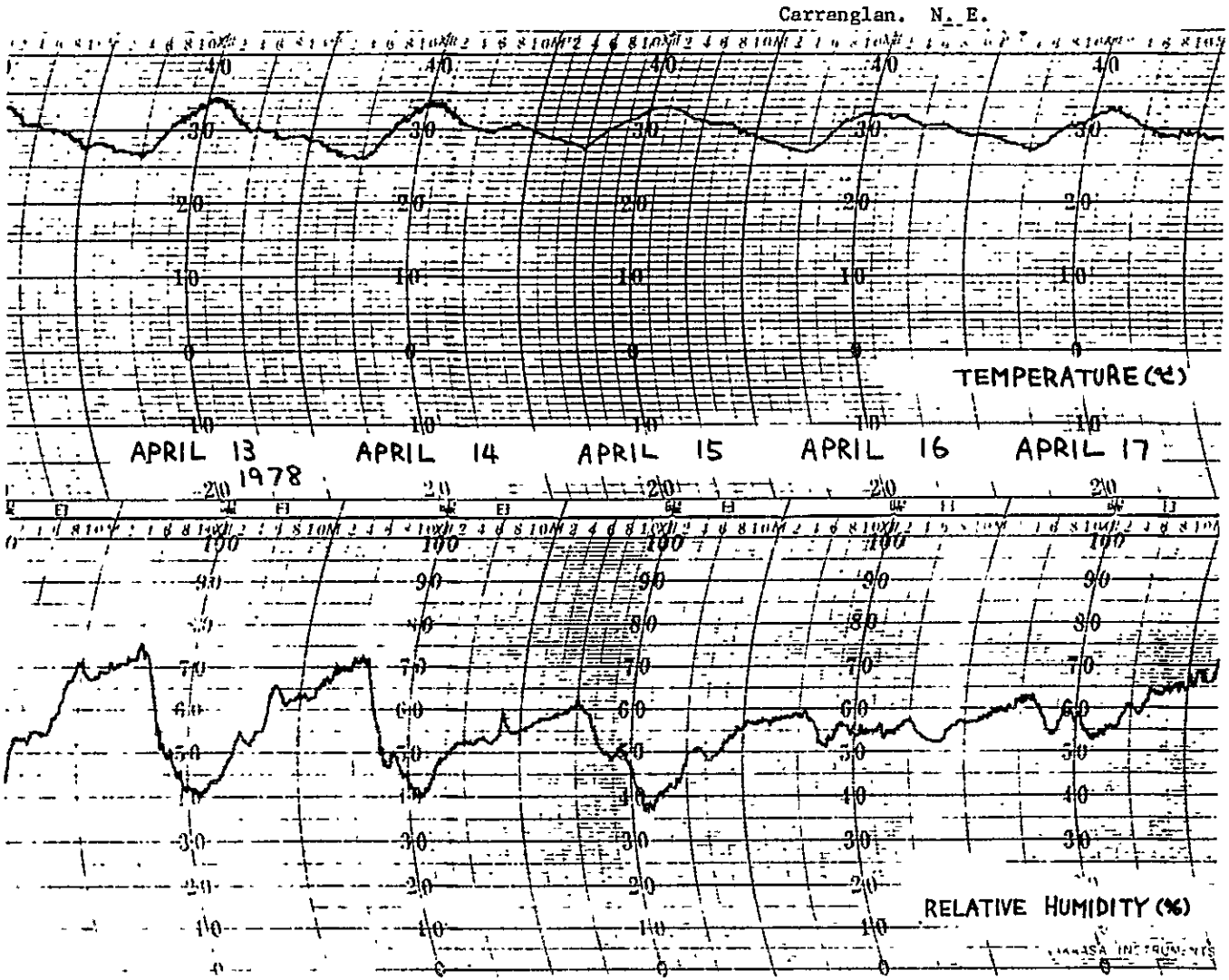


Table II-5. Topographic Features of Grassland

Classification	Area (Has.)	%
Summit and Uplands	2,350	4
Uniform Slope	17,948	33
Convex Slope	16,288	29
Concave Slope	13,088	23
Deposit	4,314	8
Erosion	1,895	3
TOTAL	55,883	100

Table II-6. Gradient of Grassland

Classification	Area (Has.)	%
6° below	20,460	37
7° - 10°	16,784	30
11° - 16°	16,071	29
17° - 21°	2,336	4
22° above	232	-
TOTAL	55,883	100

Table II-7. Elevation of Grassland

Classification	Area (Has.)	%
200 m below	2,486	4
201 - 400 m	28,402	52
401 - 600 m	13,987	25
601 - 800 m	7,503	13
801 m above	3,505	6
TOTAL	55,883	100

1.5 Geology

The foothills of Sierra Madre Mountains east of the Pantabangan area indicates a NNE-SSW trending synclinorium with flanks made up of regionally metamorphosed thick sequence of Upper Cretaceous to Upper Eocene volcanic lava flows and pyroclastic rocks. The formation includes thin intercalations of well-bedded and equally metamorphosed elastic sedimentary rocks as key beds. In general, andesitic tuff breccia and andestitic lavas with thin horizons of hale and sandstone constitute the basal zone. Vertically, they grade imperceptively into predominantly basic volcanics composed of basaltic tuff breccia and basaltic lavas, also intercallated with thin beds of elastic sedimentary rocks.

1.6 Soils

Soils in the area belong to red podosolic soil. Surface soil is a little dark and lower layer is reddish brown although red weathering and podosolization do not seem to be so extreme. This is probably due to wide distribution of immature soil, which results from severe surface erosion. In fact, at the upper part of slope or convex slope, the surface layer is shallow and the evidence of surface erosion can be observed. On the contrary, at the lower part of slope or concave slope, the surface layer is deep and lower layer is dark reddish brown. Moreover, the soils in this area are generally very hard and dense, and their physical properties are poor.

Soil fertility, naturally, depends on the topography, geology and type of soil. In this area, soils are generally acidic and infertile.

1.7 Vegetation

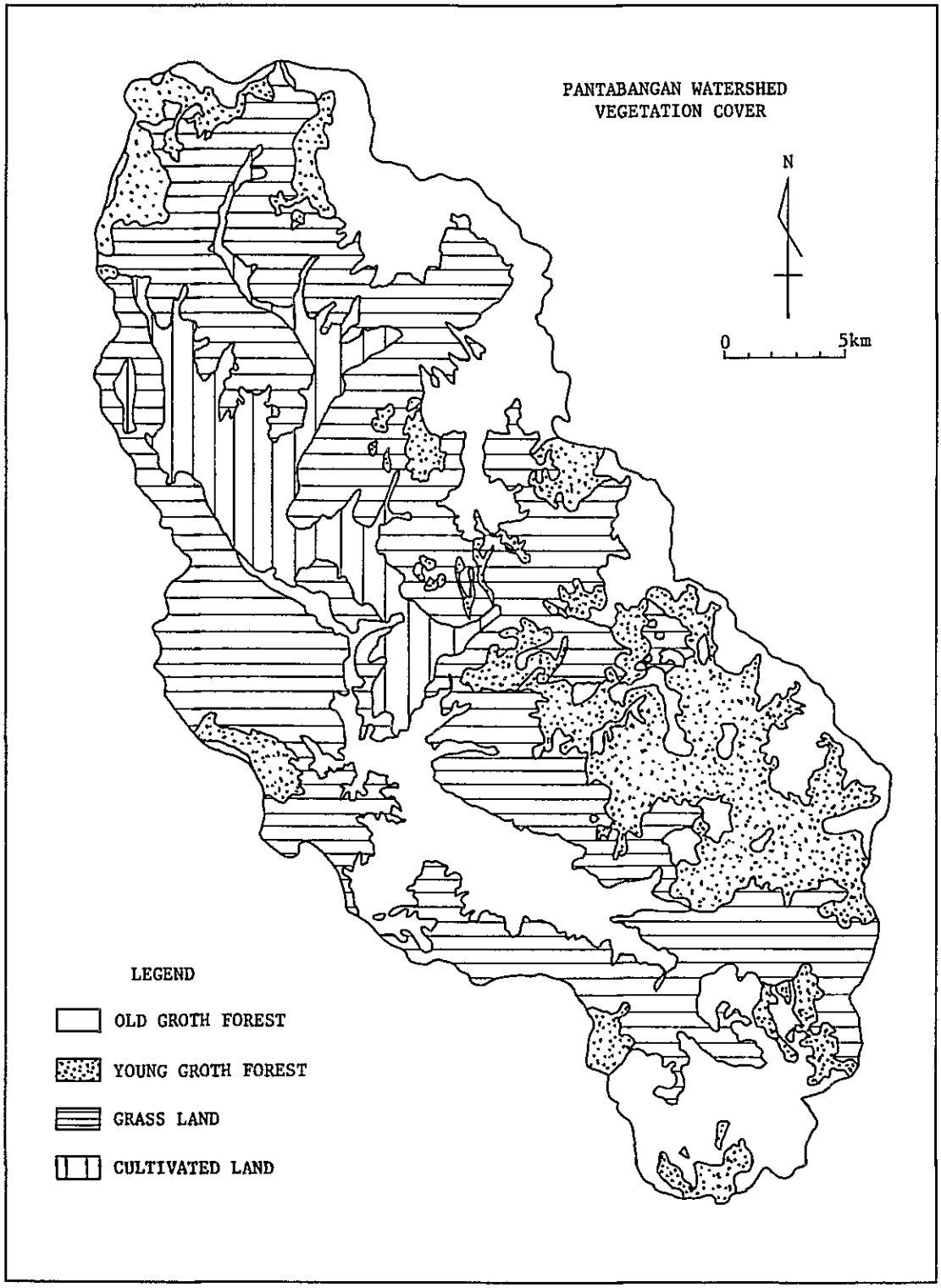
In the Pantabangan area, mountains higher than 1,000 m. a.s.l is covered by mossy forest. Below 1,000 m. a.s.l. the whole area used to be a tropical rain forest, but at present, most parts have been logged-over except a small portion of natural forest remaining in the southeast.

In the northern part of the area, natural forests of Pinus kesiya is distributed on the ridges higher than 800 m. a.s.l.. Almost the whole area lower than 800 m. is cogon land.

In the Talavera watershed, the ratio of forested area is higher than in the Pantabangan area. That is because of steeper slope and later forest

exploitation.

In the cogon land, some natural forests are in a strip or spot, along a creek surrounded by a little steep slope, but all the rest is covered with grasses. The vegetational composition of grassland is comparatively simple. Major species are Talahib (Saccharinum spontaneom), Cogon (Imperata cylindricum), Samon (Themeda triandra).


PANTABANGAN WATERSHED
VEGETATION COVER
N
0
5km
LEGEND
OLD GROTH FOREST
YOUNG GROTH FOREST
GRASS LAND
CULTIVATED LAND

2. Social Circumstances

2.1 Population

According to the 1975 census, the population of Carranglan and Pantabangan municipalities are 16,875 and 18,074. At present, Conversion is the only labor source for the project among the barangays in Pantabangan. The number of both sexes from 15 to 49 years old is 7,323 in Carranglan. The population increase percentage in Carranglan is 8.6% from 1970 to 1975.

Table II-8. Population in Carranglan and Pantabangan

Carranglan	Both Sexes	Male	Female	Number of Households
Poblacion North	1,269	654	615	193
Poblacion South	1,772	898	874	285
Baluarte	770	413	357	138
Bantug	645	310	335	102
Bunga	2,159	1,076	1,083	361
Burgos	2,082	1,086	796	356
Capintalan	709	388	321	115
Digdig	855	416	439	148
General Luna	1,325	674	651	250
Minule	548	285	263	107
Piut	534	275	259	93
Puncan	1,687	903	784	292
Putlan	587	305	284	106
San Agustin	1,071	550	521	167
Salazar	516	275	241	103
Maringalo	344	190	154	54
TOTAL	16,875	8,698	8,177	2,870

Pantabangan	Both Siexes	Male	Female	Number of House-holds
Poblacion East	2,602	1,310	1,292	435
Poblacion West	1,889	905	924	334
Cadaclan	891	425	466	148
Cambitala	895	454	441	151
Conversion	1,124	583	541	230
Ganduz	876	463	413	152
Liberty Sawmill	917	472	445	168
Marikit	694	354	340	113
Napon-Napon	641	325	316	108
Sampaloc	902	478	424	160
San Juan	1,555	788	767	252
Villarica	1,117	571	547	185
Kalayaan	2,975	1,618	1,357	600
Malbang	996	521	475	169
TOTAL	18,074	9,327	8,747	3,205

TAble II-9 Population by Age Group (Carranglan)

Age	Both Sexes	Male	Female
Under 10	5,744	2,921	2,823
10 - 14	2,376	1,239	1,137
15 - 19	2,020	1,049	971
20 - 24	1,400	729	671
25 - 29	1,107	582	525
30 - 35	787	405	382
36 - 39	836	416	420
40 - 44	648	316	332
45 - 49	525	278	247
50 - 54	451	227	224
55 - 59	315	187	128
60 - 64	272	140	132
65 - 69	172	91	81
70 and over	222	118	104
TOTAL	16,875	8,698	8,177

2.2 Local Production

The major source of income in the area is agriculture. Majority of the people are engaged in rice farming. The rice-field in the municipality of Carranglan is about 3,400 ha, of which 1,400 ha are the irrigated ricefield and 2,000 ha are the rainfed ricefield. The average ricefield size per family in Carranglan as reported by the Department of Agrarian Reform was about 2.5 ha in 1976. In the irrigated ricefield, not all of the area are planted in the dry season because of inadequate water supply. Therefore, most of rice planting activities are done during rainy season. The average yield reported by the Department of Agrarian Reform in the Carranglan area for 1976 was 39.9 cavans/ha in the rainfed fields and 54.4 cavans/ha in the irrigated field while the Bureau of Agricultural Economics had reported the rice yield at Carranglan were 2.2 and 1.6 tons/ha for irrigated and rainfed rice, respectively.

2.3 Employment

Most of the local people are working at their own field or are employed in agricultural works. The average wage for agricultural workers is 7 - 8 pesos with food. As agricultural works are mostly done during rainy season, there are less chances for the people to be employed during dry season.

The second is the RP-Japan Afforestation Project which have been employing more or less 1,000 laborers a day since 1977. The maximum number of laborers employed have reached to 2,200 last June, 1979. With the expansion of the project activities, the lack of labor force during the planting season for both agricultural works and the project, is becoming the problem in the area.

2.4 Pasturage

Livestock farming has been quite a suitable occupation in the area because of wide grassland. Usually, the forage consumed by the animals is produced without any input. However, this pasturage is one of the largest hindrance for watershed management especially in a critical area like the Pantabangan watershed. Since 1975, the BFD regulations do not allow the renewal of the lease contract or permit, but the pastures are still existing legally and illegally,

and making trouble with the afforestation project because they obstruct the implementation of plans and programs of the project. In the Pantabangan, one communal pasture which cannot be cancelled, is existing.

2.5 Kaingin

Kaingin management is a part of forest development activities. Though survey of kaigins in the area is not completed yet, it is estimated that there are approximately 300 families/kaingineros in the area. They cultivate from 1 to 5 hectares for upland crops and transfer to another area after 2 to 3 years. Their annual income is estimated at about 1,000 to 2,000 pesos which is quite low. To prevent erosion and forest fire caused by shifting cultivation and burning, resettlement of kaingineros and educating them on the value of forest is urgently necessary. In addition, involving them in the afforestation activities will redound to the benefits of both kaingineros and the project.

Table II-10. List of Existing Pasture Lease

I. Carranglan

	Name	P.L.A. No.	No. of Has.	Block No.	Remarks
1.	F. Otic	497	506	73	Expired with application for renewal
2.	M. Roxas	1,680	500	61	-do-
3.	B. Madina	30,855	500	59	-do-
4.	C. Orden	762	500	63	
5.	C. Orden	1,781	500	64.65	
6.	O. Alnas	1,962	500	76	Expired with application for renewal
7.	A. Coronel	0815	485	77	-do-
8.	E. Coronel	-	400	78	

II. Talavera

Name	P.L.A. No.	No. of Has.	Block No.	Remarks
1. S. Dagdag	3591	356	20	
2. F. Yusi	3719	170	23	Expired with application for renewal
3. M. Segui	new	500	17	New
4. R. Calvelo	3688	700	24	
5. C.L.E.C.	2591	300	16	
6. F. Umaguig	2839	155	15	Expired with application for renewal
7. A. Mejia	3682	350	28	
8. C.L.S.U.	170	689	30	
9. J. Chioco	1345	265	32	
10. D. Juni	2483	620	12	
11. Beleno	3548	150	2	
12. C. Buencamino	3132	360	3	
13. A. Cabonxe	2862	361	4	
14. J. Baclig	3832	242	4	
15. E. Sigue	New	1,340	5	New
16. B. Staines	902	-	7	
17. G. Mabutol	2052	-	6	
18. H. Sobrepena	636	448	8	

P.L.A : Pastuve Lease Agreement

III. REFORESTATION ACTIVITIES IN THE AREA

1. San Jose Reforestation Project

The San Jose Reforestation Project is under the jurisdiction of the Upper Pampanga River Basin Multiple-Use Management District (UPRBMUND, R-3, D-3). Since 1938, this project has been undertaking reforestation activities in the Talavera watershed area. Though it was reported that the project has reforested about 7,200 hectares of openlands, this figure actually includes the areas replanted annually because of frequent fire occurrences during dry season. At present, the project undertakes about 200 hectares of plantation establishment yearly, producing 500,000 seedlings in Puncan Nursery and the other subsidiary nurseries. The main problem of the project is forest fire which damages the plantations. This is bought about by the insufficient funds provided to the profect for protection activities. Seed collection is also undertaken from the 20 - 30 years established plantations of Teak, Mahogany and Narra.

2. Carranglan Reforestation Project

The Carranglan Reforestation Project is also under UPRBMUMD and undertakes the reforestation activities in the Pantabangan watershed area. Based on available records of the District Office, the project has reported around 7,600 hectares of established plantations. However, based on actual estimate, less than half of the area established has existing forest plantations while the rest has been always subjected to forest fires.
Starting October 1979, the forest renewal activities of the project will be concentrated in the Talavera watershed area while the RP-Japan Afforestation Project expands its activities in the Pantabangan watershed area.

3. Pantabangan Special Project

The Pantabangan Special Project under the jurisdiction of the Pantabangan District (R-3, D-9) was started in 1975. The project office is located at Conversion, Pantabangan and it undertakes reforestation activities in the northern part of the Pantabangan Dam. It was reported that the project had reforested 2,000 hectares and had established 17 nurseries, with a total capacity of 5.0 million seedlings. The subsidiary nurseries are distributed strategically in the proposed plantation area. The use of

SAN JOSE REFORESTATION PROJECT

Date of establishment of Project	:	May 28, 1938
Total area of the Project	:	20,000 Has.
Established plantations (1959 - 1977)		6,624.26 Has.
Plantation establishment in 1978	:	
Species planted	-	Assorted species
Area reforested	-	437.81 Has.
No. of seedlings planted	-	597,645 seedlings
Plantation establishment in 1979	:	
Date planted	-	April - June, 1979
Species planted	-	Giant Ipil-ipil
Area reforested	-	5.25 Has.
Date planted	-	July, 1979
Species planted	-	Giant Ipil-ipil, Acacia
Area reforested	-	126.05 Has.

CARRANGLAN REFORESTATION PROJECT

Date of establishment of Project	-	1957
Total area of the project	-	14,000 Has.
Established plantations (1957-1977)		7,094.52 Has.
Plantation establishment in 1978	:	
Species planted	-	Giant Ipil-ipil, Acacia Gmelina, Teak, Benguet Pine and Mahogany
Area reforsted	-	395.59 Has.
Plantation establishment in 1979	:	
Date planted	-	April - June, 1979
Species planted	-	Giant Ipil-ipil and Assorted Species
Area reforsted	-	25.96 Has.
Date planted	-	July, 1979
Species planted	-	Assorted species
Area reforested	-	115.26 Has.

Data source: Accomplishment Report, UPRBMUMD, September, 1979

boats to transport personnel and materials characterizes the system that is best suited to the area.

The major concern is forest protection and Yemane was selected as the main species from the viewpoint of fire resistance. The Pantabangan district has been proposing to transfer the jurisdiction of its established plantations within the municipality of Carranglan to the UPRBMUMD or RP-Japan Project so that the Pantabangan Special Project can concentrate its activities in Pantabangan.

4. Aya Forest Nursery

The Aya Forest Nursery with a total capacity of 500,000 seedlings, under the Pantabangan District, serves the plantable areas near the town of Pantabangan, and also provides seedlings for the planting activity of PD 1153 (refer to 3-6).

5. National Irrigation Administration Project

The reforestation activities of the National Irrigation Administration (NIA) commenced in 1974 as a joint venture with BFD, MAB-UNESCO, U.S. Peace Corps and BFD-UNDP.

In support of their reforestation activities, NIA has established 2 central nurseries and 4 subsidiary nurseries, with a total capacity of about 13 million seedlings. Approximately 2,000 hectares of plantation was established since the start of the project until 1978. They have likewise constructed 10 kilometers of roads and trails. Among the species planted are: Yemane, Benguet Pine, Albizzia falcataria, Albizzia julibrissin, Giant Ipil-ipil, Agoho, Rain tree, Teak, Narra and Mahogany. The average survival of the two-year old plantation was reported as 40%. Approximately 90 hectares of the plantation was burned in 1978.

6. PD 1153 Planting Activity

The Presidential Decree No. 1153, requiring the planting of one tree every month for five years by every citizen was issued in 1977. Following this Decree, the BFD and the municipalities in the area has been deeply involved in this planting activity. The areas planted are located near the towns and barangays.

7. Family Approach Program

This program was designed to give direct and greater participation in reforestation by the families found within or near the proposed plantation areas. Five hundred forty five (545) hectares of denuded land along the periphery of the Pantabangan reservoir in Barrio Delacay (under D-9) had been established under Phases I and II.

Other objectives of this program are:

a) To create job opportunities and provide additional source of income for the displaced people of Pantabangan;

b) To enhance forestry consciousness by involving the families in actual seedling production and plantation establishment; and

c) To generate possible raw materials for cottage industries.

The report says that this program, involving 125 participating families has been quite successful and the average survival rate reaches 90%. Moreover, the program is now currently implementing its Phases III and IV. The Phase III of the program involves 50 families with a planting area of 150 hectares, while Phase IV has 100 families and a planting area of 300 hectares.

8. Communal Tree Farm Program

The program was launched in the early part of 1979. It aims to generate income for communities by tree planting, coupled with agricultural crop production. It also aims to accelerate the reforestation activities in the country. Three of BFD Reforestation Projects in this area initiated 50 hectares of the areas each, for this program.

IV. ACCOMPLISHMENT AND REVIEW OF THE PROJECT ACTIVITIES

1. Previous Program and Accomplishment

The previous work program of the project was prepared in 1977 and the budgetary program was approved on the 3rd Joint Committee Meeting held on May 8, 1978. The substance of the program was to establish the plantation of 8,100 hectares during the period of six years from 1977 up to 1982. The total estimated expenses to be provided by the Philippine Government amounted to 37,360,000 pesos. However, in 1979, the planning and management staff of the project concluded that it was difficult to implement the project based on the said program because of the following reasons:

A. Necessity of further research and experimental activities:
Natural environment is too severe to conclude technical studies within a few years. Further trials is required to avoid the failure in conclusion.

B. Existence of pasture lands within the proposed plantation sites:
Existing pasture lands and other occupants were discovered by the project survey team. Relocation of the plantation site is recommended to evade trouble with pasture lessees concerned. It needs re-programming of detailed plans.

C. Limitation of administrative capacity:
Supervision of activities and payment of the project expenses have reached to the full limit of its management capacity. Reinforcement or increase of administrative personnel is urgently needed in order to effect administrative efficiency and up-to-date payment of project obligations.

D. Difficulty and delay of infrastructure construction:
Forest civil engineering has not yet gained the recognization as vital part of forestry in this country. Forest road construction, especially, has met with financial and technical difficulties. The management should consider this situation in planning.

F. Shortage of budgetary requirement:
The program, prepared in 1977, placed cost estimates based on 1977 level. Since then, wage and price hike hit the project. Unless re-planning of budgetary requirement is made appropriate, management of the project will not be attained.

