

TECHNICAL COOPERATION FOR  
THE TRIAL PLANTATION PROJECT  
BENAKAT, SOUTH SUMATERA

FIVE YEAR PLAN (1979 - 1984)

---

DIRECTORATE GENERAL OF FORESTRY  
DIRECTORATE REFORESTATION AND  
LAND REHABILITATION  
JULY, 1981.

TECHNICAL COOPERATION FOR  
THE TRIAL PLANTATION PROJECT IN BENAKAT,  
SOUTH SUMATERA ATA-186

---

Project Title : Trial Plantation in Benakat,  
South Sumatra.

Record of Discusssion : April 12, 1979

Location : Benakat, South Sumatera

Duration : Five (5) Years, starting  
date; 12 April, 1979

Government Cooperation Agency : Directorate of Reforestation  
and Land Rehabilitation.

Target : Manual method = 1.000 Ha.  
: Mechanical method = 850 Ha.  
: Species trial = 250 Ha.  
2.100 Ha.

Budget : Rp. 1.100.000.000

Machinery : 580.000.000 Yen

Jakarta, January, 1980

## INTRODUCTION

This Five Year Plan was drawn from Record of Discussion which was signed in April 1979, and it is a revised Five Year Plan. Originally this plan was prepared in 1979 and has been submitted in the First Joint Steering Meeting held in June 14th 1980 for discussion, which needed further improvement. Once again in the Second Joint Steering Meeting held in October 30, 1980, it was noted that the Five Year Plan would be completed in accordance with the guide lines given by the management and legalized by the Director of Reforestation and Land Rehabilitation.

During the last meeting, the Third Joint Steering Meeting held in June, 8th it was once again being discussed and it should become the valid document describing the objectives and goal of the project for the coming years activity, and must be used as a guidance to prepare Annual Plan. For Example the Annual Plan of 1981/1982 was already based on this Five Years Plan.

The budget requirement which is being presented in this plan is an estimated amount to cover all the activities, since it is subject to the budget allocation every year from the Government of Indonesia. Contribution either by JICA or the Japanese Government is a amount which is known to date such as the development of infrastructure for equipment and dormitory facilities. The other contribution for Agroforestry development is being supplemented later after feasibility study has been done by the coming JICA expert late this month.

Jakarta, June 1981

(Ir. Apandi Mangundikoro)

## CONTENTS

INTRODUCTION .....	3
CONTENTS .....	4
I. LEGAL CONTEXT .....	6
II. DEVELOPMENT OBJECTIVES	
A. Relative to Objective 1 (Species trial) .....	6
B. Relative to Objective 2 (nursery techniques) ...	7
C. Relative to Objective 3 (planting techniques) ..	7
D. Relative to Objective 4 (Protection againts fire, insect and disease) ...	7
E. Relative to Objective 5 (road construction) ....	7
F. Realtive to Objective 6 (application of machine power) .....	8
G. Relative to Objective 7 (environmental implication) .....	8
H. Relative to Objective 8 (Social implication) ...	8
I. Relative to Objective 9 (planning and evaluation techniques) .....	8
J. Relative to Objective 10(Others) .....	8
III. OUTLINE OF THE TRIAL PLANTATION	
A. Design of the trial plantation .....	9
B. Nursery .....	15
C. Forest road plan .....	16
D. Fire Break .....	16
E. Fire Look Out Tower .....	16
IV. BUDGET ALLOCATION	
A. Indonesian budget .....	17
B. Japanese budget .....	17

V. PERSONNEL REQUIREMENT ..... 18

VI. REGISTRATION, EVALUATION AND REPORT

    A. Registration ..... 19

    B. Evaluation ..... 19

    C. Report ..... 19

VII. TABLES

    A. Activities and work plan ..... 20

    B. Budget covering Government contribution ..... 23

    C. Budget covering JICA contribution ..... 26

## I. LEGAL CONTEXT

This project document (herein after referred to as plan of operation) is an instrument specifying the technical implementation of Project ATA-186. With this plan of operation it is hoped that single minded action will be taken by the Field Manager, Expert and Counterparts in carrying out this project.

## II. DEVELOPMENT OBJECTIVES

The record of discussion signed in April 1979, states that the purpose of the project is to develop and improve the following items:

1. Species trial
2. Nursery techniques
3. Planting techniques
4. Techniques for counter-measures against fire, insect and disease.
5. Techniques of designing and managing forest roads and soil conservation work
6. Techniques for application of machine power
7. Test and investigation on the environmental implication of afforestation.
8. Test and studies of the social implication of afforestation (Agroforestry)
9. Planning and evaluation techniques of afforestation
10. Other necessary techniques.

The output of the project will be take the from of reports, manuals working paper/publication, and trained personnel in the field of plantation establishment as follows:

### A. Relative to Objective 1 (Species trial)

To test the initial growth and suitability of number of species on grass land (REPORTS)

B. Relative to Objective 2 (Nursery techniques)

1. To develop an adequate nursery and facilities to produce at least 1.5 million plants (REPORTS)
2. To test and develop suitable and economical plant production for different species (MANNUALS)
3. To prepare a cost benefit study of plant production for different species (REPORTS)
4. To provide adequate training in all aspect of nursery development and plant production for 10-25 selected personal through out of the period of the project (TRAINING COURSE).