Table IV_I. Previous Program of the Project
(Unit: 1,000 Pesos)

	1977	1978	1979	1980	1981	1982	Total
Personnel	80	150	300	300	300	200	1,330
Supplies & Materials	40	100	100	100	40	20	400
Facilities	900	1,800	-	-	-	-	2,700
Labor Costs	880	3,250	7,010	8,780	10,030	1,680	31,630
(Plantation establishment *	210 ha. 630	600 ha. 1,800	1,800 ha. 4,750	2,500 ha. 6,250	3,000 ha. 7,500	-	20,930
(Tending **	200 ha. 20	800 ha. 80	2,400 ha. 240	4,300 ha. 430	5,500 ha. 550	3,000 ha. 300	1,620
(Protection ***		200 ha. 80	600 ha. 240	1,800 ha. 720	2,500 ha. 1,000	3,000 ha. 1,200	3,240
(Forest roads	5 km. 200	30 km. 1,200	40 km. 1,600	30 km. 1,200	20 km. 800	-	5,000
(Erosion control)	1 spot 30	3 spots 90	6 spots 180	6 spots 180	6 spots 180	6 spots 180	840
Operational costs	100	200	300	300	300	100	1,300
TOTAL	2,000	5,500	7,710	9,480	10,670	2,000	37,360

* nursery operation, survey, sticking, digging holes, hauling seedlings, planting, and fertilization and construction of firebreaks

** weeding

*** patrol and fire-fighting

Table IV-2. Accomplishment of Activities:

as of Sept. 30, 1979

ACTIVITY	1977	1978	1979	TOTAL
1. Nursery Operation				
Nursery Establishment	1	3	3	7
Seedling Production	0.2 M sdlgs	1.6 M sdlgs.	2.6 M sdlgs	4.4 M sdlgs.
2. Plantation Establishment				
New Establishment	207 has.	775 has.	1,051 has.	2,033 has.
Replanting		71 has.	22 has.	93 has.
3. Plantation Maintenance				
Weeding	86 has.	917 has.	200 has.	1,210 has.
Fertilization	105 has.	703 has.	350 has.	1,240 has.
4. Forest Protection				
Protection Area		210 has.	990 has.	-
Firebreak		13 km.	50 km.	63 km.
5. Road Construction				
Main Road	4.0 km.	14.4 km.	14.1 km.	32.5 km.
Operational Road		12.6 km.	6.7 km.	19.3 km.
Bridge			3	3
Road maintenance		4.0 km.	18.4 km.	22.4 km.
6. Erosion Control				
Structural Work	1		2	3
Vegetative Work	1	6	3	10
7. Facilities Construction				
Office building	1		1	2
Look-out Tower		1	1	2

2. Nursery Operation

2.1 Nursery establishment

In the master plan, three main nurseries in each parcel (Parcel I, II and III), were proposed to raise seedlings required for the project, equipped with mechanized irrigation systems and transportation facilities for hauling of seedlings from nursery to planting site. The project, had established three (3) main nurseries and three (3) sub-nurseries within the proposed plantation site since 1977, with the capacity to produce the needed seedlings. However, there is shortage of vehicles for transportation of seedlings and insufficient water supply in nurseries during summer. Aside from the nurseries in the proposed site, the project have utilized the Piut and Nanlagarian Nurseries to supply our seedlings needed but these nurseries were established by the San Jose Reforestation Project which is situated adjacent to the RP-Japan Project. These two nurseries are located beside the Talavera river which has sufficient water supply even during dry season.

Table IV-3. List of Nurseries

Nursery	Parcel	Date Established	Area (Has.)	Production Capacity (sdlgs.)
Baluarte	I	Jan. '77	2.2	800,000
Dalinat	I	Nov. '78	0.8	400,000
Talatalan A	II	Oct. '77	1.8	700,000
Talatalan B	II	Jan. '79	1.0	100,000
Bangabanga	II	Nov. '78	1.0	100,000
Conversion	III	Oct. '78	3.2	800,000
Piut		Dec. '78	0.8	150,000
Nanlagarian		Dec. '78	0.7	150,000
TOTAL			12.1	3,300,000

2.2 Seed procurement

Increase of the annual target of plantation establishment increases also the seed requirement. The increase of seed requirement from 1977 to 1979 is shown in Table IV-4. Among those seeds, pine species (except Benguet Pine), Eucalyptus species and some of experimental species

were procured from foreign countries through JICA. The seeds of other species were locally procured through BFD and purchased from the private suppliers. Narra, Yemane and Teak will be needed more in large quantities from now on, so that the procurement schedule and the storage of these seeds should be considered seriously to obtain not only sufficient quantity but also high quality of seeds for the project.

Table IV-4. Seed Requirement from 1977 to 1979

Species	1977	1978	1979
Giant Ipil-ipil	5 lit.	60 lit.	51 lit.
Agoho	5 "	1 "	1 "
Yemane	116 "	210 "	1,653 "
Eucalyptus sp.	(0.05)"	(0.4) "	(0.3) "
Benquet Pine	13 "	60 "	27 "
Caribean Pine	3.5 kgs.	45 kgs.	14 kgs.
Oocarpa Pine	2.5 "	35 "	11 "
Other Pines	11 lit.	30 lit.	
	7 kgs.		
Narra	1,600 lit.	10,100 lit.	28,866 lit.
Teak	500 "	1,345 "	1,922 "
Mahogany	1,000 "	3,310 "	1,214 "
TOTAL	3,250 lit.	15,196 lit.	33,759 lit.
	13 kgs.		

Ref. 1) Requirement for the following planting season
2) Other experimental species excluded.

2.3 Seedling Production

In the project nurseries, the total number of 4.4 million seedlings was produced during the last 3 years. Aside from this, 350,000 seedlings in 1977, 450,000 seedlings in 1978 and 1,000,000 seedlings in 1979 were taken from the other BFD projects to augment the project seedling requirements. Nursery techniques - the production of healthy and vigorous seedlings have been developed for the most part, through practice. But there are still aspects of nursery techniques that are to be studied and examined especially when dealing with delicate species.

Table IV-5. Seedling Production Accomplishment

Species	1977	1978	1979	Total
Giant Ipil-ipil		145,000	541,000	686,000
Agoho		47,000	2,000	49,000
Yemane		19,000	233,000	252,000
Eucalyptus sp.		35,000	21,000	56,000
Benquet Pine	52,000	225,000	755,000	1,032,000
Caribean Pine	32,000	332,000	379,000	743,000
Oocarpa Pine	30,000	163,000	268,000	461,000
Other Pines	52,000	69,000	50,000	171,000
Narra	20,000	159,000	180,000	359,000
Teak	10,000	33,000	17,000	60,000
Mahogany	10,000	341,000	133,000	484,000
Others		18,000	25,000	43,000
TOTAL	206,000	1,586,000	2,604,000	4,396,000

3. Plantation Establishment

3.1 Accomplishment:

In 1977, the Project had established 177 hectares of the Central Trial Plantation at Baluarte, Carranglan. Another 30 hectares plantation was established at Talatalan but was burned in 1978. The first Trial Plantation had served as fields of technical studies. The project have been conducting various kinds of research activities in the Central Trial Plantation.

The following year, 775 hectares of plantations were established and 71 hectares of the plantations which include the area burned in 1977 were replanted.

In 1979, the project was able to establish only 1,051 hectares of plantations against the target goal of 1,800 hectares as embodied in the previous work plan. The reason why the project was not able to meet its goal was the price hike and the increase of labor wages due to the oil crisis that hit the country.

At the height of the planting activities, on July 15, 1979, the mass labor lay-off was ordered and the project activities were suspended. Though the project was allowed to employ 100 laborers again starting August 1, the number of laborers was not enough to accomplish the target goal and the weather condition was no longer favorable for planting.

For the smooth implementation of the project activities, the improvement of the administrative system on work planning and accounting is pointed out. Also proposed is the rationalization of working system as follows:

a) Close supervision of laborers and appropriate instruction in the field to raise the efficiency of labor control thus, minimize labor cost.

b) Improvement of machinery maintenance to lessen the maintenance costs and the operational time loss caused by mechanical trouble.

c) Proper work scheduling of heavy equipment and vehicles to lessen the fuel consumption and the working time loss.

In some part, it was observed that the working efficiency were lowered because of lack of interest to work on the part of laborers because of repeated delay in the payment of their wages and also due to lack of adequate experienced field supervisors to supervise the work in the field.

As a trial, the project had conducted a barangay approach planting in 1979. This approach aims at the afforestation practice with lesser supervision and lesser expenses. It is also good for the barangay people because anytime during the certain period anybody in the barangay can be employed in the planting activity. The payment is done through the barangay leaders. Therefore, the barangay people can schedule the work by themselves and they can share the income as they like.

The scheme was found acceptable for both the project and the barangay, and the project is now studying further the possibility to adopt this method widely in the project.

The fruit-tree planting trial which was conducted in 1978 is the other innovative approach employed. The main purpose is the protection of plantations with the cooperation of the barangay people and they, in return, can be benefited from the fruit harvest in future. It was observed that the people are only willing to cooperate if they can get something from this plantation later on in exchange of their labor.

3.2 Record of Established Plantation:

The project established the observations spots in 1979 to record the growth of trees planted. These records will serve as basic data for the determination of suitable species in the area and for the selection of adaptable planting and tending techniques. So far, the project has only the young plantations less than three years old, which are yet too young to allow us make a conclusion.

Judging from the initial stage of growth and survival, Yemane (Gmelina arborea) and Narra (Pterocarpus indicus) are considered as the most suitable species in the area. Among pine species, Benguet Pine (Pinus kesiya or Pinus insularis) shows high growth and survival rate. Generally, pine species are considered to grow well at higher elevation, near the natural distribution of Benguet Pine. The survival rate of Teak (Tectona grandis) is comparatively high, but the growth is low because of die-back during dry season. Giant Ipil-ipil (Leucaena pulverulenta) shows high growth rate with the application of fertilizer.

Direct seeding of Yemane and Giant Ipil-ipil had been tried but the germination and survival was quite low. The cultivation planting had been tried in 1978. Although the result was better comparatively, it is not advisable to adopt this method from the viewpoint of erosion

control and machinery operation on the slope.

The stump planting of bare seedlings which is adopted for Teak and Yemane is the most economical method. For other species, however, the weather and the shipment are to be studied to apply such method. As for the spacing, 2 x 2, 2 x 3 and 3 x 3 are practical.

Table IV-6 Plantation Establishment
(By Year, by Parcel and by Block)

		1977	1978	1979	Total
Parcel I	Block 54			74.4	74.4
	55			140.3	140.3
	56		263.6	29.3	292.9
	57	177.2	100.6	143.1	420.9
	Sub-Total	177.2	364.2	387.1	928.5
Parcel II	Block 82		195.0	31.8	226.8
	83	30.1	116.9	144.3	291.3
	84			192.9	192.9
	85		68.8	130.9	199.7
	86			11.7	11.7
	Sub-Total	30.1	380.7	511.6	922.4
Parcel III	100		30.0	152.2	182.2
	Sub-Total		30.0	152.2	182.2
TOTAL		207.3	774.9	1,050.9	2,033.1

Table IV-7. Plantation Establishment
(By Parcel, By Species)

Has.

SPECIES	PARCEL I	PARCEL II	PARCEL III	TOTAL
Giant Ipil-ipil	96.3	118.4	42.2	256.9
Yemane	37.0	101.2	20.6	158.8
Agoho	21.7	-	-	21.7
Acacia	47.1	-	-	47.1
Eucalyptus sp.	23.7	-	-	23.7
Benguet Pine	108.8	121.8	44.0	274.6
Caribean Pine	133.5	64.4	28.0	225.9
Oocarpa Pine	98.3	74.4	30.4	203.1
Narra	198.8	84.6	12.5	295.9
Teak	29.7	158.5	4.5	192.7
Mahogany	90.8	168.6	-	259.4
Others	42.8	30.5	-	73.3
TOTAL	928.5	922.4	182.2	2,033.1

Table IV-8. Plantation Establishment
(By Year, By Species)

Has.

SPECIES	1977	1978	1979	TOTAL
Giant Ipil-ipil	25.1	154.6	87.5	267.2
Yemane	3.8	22.4	133.6	159.8
Agoho	16.7	14.7	-	31.4
Acacia	33.1	41.3	-	74.4
Eucalyptus sp.	2.4	14.9	0.4	23.7
Benguet Pine	13.6	74.4	201.0	289.0
Caribean Pine	10.8	143.7	71.5	226.0
Oocarpa Pine	8.5	77.3	117.3	203.1
Narra	17.9	100.7	183.9	302.5
Teak	40.0	44.9	118.1	203.0
Mahogany	14.4	113.5	133.1	201.0
Others	21.0	43.3	20.9	85.2
TOTAL	207.3	(70.8) 845.7	(22.4) 1,073.3	(93.2) 2,126.3

Table IV-9. Height Growth by Species

Place : Central Tiral Plantation
Date Measured : February, 1979
Year Planted : 1977

SPECIES	COMPARTMENT	SURVIVAL (%)	NO. OF SEEDLINGS	HEIGHT (cm.) MEAN	HEIGHT (cm.) RANGE	REMARKS
Giant Ipil-ipil	A	82	220	168.8	20 - 360	Fertilization
	H	76	246	63.8	10 - 170	
Teak	H	83	155	95.2	10 - 142	North
	A	94	224	77.0	22 - 145	South
	A	80	73	99.4	22 - 185	Fertilization
	B	88	194	51.3	15 - 111	
	E	92	245	56.6	15 - 170	
Mahogany	B	55	566	38.5	8 - 90	Density Test
	H	61	505	33.0	9 - 90	
Benguet Pine	A	63	704	54.0	8 - 112	Seedlings from Baguio
	F	70	247	30.0	10 - 72	
Caribean Pine	C	65	289	33.0	11 - 75	
	C	71	250	37.3	15 - 66	Planted in 1978
Oocarpa Pine	D	61	255	32.9	10 - 111	
	C	40	275	20.2	9-- 40	1978
Narra	E	82	245	96.7	40 - 200	
	G-1	92	339	139.6	17 - 281	Kick-off Planting
Agoho	D	72	677	66.2	10 - 160	1978
Camphor	G-1	97	538	39.4	8 - 80	1978
Bagras	E	63	235	93.7	20 - 232	
E. camaldulensis	D	-	125	29.8	5 - 100	1978
Yemane	A	84	395	87.7	38 - 158	
	C	92	404	91.3	31 - 152	1978

Prepared by: Ryoya Shimada

Table IV-10. Permanent Observation Spots Measurement

Place : Central Trial Plantation
Date : September 25 - October 10, 1979

SPECIES	COMPART-MENT	YEAR PLANTED	HEIGHT (Cm)		DIAMETER (Cm)		MORTALITY	REMARKS
			MEAN	RANGE	MEAN	RANGE		
Benquet Pine	A	1977	105	38 - 230	3.0	0.9 - 5.5	18	Seedlings from Baguio
	B	1977	105	60 - 184	1.9	0.8 - 4.9	48	
Narra	B	1977	141	40 - 240	2.5	0.8 - 4.0	34	
	E	1977	121	20 - 235	2.2	0.8 - 4.6	22	
	G-1	1977	133	45 - 290	2.9	1.0 - 4.5	11	Kick-off Planting
Teak	A	1977	107	55 - 200	3.7	1.4 - 5.2	6	
	B	1977	58	20 - 110	2.4	1.1 - 3.7	18	
	E	1977	57	27 - 150	1.7	0.3 - 3.2	34	
Giant Ipil-ipil	A	1977	309	40 - 490	4.0	0.6 - 8.0	4	Fertilization test
Yemane	C	1978	118	70 - 190	2.0	1.1 - 3.7	6	
E. deglupta	E	1977	103	15 - 230	0.9	0.3 - 2.5	52	Measured on May 21, 1979
E. camaldulensis	D	1978	98	45 - 135	1.1	0.3 - 2.0	38	
Agoho	D	1978	115	40 - 175	1.5	0.1 - 2.8	42	

Sampling: 50 plantings/spot

Prepared by: Mercedes Abanador

Table IV-11. Monthly Growth

Place: Central Trial Plantation

SPECIES	COMPART-MENT	NO. OF SAMPLES	DATE MEASURED	HEIGHT (Cm) MEAN	HEIGHT (Cm) RANGE
Benguet Pine	A	24	July 1, 1979	84.6	40 - 139
			Aug. 21, 1979	97.8	50 - 169
			Sept.25, 1979	106.1	57 - 186
Caribean Pine	C	10	July 24, 1979	47.3	28 - 66
			Aug. 21, 1979	49.2	28 - 66
			Sept.28, 1979	52.0	28 - 73
Narra	E	10	Aug. 21, 1979	166.6	106 - 255
			Sept.25, 1979	170.5	106 - 260
Teak	E	20	Aug. 21, 1979	54.9	20 - 110
			Sept.25, 1979	57.4	21 - 114
Yemane	C	20	June 14, 1979	96.6	62 - 135
			July 24, 1979	102.3	75 - 140
			Aug. 22, 1979	105.2	75 - 144
			Sept.25, 1979	107.1	75 - 144
Camphor	G-1	20	June 14, 1979	45.0	30 - 53
			July 24, 1979	52.8	37 - 66
			Aug. 22, 1979	53.3	40 - 66
			Sept.25, 1979	54.0	45 - 66

Prepared by:

Mercedes Abanador

RP-JAPAN AFFORESTATION PROJECT
BARANGAY APPROACH OF PLANTATION ESTABLISHMENT

Eriel B. Bumatay*

INTRODUCTION

The RP-Japan Afforestation Project had introduced the Barangay approach on plantation establishment in 1979. It is most likely by contractual basis wherein the Chief of Barangay is given the responsibility to conduct planting within a fixed area. This approach is, in most advantage to those out-of-school youth who are not actually employed in the project.

OBJECTIVE

The first launching was completed in a 40-hectare area in Parcel II-B of the project, the purpose of which, is to plant in the minds of the population the love of nature, our natural resources as a whole. It was known, however, that plantation establishment becomes faster but sure. The selection of seedlings is rigid in order for them to attain very satisfactor percentage survival in the future. The usual constraints of supervision and recuitment of laborers are also eliminated among the technical men of the project.

With regards to protection competition exists among the Barangay Chiefs as to who of them will be able to protect their respective plantation during the fire season.

PLANTATION ACTIVITIES

The establishment of plantation by Barangay approach begins during the planting season. The nurseries in operation provide the seedlings for disposal to different barangays. Preparation of plantation areas such as staking, digging, brushing, hauling and planting is undertaken by the barangays themselves. After planting, what follows is the application of fertilizer and replanting.

CONCLUSION

Numerous advantages mentioned above seemingly favor this method of plantation establishment, among which is the rigid selection of plantable seedlings to ensure a high percentage of survival. The use of proper technique to encourage produce high resistant seedlings in the nurseries could always be assured. Protection and management is well organized and placed in the hands of the Barangay Captains.

* Administrative Officer, RP-Japan Afforestation Project

4. Plantation Maintenance

4.1 Weeding:

Weeding was done based on the actual grass growth survey in each Parcel. The plantations are mostly covered by cogon of which the height reaches to 100 cm. in the rainy season. Depending on the height and thickness of grass, there are three kinds of methods, clear weeding, strip weeding, and ring weeding. Strip and ring weeding are commonly applied in the project and clear weeding is for fire protection to serve as firebreak. It is recommended that weeding be applied twice a year, particularly in the beginning and end of the rainy season. However, the project conducts weeding operation only once a year considering the labor demand during the season. The working efficiency survey which was conducted by the project, brought out the result that the machine weeding requires less labor force.

The controversial points on the introduction of machinery operation is the difficulty to purchase in large number locally and, the constant supply of fuel during the operation and the care and maintenance of these machineries.

Table IV-12. Weeding Work Efficiency

	METHOD	WORK EFFICIENCY		REMARKS
		SEEDLINGS/ MANDAY	MANDAYS/ HECTARE	
Manpower	Ring	200	12.5	Radius: 30-50 cm.
	Strip	120	21.0	Width : 50-80 cm.
Machine	Strip	800	3.1	Width : 70-100 cm.

Vegetation: Cogon grass (average height 80 cm)
Spacing : 2 m x 2 m (2,500 seedlings/hectare)
Bush cutter: ROBIN MODEL NB04-2D (37.7 cc)
Reported by: Eriel B. Bumatay (1977)

4.2 Fertilization:

The purpose of fertilizer application in the plantation is to promote the initial growth of planted seedlings. The application method is a half-moon plowing of upper slope and the dosage is 30 grams per seedling. The fertilizer tried in the project is the N-P-K, component of 20-10-10, 13-17-12 and 14-14-14. Among the species fertilized to the

plantations, Giant Ipil-ipil, Yemane and Teak showed the remarkable fertilizer effect in their growth. Besides, the slow-released solid fertilizer is tested in the plantations.

Table IV-13. Weeding Accomplishment

	1977			1978			Total
	P I	P II	Total	P I	P II	Total	
Ring Weeding	57.5	10.0	47.5	385.0	374.8	759.8	807.3
Strip Weeding	38.5	-	38.5	121.1	36.0	157.1	195.6
TOTAL	76.0	10.0	86.0	506.1	410.8	916.9	1,002.9

Table IV-14. Fertilization Accomplishment

FERTILIZER	1977			1978			TOTAL
	P I	P II	TOTAL	P I	P II	TOTAL	
20-10-10	67.1	-	67.1	139.0	8.4	147.4	214.5
13-17-12	32.9	-	32.9	119.4	-	119.4	152.3
14-14-14	-	5.0	5.0	177.1	206.9	384.0	389.0
Others	-	-	-	52.0	-	52.0	52.0
TOTAL	100.0	5.0	105.0	487.5	215.3	702.8	807.8

5. Forest Protection

Forest protection means mostly fire protection and fire-fighting activities.

In 1978, 30 hectares of plantation in Parcel II was burnt and 16 hectares in 1979.

Generally, the bigger the established plantation is, the more protection cost increases. The project employed 480 fire-fighters and 60 plantation guards to protect 1,000 hectares of established plantations during the dry season from January to May, 1979.

The protection activity includes patrolling, watching, education and fire-break construction for the prevention of fire and fire suppression including the training of fire-fighters.

Moreover, the project have established the fruit-tree plantation in the project site to expect the cooperation of the inhabitants for the protection of the project plantation. They, in return, will be benefited from

the fruit harvest in future.

For a protective green belt, also the project tried the line planting of Kakawati cuttings in 1979. The performance was not so satisfactory but the project continues the study on this method.

Causes of fire is classified into two categories, which are the intentional and the accidental. The intentional fire includes malicious burning of the project and meaningless lighting to start fire just for fun. The accidental involves carelessness of trespassers, range preparation, kaingin-making and so on.

Fire Prevention Activities:

a) Patrolling - Patrolling in and outside of the plantations by Forest Guards and Fire-fighters equipped with flasslight and walkie-talkie. During the fire season, one Jeep is assigned for patrol.
b) Watching - Fire detection and trespasser control at 2 permanent look-out towers and other temporary stations. Walkie-talkie is linked up with the radio at the tower and Technical Cooperation Center.
c) Firebreak Construction - Firebreak is constructed surrounding the plantations and inside, 30 m. of width and 40 m/hectare of density.
d) Education of rural people - Display of signboards, streamers and posters. Distribution of T-shirts and Patch. Film showing and propaganda on the community meeting.
e) Fire-fighter training - Training is held before and during the fire season, especially for new employees.

Fire-fighting Systems:

a) Fire detection - Patroller and tower man report through the radio to the Center, the place or direction. Protection officer infers the place from the reported directions.
b) Dispatch of fire-fighters - Fire-fighters equipped with water shooter is dispatchecd by trucks and jeeps available. Also, Protection Officer and relief party keeping the contact with Center through radio.
c) Fire suppression - Swatters and tree branches are used for suppression with the help of water shooter. Depending on the topography and weather condition, fire control officer conducts back firing. After the fire had been put out, a mopping up operation is conducted to be sure all fires are completely put out.
d) Watching after suppression - After suppression, fire-fighters and plantation guard watch the area burnt at least 24 hours to prevent secondary fire.

e) Investigation - Investigation is conducted immediately after the fire. Report gives data for analysis and informations for future prevention.

6. FOREST ROAD CONSTRUCTION

The project have constructed 33.0 km. of the main or access roads and 18.8 kms. of the operational or plantation roads up to the present. Main road is a permanent and all weather road to be maintained as long as the project needs. It may serve as a public road also, if the people who resides near the road want to pass through.

Operational road is constructed only for the plantation establishment and maintenance which last a few years. Therefore, it is more economical to construct the operational road than main road unless there is danger of erosion.

The project has constructed all these roads by administration making use of the equipment of the project. However, the maintenance of equipment and the training of operator became a big problem because spare parts are not readily purchased and the mechanics and operators are not well experienced. Operators once trained seek transfer to other agencies or companies who offer high salaries.

7. EROSION CONTROL

The erosion control work was started late in 1977 by Forester Masayoshi Shinagawa, expert on erosion control. After the detailed survey of the project site, 3 spots of structural works and 10 spots of vegetative works were constructed. Besides, 1 check dam which was requested by the R-3, D-3 Forest District was constructed by the trained RP counterpart.

Considering the importance of the erosion control work in the critical watershed area, this erosion control project is proposed to be transferred to the Training Center for Forest Conservation which is expected to become operational soon.

Table IV-15. Fire Suppression Record
(November, 1978 - April, 1979)

DATE	TIME DETECTED'	PLACE	NO. OF FIRE-FIGHTERS	AREA BURNT (HA.)	CAUSE OF FIRE	REMARKS
November 11, 1978	4:30 P.M.	Digdig	20	50	Intentional	Grassland
December 15, 1978	1:00 P.M.	Maringalo	25	22	Ranch burning	Valbueco Ranch
December 17, 1978	11:30 A.M.	Maringalo	15	11	Ranch burning	Grassland
January 2, 1979	6:00 P.M.	Bunga	50	3.5	Ranch burning	Grassland
January 25, 1979	8:30 P.M.	Dalinat	100	80	Kaingin-making	NIA Plantation
January 27, 1979	11:20 A.M.	Maringalo	300	20	Carelessness	Pro FEM
February 2, 1979	3:00 P.M.	Baluarte	125	4	Incendiary	RP-Japan
February 21, 1979	5:15 P.M.	Tala-talan	410	3	Ranch burning	Catalan Ranch
March 3, 1979	7:30 P.M.	Maringalo	200	0.3	Incendiary	RP-Japan
March 10, 1979	1:00 P.M.	Conversion	80	1	Kaingin-making	Public forest
March 19, 1979	7:35 P.M.	Maringalo	200	65	Intentional	RP-Japan
April 6, 1979	10:30 A.M.	Baluarte	6	21	Kaingin-making	A & D
April 7, 1979	12:45 P.M.	Conversion	10	1	Kaingin-making	A & D
April 8, 1979	12:20 P.M.	Maringalo	5	1	Ranch burning	Valbueco Ranch
April 9, 1979	9:15 A.M.	Maringalo	15	10	Intentional	RP-Japan
April 10, 1979	7:45 P.M.	Dalinat	40	50	Carelessness	Grassland
April 11, 1979	6:20 P.M.	Baluarte	76	5	Intentional	RP-Japan
April 12, 1979	6:30 P.M.	Maringalo	50	2.5	Ranch burning	Choco Ranch
April 14, 1979	10:55 A.M.	Maringalo	20	30	Carelessness	ProFEM
April 14, 1979	10:55 A.M.	Maringalo	25	100	Carelessness	Chioco Ranch
April 15, 1979	7:20 P.M.	Maringalo	5	2.5	Ranch burning	A & D
April 16, 1979	1:30 P.M.	Baluarte	200	7	Intentional	RP-Japan
April 18, 1979	7:45 P.M.	Maringalo	5	1	Ranch burning	Valbueco Ranch
April 19, 1979	8:15 P.M.	San Agustin	4	1.5	Kaingin-making	A & D

Prepared by: Nestor Parado
Protection Officer
RP-Japan Afforestation Project

Table IV-16. Plantation Damaged by Fire

DATE	PARCEL	COMPART-MENT	SPECIES	AREA BURNT	NO. OF SEEDLINGS	REMARKS
March 25, 1978	II-B	83	Teak and Other 4	30	75,000	Range preparation
February 2, 1979	I	57	Mango	4	26	Incendiary
March 3, 1979	I	56	Narra, Mahogany	0.3	300	Incendiary
April 11, 1979	I	56	Acacia Mahogany	5	3,400	Incendiary
April 16, 1979	I	56	Mahogany	7	5,000	Incendiary

Prepared by: Nestor Parado

Table IV-17. Road Construction Accomplishment

as of September 30, 1979

WORK	PARCEL	1977	1978	1979	TOTAL
Main Road	I	4.0 km.	2.9 km.	2.1 km.	9.0 km.
	II		6.0 km.	9.0 km.	15.0 km.
	III		5.5 km.	3.0 km.	8.5 km.
	Total	4.0 km.	14.4 km.	14.1 km.	32.5 km.
Operational Road	I		9.1 km.	2.0 km.	11.1 km.
	II		3.5 km.	4.7 km.	8.2 km.
	III				
	Total		12.6 km.	6.7 km.	19.3 km.
Road Maintenance	I		4.0 km.	6.9 km.	
	II			6.0 km.	
	III			5.5 km.	
	Total		4.0 km.	18.4 km.	
Bridge Construction	I			2	2
	II			1	1
	Total			3	3

Table IV-18. Existing Forest Road

As of Sept. 30, 1979

PARCEL	MR/OR	NAME	TOTAL DISTANCE	REMARKS
I	M.R.	CTP No. 1	4.0 km.	
	M.R.	Clarete Road	5.0 km.	
	M.R.	Agnes Road	3.0 km.	Training Center
	O.R.	CTP No.2	2.5 km.	
	O.R.	P I No. 1	2.6 km.	Extension A, B
	O.R.	P I No. 2	4.5 km.	Extension A
	O.R.	P II No. 3	1.5 km.	
II	M.R.	East Tala-talan	5.0 km.	
	M.R.	West Tala-talan (A)	1.0 km.	
	M.R.	Ohira Main	5.2 km.	
	M.R.	Ohira No.2	3.8 km.	
	O.R.	West Tala-talan (B)	1.5 km.	
	O.R.	Ohira No.1	2.2 km.	
	O.R.	South Tala-talan	4.5 km.	
III	M.R.	Conversion Road	8.2 km.	
	M.R.	Nursery Road	0.3 km.	
	T O T A L		54.8 km.	

Table IV-19. Erosion Control Structural Work

As of Sept. 30, 1979

YEAR	PARCEL	WORK	STRUCTURE	VOLUME	REMARKS
1977	I	Hillside work	Wet stone	75.0 m^3	
1978	I	Hillside work	Wet stone	33.8 m^3	Restoration
1979	II	Check Dam	Concrete	24.8 m^3	
			Gabion	20.0 m^3	
	II	Water Gauge Station	Concrete Boulder	24.8 m^3	
			Concrete	12.0 m^3	
			Concrete Walls	15.5 m^3	2 walls

Table IV-20. Erosion Control Vegetative Work

As of Sept. 30, 1979

YEAR	BLOCK NO.	AREA NO.	NO. OF SPOTS	AREA	REMARKS
1977	57	77-1	1	0.1 ha.	Nursery
1978	57	78-5	1	0.1 ha.	Nursery
	56	78-1	7	1.7 has.	
	56	78-2	12	7.5 has.	
	56	78-3	1	5.5 has.	
	56	78-4	4	0.8 has.	
	56	78-6	1	0.1 ha.	
1979	56	79-1	3	1.0 ha.	
	56	79-2	3	2.0 has.	
	56	79-3	1	5.0 has.	

8. Research and Training

The project has been conducting various kinds of research activities which aim at the immediate technical development for a large scale afforestation project. The subjects are the development of adaptable techniques to the project, and those techniques are introduced immeidately in the project operation. At the same time, the project continues to measure and record the growth of planted seedlings periodically.

In 1979, the project established the seed orchard aiming at the development of tree breeding techniques.

The project has a training system which consist of on-the-job training through the practice of the project operation and off-the-job training like seminars and observations. The project also, sends the staff to Japan for advanced training. Moreover, the project has been cooperating to other forestry training programs conducted by the Bureau and other foreign agencies.

LIST OF RESEARCH ITEMS

Item	Subject	Remarks
Nursery Techniques:		
Shading Test	Effect of light intensity	Concluded
Chemical Test	Application of chemicals for seedlings	- do -
Cutting Test	Seedling production by cutting	Continue
Fertilization test	Application of fertilizer in the nursery	- do -

Item	Subject	Remarks
Tree Breeding Techniques:		
Provenance Trial	Difference of gorwth by provenance	New
Elite Tree Selection	Selection of elite tree (Mother tree)	-do-
Grafting Test	Grafting techniques in seed orchard	-do-
Planting Techniques:		
Species Trial	Selection of suitable species	Continue
Density Trial	Determination of adequate spacing	- do -
Interplanting Trial	Effect of interplanting	- do -
Cultivation Trial	Effect of planting site cultivation	- do -
Natural Growth	Enrichment of natural growth	- do -
Mycorrhizae Trial	Effect of mycorrhiza	- do -
Planting Hole Size Test	Determination of adequate size	- do -
Seedling Size Trial	Determination of adequate size	- do -
Direct Seeding Trial	Adaptability of direct seeding	Concluded
Cutting Trial	Adaptability of cutting planting	- do -
Pot Size Test	Determination of adequate size	Continue
Nest Planting Trial	Effect of nest (spot) planting	New
Mechanization Test	Introduction of Bush Cutter and Hole Digger	Concluded
Bare-root Trial	Adaptability of Bare-root planting	Continue
Tending Techniques:		
Weeding Test	Determination of adequate method	- do -
Fertilization	Determination of adequate method	- do -
Road Construction Techniques:		
Roadside Protection	Determination of proper method	- do -
Work Standard	Standardization of Construction Work	- do -
Erosion Control Techniques:		
Hillside Vegetation	Stabilization of Hillside	- do -
Water Gauging	Survey on water flow and soil erosion	- do -

Table IV-21. Off-The-Job Training

	1976	1977	1978	1979	Total
Training in Japan (No. of trainees)	1	2	4	(3)*	7 (3)
Seminar/Lecture		2	2	1	5
Study Tour				1	1

* Proposed for 1979

9. Equipment and Facilities

Since 1977, the Japanese Government has donated the equipment and materials to the project. The project still needs several equipment especially for fire protection and for road construction. The problem for those equipment is lack of proper maintenance. Likewise, the mechanics and operators lack the necessary experience and the unavailability of spare parts in the local market. For the mechanics and operators, proper training and the granting of higher wages can solve the problem, but the project cannot purchase the spare parts as some is not available in the country.
The project has constructed several buildings to accommodate staff and personnel and to facilitate the project management. Also constructed are two look-out towers for fire protection.

Building and Facility

Center Office and Dormitory -------- 1
Nursery Office (Parcel II) --------- 1
Look-out Tower ---------- 2
Motor Pool ---------- 1
Warehouse ---------- (under construction)

Table IV-22. LIST OF EQUIPMENT DONATED BY THE JAPANESE GOVERNMENT

	1st SHIPMENT (Aug.'77)	2nd SHIPMENT (Nov.'77)	3rd SHIPMENT (June'78)	4th SHIPMENT (April'79)	TOTAL
For Nursery Operation:					
4-ton Truck		2			2
Irrigation System		1	1		2
Shade House		1	1	1	3
Potting House	1	1	2	1	5
Shade Net		30		1,000	1,030
For Planting Activity					
Crawler Tractor (5.5 tons)	1	1			2
Wheel Tractor (2.5 tons)		1	1		2
Hole Digger		5	5		10
Bush Cutter	10		10	10	30
Tool (Hoe)				200	200
For Fire Protection					
Water pump			3	2	5
Extinguisher				20	20
Collapsible Tank			3	2	5
Jacket				50	50
Sleeping Bag				50	50
For Road Construction					
Bulldozer (16 tons)		1			1
Dozer Shaver (12 tons)		1		1	2
Motor Grader			1		1
Dump Truck		1	1	1	3
Crane Truck				1	1
Rock Drill				1	1
H-Beam Bridge				3	3
Survey Instrument			7		7
Chain Saw	2				2
For Erosion Control					
Seep Sprayer				1	1
Concrete Mixer				1	1
Vibrator				1	1
Sand Pump				1	1
Belt Conveyor				1	1
V Notch			2		2

	1st	2nd	3rd	4th	Total
For Research					
Seed Stocker	1		4	1	6
Microscope		1			1
Germinator		1			1
Automatic Balance		1			1
Pressure Chamber		1	1		2
Tension Meter		1			1
Rainfall Recorder		1			1
Pluviograph		20			20
Water Gauge			2		2
Hygrothermo Meter				1	1
Butcher Scale				2	2
Concrete Tester				1	1
Slump Tester				1	1
For Administration					
Typewriter	1	1			2
Copying machine	1		1		2
Filing Cabinet	2		5		7
Locker	2		2		4
Blackboard		2	2		4
Clock		2			2
Generator	1	4	1		6
Switchboard		1			1
Battery		3			3
Garage-jack		1			1
Battery Charger		1			1
SSB Radio			2		2
VHF Radio			4		4
Transciever			6		6
Jeep (Wagon)	2				2
Jeep (Hard Top)		2		1	3
Jeep (Pick-up)			1	1	2
Motorcycle		3	3	5	11

Other materials excluded

10. ORGANIZATION

The project was started with five RP-Counterparts and two Japanese Experts. Since then, the project has increased the number of staff. At present, 31 personnel serve on full-time and 7 serve as concurrent capacity. Seven (7) Japanese Experts serve as technical advisers.

STAFF OF CENTRAL OFFICE

Project Director	Rogelio B. Baggayan	Chief, Reforestation & Afforestation Division, BFD
Asst. Project Director	Jose L. Lechoncito	Asst. Division Chief Reforestation & Afforestation Div.
RP-Counterpart	Jose B. Elpa	Senior Forester
Special Disbursing Officer	Ernesto B. Pedro	
- do -	Cristeta R. Rulloda	

OTHER OFFICES

Co-Project Leader	Oscar M. Hamada, Jr.	District Forester R-3, D-9
Co-Project Leader	Remilio Atabay	Pantabangan Station Chief, FORI
RP-Counterpart on Research	Bernardo B. Jasmin	FORI

Table IV-23. Staff & Personnel of the RP-Japan Project
As of October 15, 1979

	I. Regular	DESIGNATION	PLACE OF ASSIGNMENT	EDUCATIONAL QUALIFICATION AND ELIGIBILITY IF ANY
1.	Manuel H. Zambrano	Project Leader	RP-Japan Center	Registered Forester
2.	Romualdo J. Villador	Asst. Project Leader	RP-Japan Center	Registered Forester
3.	Eriel B. Bumatay	RP Counterpart/Administration	RP-Japan Center	Registered Forester
4.	Reginaldo R. Domingo	RP-Counterpart/Erosion Control	RP-Japan Center	Registered Forester
5.	Floro T. Tadena	RP-Counterpart/Planning Officer	RP-Japan Center	Registered Forester
6.	James M. Jacob	RP-Counterpart/Forester In-Charge P-III	Conversion, Carranglan	Registered Forester
7.	Jose U. Natibo-oc	RP-Counterpart/Forester In-Charge P-II	Talatalan, Carranglan	Registered Forester
8.	Redentor Laureta	RP-Counterpart/Forester In-Charge P-I	Baluarte, Carranglan	Forestry Technician C-Service (Prof.)
9.	Meliton I. Vicente	RP-Counter/Asst. Erosion Control	RP-Japan Center	Registered Forester
10.	Eduardo Cortez	Nursery-in-Charge	Baluarte Central Nursery	
11	Antonio Manaloto	OIC, Infrastructure	RP-Japan Center	B.S. Architect

	II. CASUAL PERSONNEL	DESIGNATION	PLACE OF ASSIGNMENT	EDUCATIONAL QUALIFICATION AND ELIGIBILITY IF ANY
1.	Nestor P. Parado	Forest Protection Officer	RP-Japan Center	B.S. in Forestry
2.	Romeo R. Clarete	Forest Road Construction	- do -	Mech. Engr. (BSME)
3.	Warlito Gaygay	Asst. Forest Road Const.	- do -	Asso. in Forestry
4.	Angelita Velasquez	Assistant, Planning	- do -	Asso. in Forestry
5.	Benjamin Tugab	Asst. Seedling Prod.	- do -	Undergrad. (B.S.F.)
6.	Zacarias C. Willanar	Motorpool In-charge	- do -	Mech. Engr. (undergrad.)
7.	Romeo Galasinao	Asst. Forest Protection	P-I	B.S. Forestry
8.	Marcelina Sobrepena	Asst. Nursery Operation	P-I	B.S. Forestry
9.	Gerardo del Leon	RP-Assistant	P-I	Undergrad. (B.S.F.)
10.	Lodita Robasto	Asst. Seed Orchard	P-I	B.S. Agriculture
11.	Manolito dela Cruz	Asst. Forest Protection	P-II	B.S. Forestry
12.	Oldelon Azul	Asst. Nursery Operation	P-II	Associate in Forestry
13.	Rosemarie Domingo	RP-Assistant	P-II	B.S. Agriculture
14.	Mercedes Abanador	RP-Assistant	P-II	Associate in Forestry
15.	Romeo Vasquez	RP-Assistant	P-III	B.S. Forestry
16.	Wilfredo Ramos	Asst. Nursery Operation	P-III	B.S. Agriculture
17.	Alice Gloria	RP-Assistant	P-III	Undergrad. (B.S.F.)
18.	Leonila Pascua	RP-Assistant	P-III	B.S. Agriculture
19.	Dionisio Gomez	OIC, Communication Unit	RP-Japan Center	Radio Operator Technician

11. LABOR FORCE

Since 1977, the number of laborers employed in the project has increased and it reached 2,200 last June, 1979, which was the maximum record of laborers employed in the last 3 years.

During the planting season in 1979, the project received a letter from the Mayor of Carranglan requesting for coordination with the municipal authorities concerning the hiring of labor force which are needed by the project and for rice production in the area. Also the project received the request from schools in Carranglan asking not to employ students under compulsory education so that they will not stop going to school. In response to these requests, the project decided to enforce five working days only so that Saturdays and Sundays will be devoted to rice production activities. And also, the project issued an order to all In-charge of different field activities instructing them not to employ children under compulsory education, from the educational standpoint. In such social circumstances, future labor force shortage in the area is predicted to increase. The project has tried to recruit labor force from neighboring municipalities to meet with the project labor demand. The problems on importing labor force are:

1. Repeated delay of payment of wages which hinder the project from recuitment of short-term imported labor.
2. Public transportation system is inadequate to transport the laborers, and transporting laborers by the project vehicles is not advisable considering availability of vehicles and unexpected accident.
3. Housing accommodation for laborers is not available and construction of cottages for them requires additional expenses.

The municipal authorities of Carranglan requested also, to employ the people in the area continuously. Expecting the cooperation of the people living in the locality on forest protection and the other project activities, proper labor force management and control should be considered in the project management plan.

The proposed project area is far from the dwellings of people and the project activities and laborers will be dispersed to several places from now on. The increase of commuting distance may result to the shortening of actual working hours and the requirement of transportation services for laborers.

In Parcel III, the use of bancas in transporting laborers will be one of the transportation measures. Involving the kainginero and other squatters in the project site is another matter to be studied.

Table IV-24. Monthly Labor Employment

Unit: 1,000 Mandays

ACTIVITY	OCT 1978	NOV	DEC	JAN 1979	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT	TOTAL
Nursery Operation	9.8	10.7	12.5	31.5	19.7	11.4	18.9	8.4	4.6	2.1	0.5	1.1	131.2
Plantation Establishment								24.9	62.0	11.6	5.6	5.0	109.1
Forest Protection	4.1	6.9	7.3	14.9	13.4	14.8	14.4	7.5	1.2	0.8	0.6	0.6	86.5
Construction Works	0.8	0.9	0.9	1.5	2.3	2.6	2.5	3.0	2.9	-	-	-	17.4
Administration	0.8	0.8	0.8	2.1	1.6	1.6	1.4	1.6	1.8	1.5	1.2	1.2	16.4
Central Office	0.2	0.2	0.2	0.3	0.3	0.5	0.6	0.6	0.6	0.6	0.4	0.4	4.9
TOTAL	15.7	19.5	21.7	50.3	37.3	30.9	37.8	46.0	73.1	16.6	8.3	8.3	365.5
WAGES TOTAL (₱1,000)	162	201	223	564	418	346	423	515	892	200	100	100	4,144

Note: Mandays from July to September, 1979 is the presumed number.

12. BUDGET AND EXPENSES

The budget of the project was 2 million pesos in 1977, 5.5 million pesos in 1978 and 7.1 million pesos in 1979. Among these, 1 million pesos in 1977 and 2 million pesos in 1978 were the collateral funds of Rice Donation extended to the Philippines by the Japanese Government. In 1979, the nationwide price hike had influence on the project activities because the budget plan was prepared in 1977 and was estimated based on the cost level of that time. Besides, the allotment for labor wages in 1979 was retrenched and 20% of wage hike resulted in the suspension of project activities in July 15, 1979. Roughly comparing the plantation establishment cost; 9,500 pesos per hectare in 1977, 7,100 pesos per hectare in 1978 and 6,800 pesos per hectare in 1979. This shows that the unit cost was decreased in spite of price hike.

Among the items of 1979 budget, labor wages (01) is 3,937,000 pesos out of 7,117,000 pesos or 55% of total budget. The ratio of labor wages in the budget is considerably high and the effect of wage increase to the expenses was not disregarded. Most amount for other services (06) were disbursed for the brokerage fee of equipment from Japan and the expenses for repair service of equipment was limited. For supplies and materials (07), the increase of allotment for fuel cost was covered by controlling the expense of other items. The disbursement of capital outlay (20) was delayed because of procedural mistake on releasing allotment and it caused the delay of construction works.

The financial crisis of the project was mainly caused by the budgetary shortage against the target goal of the project activities. This is because the work plan was not checked in certain period and was not adjusted to the real budgetary situations.

Items to be studied for the improvement of accounting system are as follows:

1. To increase the number of Special Disbursing Officers (S.D.O.) or to increase the working capital of S.D.O. in order to meet the increase of allotment given to the project.
2. To assign at least one S.D.O. at the Technical Cooperation Center, dealing with the disbursement of supplies and materials (07), for smooth disbursement and for proper control of expenditures.
3. To submit the monthly or quarterly accounting report to the Project Director to avoid unexpected budgetary shortage.

Table IV-25. Budgetary Allotment and Expenditure (1979)

as of September 30, 1979
Unit: 1,000 pesos

Item		1st QUARTER	2nd QUARTER	3rd QUARTER	4th QUARTER	TOTAL
Personal Services (01-1)	Allotment	787	1,182	1,181	787	3,937
	Expenditure	1,328	1,830	400	(379)	
Traveling Expenses (02)	Allotment	28	41	41	28	138
	Expenditure	28	41	41	(28)	
Other Services (06)	Allotment	60	90	90	60	300
	Expenditure	60	90	90	(60)	
Supplies & Materials (07)	Allotment	192	289	289	192	962
	Expenditure	129	244	397	(192)	
Capital Outlay (20)	Allotment	0	710	535	535	1,780
	Expenditure	0	710	535	(535)	
TOTAL	Allotment	1,067	2,312	2,136	1,602	7,117
	Expenditure	1,545	2,915	1,463	(1,194)	

( ) : Balance left for 4th Quarter

4. To fill up the accounting staff and personnel in the Technical Co-operation Center and field offices to hasten the submission of pay-rolls and other expense vouchers.
5. To plan the monthly or quarterly expense and work plan based on the actual allotment or remaining balance of the budget.

As for the planning of annual budgetary requirement, main points to be considered are as follows:

1. Preparation of the budgetary requirement plan one year advance to have enough time to discuss about the propriety of the plan.
2. Review and evaluation of the previous plan to give more accuracy on the basic cost estimate of the activity.
3. Collection and filing of necessary information for conformity with the work plan.

13. JICA ASSISTANCE

The Japan International Cooperation Agency (JICA) has been supporting the project not only in accordance with the agreement in the Record of Discussions but also by other technical and financial assistance.
Based on the Record of Discussions, JICA has cooperated with the Bureau of Forest Development which is the executing body of the project by sending experts on the fields of forestry, donation of necessary equipment and training of RP-Counterparts in Japan. Moreover, JICA has also extended assistance such as restoration works of the project facilities and construction of model infrastructures for the smooth implementation of the project.
The Japanese experts dispatched to the project have been working together with the RP-Counterparts to develop various techniques and improve the project management. Therefore, they are expected to serve as technical advisers for the project from now on.
The project has been implemented with the use of equipment and materials donated to the project by JICA. All these are necessary items for the success of the project. Therefore, it is required to be utilized and maintained for the project implementation throughout the period of the project operation.
From the standpoint of immediate necessity for the smooth implementation of the project, JICA has extended assistance on the restoration of facilities damaged by disaster, and the construction of model infra-structures which were needed immediately for training and experimental

purposes. These construction works assisted by JICA contributed to the project financially and technically, especially for the forest civil engineering such as forest road construction.

NAME LIST OF JAPANESE EXPERTS

Long Term Experts:

Sumihiko ASAKAWA	Chief Adviser	Nov. 24, 1976 - Nov. 23, 1978
Masanori TANAKA	Team Leader, Silviculture	- do -
Masayoshi SHINAGAWA	Erosion Control	Aug. 3, 1977 - Aug. 2, 1979
Osamu TAKASAWA	Forest Management	Aug. 3, 1977 - Nov. 2, 1979
Ryoya SHIMADA	Forest Management	Oct. 16, 1978-Oct. 15, 1980
Yoshitaka YANAGISAWA	Silviculture	- do -
Senshi NAMBA	Chief Adviser	Nov. 13, 1978-Nov. 12, 1980
Katsusuke OKADA	Silviculture	- do -
Susumu TANOUE	Forest Engineering	June 15, 1979-June 14, 1981
Nobuhito HOBO	Liaison Officer	- do -

Short Term Experts:

Kota YAMATE	Tree Breeding	March 23, 1977-June 27, 1977
Akira KINUKAWA	Forest Management	- do -
Takao KOBAYASHI	Forest Pathology	Aug. 3, 1977 - Oct. 2, 1977
Teruhiko KAWAHARA	Forest Ecology	- do -
Tadao YOKOKOJI	Forest Machinery	Aug. 30, 1977-Sept. 29, 1977
Tomoyoshi NAGANUMA	Nursery Facility	- do -
Masaharu KONNO	Model Infrastructure	July 27, 1978-Jan. 22, 1979
Yasushi MORIKAWA	Forest Physiology	Aug. 1, 1978 - Sept. 30, 1978
Hideo YANASE	Erosion Control	Aug. 31, 1978-June 20, 1979

RESTORATION WORK ASSISTED BY JICA

1. Reconstruction of Nursery Facility (June, 1978)			
	Concrete Embankment	1 spot	Baluarte
2. Reconstruction of Bridges (Jan. 1979)			
	Wooden Bridges	2 units	C.T.P.
3. Restoration of Forest Road (June, 1979)			
		1 km.	Parcel II
4. Restoration of Forest Road (June, 1979)			
	Graveling and side canal Improvement	2 kms.	C.T.P.

MODEL INFRASTRUCTURE CONSTRUCTION

1.	1st Construction Work (Jan., 1979)		
	Improvement of nursery	4.4 has.	Parcel II
	Access Road	2.4 kms.	- do -
	Seed Orchard	5.9 has.	C.T.P.
	Look-out Tower	1 unit	Parcel II
2.	2nd Construction Work (June, 1979)		
	Forest Protection Road	5.2 kms.	Parcel II
	Water reservoir	5 units	- do -
	Permanent firebreak	6 kms.	- do -

V. RECOMMENDATIONS ON PROJECT MANAGEMENT

Since the project had started its operation in January, 1977, it has established 2,030 hectares of plantations and has been successful in the development of afforestation techniques in the Pantabangan area. The project is, still, expanding its activities and is facing various problems to attain its objectives. Therefore, the project surely requires the improvement and reinforcement of its management.

There are three main points to be considered regarding project management. The so-called three M's, those consist of manpower, materials and money.

Manpower	-	Organization
		Staff and Personnel
		Labor force
Materials	-	Land
		Equipment and Materials
Money	-	Budget
		Accounting

These three factors are all necessary for the management and are related mutually. Therefore, a well-balanced and harmonized planning of these three factors will result to the expected accomplishment of the project goal.

Another basic idea for the better management is PLAN-DO-SEE-SYSTEM.

PLAN - planning - Forecast and arrangement of 3 M's to attain the proposed target goal of activity.

↓

DO - practice
- ◦ top management - Decision-making; Coordination, Negotiation
- ◦ management staff - Arrangement of 3 M's; Investigation of activities; Recommendations to the top
- ◦ field officer - Instruction and supervision in the field; Record and report of accomplishment

↓

SEE - reviewing - Accomplishment analysis and collection of necessary informations for the following planning.

↓

(PLAN)

Formerly, the management staff were apt to foreget reviewing the accomplishment of activities. Reviewing after practice and accomplishment analysis before planning is one of the keypoint to implement the project successfully. Finally, it is recommended that all foresters and technical personnel should supervise field work frequently, inspect field activities regularly and conduct survey and research work in the field. This practice will, surely, benefit both the project and the personnel concerned.

APPENDICES

APPENDIX A

FORESTRY LAWS, REGULATIONS AND ORDERS

Compiled by

NOBUHITO HOBO

October 1979

I. CONSTITUTION:

The Constitution of the Republic of the Philippines prescribes the state policies, rights and obligations of citizens, conduct of the government, the national economy and the patrimony of the nation. All laws and regulations are based on this Constitution.

II. PRESIDENTIAL DECREES:

P.D. 54

This decree specifies penalties to persons who directly or indirectly cuts, declares, classifies, possesses or export logs in violation of existing laws, rules and regulations.

P.D. 330

This decree specifies that any person who cuts, gathers, removes, or smuggles timber or other forest products from any forest in violation of existing laws, rules and regulations shall be guilty of the crime of qualified theft as defined and penalized under the Revised Penal Code.

P.D. 331

The document stipulates that all public forests be developed, managed and utilized on a substained-yield basis with the assistance of technically trained and Registered Foresters. It seeks to harmonize the productivity and stability of the nation's forest ecosystems.

P.D. 705

This Revised Forestry Reform Code was promulgated in 1975. This code defines the functions and responsibilities of the Bureau of Forest Development. It answers all views of forest resources management, utilization, demarcation, protection, enforcement and rehabilitation. Thus, this code has instructions concerning forest policies of the nation.

As the result, all laws, orders, rules and regulations or any part of them which were inconsistent with this code were repealed or amended accordingly.

P.D. 865

This decree amended section 32 of P.D. 705 to allow temporarily limited and selective exportation of logs.

P.D. 953

This decree requires every person who owns land adjoining a river or creek, to plant trees extending at least 5 meters on his land adjoining it. Likewise, every holder of a license agreement, lease, license or permit from the government, involving occupancy and utilization of forest or grazing land with a river or creek therein shall plant trees extending at least 20 meters from the edge of it.

P.D. 1153

This decree makes mandatory and obligatory the participation of the citizenry, 10 years of age and above unless physically disabled, to plant one tree every month for five consecutive years. Trees planted shall be taken care of for at least two years and replace if the same die, are diseased or are defective.

P.D. 1559

This decree amended 23 sections of P.D. 705, including Section 32 which was amended by P.D. 865, and added 2 sections, to make the said code more responsive to present realities and to the new thrust of government policies and programs on forest development and conservation and rationalization of the wood industry.

III. LETTERS OF INSTRUCTION:

L.O.I. 145 -

Directed the Presidential Committee on Wood Industries Development to work out and submit a program at promoting the development of industrial forest plantation and tree farms.

L.O.I. 404 -

Requires all government agencies to participate in the tree planting campaign all over the country.

L.O.I. 409 -

Was issued to execute offices of D.N.R. and B.F.D. to determine the performance of forest concessionaries and their adherence to forest regulations and policies.

L.O.I. 423 -

Brought a new massive approach towers forest ecosystem management directing the creation of Presidential Council for Forest Ecosystem Management (PCFEM).

L.O.I. 424 -

Requires the participation of local governments from regional down to the barangay level in order to make more effective the tree planting program as required under L.O.I. 404.

L.O.I. 525 -

Was issued to expedite the implementation of the government's agro-forestry development pilot project under Proclamation No. 1632.

L.O.I. 550 -

States that the Secretary of Natural Resources shall cause the training of the barangay officials to qualify them as deputy fish wardens and/or deputy forest officials.

L.O.I. 818 -

Requires all holders of existing timber licenses to reforest one hectare of open, denuded and/or brushland, forest area, for every hectare logged-over, planting the same species as cut.

L.O.I. 822 -

Requires the cancellation of the effective permits to operate sawmills granted to those without any timber license, logging concession, or authorized sources of logs.

IV. OTHER ORDERS RELATED TO THE PROJECT IMPLEMENTATION

Forest Special Uses Regulations was promulgated in 1941 for information and guidance governing the leasing or granting of permits. This regulations, still, serves as implementing guidelines on forest special uses, including pasturage, practically.

BFD Special Order No. 104, Series of 1977 was issued on March 29, 1977, to establish a Joint Committee for implementation of the Technical Co-operation Project for the Afforestation of the Pantabangan Area.

LC Committee Special Order No. 32, Series of 1978, was issued on February 1, 1978, to create Composite LC Team No. 90 for survey of the RP-Japan Project sites and other special land classification cases requiring immediate action.

APPENDIX B

RECORD OF DISCUSSIONS BETWEEN THE JAPANESE FORESTRY SURVEY TEAM AND DEPARTMENT OF NATURAL RESOURCES CONCERNING THE TECHNICAL COOPERATION PROJECT FOR THE AFFORESTATION OF THE PANTABANGAN AREA

In pursuance of the Survey for Implementation Planning of the Project which was conducted in December, 1975, the Japanese Forestry Survey Team, organized by the Japan International Cooperation Agency (JICA) and headed by Mr. Katsuhiro KOHTARI, Special Adviser to the President of JICA visited the Philippines from June 10 to 18, 1976 for the purpose of discussing with the authorities concerned of the Government of the Republic of the Philippines concerning the desirable measures to be taken by both Governments to implement the Technical Cooperation Project for the Afforestation of the Pantabangan Area.

As a result of the discussions, both parties agreed to recommend to their respective Governments to carry out the matters referred to in the attached Record of Discussions concerning the technical cooperation in the said project.

June 18, 1976

KATSUHIRO KOHTARI
Head of the Japanese
Forestry Survey Team

EDMUNDO V. CORTES
Director
Bureau of Forest Development

A True Copy:
otl/10/26/79

RECORD OF DISCUSSION

1. (1) In line with the forestry policy of the Republic of the Philippines aiming at the proper conservation, management and utilization of forest resources, the Government of the Republic of the Philippines and the Government of Japan will cooperate, through their appropriate agencies, in implementing the Technical Cooperation Project for the afforestation of the Pantabangan Area (hereinafter referred to as "the Project").
The purpose of the project will be to establish afforestation techniques so as to contribute to successful afforestation in the open grass lands and other denuded lands of about 50,000 has. in the Pantabangan Area which is one of the most important watersheds in the Republic of the Philippines. The master plan of the Project is specified in Annex 1.

(2) The Project will be implemented based on the guidelines of the annual work plan to be formulated by the Joint Committee referred to in Article 8.

2. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to provide at their own expense the services of the Japanese experts as listed in Annex 2 through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

(2) In accordance with laws and regulation in force in the Philippines, the Japanese experts mentioned above and their families will be granted in the Philippines, privileges, exemptions and benefits within the framework of the Colombo Plan Technical Cooperation Scheme.

3. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to provide at their own expenses such equipment, machinery, vehicles, a motor boat, implements, instruments, tools, spare parts and other materials, as listed in Annex 3 required for the Project through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

(2) The articles referred to above will become the property of the Government of the Republic of the Philippines upon being delivered c.i.f. to the Philippine authorities concerned at the ports of disembarkation and/or international airports, and will be utilized exclusively for the implementation of the Project.

4. (1) In accordance with laws and regulations in force in Japan, the Japanese authorities concerned will take necessary measures to receive the Philippine personnel engaged in the Project for technical training or study tour in Japan through the normal procedures under the Colombo Plan Technical Cooperation Scheme.

(2) The Government of the Republic of the Philippines through the authorities concerned will take necessary measures to ensure that the knowledge and experience acquired by the Philippine personnel through technical training in Japan will be utilized primarily for the effective implementation of the Project.

5. (1) In accordance with laws and regulations in force in the Philippines, the Government of the Republic of the Philippines through the authorities concerned will take necessary measures to provide at its own expense:

(a) the services of the Philippine experts and other personnel as listed in Annex 4;

(b) acquisition of land and buildings as listed in Annex 5, as well as other incidental facilities required therefor;

(c) supply or replacement of articles necessary for the implementation of the Project other than those provided by the Japanese authorities concerned under Article 3 (1);

(d) suitability furnished housing accommodations for the Japanese experts and their families.

(2) In accordance with laws and regulations in force in the Philippines, the Government of the Republic of the Philippines through the authorities concerned will take necessary measures to meet:

(a) expenses necessary for the construction of forest roads and other facilities except for such equipment, machinery, vehicles, tools, spare parts and other materials, as listed in Annex 3;

(b) expenses necessary for transportation within the Philippines

of the articles as listed in Annex 3 as well as for the installation, operation and maintenance thereof;

(c) all operating expenses necessary for the implementation of the Project;

(d) customs duties, internal taxes and any other charges, if any, imposed in the Philippines with respect to the articles to be brought in from Japan as listed in Annex 3;

(e) expenses for transportation facilities and internal travel in the Republic of the Philippines of the Japanese experts while on duty;

(f) free medical and dental services and facilities for the Japanese experts and their families, within the framework of the Colombo Plan Technical Cooperation Scheme;

(g) customs duties, and texes on personal and household effects of the Japanese experts and their families, as well as on one motor car for each expert, within the framework of the Colombo Plan Technical Cooperation Scheme.

6. The Secretary of the Department of Natural Resources through the Director of the Bureau of Forest Development of the Government of the Republic of the Philippines will be responsible for the administrative matters for the implementation of the Project, and the Japanese experts will provide primarily technical guidance and advice for the Project.

7. The Government of the Republic of the Philippines through the authorities concerned shall undertake to bear claims, if any accidents arise, on the Japanese experts engaged in the Project resulting from, occuring in the course of, or otherwise connected with, the discharge of their official functions in the Philippines, except for those claims arising from willful misconduct or gross negligence of the Japanese experts.

8. For the successful and smooth implementation of the Project a Joint Committee will be established as specified in Annex 6.

9. (1) The period of the technical cooperation mentioned in this record of discussions will be two (2) years.

(2) Within this period there will be mutual consultations between the two governments to reach a bilateral agreement for the technical cooperation thereafter.

(3) This record of discussions will serve as a basis for the implementation of the Project.

Annex 1. The Master Plan of the Project

The Project will be implemented through the organization as shown in the attached chart. The Technical Cooperation Center is composed of an administrative office and related facilities,a pilot forest, and nurseries. The administrative office and related facilities will be established in the district office of the Upper Rampanga River Basin Multiple Use Management District. Supervision and administration of the whole activities of the Technical Cooperation Center, as well as the fundamental experiments and indoor trainings necessary for the Project implementation, will be conducted by the officers stationed at the Center.

In the Pilot Forest (including forest roads) and the nurseries, development and improvement of requisite techniques and on-the-job training will be performed.

As to the scale of the Pilot Forest, -rial plantations of 1,300 has. will be established in the first phase of the Project, and test plantations of 6,300 has. in the second phase.

The activities of the Center will be:

1. Development and improvement of requisite techniques
   1) Development of specific techniques
      (1) Species trial
      (2) Tree improvement
      (3) Trials in nursery techniques
      (4) Trials in planting tec-niques
      (5) Trials of counter measures against fire insects, diseases and meteorological damages
      (6) Trials in the techniques on forest road and soil conservation works
   2) Management Test
      (1) Systematization of silvicultural and forest protection techniques
      (2) Economic assessment of afforestation on an industrial scale
      (3) Test and investigation on the environmental implications of afforestation
      (4) Test and study on the social implications of afforestation
      (5) Other necessary studies and investigation

2. Technical Training

1) Training of managerial staff

(1) Planning techniques of afforestation project

(2) Technical and managerial aspects of nursery and plantation works

(3) Techniques for designing and managing forest road and soil conservation works

(4) Techniques for the application of machine power

(5) Techniques to control fire, insects, diseases and meteorological damages

2) Training of Technical Staff

(1) Techniques of nursery and plantation works

(2) Techniques of tree improvement

(3) Techniques of forest road and soil conservation works

(4) Operation and maintenance of machinery

(5) Education on forest protection

Annex 2. Japanese Experts

Category	Field
1. Chief Adviser	Silviculture
2. Experts	Forest Environment
	Tree Improvement
	Forest Management
3. Liaison Officer	

Note: 1. The Chief Adviser will be attached to the Central Office of the Project in the Department of Natural Resources.

2. A team leader will be nominated by JICA from among the experts.

3. Short-term experts in the fields mentioned above as well as soil conservation and erosion control, civil and mechanical engineering, forest protection and other fields may be dispatched when necessity arises.

Annex 3. Articles to be Provided by the Japanese Authorities Concerned

1. Machinery, equipment and materials for nursery works.
2. Machinery, equipment and materials for planting works.
3. Machinery, equipment and materials for tending and thinning.
4. Machinery, equipment and materials for forest road, fire creak, and soil conservation works.
5. Machinery, equipment and materials for fire fighting.
6. Equipment, implements, instruments and materials for research and training.
7. Vehicles and a motor boat.
8. Equipment, tools, spare parts and materials for repair works.
9. Equipment and materials for public utilities, including radio communication system.
10. Other necessary equipment, tools and materials to be mutually agreed upon.

Annex 4. Philippine Counterparts and Other Personnel

Category	Field
1. Project Director	
2. Project Leader	
3. Co-project Leader	
4. Counterparts	Silviculture
	Forest Environment
	Tree Improvement
	Forest Management
	Soil Conservation & Erosion Control
	Civil & Mechanical Engineering
	Forest Protection
5. Assistants	
6. Clerical and Service Employees	
7. Laborers	

Note: 1. Co-project Leader may concurrently act as a counterpart in one of the above fields.

2. Counterparts in the fields of Soil Conservation & Erosion Control and Forest Protection may be on a short-term basis.

Annex 5. Land and Buildings

1. Land
   1) Land for nurseries
   2) Land for Pilot Forest
      (1) trial plantations 1,300 has.
      (2) test plantations 6,800 has.
   3) Land for Administrative Office of the Technical Cooperation Center and related facilities.

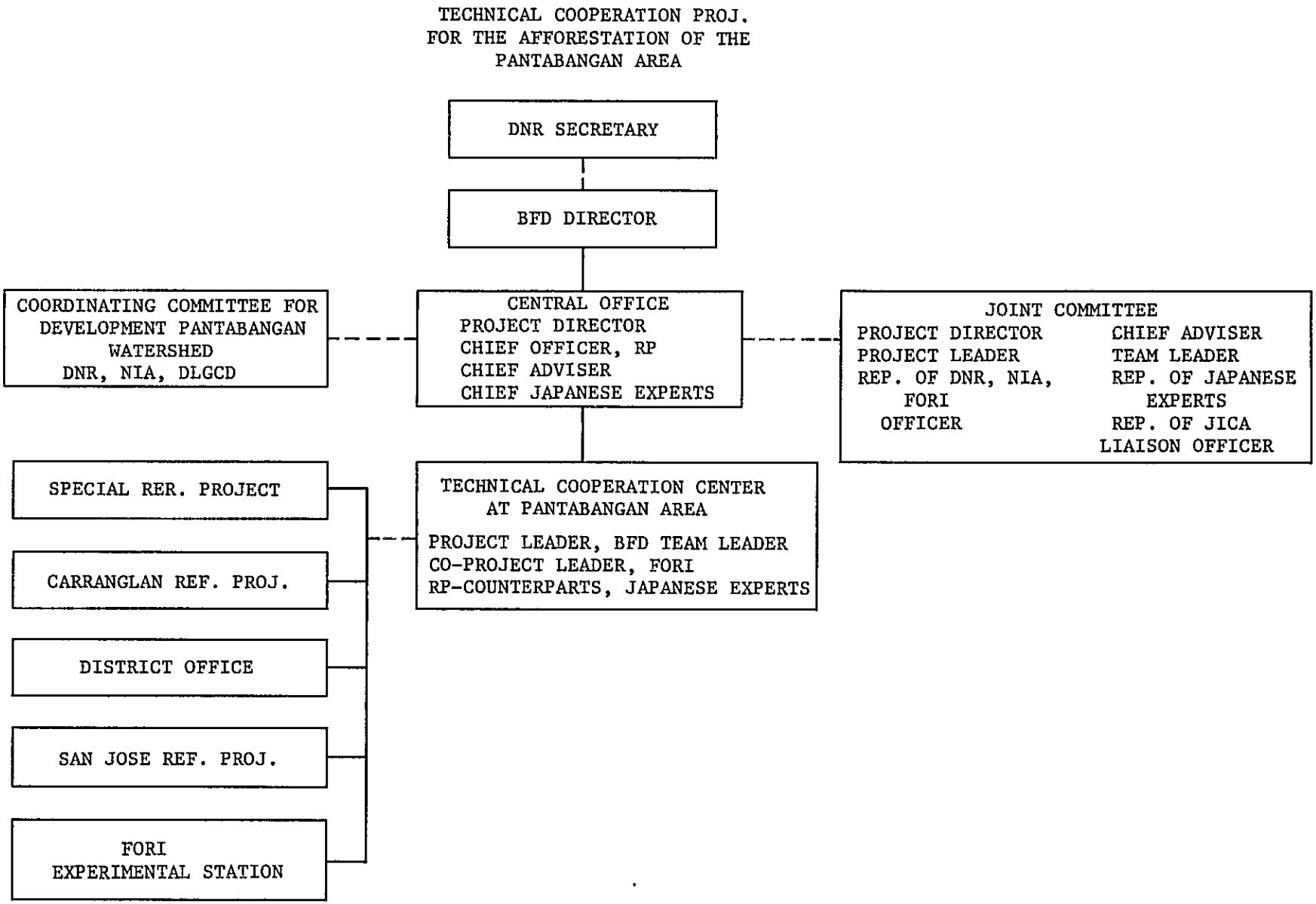
2. Buildings
   1) Central Office, in the Department of Natural Resources
   2) Administrative Office and the related facilities.
      (1) administrative office
      (2) laboratories and lecture rooms
      (3) storehouse for forestry materials
      (4) sheds for machinery and equipment
      (5) workshop garage
      (6) generator house
      (7) pump house
      (8) dormitory for trainee
      (9) field accommodation for Japanese experts and Philippine counterparts
      (10) guest house
      (11) others

Annex 6. Composition of the Joint Committee

Chairman: BFD Director

Japanese Side	Philippine Side
1. Chief Adviser	1. Project Director
2. Team Leader	2. Project Leader
3. Expert(s) designated by Chief Adviser	3. One Representative from DNR
4. Representative of JICA	4. One Representative from NIA
5. Liaison Office	5. One Representative from FORI

Note: An official of the Embassy of Japan may attend the meetings of the Joint Committee as an observer.


TECHNICAL COOPERATION PROJ.
FOR THE AFFORESTATION OF THE
PANTABANGAN AREA
DNR SECRETARY
BFD DIRECTOR
COORDINATING COMMITTEE FOR
DEVELOPMENT PANTABANGAN
WATERSHED
DNR, NIA, DLGCD
CENTRAL OFFICE
PROJECT DIRECTOR
CHIEF OFFICER, RP
CHIEF ADVISER
CHIEF JAPANESE EXPERTS
JOINT COMMITTEE
PROJECT DIRECTOR
PROJECT LEADER
REP. OF DNR, NIA,
FORI
OFFICER
CHIEF ADVISER
TEAM LEADER
REP. OF JAPANESE
EXPERTS
REP. OF JICA
LIAISON OFFICER
SPECIAL RER. PROJECT
CARRANGLAN REF. PROJ.
DISTRICT OFFICE
SAN JOSE REF. PROJ.
FORI
EXPERIMENTAL STATION
TECHNICAL COOPERATION CENTER
AT PANTABANGAN AREA
PROJECT LEADER, BFD TEAM LEADER
CO-PROJECT LEADER, FORI
RP-COUNTERPARTS, JAPANESE EXPERTS

APPENDIX C

PROPOSED MASTER PLAN OF THE PROJECT

DRAFT OF AGREEMENT BETWEEN THE GOVERNMENT OF JAPAN AND THE GOVERNMENT OF THE REPUBLIC OF THE PHILIPPINES CONCERNING TECHNICAL COOPERATION FOR THE FORESTRY DEVELOPMENT PROJECT OF THE PANTABANGAN AREA

The Master Plan of the Project

The Project consists of the following two Sub-projects and both Sub-projects are controlled by Project Director referred to in Annex IV under the guidance and advice of Chief Adviser referred to in Annex II stationed at the Head Office set up in the Central Office of the Bureau of Forest Development, Diliman, Quezon City.

Sub-project I: Afforestation Technical Cooperation Center

1. The purpose of this Sub-project will be to develop and improve afforestation techniques and to train Philippine counterparts and other technical staff so as to contribute to afforestation in the Pantabangan area through establishment of the Pilow Man-made Forest and nurseries.

2. The Pilot Man-made Forest will be composed of trial plantations in the first phase which is about 1,300 hectares in size and of test plantations in the second phase which is about 6,800 hectares in size.

3. The activities of the Afforestation Technical Cooperation Center are as follows:
   - (a) Development and Improvement of Techniques of Afforestation
     - (i) Specific techniques
       - (1) Trial in techniques on selecting species
       - (2) Trial in nursery techniques
       - (3) Trial in planting techniques
       - (4) Trial in counter measures against forest fire and disease, insect and meteorological damages
       - (5) Trial in techniques on forest roads construction
     - (ii) Management techniques
       - (1) Systematization of silvicultural techniques and forest protection techniques
       - (2) Economic assessment of afforestation on a large scale
       - (3) Test and research on the environmental implications of afforestation
       - (4) Research and study on the social implications of afforestation
       - (5) Other necessary studies and research

(b) Technical Training on Afforestation

(i) Training of management techniques

(1) Planning of afforestation project

(2) Techniques for systematization of nursery and plantation work

(3) Techniques for designing and managing forest roads

(4) Techniques for the application of machine power

(5) Techniques for prevention of forest fire and disease, insect and meteorological damages

(ii) Training of working techniques

(1) Techniques of nursery and plantation work

(2) Techniques of forest roads construction

(3) Operation and maintenance of machinery

(4) Techniques of forest protection

Sub-project II: Training Center for Forest Conservation

1. The purpose of this Sub-project will be to conduct theoretical and practical training for forestry technicians and foresters as well as to develop and improve forest conservation techniques.

2. The activities of the Training Center for Forest Conservation are as follows:

(a) Technical Training on Forest Conservation

(i) Training courses

(1) Ordinary courses:

Erosion control course

Operation course

(2) Senior courses:

Erosion control course

General course

(ii) Training subjects:

(1) Erosion control engineering

(2) Erosion control planning

(3) Design of erosion control facilities

(4) Construction and maintenance of erosion control facilities

(5) Mechanized construction of erosion control facilities

(6) Afforestation for erosion control

(7) Other necessary subjects for forest conservation

(b) Development and Improvement of Techniques and Forest Conservation

(1) Design of erosion control facilities

(2) Construction and maintenance of erosion control facilities

(3) Mechanized construction of erosion control facilities

(4) Other necessary techniques for forest conservation

APPENDIX D

FIVE-YEAR WORK PROGRAM
(1978-1982)

RP-JAPAN TECHNICAL COOPERATION FOR THE AFFORESTATION OF THE PANTABANGAN AREA

FIVE-YEAR WORK PROGRAM
(1978-1982)
RP-JAPAN TECHNICAL COOPERATION FOR THE
AFFORESTATION OF THE PANTABANGAN AREA

1. Five-Year (1978-1982) Plan and Cost Estimates

Attached you will find the table (Annex "A") indicating target goals and local cost estimates of the project. The operational expenses is provided by the Philippine Government for the following activities: administration, construction of facilities, nursery operations, plantation establishment, plantation protection and maintenance, forest roads construction, erosion control, etc.

2. As the project progresses, set goals will be increased and, therefore, we shall need additional number of laborers annually. The strategy is to employ all local labor in the community where the project is located. However, if there is no available labor force in the locality in view of increasing requirements of the project, manpower from neighboring villages and communities shall be utilized.

3. Technical Personnel Component Requirement

Annex "B" indicates the number of personnel needed to pursue with effectiveness and efficiency the implementation of the project.
Under the personnel program, about eight foresters shall be assigned to the project as RP counterparts.

4. Protection Plan of Plantation from Fire and Other Agents of Destruction

This activity is always given top priority in our reforestation activities. Under this scheme, the following activities are to be undertaken:

a) Physical protection of established plantations. - This will be undertaken by employing laborers and be given sectors of responsibility within established plantations.

b) Roving patrol shall be created to supervise the sectoral protection crews and to patrol not only the plantation site but surrounding vicinities.

c) Construction of firelines and firebreaks and watch towers. - The project is in the process of constructing watch towers strategically situated within the project area. Hand in hand with the construction of this infrastructure is the construction of fire-lines and

firebreaks. These firelines and firebreaks are necessary in extensive plantation areas where the same could not be adequately covered by the sectoral crews and roving patrols.

d) Information campaign. - It is the task of the project to initiate information campaign on forest conservation and forest protection of the area. This activity may be undertaken firstly, by person to person contact, distribution of conservation leaflets, and other materials like towels with inscriptions or prints regarding protection of forest lands from fire.

Annex "A"

COUNTERPART FUND TO BE PROVIDED BY THE PHILIPPINE GOVERNMENT
FOR THE RP-JAPAN AFFORESTATION PROJECT IN PANTABANGAN

(Unit: 1,000 Pesos) 1978.5

	1977	1978	1979	1980	1981	1982	TOTAL
Personnel	80	150	300	300	300	200	1,330
Supplies & Materials	40	100	100	100	40	20	400
Facilities	900	1,800	-	-	-	-	2,700
Labor costs	880	3,250	7,010	8,780	10,030	1,680	31,630
(Plantation establishment*	210 ha. 630	600 ha. 1,800	1,800 ha. 4,750	2,500 ha. 6,250	3,000 ha. 7,500	-	20,930
(Tending **	200 ha. 20	800 ha. 80	2,400 ha. 240	4,300 ha. 430	5,500 ha. 550	3,000 ha. 300	1,620
(Protection ***		200 ha. 80	600 ha. 240	1,800 ha. 720	2,500 ha. 1,000	3,000 ha. 1,200	3,240
(Forest roads	5 km. 200	30 km. 1,200	40 km. 1,600	30 km. 1,200	20 km. 800	-	5,000
(Erosion control	1 spots 30	3 spots 90	6 spots 180	6 spots 180	6 spots 180	6 spots 180	840
Operational costs	100	200	300	300	300	100	1,300
T O T A L	2,000	5,500	7,710	9,480	10,670	2,000	37,360

* nursery operation, survey, sticking, digging holes, hauling seedlings, planting and fertilization, and construction of firebreaks
** weeding
*** patrol and fire-fighting

Personnel Program

Annex "B"

	Operational Target	RP Counterparts (Foresters)	Field Forces				Technical	Skilled	GRAND TOTAL
			Field OIC	Assistant	Operator	Crew Leader			
General		2					1		2
Nursery Operation	5 Nurseries	1	5	5	2 (2 tractors)		1	12	13
Plantation establishment	2,000 has.	3	3	10	5 (truck,etc.)	100*	3	118	121
Forest road construction	30 kms (5 lines)	1	1	5	9	(9)**	1	15	17
Erosion Control Work	6 spots	1	1	3	2 (mixer,etc.)	6	1	12	13
Fore Protection***		(3)	(3)	(10)			-	-	
TOTAL		8	10	23	18	106	8	158	166
		Staff		Laborers					

* - 1 Crew consists of 20 laborers.

** - For forest road construction, operators are crew leaders at the same time.

*** - Personnel for plantation establishment takes care of fire protection during dry season.

ANNEDIX E

PROPOSED WORK PLAN AND BUGETARY REQUIREMENT

OF

THE RP-JAPAN TECHNICAL COOPERATION PROJECT FOR

THE AFFORESTATION IN THE PANTABANGAN AREA

OCTOBER, 1979

PREPARED BY:

FLORO T. TADENA

PROJECT PLANNING OFFICER

WORK PLAN FOR CY 1980

1. NURSERY OPERATIONS

1.1 Nurseries

		Production Capacity
Parcel I	Baluarte Nursery (Existing)	600,000 sdlgs.
	Dalinat Nursery (Existing)	400,000 sdlgs.
	Dalinat Subsidiary Nursery (Proposed)	300,000 sdlgs.
Parcel II	Talatalan Nursery (Existing)	600,000 sdlgs.
	Bangabanga Nursery (Existing)	200,000 sdlgs.
	San Miguel Nursery (Proposed)	300,000 sdlgs.
Parcel III	Salvacion Nursery (Existing)	400,000 sdlgs.
	Degayat Nursery (Proposed)	500,000 sdlgs.

1.2 Seedling Production

Planting Stock for 1980	2,722,300 sdlgs.
Planting Stock for 1981	1,460,200 sdlgs.
Total	4,182,500 sdlgs.

PLANTING STOCK REQUIREMENT FOR 1980

GROUP	S P E C I E S	SEEDLING REQUIREMENT	
Fast-growing	Yemane	666,600	
	Giant Ipil-ipil	250,000	
	E. camaldulensis	83,350	
	Acca. auriculaeformis	83,350	
	Sub-Total		1,083,300
Long Rotation	Narra	666,800	
	Teak	222,200	
	Mahogany	125,000	
	Sub-Total		1,014,000
Others (Experimental)			125,000
	T O T A L		2,722,300

2. PLANTATION ESTABLISHMENT

Parcel I		650 hectares
Parcel II		680 hectares
Parcel III		170 hectares
	Total	1,500 hectares
Replanting		200 hectares

3. PLANTATION MAINTENANCE

3.1 Weeding:

1978 and 1979 Plantation		1,000 hectares
1980 Plantation		1,500 hectares
	Total	2,500 hectares

3.2 Fertilization:

1980 Plantation		1,500 hectares
Replanting		200 hectares
	Total	1,700 hectares

4. PROTECTION

4.1 Firebreak construction (Jan.-May)		80 km.
Firebreak construction (Oct.-Dec.)		40 km.
	Total	120 km.

4.2 Fire prevention and extension work:

	P - I	P - II	P - III	Total	Remarks
Plantation Guard	30	25	5	60	
Fire fighter	150	150	50	300	6 mos. only

5. FOREST ROAD CONSTRUCTION

5.1 Main forest road construction ---------- 9 km.

Culvert ---------- 823.5 m.

Side Canal ---------- 7,200.0 m.

Wetstone work ---------- 406.8 m^2

Graveling ---------- 4,050.0 m^3

5.2 Operational forest road construction ---------- 14 km.

Culvert ----------	882.0 m.
Side canal ----------	11,200.0 m.
Wetstone work ----------	406.0 m^2
Graveling ----------	1,400.0 m^3

5.3 Bridge Construction ---------- 4 units

Wooden Bridge ----------	1
Overflow Bridge ----------	1
H-Beam Bridge ----------	2

5.4 Forest road maintenance:

Total Distance (Main Road) ---------- 52 km.

Grading ----------	52 km.
Graveling ----------	2,600 m^3
Cross Canal ----------	26 spots
Wetstone work ----------	50 m^2

6. EROSION CONTROL WORK

6.1 Structural work ---------- 3 spots

Water Gauge Station ----------	1
Check Dam ----------	2

6.2 Vegetative Work ---------- 6 spots

WORK AND BUDGETARY PLAN
OF RP-JAPAN AFFORESTATION PROJECT
FOR CY 1980

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MONDAYS	ESTIMATED COST	REMARKS
1. PERSONAL SERVICES (01-1)					
1. Nursery Operations:					
1.1 Seed collection	liter	38,676	6,377	₱ 82,900.00	
1.2 Establishment of new nursery	no.	3	19,500	253,500.00	
1.3 Seedling production	pcs.	4,182,500	63,346	836,500.00	Includes seedlings for 1981
1.4 Seedling care and maintenance	pcs.	4,182,500	36,608	501,900.00	
1.5 Preparation for shipment	pcs.	2,722,300	20,938	272,200.00	
Sub-total			149,769	₱1,947,000.00	
2. Plantation Establishment:					
2.1 Survey & mapping	has.	1,500	500	6,500.00	
2.2 Staking	has.	1,500	10,500	136,500.00	
2.3 Brushing	has.	1,500	22,500	292,500.00	
2.4 Digging	no.	2,722,300	27,223	353,900.00	

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MONDAYS	ESTIMATED COST	REMARKS
2.5 Hauling	pcs.	2,722,300	18,149	₱ 235,900.00	
2.6 Planting	pcs.	2,722,300	18,149	235,900.00	
2.7 Trial construction	kms.	30	900	11,700.00	
Sub-Total			97,921	₱1,272,900.00	
3. Plantation Maintenance:					
3.1 Weeding	has.	2,500	30,000	390,000.00	
3.2 Fertilization	has.	1,700	17,000	221,000.00	
Sub-Total			47,000	₱ 611,000.00	
4. Forest Protection:					
4.1 Firebreak construction	kms.	120	12,000	156,000.00	
4.2 Patrolling (Plantation Guard)	no.	60	21,900	284,700.00	Whole year
4.3 Fire prevention (Fire-fighter)	no.	300	54,000	702,000.00	6 months work
Sub-Total				₱1,142,700.00	

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
5. Forest Road:					
5.1 Construction	kms.	23		₱ 370,000.00	
5.2 Maintenance	kms.	43		70,000.00	
Sub-Total				₱ 440,000.00	
6. Erosion Control:					
6.1 Structural Work	spots	3	2,600	33,800.00	
6.2 Vegetative Work	spots	6	1,560	20,300.00	
Sub-Total				₱ 54,100.00	
7. Administration and Supervision:					
7.1 Staff and other personnel				758,300.00	
TOTAL (01-1)				₱6,226,000.00	
II. MAINTENANCE AND OPERATING EXPENSES					
1. Traveling expenses (02)					
1.1 Foresters & Other Staff	no.	35		210,000.00	
1.2 Driver	no.	20		96,000.00	
Sub-Total				₱ 306,000.00	

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
2. Other Services (06)					
2.1 Brokerage fee				₱ 250,000.00	
2.2 Equipment rental				699,000.00	Vehicles & equipment
2.3 Maintenance and repair				100,000.00	
2.4 Others				100,000.00	
Sub-Total				₱1,149,000.00	
3. Supplies and Matdrials (07)					
3.1 Plastic bags	pcs.	2,000,000		80,000.00	
3.2 Fertilizer	bags	600		54,000.00	
3.3 Sprinkler	pcs.	400		10,000.00	
3.4 Pickmattock and tools	pcs.	400		20,000.00	
3.5 Spare tires				237,800.00	
3.6 Spare parts				140,000.00	
3.7 Gasoline	liters	60,000		222,000.00	
3.8 Crude oil	liters	144,000		228,000.00	
3.9 Motor oil	liters	12,000		120,000.00	

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
3.10 Cement	bags			91,000,00	
3.11 Culvert				146,000.00	
3.12 Lúmber				132,000.00	
3.13 Other materials				209,800.00	
3.14 Office supplies				68,400.00	
Sub-Total				₱1,819,000.00	
Total (02-07)				3,274,000.00	
Grand Total				₱9,500,000.00	

WORK PLAN AND BUDGETARY REQUIREMENTS
OF RP-JAPAN AFFORESTATION PROJECT
FOR CY 1981

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
I. PERSONAL EXPENSES (01-1)					
1. Nursery Operations:					
1.1 Seed collection	liters	24,063	5,147	₱ 77,205.00	
1.2 Establishment of new nursery	no.	4	26,000	390,000.00	
1.3 Seedling production	pcs.	2,791,800	42,807	642,114.00	Includes seedling for 1982
1.4 Seedling care & maintenance	pcs.	2,791,800	27,918	418,770.00	
1.5 Preparation for shipment	pcs.	2,444,600	21,186	317,798.00	
Sub-Total			123,058	₱1,845,887.00	
2. Plantation Establishment					
2.1 Survey & mapping	has.	1,500	500	7,500.00	
2.2 Staking	has.	1,500	10,500	157,500.00	
2.3 Brushing	has.	1,500	22,500	337,500.00	
2.4 Digging	no.	2,444,600	24,446	366,690.00	
2.5 Hauling	pcs.	2,444,600	16,297	244,455.00	
2.6 Planting	pcs.	2,444,600	16,297	244,455.00	
2.7 Trial construction	kms.	30	900	13,500.00	
Sub-Total			91,440	₱1,371,600.00	

PROGRAM/PROJECT ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
3. Plantation Maintenance					
3.1 Weeding	has.	2,500	30,000	450,000.00	
3.2 Fertilization	has.	1,600	16,000	240,000.00	
Sub-Total			46,000	₱ 690,000.00	
4. Forest Protection:					
4.1 Firebreak construction	kms.	150	15,000	225,000.00	Whole year
4.2 Extension workers	no.	15	5,475	82,125.00	Whole year
4.3 Patrolling (Plantation guards)	no.	80	29,200	438,000.00	6 months work only
4.4 Fire prevention (Fire-fighters)	no.	300	54,900	823,500.00	
Sub-total			104,575	₱1,568,625.00	
5. Forest Road:					
5.1 Construction	km.	30	33,133	632,000.00	
5.2 Maintenance	km.	70	8,400	126,000.00	
Sub-total			41,533	₱ 758,000.00	
6. Erosion Control:					
6.1 Structural work	spots	4	7,667	115,000.00	
6.2 Vegetative work	spots	10	2,000	30,000.00	
Sub-total			9,667	₱ 145,000.00	

	PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TARGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
	7. Administration and Supervision:					
	7.1 Staff and other personnel			42,120	₱ 889,440.00	
	Total (01-1)				₱7,398,552.00	
II.	MAINTENANCE & OPERATING EXPENSES					
	L. Traveling Expenses (02)				₱ 342,000.00	
	2. Other Services (06)					
	2.1 Brokerage fee				300,000.00	
	2.2 Maintenance and repair				250,000.00	
	2.3 Rental fee for equipment				1,650,000.00	
	2.4 Others				120,000.00	
	Sub-total				₱2,320,000.00	
	3. Supplies & Materials					
	3.1 Plastic bags	pcs.	2,000,000		100,000.00	
	3.2 Fertilizer	bag	300		27,000.00	
	3.3 Sprinkler	pcs.	400		12,000.00	
	3.4 Insecticides	gal.	10		2,900.00	
	3.5 Wheelbarrow	unit	50		30,000.00	
	3.6 Pickmattock and shovel	pcs.	200		12,000.00	
	3.7 Spare parts				144,000.00	

PROGRAM/PROJECT/ ACTIVITY	UNIT OF MEASURE	TRAGET GOAL	MANDAYS	ESTIMATED COST	REMARKS
3.8 Spare tires				285,288.00	
3.9 Gasoline	liters	60,000		266,400.00	
3.10 Crude oil	liters	144,000		345,600.00	
3.11 Motor oil	liters	14,000		144,000.00	
3.12 Cement	bags			208,100.00	
3.13 Culvert				267,000.00	
3.14 Lumber				345,300.00	
3.15 Office supplies				72,000.00	
3.16 Others				545,600.00	
Sub-total				₱2,897,188.00	
Total (02-97)				₱5,559,188.00	
Grand Total				₱12,957,740.00	

BUDGETARY REQUIREMENT (1980-1984)

PROGRAM/PROJECT ACTIVITY	1980		1981		1982		1983		1984		TOTAL	
	Target Goal	Amount (Pesos)	Target Goal	Amount (Pesos)	Target Goal	Amount (Pesos)	Target Goal	Amount (Pesos)	Target Goal	Amount (Pesos)	Target Goal	Amount (Pesos)
1. Personal Service (01)												
1.1 Nursery Operation	2-7M	1,947,000	2.4M	1,846,000	2-4M	2,078,000	2-5M	2,596,000	0-6M	729,000	10.6M	9,196,000
1.2 Plantation Establishment (replanting)	(200) 1,500 has.	1,273,000	(100) 1,500 has.	1,372,000	(100) 1,500 has.	1,645,000	(100) 1,500 has.	2,048,000	(400) - has.	592,000	(900) 6,000 has.	6,930,000
1.3 Plantation Maintenance	2,500 has.	611,000	3,000 has.	690,000	3,000 has.	828,000	3,000 has.	994,000	2,000 has.	795,000	13,500 has.	3,918,000
1.4 Protection	2,000 has. (52)	1,143,000	3,500 has. (70)	1,569,000	5,000 has. (90)	1,809,000	6,500 has. (100)	2,022,000	8,100 has. (100)	2,234,000	- has. -	8,777,000
1.5 Forest road (maintenance)	23 km	440,000	30	758,000	30	913,000	20	797,000		306,000	103	3,214,000
1.6 Erosion control	9spots	54,000	14	145,000	14	174,000	14	209,000	14	251,000	65	833,000
1.7 Administration		758,000		1,019,0s0		1,067,000		1,281,000		1,537,000		5,662,000
Sub-Total		6,226,000		7,399,000		8,514,000		9,947,000		6,444,000		38,530,000
2. Traveling Expenses (02)		306,000		342,000		441,000		529,000		608,000		2,226,000
3. Other Services (06)		1,149,000		2,320,000		2,927,000		2,217,000		1,066,000		9,679,000
4. Supplies and Materials(07)		1,819,000		2,897,000		2,915,000		2,918,000		1,996,000		12,545,000
Sub-Total		3,274,000		5,559,000		6,283,000		5,664,000		3,670,000		24,450,000
TOTAL		9,500,000		12,958,000		14,797,000		15,611,000		10,114,000		62,980,000

APPENDIX F

CENSUS REPORT OF BARRIO GENERAL LUNA

Date investigated: August 19, 1979
Reporter : Atanacia P. Diaz*

S U M M A R Y

1. Profession of Family Head	-	Farmer	42
		Laborer	13
		Driver	1
		Employee	1
		Community Home Defense Force	1
		No profession	1
		Housekeeper	1
		Total	60
2. Ricefield	-	Irrigated	89.0 has.
		Non-irrigated	35.5 has.
		Total	124.5 has.
3. Average Age of Family Head			40.0
4. Average Number of Dependent			6.8
5. Average Ricefield/Family (42 Farmers)			3.0 has.

6. Number of Fruit-Tree

Star apple	- 70	Jackfruit	- 43
Atis	- 4	Pomelo	- 10
Avocado	- 8	Santol	- 23
Tamarind	- 19	Guyabano	- 55
Guava	- 161	Tiesa	- 57
Mango	- 89		

* Administrative Assistant, RP-Japan Afforestation Project

HEAD OF FAMILY PROFESSION	AGE	NO. OF DEPENDENTS	RICEFIELD (HAS.)		
			IRRIGATED	NON-IRRIGATED	TOTAL
1. Farmer	47	9	6	-	6
2. Farmer	33	10	2.5	-	2.5
3. Farmer	39	8	3	-	3
4. Farmer	62	6	4	-	4
5. Farmer	37	10	3	1	4
6. C.H.D.F.	30	6	-	-	-
7. Driver	39	7	-	-	-
8. Farmer	53	5	8	8	16
9. Farmer	25	6	2	3	5
10. Farmer	43	7	-	2	2
11. Farmer	54	6	1	1	2
12. Farmer	26	3	1	-	1
13. Farmer	42	8	2	-	2
14. Farmer	66	4	2.5	-	2.5
15. Farmer	27	5	0.5	-	0.5
16. None	47	8	-	-	-
17. Farmer	26	6	0.5	-	0.5
18. Farmer	26	6	1.5	-	1.5
19. Farmer	32	4	1	-	1
20. Farmer	62	11	3.5	-	3.5
21. Laborer	54	11	-	-	-
22. Laborer	45	6	-	-	-
23. Housekeeper	48	4	-	-	-
24. Farmer	54	9	-	3	3
25. Farmer	34	10	-	2	2
26. Farmer	45	10	4	-	4
27. Farmer	35	7	1.5	-	1.5
28. Laborer	32	7	-	-	-
29. Farmer	34	10	4	-	4
30. Laborer	32	8	-	-	-
31. Farmer	34	7	2.5	-	2.5
32. Laborer	30	5	-	-	-
33. Farmer	34	8	1.5	-	1.5
34. Laborer	52	4	-	-	-
35. Farmer	30	8	-	3	3
36. Laborer	35	7	-	-	-

HEAD OF FAMILY PROFESSION	AGE	NO. OF DEPENDENTS	RICEFIELD (HAS.)		
			IRRIGATED	NON-IRRIGATED	TOTAL
37. Laborer	55	8	-	-	-
38. Farmer	51	4	-	2	2
39. Laborer	29	7	-	-	-
40. Laborer	59	3	-	-	-
41. Farmer	43	6	1.5	-	1.5
42. Employee	31	7	-	-	-
43. Farmer	22	5	-	2	2
44. Farmer	55	4	2	-	2
45. Laborer	44	8	-	-	-
46. Farmer	23	4	1	-	1
47. Farmer	48	10	1.5	-	1.5
48. Farmer	29	7	-	2.5	2.5
49. Farmer	33	7	1	5	6
50. Laborer	53	7	-	-	-
51. Laborer	24	5	-	-	-
52. Farmer	37	9	2	1	3
53. Farmer	45	13	2.5	-	2.5
54. Farmer	45	9	3	-	3
55. Farmer	31	3	2.5	-	2.5
56. Farmer	35	7	2.5	-	2.5
57. Farmer	48	4	6	-	6
58. Farmer	42	7	4	-	4
59. Farmer	38	5	2.5	-	2.5
60. Farmer	36	4	1.5	-	-
TOTAL		409	89.0	35.5	124.5

APPENDIX G

REFORESTATION THROUGH FAMILY APPROACH IN PANTABANGAN, NUEVA ECIJA

Oscar M. Hamada*

I. BACKGROUND INFORMATION

The construction of Pantabangan Dam called for the resettlement of the whole population of the old Pantabangan town on higher grounds where they hardly found lands to till. In response, different government agencies collaborated to uplift the social condition of the people. Projects were created for their benefits which include employment, food assistance, housing project, awarding of farm lots, etc. But most of these projects are about to be finished, as a result, a great number will have no job.

It is true that a number of them were awarded with farm lots for food production but many still resort to baingin making as a source of living. Added to this, is the reported illegal cutting of trees. The effects of these activities are evident in the area and if these nefarious activities continue, it will shorten the expected life span of the multi-million peso dam.

The DNR launched a program in 1976 using the same scheme, system and procedures. The result of the program was found to be effective and the people were receptive to its objectives. The program involved 30 families and was able to reforest 185.0 hectares of barren lands.

It is proposed, therefore, that in order to help and promote forest consciousness to the displaced people of Pantabangan, another program involving seedling production and plantation establishment through family approach be undertaken.

II. OBJECTIVES OF THE PROGRAM

1. To create job opportunities and provide source of income for the resettled families (70) in Pantabangan;
2. To reforest at least 210.0 hectares of denuded lands within the watershed of Pantabangan Dam within a period of two (2) years;

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* District Forester, R-3, D-9 (Co-Project Leader, RP-Japan Afforestation Project).

3. To develop forest consciousness and encourage the people to appreciate the value of trees by actually doing nursery and plantation activities;
4. To establish better relationship between forestry personnel and the community; and
5. To produce raw materials for livestock and cottage industries.

III. SYSTEMS AND PROCEDURES

1. The Project Leader shall conduct a seminar and training program for the participating families about nursery and plantation practices;
2. The families shall be given seeds to propagate which will be sufficient to cover the area allotted to them. Enough seedlings should be raised to give allowance for mortality and culling. Propagation may be carried out in their own backyards or in nearby nurseries established for common use;
3. All activities shall be done on a contractual basis or piece work system. An inventory shall be undertaken after every major activities to determine the quantity of work done and the corresponding amount to be paid;
4. Potted seedlings should be well maintained and hardened according to established nursery practices;
5. Survey and subdivision of the area shall be made not later than April, 1977 so that the area will be thoroughly prepared;
6. Land preparation includes construction of trails, brushing, digging of holes and staking;
7. Planting should be done following the contour lines using a spacing of 3 x 3 meters; and
8. Each family shall be responsible in protecting their designated lots against fire, animals and trespassers.

IV. MODE OF PAYMENT:

Payments will be in six (6) installments, after every major activity has been accomplished. Two installments will take place for the nursery operations while four installments for the plantation operation.

A. Nursery Operation

First payment will be done after preparing the potbeds and potting/sowing of seeds. Every family is required to pot at least 4,500 in order to give allowance for mortality and culling. The first payment will be ₱0.03 per pot or a total of ₱135.00.

Second payment will be based on the number of plantable seedlings at ₱0.05 each. The maximum required number of seedlings to be planted will be 3,600. Any excess seedlings thereof will be turned over to the government.- free of charge.

The total amount to be given for the nursery operation per 1,200 seedlings or per hectare will be ₱105.00. The overall cost of the seedlings will be ₱0.08 per piece.

B. Plantation Operation

Third payment will be done after the area has been fully planted at 1,200 seedlings per hectare. The activities involved are: construction of trails, transporting of seedlings, brushing, digging of holes, staking, planting and fertilization. The amount to be given will be based at ₱0.01 per seedling planted or ₱120.00 per hectare.

Fourth payment will be given three or four months after planting, that is, after conducting an inventory of the seedlings that survived in the plantation. The activity involved will be the construction of firelines, including the protection of the established plantation. The amount to be paid will be based on ₱0.06 per surviving seedling.

Fifth payment will be done after weeding, cultivation, replanting, and fertilization. The seedlings to be used for replanting will be provided by the BFD or the families themselves. The amount to be paid will be ₱0.07 per seedling or ₱84.00 per hectare.

Sixth payment will be the final payment to be given after the family has cleared or weeded his assigned area and a final inventory of the living seedlings/saplings has been conducted. The amount to be paid will be based on ₱0.03 per seedling/sapling that survived.

The total amount to be given for the plantation operation will be ₱312.00 per hectare, assuming a 100% survival during the turn-over of the plantation area to the government.

All in all, the amount paid per hectare will be ₱417.00 at 100% survival count. Hereunder is the breakdown of the activities and the corresponding amount to be paid per hectare:

Nursery Operation	Unit Cost/Hectare
Raising & maintenance of seedlings (Includes potbed preparation, poting & maintenance of seedlings)	₱105.00/1,200 seedlings or one ha.

	Planting Operation	Unit Cost/Hectare
1.	Construction of trails	₱12.00/ha.
2.	Transporting of seedlings	36.00/ha.
3.	Land preparation (brushing, staking & hold digging)	48.00/ha.
4.	Planting & fertilization (3 m x 3 m spacing)	96.00/ha.
		₱192.00/ha.

	Maintenance & Protection of Plantation	
1.	Construction of firelines	₱10.00/ha.
2.	Weeding & cultivation (2x)	72.00/ha.
3.	Seedling cost (20% replanting)	16.00/ha.
4.	Replnating & fertilization	16.00/ha.
5.	Protection of plantation	6.00/ha.
		₱120.00/ha.

V. CONCLUSION

The project which aims to provide source of income for the resettled families in Pantabangan will at the same time protect and conserve the watershed of the Pantabangan River which likely will be tilled and utilized for kaingin purposes if no proper measure will be undertaken.

The project also aims to make the people more conscious to forest conservation and, therefore, protection of said land is expected. This at the same time, develop the forest consciousness of the children who will likely be participants in their parents' endeavor.

APPENDIX H

WEATHER REPORT

RAINFALL (1977-1979)

CARRANGLAN, NUEVA ECIJA

Prepared by
ANGELITA V. VELASQUEZ
Research Assistant
RP-Japan Technical Cooperation Project
for
the Afforestation in the Pantabangan Area

(mm)

DATE	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1977								
1	0	1.5	4.0	5.5	4.3	0	0	0
2	0	0	9.0	0	0	0	0	0
3	0	2.6	30.0	17.6	15.1	0	0	0
4	0	23.4	30.0	31.3	18.3	18.3	0	0
5	0	3.4	18.0	4.3	7.8	4.2	0	0
6	0	0	0	0	7.2	2.8	0	0
7	0	0	13.3	10.9	0	0	0	0
8	0	0	23.6	0.3	0	0	0	0
9	0	0	9.5	20.9	0	0	0	0
10	0	0	0	0	8.7	0	0	0
11	0	0	0	1.2	29.5	0	0	0
12	0	1.5	88.0	0	10.6	0	0	0
13	0	19.0	10.0	0	76.5	0	0	0
14	0.2	0	0	5.0	0	0	27.0	0
15	0	0	0	0	1.5	0	127.7	0
16	0	6.5	0	6.5	58.8	0	11.5	0
17	0	4.2	0	1.1	22.2	0	3.0	0
18	0	0	31.6	0	23.5	0	0	0
19	39.0	0	12.3	51.7	19.2	0	0	0
20	1.3	0	17.2	11.4	6.9	0	0	0
21	3.2	0	0	56.5	0.3	0	0	0
22	0	0	17.2	4.2	1.5	0	0	0
23	6.2	0	25.6	1.2	11.7	0	0	0
24	9.2	0	34.4	0	37.1	0	0	0
25	84.5	0	48.2	0	31.5	0	0	0
26	3.3	0	13.3	0	0.3	0	0	0
27	7.2	0	0	0	16.2	0	0	0
28	1.1	6.5	0	3.8	13.3	0	0	0
29	5.6	11.0	0	1.0	0	0	0	0
30	2.8	38.1	0	47.7	28.4	0	0	0
31	4.5		0	6.3		0		
TOTAL	168.1	93.3	428.6	287.1	475.5	25.3	169.2	0

(mm)

DATE	Jan.	Feb.	March	April	May	June
1978						
1	0	0	0	0	0	5.2
2	0	0	0	0	0	7.9
3	0	0	0	0	0	8.1
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	15.0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	3.0
10	0	0	1.8	0	0	0
11	0	0	0	0	0	3.8
12	0	0	0	0	0	10.0
13	0	0	0	0	0	9.6
14	0	0	0	0	0	0
15	0	0	0	0	0	1.0
16	0	0	0	0	0	20.0
17	0	0	0	0	0	4.9
18	0	0	0	0	0	0
19	0	0	0	0	0	18.0
20	0	0	0	0	0	23.5
21	0	0	0	9.4	0	0
22	0	0	0	10.1	8.2	16.0
23	0	0	0	0	0	4.4
24	0	0	0	0	15.8	30.9
25	0	0	0	0	2.3	1.5
26	0	0	0	0	12.6	0
27	0	0	0	0	0	0
28	0	0	0	0	25.7	0
29	0		0	7.9	17.1	0
30	0		0	0	4.7	2.0
31	0		0		1.0	
TOTAL	0	0	1.8	27.4	102.4	169.8

(mm)

DATE	July	Aug.	Sept.	Oct.	Nov.	Dec.
1978						
1	4.9	16.8	2.3	11.4	22.7	0
2	0	4.0	0	7.0	15.2	0
3	0	1.0	0	43.7	9.8	0
4	0	0	18.7	0	0	0
5	8.0	41.2	0	0	0	0
6	32.5	28.0	0	0	0	0
7	0	55.5	55.1	0	0	0
8	39.2	58.2	6.8	0	0	0
9	0	74.4	19.2	67.2	0	0
10	5.5	6.2	26.5	38.8	0	0
11	27.6	8.3	5.8	31.5	0	0
12	5.6	0	5.2	29.7	0	0
13	0	75.0	1.6	19.4	0	0
14	0	50.7	16.9	1.2	0	0
15	0	5.3	0	0	0	0
16	0	9.2	24.3	16.5	0	0
17	3.4	0	49.0	8.4	0	0
18	7.5	0	3.8	5.7	0	0
19	20.0	2.1	1.8	0	0	0
20	17.5	13.3	1.3	2.9	13.8	0
21	0	0	0	14.3	2.2	0
22	152.0	35.6	39.8	3.2	0	0
23	5.0	4.5	26.1	0	0	0
24	29.0	160.2	0	0	0	0
25	32.5	68.6	8.5	0	0	0
26	30.4	33.5	13.7	26.1	0	0
27	17.9	12.5	11.9	193.5	0	0
28	5.0	1.5	34.3	0	0	0
29	4.6	10.6	0	0	0	0
30	0	27.3	2.3	3.6	0	0
31	29.0	31.5		12.3		
TOTAL	477.1	835.0	374.9	536.4	63.7	0

(mm)

DATE	Jan.	Feb.	March	April	May	June
1979						
1	0	0	0	0	0	4.6
2	0	0	0	0	0	72.8
3	0	0	0	0	0	11.0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	26.2
8	0	0	0	0	0	10.0
9	0	0	0	0	0	8.8
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	10.7	0
13	0	0	0	0	3.6	0
14	0	0	0	0	3.7	2.4
15	0	7.4	0	0	0	7.3
16	0	0	0	0	36.1	3.5
17	0	0	0	0	4.3	6.6
18	0	0	0	1.0	33.2	0
19	0	0	0	0	50.0	0
20	0	0	0	0	0	0
21	0	0	0	0	6.6	0
22	0	0	0	0	1.0	13.0
23	0	0	0	0	6.2	3.0
24	0	0	0	0	0	0
25	0	0	0	0	10.7	17.2
26	0	0	1.0	6.0	3.3	0
27	0	0	0	0	0.2	4.6
28	0	0	0	18.5	3.0	5.0
29	0		0	0	0	0
30	0		0	0	0	3.6
31	0		0		85.4	
TOTAL	0	7.4	1.0	25.5	258.0	199.6

(mm)

DATE	July	Aug.	Sept.
1979			
1	2.6	8.6	43.5
2	0	3.0	1.9
3	50.0	17.9	2.0
4	33.7	0	2.6
5	24.2	2.7	0
6	1.6	12.2	0
7	27.8	29.9	0
8	7.2	43.1	1.4
9	11.0	22.7	0.8
10	7.0	2.2	
11	0	8.7	5.8
12	0	5.5	
13	0	5.7	0
14	0	36.8	
15	0	10.0	3.2
16	0	13.0	3.6
17	0	8.0	6.8
18	0	0	23.4
19	0	0	13.6
20	6.6	1.3	1.2
21	1.5	0	
22	0	0	13.8
23	7.5	0	17.7
24	11.9	0	0
25	19.5	0	7.0
26	26.5	0	7.1
27	7.9	0	20.8
28	28.9	0	3.0
29	7.4	1.0	102.0
30	0	10.8	11.6
31	8.3	5.5	
TOTAL	291.1	248.6	292.8

APPENDIX I

COST ESTIMATE ON THE ESTABLISHMENT, MAINTENANCE AND PROTECTION OF A ONE-HECTARE PLANTATION

MAY 1979

REFORESTATION AND AFFORESTATION DIVISION
BUREAU OF FOREST DEVELOPMENT

INTRODUCTION

Reforestation work is a costly endeavor. It is a labor-intensive activity wherein it involves more muscles than machines. It is also a slow process considering that trees, unlike other plants, take more years to grow and mature.

The Reforestation and Afforestation Division, BFD, has prepared the herein cost data in order to have a general basis in determining the actual cost of reforestation work in the country today. This may serve as guide in the preparation of plans and programs for contractual reforestation and in justifying our request for budget releases. The prevailing rates used herein may not represent the actual cost in a particular locality, hence, it is subject to adjustment in order to conform with the actual conditions obtaining in a locality where reforestation work is to be undertaken. The type of species used and the cost of seeds may, likewise, alter the cost of raising seedlings which will affect the total cost of reforestation per hectare.

The cost estimates were made from the time the seeds are collected and propagated in the nurseries, up to the time when a sufficient number of trees are growing in the plantation. Thus, it has been estimated that a three-year period will be sufficient enough to grow a tree at a desirable height that does not need further maintenance and protection.

COST ESTIMATE ON THE ESTABLISHMENT, MAINTENANCE AND PROTECTION OF A ONE-HECTARE PLANTATION

SUMMARY

			Cost/ha.
A.	FIRST YEAR:		
	1. Nursery activities		₱1,173.53
	2. Plantation, establishment, maintenance and protection		1,589.77
	3. Administratinn and supervision		95.00
		Sub-total	₱2,858.30
B.	SECOND YEAR:		
	1. Nursery activities		₱ 161.25
	2. Plantation maintenance and protection		561.21
	3. Administration and supervision		95.00
		Sub-Total	₱ 817.46
C.	THIRD YEAR:		
	1. Plantatinn maintenance and protection		₱ 253.50
	2. Administration and supervision		95.00
		Sub-Total	₱ 348.50
		Grand Total	₱4,024.27
		or	₱1.61/seedling

1. COST ESTIMATE OF ESTABLISHMENT, MAINTENANCE AND PROTECTION OF A ONE-HECTARE PLANTATION (FIRST YEAR)

BASIC ASSUMPTION

1. Daily wage of a laborer is ₱13.00.
2. Species to be used is Narra (No. of seeds per liter - 59).
3. Cost per liter of seeds of Narra is ₱0.50.
4. Seedlings will be raised in polyethylene bags.
5. Cost of polyethylene bag is ₱36.00/thousand or ₱0.04 per bag.
6. The spacing in the plantation is 2 m x 2 m or 2,500 seedlings to be planted per hectare.
7. Seedling requirement includes a tree percentage allowance of 10% or 2,750 seedlings to be raised per hectare.

Activities	Goal per ha.	Output per Man-day	No. of Man-day per Ha.	Cost per Ha.
A. NURSERY ACTIVITIES:				
1. Seed procurement and handling	65.0 liters	-	-	₱ 32.50
2. Nursery site preparation	15.0 m^2	15.0 m^2	1.00	13.00
3. Sowing seeds	7.2 m^2	25 m^2	0.29	3.77
4. Gathering & preparation of potting soil 1/	1.93 m^3	1 m^3	1.93	25.09
5. Potting of seedlings	2,750 pots	400 pots	6.88	89.44
6. Preparation of potbeds & arranging pots	11.50 m^2	25 m^2	0.46	5.98
7. Maintenance of seedlings (10 mos)	2,750	12,000 sdlgs.	68.75	893.75
8. Cost of plastic bags	2,750 pcs.	-	-	110.00
		Sub-Total	79.31	₱1,173.53

1/ A 4 x 6 x .002 polyethylene bag needs 500 cc of potting soil.

Activities	Goal per ha.	Output per Man-day	No. of man-day per ha.	Cost per Ha.
B. PLANTATION ESTABLISHMENT, MAINTENANCE AND PROTECTION:				
1. Detailed survey & mapping	1 ha.	0.5 ha.	2.0	26.00
2. Site preparation				
a) Strip brushing	5,000 m^2	250 m^2	20.0	260.00
b) Digging of holes & pulverization	2,500 holes	125 holes	20.0	260.00
3. Transport of seedlings (potted)2/	2,600 sdlgs.	120 sdlgs.	21.67	281.71
4. Planting	2,500 sdlgs.	150 sdlgs.	16.67	216.71
5. Plantation maintenance (Ring weeding, cultivation, mulching, etc.)	2,500 spots	120 spots	20.83	270.79
6. Firebreak construction (10 m wide)	150 m^2	70 m^2	2.14	27.82
7. Footpath construction (1 m wide)	50 m^2	15 m^2	3.33	43.29
8. Patrolwork (Whole year)3/	1 ha.	100 has.	3.65	47.45
9. Fertilizer requirement	2 bags	-	-	156.00
		Sub-Total	110.29	₱1,589.77
		Total Cost	189.60	₱2,763.30

2/ Distance is one (1) kilometer

3/ No. of man-days is .01 x 365 days/year, or 3.65 man-day/ha./year

II. COST ESTIMATE OF REPLANTING, MAINTENANCE AND PROTECTION OF ONE-HECTARE ESTABLISHED PLANTATION (SECOND YEAR)

BASIC ASSUMPTIONS

1. The spacing in the plantation is 2 m x 2 m or 2,500 seedlings per hectare.
2. Mortality rate of planted seedlings is 15% or 375 seedlings per hectare.
3. Cost of raising one (1) narra seedling per our estimate of cost of nursery operation is ₱0.43.
4. Daily wage of laborers is ₱13.00.

Activities	Goal per ha.	Output per Man-day	No. of Man-day per ha.	Cost per ha.
A. Replanting, protection and maintenance of plantation:				
1. Cost of raising seedlings at ₱0.43 per seedlings	375 sdlgs.	-	-	161.25
2. Replanting, including transport of seedlings	375 spots	30 spots	12.5	162.50
3. Firebreak maintenance	150 m^2	250 m^2		
4. Footpath maintenance	50 m	200 m	0.25	3.25
5. Patrol work (Whole year)1/	1 ha	100 ha	3.65	47.45
6. Plantation maintenance (ring weeding, cultivation, fertilizing, mulching, etc.)	2,125 spots	150 spots	14.17	184.21
7. Fertilizer requirement at ₱78.00 per bag	2 bags	-	-	156.00
			31.17	₱722.46

1/ No. of Man-days is .01 x 365 days/year of 3.65 man-days/ha./year.

III. COST ESTIMATE OF MAINTENANCE AND PROTECTION OF ONE HECTARE ESTABLISHED PLANTATION (THREE YEARS OLD AND OVER)

Activities	Goal per ha.	Output per man-day	No. of Man-days per ha.	Cost per ha.
A. Protection and Maintenance of Plantation				
1 Firebreak maintenance	150 m^2	250 m^2	0.6	7.80
2. Footpath maintenance	50 m	200 m	0.25	3.25
3. Patrol work (Whole year) 1/	1 ha	100 has.	3.65	47.45
4. Plantation maintenance (Ring weeding, cultivation, fertilizing, mulching, etc.)	2,250 spots	150 spots	15.0	195.00
		TOTAL COST	19.5	₱253.50

IV. COST ESTIMATE FOR SUPERVISION AND SUNDRIES PER HECTARE FOR THE THREE-YEAR PERIOD:

1. Supervision 2/	₱150.00
2. Sundries 3/	135.00
TOTAL	₱285.00

1/ No. of man-day is 0.1 x 365 (No. of days per year) or 3.65 man-days for the whole year.

2/ This covers the traveling expenses of personnel.

3/ Includes cost of supplies and materials, other services and incidental expenses.

APPENDIX J

FOREST ROAD CONSTRUCTION
STANDARD COST ESTIMATE
PER KILOMETER

BY FOR. MASAYOSHI SHINAGAWA

JUNE 1979

RP-JAPAN AFFORESTATION PROJECT

Basic Assumptions:

1. Length ; 1,000 m
2. Width : 5.0 m with side canal
3. Soil Cutting : 7.5 m^3/m (see Chart I)

   7.5 m^3/m x 1,000 m = 7,500 m^3/km
4. Culvert

   Ø 200 cm : 0.5 spot x 7.0 m = 3.5 m

   Ø 100 cm : 2 x 8.0 = 16.0 m

   Ø 60 cm : 4 x 9.0 = 36.0 m

   Ø 45 cm : 4 x 9.0 = 36.0 m
5. Side Canal : Cutting 0.2 m^3/m (See Chart I)

   Length 800 m
6. Graveling : Depth : 0.15 m

   Width : 3.0 m

   Length : 1,000 m

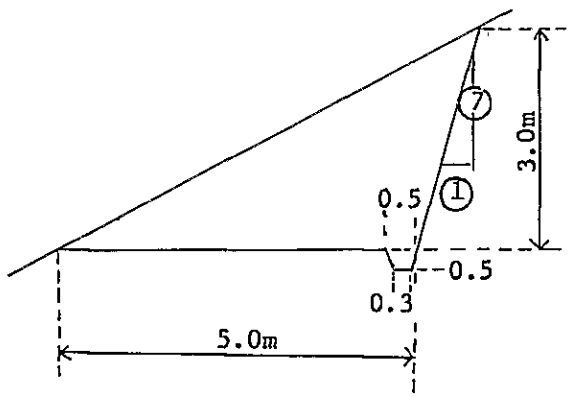
   0.15m x 3.0m x 1,000m = 450 m^3
7. Wet Stone Work: 2.15 m^2/spot (See Chart 2)

   6 spots x 2 = 12 spots

   12 x 3.77 = 45.2 m^2
8. Dry Stone Work 5 spots x 2 = 10 spots

   10 x 3.77 = 37.7 m^2

   Average inclination - 27°30'



Soil cutting m^3/m

$\frac{5\text{ m x }3\text{ m}}{2}$ = 7.5 m^2

7.5 m^2 x 1 m = 7.5 m^3

Side Canal m^3/m

$\frac{(0.3\text{ m} + 0.5\text{ m})}{2}$ x 0.5 m

= 0.2 m^2

0.2 m^2 x 1 m = 0.2 m^3

CHART I. CROSS SECTION OF SOIL CUTTING

Scale $\frac{1}{50}$

a = 4.3 x 1.2 ÷ 2 = 2.58m^2
b = 3.4 x 0.6 ÷ 2 = 1.02m^2
c = 2.4 x 0.8 ÷ 2 = 0.96m^2
Total 4.56m^2
d = $(0.5)^2$ x t = 0.79m^2

3.77m^2

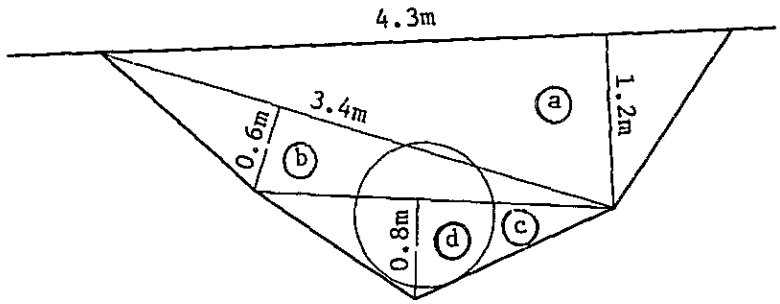


CHART 2. SIDE VIEW OF STONE WORK

STANDARD COST ESTIMATE PER KILOMETER

ITEMS	QUANTITY	UNIT	UNIT COST (Pesos)	AMOUNT (Pesos)	REMARKS
Soil Cutting	7,500.0	m^3	8.06	60,450.00	Unit Cost Table No.1
Culvert 200	3.5	m	116.0	406.00	Unit Cost Table No.2
100	16.0	m	184.0	2,944.00	Unit Cost Table No.3
60	36.0	m	136.0	4,896.00	Unit Cost Table No.4
45	36.0	m	113.4	4,082.00	Unit Cost Table No.5
Side Canal	800.0	m	4.8	3,840.00	Unit Cost Table No.6
Graveling	450.0	m^3	35.6	16,020.00	Unit Cost Table No.7
Wet Stone Work	45.2	m^2	143.7	6,495.24	Unit Cost Table No.8
Dry Stone Work	37.7	m	43.0	1,621.10	Unit Cost Table No.9
Total				100,754.74	
Indirect Cost				5,037.74	
GRAND TOTAL				105,792.48	

1) Culvert : Unit cost of corrugated steel pipe is excluded.

2) Indirect cost : 5% of total cost

TABLE NO.	UNIT COST TABLE
Table No. 1	Soil Cutting (1 m^3)
2	Ø 200 cm Culvert (1 m)
3	Ø100 cm Culvert (1 m)
4	Ø 60 cm Culvert (1m)
5	Ø 45 cm Culvert (1 m)
6	Side Canal (1 m)
7	Graveling (1 m^3)
8	Wet Stone Work (1 m^2)
9	Dry Stone Work (1 m^2)
10	Concrete 1 m^3
11	Sand 1 m^3 (0-5 m/m)
12	Gravel 1 m3
13	Stone 1 m^2
14	Gathering and Loading (Sand and Gravel)
15	Carriage 1 m^3 (Sand & Gravel)
16	Carriage 1 m^2 (Stone)
17	Excavation 1 m^3

UNIT COST TABLE NO.1

SOIL CUTTING (1 m^3)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Bulldozer rental	1	m^3	6.86	6.86
Operator	0.004	M.D.	25.00	0.10
Diesel Oil	0.45	ℓ	1.60	0.72
Other Oil				0.14
Labor	0.02	M.D.	12.00	0.24
TOTAL				8.06

1) Bulldozer rental

Daily Bulldozer rental : ₱1,700.00 (excluding Fuel and Operator)

Soil cutting volume : 38.1 m^3/hour (D60 Bulldozer)

38.1 m^3/hour x 6.5 hour = 247.7 m^3/day

1,700.00 ÷ 247.7 = ₱6.86/m^3

2) Operator: 1 manday

1 M.D. ÷ 247.7 m^3/day = 0.004 M.D./m^3

3) Labor: Helper of operator 1.0 M.D.

Bulldozing Work (Grading and Banking) 4.0 M.D.

Total 5.0 M.D.

5 M.D. ÷ 247.7 m^3/day = 0.02 M.D./m^3

4) Diesel Oil Consumption: 17 liters/hour

17.0 liters/hour ÷ 38.1m^3/hour = 0.45 liter/m^3

5) Other oil: 20% of Diesel oil consumption

UNIT COST TABLE NO.2

Ø 200 cm CULVERT (1 m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Ø 2.0 corrugate pipe*	1.0	m	-	-
Skilled labor	4.0	M.D.	20.0	80.0
Labor	3.0	M.D.	12.0	36.0
Total				116.0

*Materials on hand

UNIT COST TABLE NO. 3

Ø 100 cm CULVERT (1 m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Ø 1.0 Concrete pipe	1.0	m	120.0	120.0
Skilled labor	2.0	M.D.	20.0	40.0
Labor	2.0	M.D.	12.0	24.0
Total				184.0

UNIT COST TABLE NO. 4

Ø 60 cm CULVERT (1 m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Ø 60 Concrete pipe	1.0	m	85.0	85.0
Carriage of pipe	1.0	m	16.6	16.6
Skilled labor	1.0	M.D.	20.0	20.0
Labor	1.2	M.D.	12.0	14.4
Total				136.0

UNIT COST TABLE NO. 5

Ø 45 cm CULVERT (1 m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Ø 45 Concrete pipe	1.0	m	78.0	78.0
Carriage of pipe	1.0	m	9.8	9.8
Skilled labor	0.8		20.0	16.0
Labor	0.8		12.0	9.6
Total				

UNIT COST TABLE NO. 6

SIDE CANAL (1 m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Excavation	0.2	m^3	24.0	4.8
Total				

1) Excavation: UNIT COST TABLE No. 17

UNIT COST TABLE NO. 7

GRAVELING (1 m^3)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Gathering and Loading	1	m^3	16.7	16.7
Carriage	1	m^3	16.5	16.5
Scattering	0.2	M.D.	12.0	2.4
Total				35.6

1) Gathering and Loading : UNIT COST TABLE No. 14
2) Carriage : UNIT COST TABLE No. 15

UNIT COST TABLE NO. 8

WET STONE WORK (1 m^2)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Concrete	0.20	m^3	273.9	54.8
Stone	1	m^2	23.0	23.0
Gravel	0.4	m^3	42.8	17.1
Excavation	0.8	m^3	36.0	28.8
Skilled labor	1.0	M.D.	20.0	20.0
Total				143.7

1) Concrete : UNIT COST TABLE No. 10
2) Stone : 28.9 pcs/m^2
3) Gravel : UNIT COST TABLE No. 12
4) Excavation : UNIT COST TABLE No. 17

UNIT COST TABLE No. 9

DRY STONE WORK (1 m^2)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Stone	1	m^2	23.0	23.0
Skilled labor	1	M.D.	20.0	20.0
Total				43.0

1) Stone : 28.9 pcs./m^2

UNIT COST TABLE NO. 10

CONCRETE 1 m^3

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Cement	250	kg	0.7	175.0
Sand	0.4	m^3	39.2	15.7
Gravel	0.8	m^3	42.8	34.2
Compaction	3.0	M.D.	12.0	36.0
Sub-Total				260.9
Tools				13.0
Total				273.9

1) Sand : UNIT COST TABLE No. 11
2) Gravel : UNIT COST TABLE No. 12
3) Tools : 5% of total cost

UNIT COST TABLE No. 11

SAND 1 m^3
(0-5 m/m)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Gathering and Loading	1	m^3	16.7	16.7
Carriage	1	m^3	16.5	16.5
Selection & washing	0.5	M.D.	12.0	6.0
Total				39.2

1) Gathering and Loading: UNIT COST TABLE No. 14
2) Carriage : UNIT COST TABLE No. 15

UNIT COST TABLE No. 12

GRAVEL 1 m^3

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Gathering and Loading	1	m^3	16.7	16.7
Carriage	1	m^3	16.5	16.5
Selection & washing	0.8	m^3	12.0	9.6
Total				42.8

1) Gathering and Loading: UNIT COST TABLE No. 14
2) Carriage : UNIT COST TABLE No. 15

UNIT COST TABLE No. 13

STONE 1 m^2

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Gathering and Loading	0.6	M.D.	12.0	7.2
Carriage	1	m^2	15.8	15.8
Total				23.0

1) Gathering and Loading: 28.9 pcs/m^2
2) Carriage : UNIT COST TABLE No. 16

UNIT COST TABLE No. 14

GATHERING AND LOADING 1 m^3
(Sand and Gravel)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Tractor shovel rental	1	m^3	15.3	15.30
Operator	0.01	M.D.	25.0	0.25
Diesel oil	0.54	ℓ	1.6	0.86
Other oil				0.17
Helper	0.01	M.D.	12.0	0.12
Total				16.70

1) Tractor shovel rental

a) Working volume: $V = \frac{3,600}{cm} \times q \times E \times k$

cm : cycle time 76 sec

q : bucket volume 1.3 m^3

E : Coefficient of work 0.44

k : Coefficient of bucket 0.6

$V = 16.3\ m^3/hour$

b) Daily Tractor shovel rental : ₱1,620.00

c) Daily working hour : 6.5 hours

d) Daily working volume : 16.3 m^3/hour x 6.5 hours = 105.95 m^3

e) Tractor shovel rental per m^3: 1,620.00 ÷ 105.95 = ₱15.30

2) Operator, Helper

1 M.D. ÷ 105.95 m^3 = 0.01 M.D./m^3

3) Diesel oil consumption = 57.2 liters/day

57.2 ÷ 105.95 = 0.54 liters/m^3

4) Other oil : 20% of diesel oil consumption

UNIT COST TABLE No. 15

CARRIAGE 1 m^3
(Sand and Gravel)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Dump Truck rental	1	m^3	14.1	14.1
Driver	0.02	M.D.	20.0	0.4
Diesel Oil	0.96	ℓ	1.6	1.5
Other oil				0.3
Helper	0.02	M.D.	12.0	0.2
Total				16.5

1) Dump truck rental (8 tons)

a) Cycle time L: Distance 5,000 m

$$cm = \frac{25}{6,000} \times (L - 1,000) + 15$$

$\therefore cm = 31.7$ min.

b) Daily working hour : 6.5 hours

c) One day trip : $6.5 \div \frac{31.7}{60} = 12.3$ times/day

d) Load volume capacity : $8.0 \div 1.7 \times 0.9 = 4.2\ m^3$

e) Daily working volume : $12.3 \times 4.2 = 51.7\ m^3$

f) Daily Dump truck rental: ₱730.00

g) Dumptruck rental per m^3: $730.00 \div 51.7 =$ ₱14.1

2) Driver, Helper : 1 M.D. - 51.7 m^3 = 0.02 M.D./m^3

3) Diesel oil consumption

7.6 liters/hour x 6.5 hour ÷ 51.7 m^3 = 0.96 liter/m^3

4) Other oil: 20% of diesel oil consumption

UNIT COST TABLE No. 16

CARRIAGE 1 m^2

(Stone)

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Dump Truck rental	1	m^2	13.3	13.3
Driver	0.02	M.D.	20.0	0.4
Diesel oil	1.03	ℓ	1.6	1.6
Other oil				0.3
Helper	0.02	M.D.	12.0	0.2
Total				15.8

1) Dump truck rental

a) Cycle time $cm = \frac{25}{6,000} \times (L - 1,000) + (12 + t)$

t: loading and unloading time (by manpower) 60 min.

L: 5,000 m

$$cm = \frac{25}{6,000} (5,000 - 1,000) + (12 + 60) = 89 \text{ min.}$$

b) One day trip: $6.5 \times 60 \div 89 = 4.4$ times/day

c) Carriage of stone: 1 truckload = 3.6 m^3, 100 pcs./m^3

$3.6 \times 100 \times 4.4 = 1,584$ pcs./day

d) Stones per m^2 : 28.9 pcs.

e) Dump truck rental per m^3

$730.00 \div 1,584 \times 28.9 = ₱13.3$

2) Driver, Helper 1 M.D. ÷ 54.8 m^2 = ₱0.02 M.D./m2

3) Diesel oil consumption: 56.2 liters/day ÷ 54.8 m^2 = 1.03 liters/m^2

4) Other oil: 20% of diesel oil consumption

UNIT COST TABLE No. 17

EXCAVATION 1 m^3

ITEM	QUANTITY	UNIT	UNIT COST	AMOUNT
Soil excavation	2	M.D.	12.0	24.0
Soil accumulation	3	M.D.	12.0	36.0

APPENDIX K

PLANTATION REGISTER

SEPTEMBER, 1979

RP-JAPAN AFFORESTATION PROJECT

PARCEL I

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
54	A	Oocarpa Pine	1979	19.7	2 x 3	
	B	Benguet Pine	1979	50.8	2 x 3	
	C	Caribean Pine	1979	3.9	2 x 3	
		Sub-Total		74.4		
55	A	Narra	1979	82.4	2 x 3	
		Oocarpa Pine	1979	7.6	2 x 3	
	C	Narra	1979	6.7	2 x 3	
		Yemane	1979	11.7	3 x 3	
		Giant Ipil-ipil	1979	20.5	2 x 3	
		Giant Ipil-ipil	1979	3.1	2 x 3	
	D	Caribean Pine	1979	8.3	2 x 3	
		Sub-Total		140.3		
56	A	Mahogany	1978	10.5	2 x 2	
		Giant Ipil-Ipil	1978	12.2	1 x 1	Direct seeding
	B	Giant Ipil-ipil	1978	8.5	2 x 2	
		Narra	1978	5.2	2 x 3	
		Giant Ipil-ipil	1978	2.8	2 x 2	
	C	Narra	1978	20.9	2 x 2	
		Yemane	1978	7.0	2 x 2	
	D	Benguet Pine	1978	16.4	2 x 3	
		Agoho	1978	11.0	2 x 2	
	E	Oocarpa Pine	1978	10.0	2 x 2	
		Caribean Pine	1978	12.3	2 x 3	
	F	Caribean Pine	1978	7.5	2 x 2	
		Giant Ipil-ipil	1978	4.0	2 x 2	
		Caribean Pine	1978	1.0	2 x 2	bahamensis
		Caribean Pine	1978	12.5	2 x 2	
		Caribean Pine	1978	3.3	2 x 3	
		Caribean Pine	1978	2.5	2 x 3	bahamensis
	G	Caribean Pine	1978	25.2	2 x 3	
	H	Oocarpa Pine	1978	7.5	2 x 3	
		Caribean Pine	1978	4.5	2 x 3	bahamensis
		Acacia	1978	14.5	2 x 3	
		Experimental plantation	1978	4.8	2 x 2	

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
56	I	Mahogany	1978	7.7	2 x 2	
		Acacia	1978	2.5	2 x 2	
		Giant Ipil-Ipil	1978	24.3	2 x 3	
		Moluccan sau	1978	2.5	2 x 2	
	J	Acacia	1978	22.5	2 x 2	
		Benguet Pine	1979	8.0	2 x 3	
		Caribean Pine	1979	4.8	2 x 3	
	K	Yemane	1979	13.6	3 x 3	
		Narra	1979	2.9	2 x 3	
		Sub-Total		292.9		
57	A	Benguet Pine	1977	6.60	2 x 2	Fertilization test
		Teak	1977	8.84	2 x 2	- do-
		Giant Ipil-ipil	1977	6.68	2 x 2	- do -
		Acacia	1977	5.84	2 x 2	
		Agoho	1977	2.64	2 x 2	
		Yemane	1977	2.82	2 x 2	
		Teak	1977	1.00	2 x 2	
	B	Mahogany	1977	2.78	2 x 2	Density Trial
		Benguet Pine	1977	4.76	2 x 2	
		Narra	1977	6.12	2 x 2	Density Trial
		Teak	1977	7.92	2 x 2	- do -
		Local Ipil-ipil	1977	5.90	2 x 2	
	C	Caribean Pine	1977	8.60	2 x 2	
		Local Ipil-ipil	1978	5.32	2 x 2	Direct seeding, Replanted
		Oocarpa Pine	1978	10.30	2 x 2	Provenance trial, re-planted
		Caribean Pine	1978	4.46	2 x 2	Provenance trial, re-planted
		Yemane	1978	1.92	2 x 2	Replanted
	D	Local Ipil-ipil	1977	2.24	2 x 2	Cultivation, direct seeding (1978)
		Oocarpa Pine	1977	6.60	2 x 2	
		Agoho	1977	4.36	2 x 2	

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
57	D	E. torelliana	1978	5.20	2 x 3	Replanted
		E. tereticornis	1978	5.94	2 x 3	- do -
		E. camaldulensis	1978	3.76	2 x 3	
	E	Teak	1977	2.42	2 x 2	
		Narra	1977	3.54	2 x 2	
		Mahogany	1977	4.34	2 x 2	
		Bagras	1977	2.42	2 x 2	
		Teak	1977	9.56	2 x 2	
		Agoho	1978	3.70	2 x 2	Replanted
	F	Caribean Pine	1977	2.24	2 x 2	
		Oocarpa Pine	1977	1.90	2 x 2	
		Slash Pine	1977	2.24	2 x 2	
		Benguet Pine	1977	2.26	2 x 2	
		Giant Ipil-ipil	1979	4.46	2 x 2	
		Benguet Pine	1979	3.10	2 x 2	Replanted
	G	Sample Plantation	1978	3.04	2 x 2	11 species
		Acacia	1978	1.80	2 x 2	
		Caribean Pine	1978	1.54	2 x 2	
		Caribean Pine	1978	1.30	2 x 2	Bahamensis
	G-1	Narra	1977	3.30	2 x 2	Kick-off planting
		Camphor tree	1978	0.66	2 x 2	Replanted
	H	Mahogany	1977	7.29	2 x 2	
		Giant Ipil-ipil	1977	9.69	2 x 2	
		Caribean Pine	1978	3.14	2 x 2	Replanted
	H-1	Mango	1978	2.38	10x10	Fruit-bearing tree
		Mahogany	1979	2.0	2 x 3	
		Cashew	1979	6.6	2 x 3	Fruit-bearing tree
	I	Narra	1979	15.44	2 x 2	
		Mahogany	1978	6.98	2 x 2	
		Narra	1978	15.28	2 x 3	
	J	Benguet Pine	1978	16.82	2 x 2	
		Mahogany	1978	11.22	2 x 3	
		Mahogany	1978	12.72	2 x 2	

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
57	K	Caribean Pine	1979	26.5	2 x 3	
	L	Mahogany	1979	23.2	2 x 3	
		E. camaldulensis	1979	6.4	2 x 3	
		Oocarpa Pine	1979	34.7	2 x 3	
	M	Mahogany	1979	2.1	3 x 3	Bare root
		Experimental plantation	1979	6.4	-	Nest planting
	N	Narra	1979	37.1	2 x 3	
		Sub-Total		420.38		
		Parcel I Total		927.98		

PARCEL II

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
82	A	Teak	1978	4.0	3 x 3	
		Narra	1978	24.5	3 x 3	
		Caribean Pine	1978	7.7	2 x 2	
	B	Caribean Pine	1978	30.3	2 x 2	
		Oocarpa Pine	1978	13.7	2 x 3	
		Benguet Pine	1978	38.2	2 x 3	
	C	Oocarpa Pine	1978	8.8	3 x 3	
		Narra	1978	11.3	3 x 3	
		Slash Pine	1978	13.5	2 x 3	
	D	Giant Ipil-ipil	1978	43.0	2 x 2	Direct seeding
	E	Mahogany	1979	31.8	3 x 3	
		Sub-Total		226.8		
83	A	Teak	1978	6.2	2 x 2	
		Narra	1978	6.6	2 x 2	
		Bauhinia Spp.	1978	2.7	2 x 2	
		Mahogany	1978	31.1	2 x 2	
		Caribean Pine	1978	12.4	2 x 3	
	B	Giant Ipil-ipil	1978	22.8	2 x 3	Bare root
		Teak	1978	23.4	2 x 2	Replanted (20 has.)
		Mahogany	1978	10.8	2 x 2	Replanted (10 has.)

BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
83	B	Narra	1978	1.5	2 x 2	
		Yemane	1978	13.5	2 x 2	
	C	Benguet Pine	1979	16.0	2 x 3	Replanted
		Benguet Pine	1979	33.3	2 x 3	
	D	Yemane	1979	30.5	3 x 3	
	E	Yemane	1979	12.9	3 x 3	
		Teak	1979	42.2	3 x 3	
		Molave	1979	14.3	3 x 3	
		Yemane	1979	11.1	3 x 3	
		Sub-Total		291.3		
84	A	Oocarpa Pine	1979	24.9	2 x 3	
	B	Mahogany	1979	34.7	3 x 3	
	C	Yemane	1979	44.3	3 x 3	
	D	Teak	1979	60.3	3 x 3	
	E	Mahogany	1979	28.7	3 x 3	
		Sub-Total		192.9		
85	A	Benguet Pine	1979	47.3	2 x 3	
	B	Teak	1978	11.3	2 x 3	
		Mahogany	1978	22.5	3 x 3	
		Oocarpa Pine	1978	27.0	3 x 3	
		Caribean Pine	1978	7.0	3 x 3	
		Caribean Pine	1978	1.0	3 x 3	Bahamensis
	C	Narra	1979	3.2	3 x 3	
		Mahogany	1979	3.1	3 x 3	
		Narra	1979	13.5	3 x 3	
	D	Narra	1979	18.2	3 x 3	
		Giant Ipil-ipil	1979	45.6	3 x 3	
		Sub-Total		199.7		
86	A	Narra	1979	5.8	3 x 3	
		Mahogany	1979	5.9	3 x 3	
		Sub-Total		11.7		
		Parcel II Total		922.4		

PARCEL III

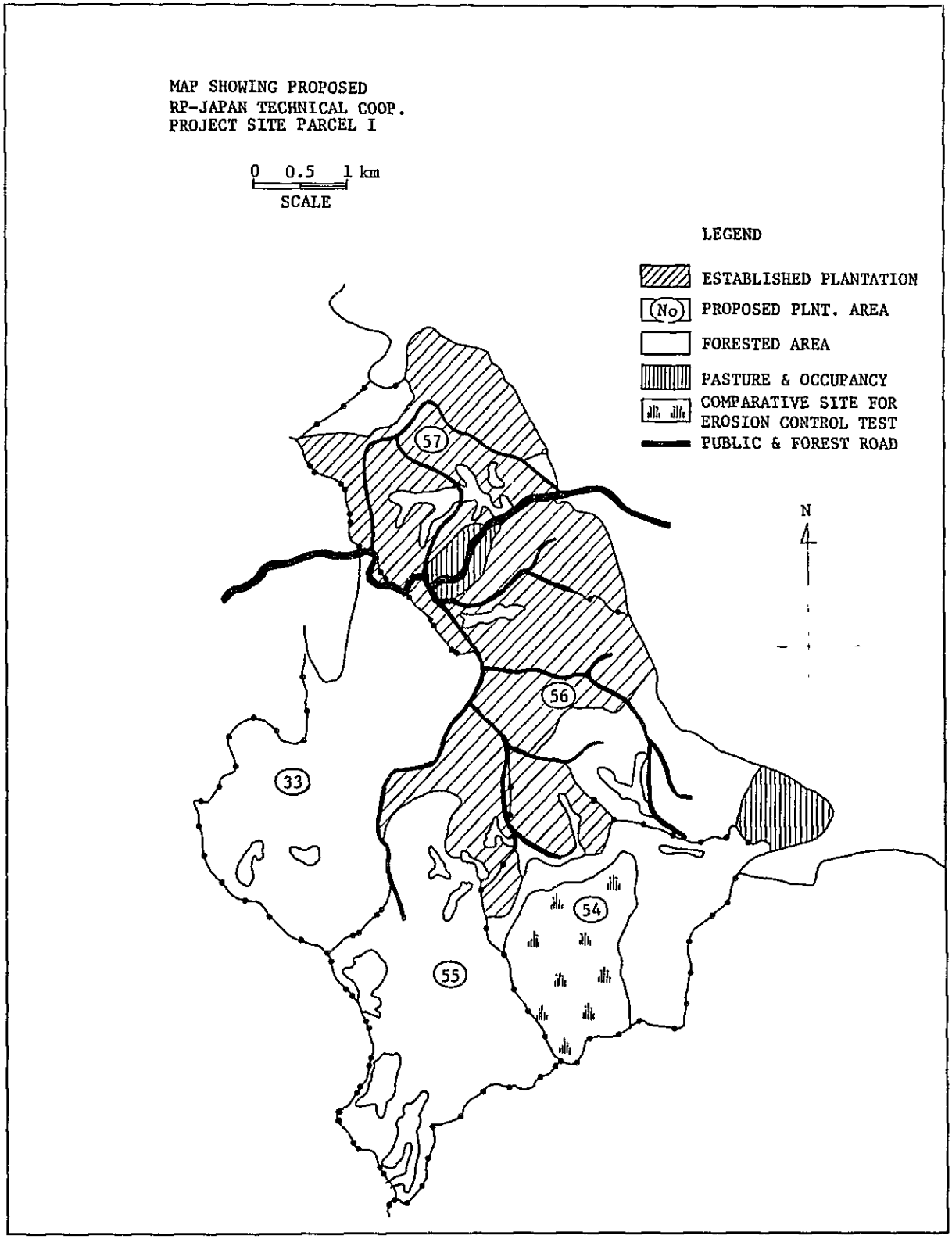
BLOCK	COMPART-MENT	SPECIES	YEAR PLANTED	AREA (HAS.)	SPACING	REMARKS
100	A	Giant Ipil-ipil	1978	30.0	1 x 1	Direct seeding
	B	Yemane	1979	10.9	2 x 3	
	C	Yemane	1979	4.2	2 x 3	
		Narra	1979	12.5	3 x 3	
		Yemane	1979	1.8	2 x 3	
	D	Benguet Pine	1979	44.0	2 x 3	
	E	Caribean Pine	1979	22.8	2 x 2	
	F	Giant Ipil-ipil	1979	12.2	2 x 3	Bare root
		Teak	1979	4.5	2 x 3	
		Yemane	1979	3.7	2 x 3	
		Caribean Pine	1979	5.2	2 x 3	
	G	Oocarpa Pine	1979	21.5	2 x 3	
		Oocarpa Pine	1979	8.9	2 x 2	
		Sub-Total		182.2		
		Parcel III Total		182.2		

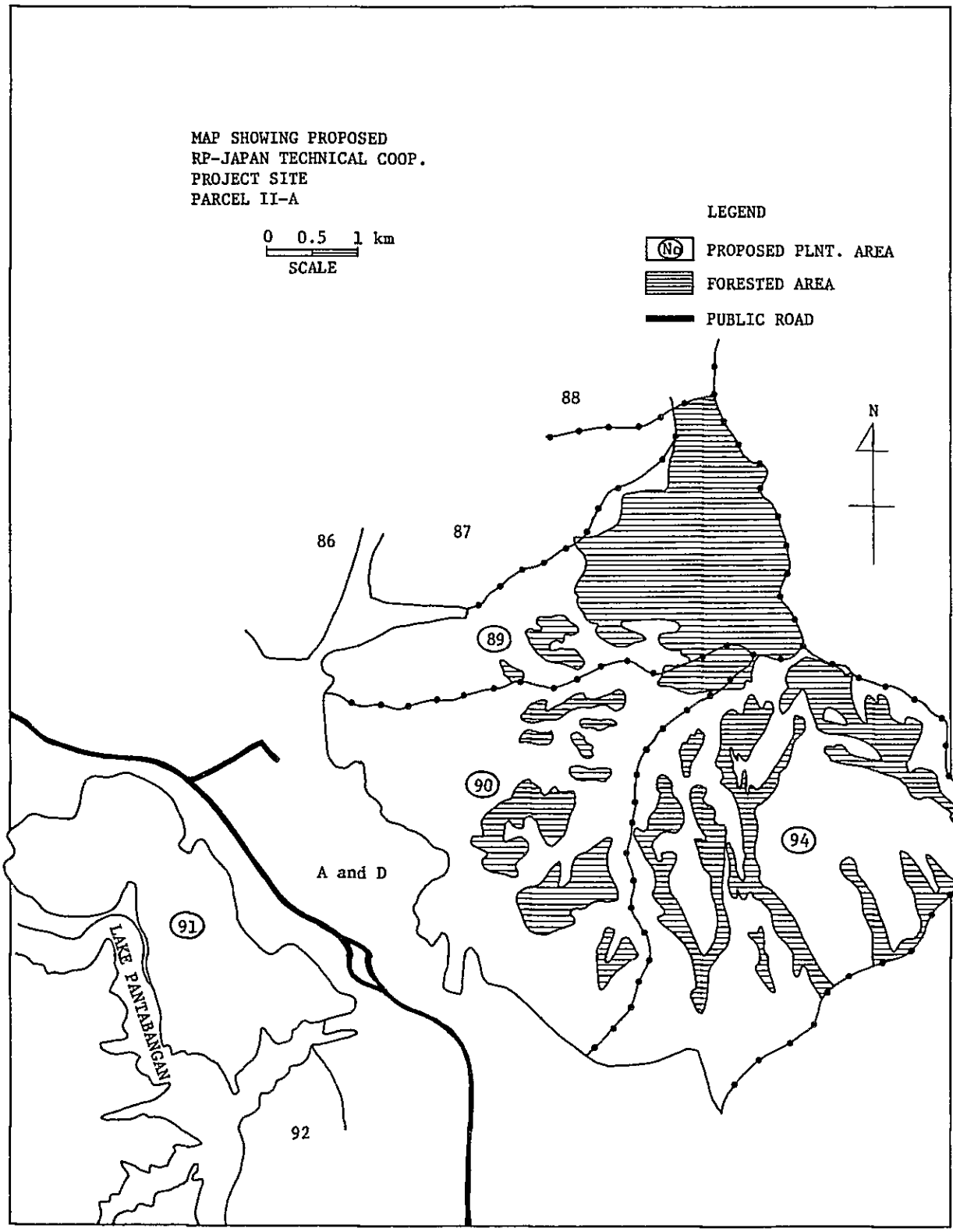
APPENDIX L

M A P S

I. MAP SHOWING THE AREA PROPOSED FOR RP-JAPAN AFFORESTATION PROJECT (PARCEL I, II-A, II-B, and III)

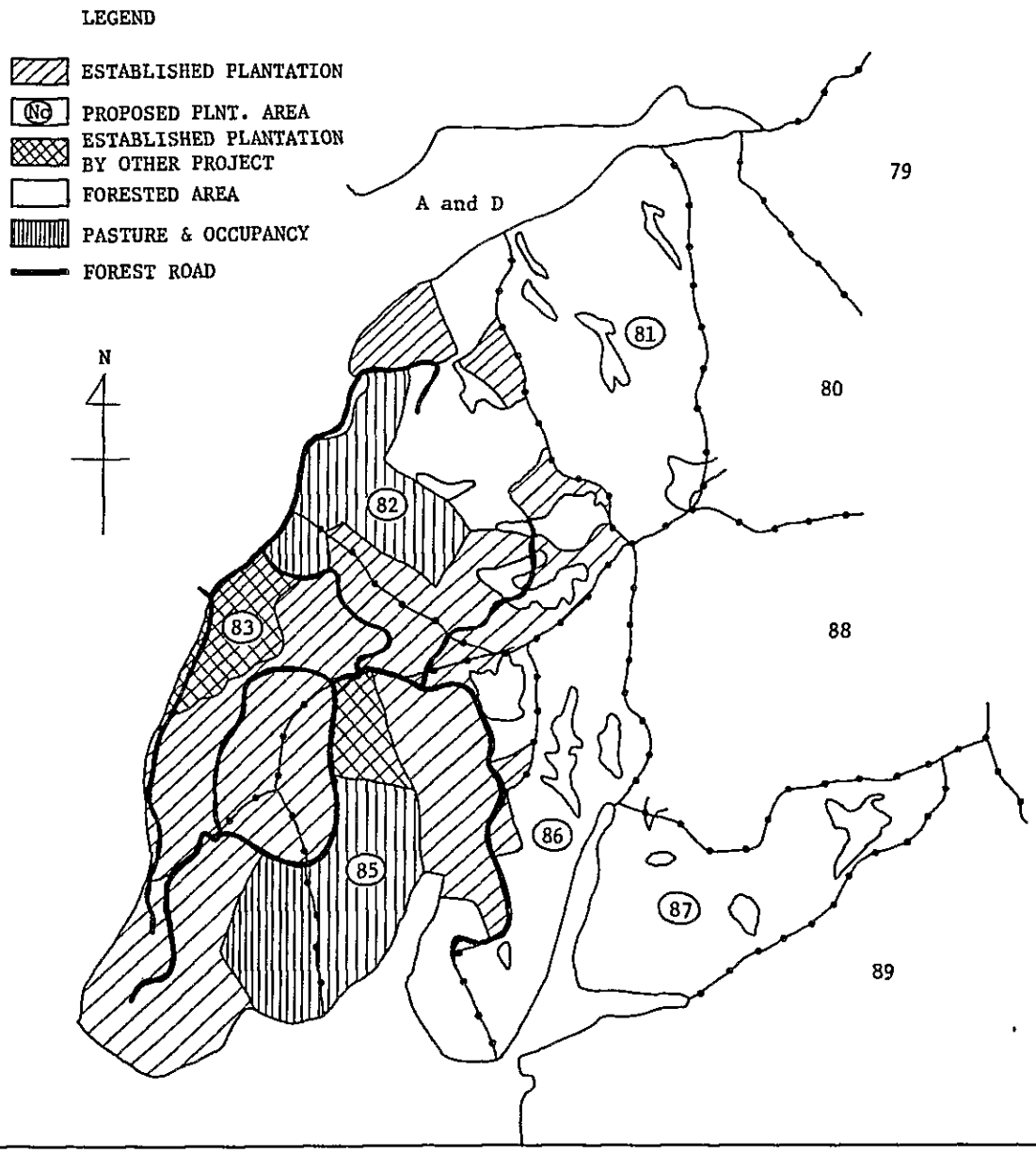
II. MAP SHOWING THE AREA SUITABLE FOR AFFORESTATION IN PROPOSED RP-JAPAN PROJECT SITE (PARCEL I, II-A, II-B, and III)

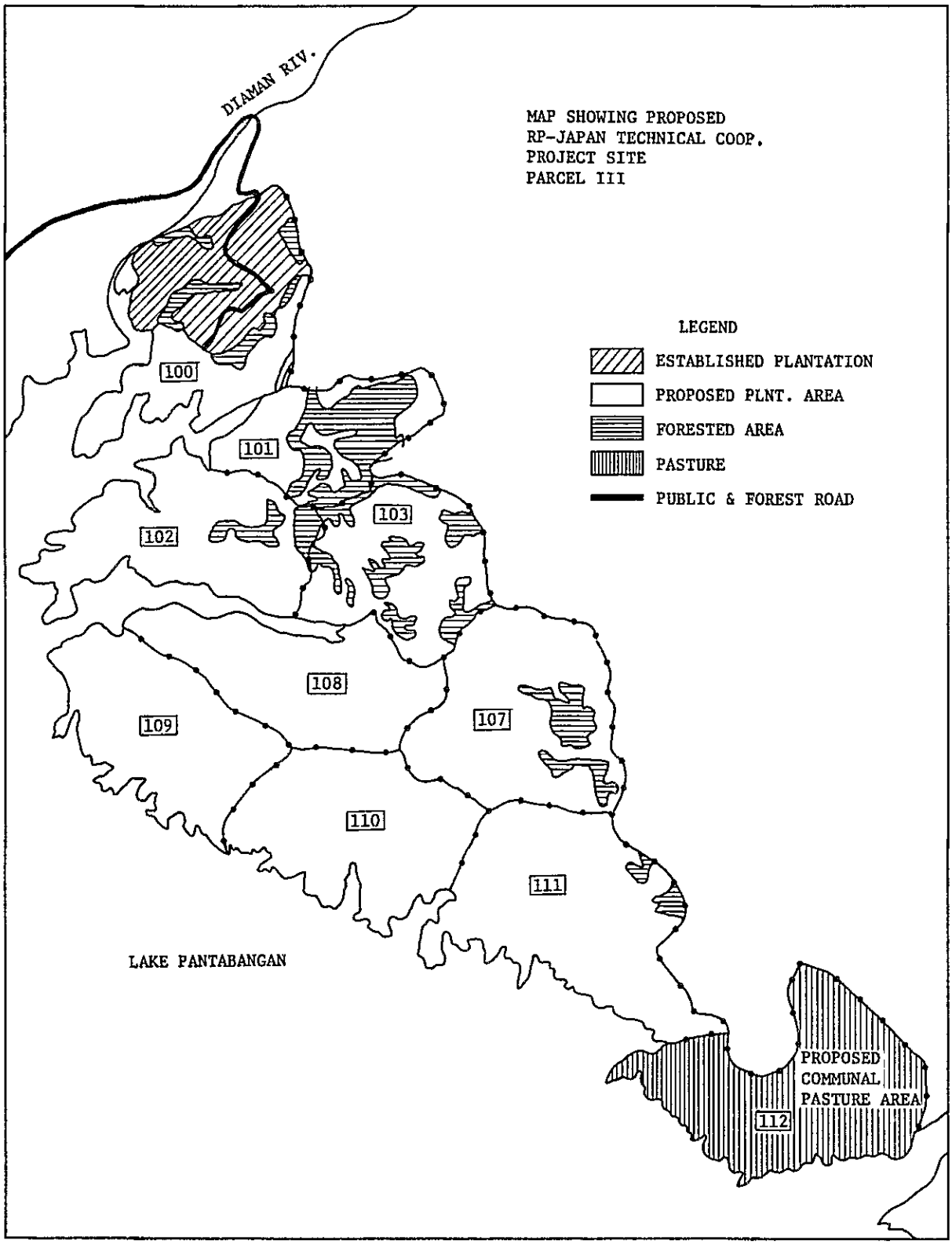

MAP SHOWING PROPOSED
RP-JAPAN TECHNICAL COOP.
PROJECT SITE PARCEL I
0 0.5 1 km
SCALE
LEGEND
ESTABLISHED PLANTATION
(No) PROPOSED PLNT. AREA
FORESTED AREA
PASTURE & OCCUPANCY
COMPARATIVE SITE FOR EROSION CONTROL TEST
PUBLIC & FOREST ROAD
N
57
56
33
54
55


MAP SHOWING PROPOSED
RP-JAPAN TECHNICAL COOP.
PROJECT SITE
PARCEL II-A
0 0.5 1 km
SCALE
LEGEND
PROPOSED PLNT. AREA
FORESTED AREA
PUBLIC ROAD
N
88
86
87
89
90
94
A and D
91
LAKE PANTABANGAN
92

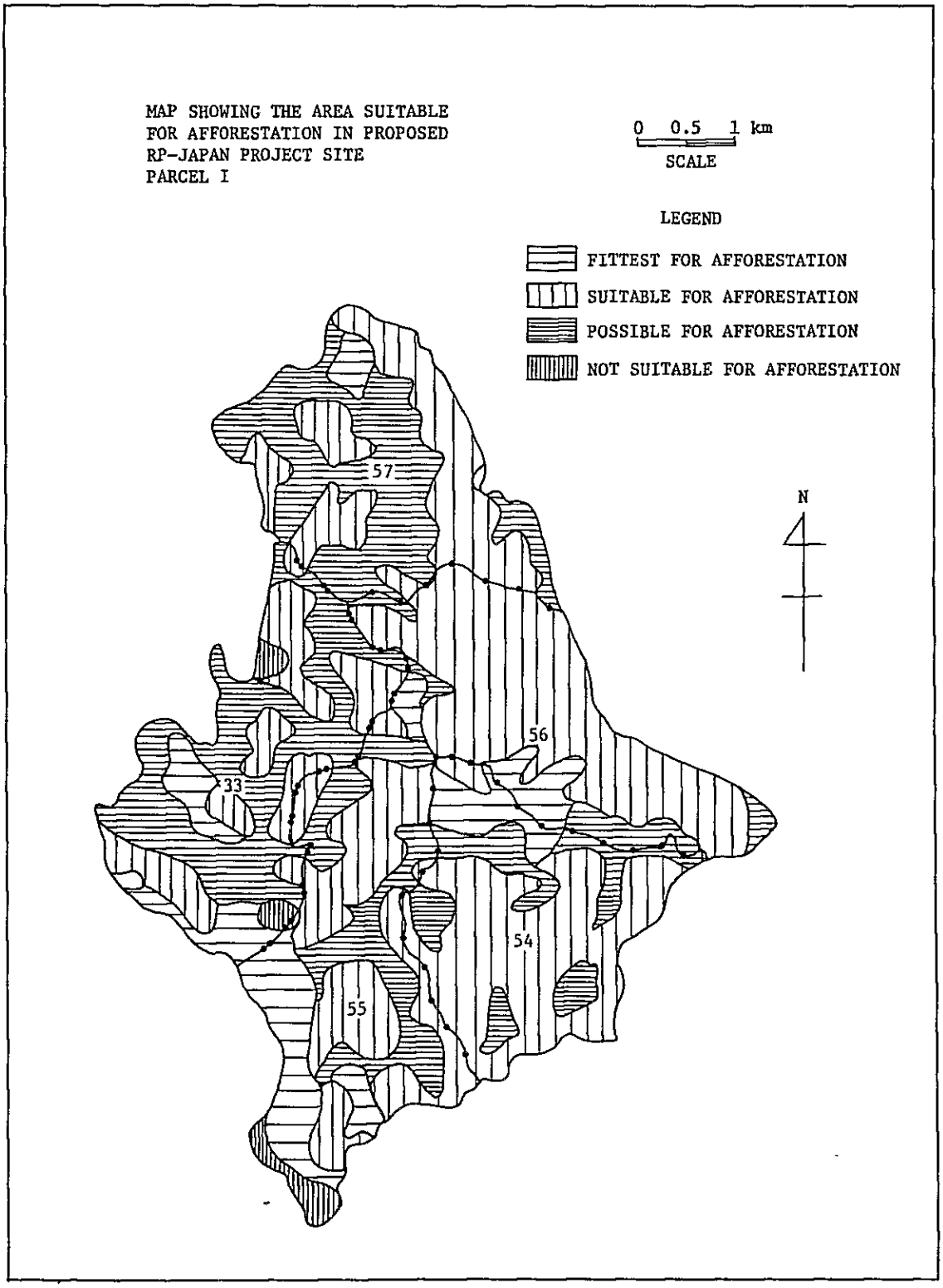
MAP SHOWING PROPOSED
RP-JAPAN TECHNICAL COOP.
PROJECT SITE
PARCEL II-B

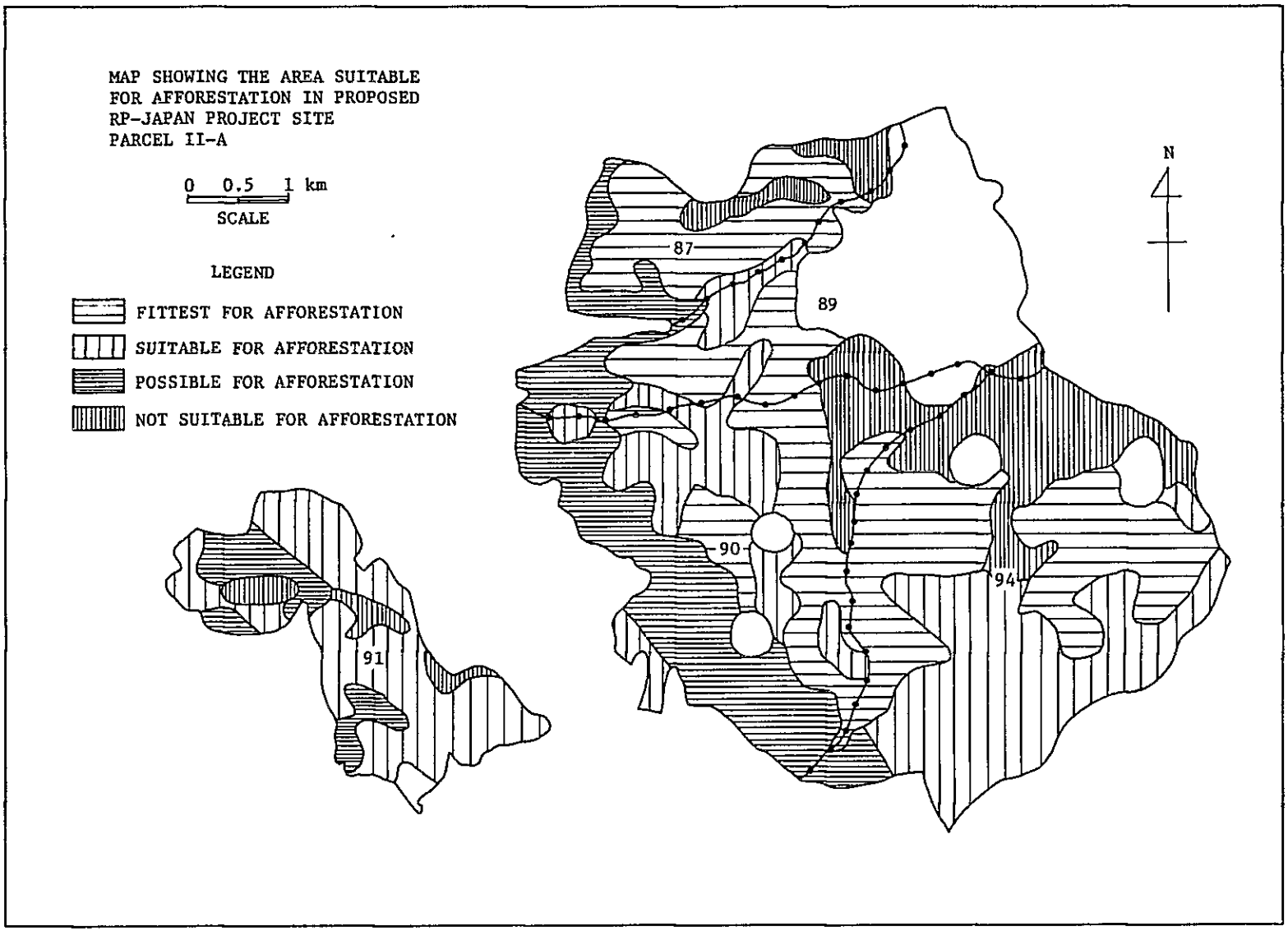
0 0.5 1 km
SCALE




DIAMAN RIV.
MAP SHOWING PROPOSED
RP-JAPAN TECHNICAL COOP.
PROJECT SITE
PARCEL III
LEGEND
ESTABLISHED PLANTATION
PROPOSED PLNT. AREA
FORESTED AREA
PASTURE
PUBLIC & FOREST ROAD
100
101
102
103
107
108
109
110
111
112
LAKE PANTABANGAN
PROPOSED
COMMUNAL
PASTURE AREA

MAP SHOWING THE AREA SUITABLE
FOR AFFORESTATION IN PROPOSED
RP-JAPAN PROJECT SITE
PARCEL I



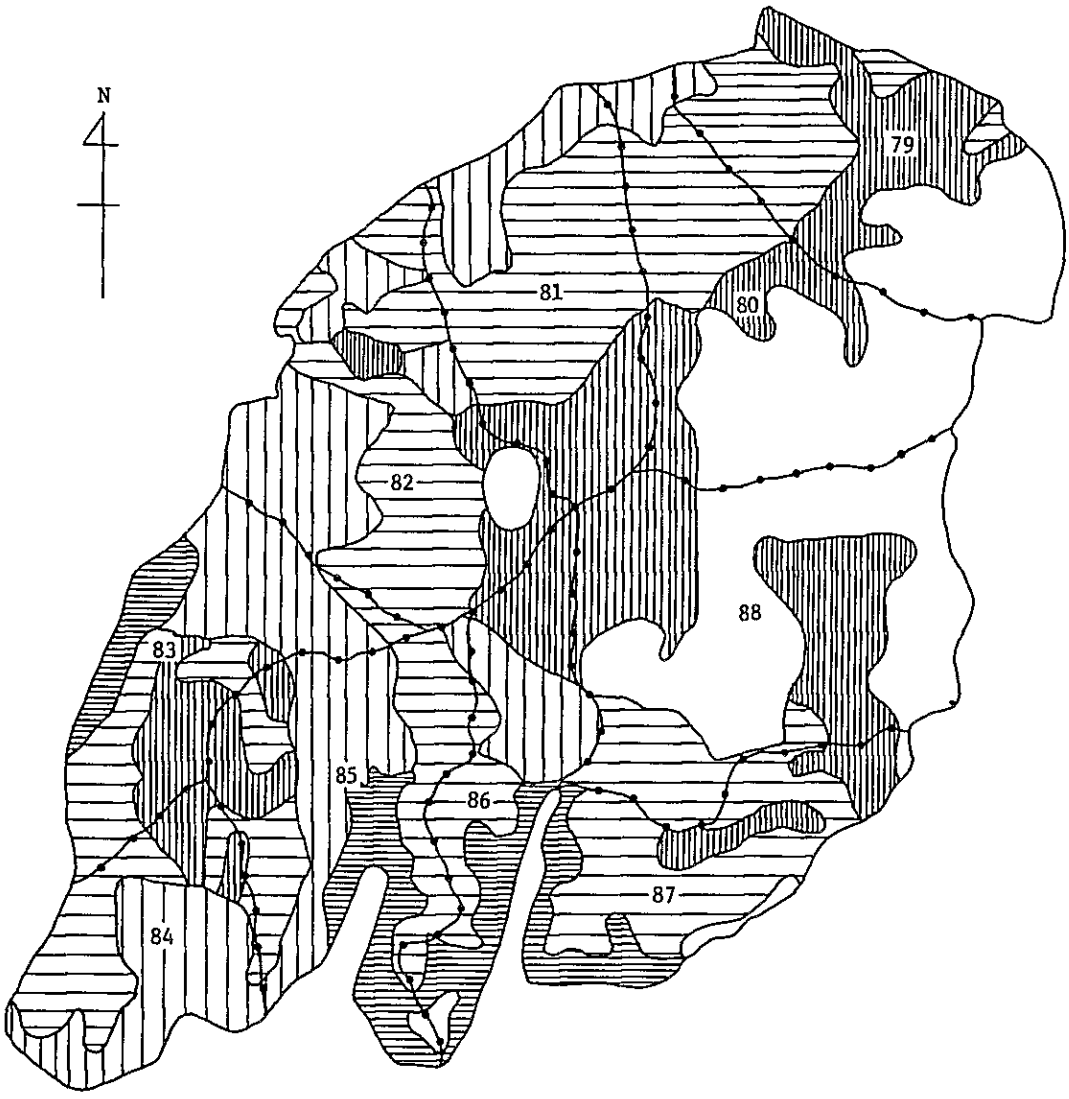

MAP SHOWING THE AREA SUITABLE
FOR AFFORESTATION IN PROPOSED
RP-JAPAN PROJECT SITE
PARCEL II-A
0 0.5 1 km
SCALE
LEGEND
FITTEST FOR AFFORESTATION
SUITABLE FOR AFFORESTATION
POSSIBLE FOR AFFORESTATION
NOT SUITABLE FOR AFFORESTATION
N
87
89
90
91
94

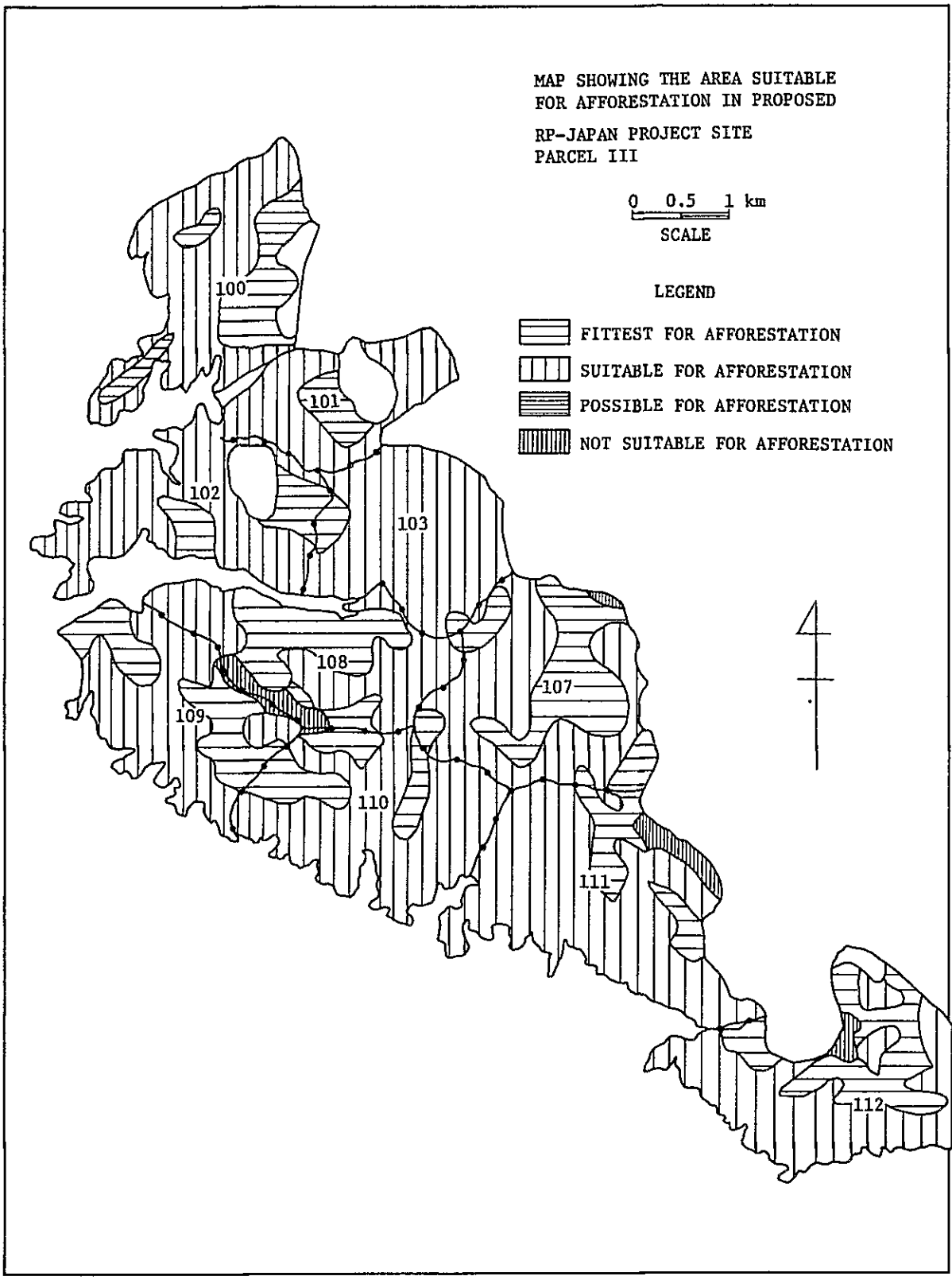
MAP SHOWING THE AREA SUITABLE
FOR AFFORESTATION IN PROPOSED
RP-JAPAN PROJECT SITE
PARCEL II-B

0 0.5 1 km
SCALE

LEGEND

FITTEST FOR AFFORESTATION
SUITABLE FOR AFFORESTATION
POSSIBLE FOR AFFORESTATION
NOT SUITABLE FOR AFFORESTATION




MAP SHOWING THE AREA SUITABLE
FOR AFFORESTATION IN PROPOSED
RP-JAPAN PROJECT SITE
PARCEL III
0 0.5 1 km
SCALE
LEGEND
FITTEST FOR AFFORESTATION
SUITABLE FOR AFFORESTATION
POSSIBLE FOR AFFORESTATION
NOT SUITABLE FOR AFFORESTATION
100
101
102
103
107
108
109
110
111
112