C. Relative to Objective 3 (Planting techniques)

1. To investigate and compare a variety of techniques of planting by hand, mechanical and agri-silvicultural method (MANNUAL)
2. To investigate and to develop suitable techniques of plant transportation and planting method (MANNUAL)
3. To investigate and compare a variety of techniques of tending including hand, mechanical, chemical, fertilizer, and nurse plant treatments (MANNUAL).

D. Relative to Objective 4 (Protection against fire, insect and disease).

1. To investigate and determine suitable measure for prevention and control of fire (REPORTS)
2. To develop a suitable training programme and conduct training course in fire protection for selected personal (TRAINING COURSE)

E. Relative to Objective 5 (Road construction)

1. To develop suitable method of plantation road construction (REPORTS).

F. Relative to Objective 6 (Application of machine power)

1. To develop the organization of machines and equipment in mechanized afforestation project (REPORTS)
2. To implement an on-job training course in machine and equipment (Training course)
3. To prepare recommendation for selection of suitable machine and equipment (REPORTS)

G. Relative to Objective 7 (Environmental implication)

1. To determine the effects of different tree species and planting distance in alang-alang (imperata cylindrica) (REPORTS).

H. Relative to Objective 8 (Social implication)

1. Social pattern and requirements of an integrated afforestation project (REPORTS).
2. Suitability of a modified tumpangsari system (REPORTS).

I. Relative to Objective 9 (Planning and evaluation techniques)

1. To develop and implement a suitable cost recording system (REPORTS)
2. Cost benefit analysis identification of the recommended afforestation techniques (REPORT).
3. Outline a management for large scale industrial plantation on grassland (REPORT)

J. Relative to Objective 10 (Others)

1. Any other activities identified during the course of the project relevant to conduct of the project.
2. The technical data and information resulting from the project will be published in the interest of reforestation activities in Indonesia (Working paper/Publication).



### III. OUTLINE OF THE TRIAL PLANTATION

Detailed specification of the above mentioned activities:

#### A. DESIGN OF THE TRIAL PLANTATION

Location : The site is established on National Forest, situated at Benakt about 15 Km Westward from Pendopo.

The area of site : The total area of trial plantation site is about 2,400 Ha. including the land for the forest road, fire breaks and left over area about 300 Ha.

The main purpose of the trial plantation are:

- To select the suitable tree species from the ordinary planting species in Rainforest area for the grassland and to establish their right afforestation techniques by mechanization for the grassland.
- Accordingly the trial plantation consist of 3 types of experiment and species trial.

#### 1. Manual experiment (Experiment A)

This experiment carried and by using tree species that have already been experimented at various countries under the rainforest climate. The aims of this experiment are to select the suitable tree species for this area from the following eight tree species and to make clear the relationships between the growth of each species and the various silvicultural operation in this area by manual. The eight tree species taking part in this experiment are as follows:

<u>Botanical name</u>	<u>Species code</u>	<u>Indonesian name</u>
1. <u>Pinus merkusii</u>	PIM	Pinus
2. <u>Albizzia falcataria</u>	ALF	Albisia
3. <u>Eucalytus deglupta</u>	EUD or	Eukaliptus
<u>E. Urophylla</u>		

4. <u>Swietenia macrophylla</u>	SWM	Mahoni
5. <u>Schima bancana</u>	SCB	Puspa
6. <u>Acacia auriculiformis</u>	ACA	Formis
7. <u>Peronema Canescens</u>	PEC	Sungkai
8. <u>Anthocephalus cadamba</u>	ANC	Jabon

The items of the experiment taking into account in this as follows:

- a. Effect of topography : 2 categories
  - a) top and upper slope of terrain.
  - b) foot and lower slope of terrain
- b. Effect of site preparation: 3 categories
  - a) Strip
  - b) Cutover
  - c) Cutover with burning

Site preparation is carried out by strip in general, effect of cutover with burning will be examined separately.

The strip are cleared 1 m wide by using bush cleaner and plowing the planting spots in area of 50 cm x 50 cm.

- c. Effect of planting distance: 3 categories
  - a) 2 m x 2 m
  - b) 4 m x 2 m
  - c) 4 m x 4 m
- d. Effect of soil improving tree such as Leucaena glauca.

The half on planting area is planted with soil improving tree by using planting distance 4 m x 4 m as follows.

----X----O----X----O----	X tree species 2 m x 2 m
	O soil improving tree 4 m x 4 m
X----O----X----O----X----	X tree species 4 m x 4 m
	O soil improving tree 4 m x 4 m

- e. Effect of planting season: 3 categories
  - a) rainy season (November - January )
  - b) intermediate season (March - May )
  - c) dry season (July - September)

Planting season on rainy season will be carried out in general, while b) and c) will be examined separately,

f. Effect of fertilizer: 3 levels

- a) non fertilizer
- b) standard amount of fertilizer and
- c) half amount of fertilizer standard

Fertilizer using on this polynutrient fertilizer NPK= 13 : 17 : 12 or 14 : 16 : 12. Other kind of fertilizer will be tested. 20 gr. Nitrogen per seedling for broad leaves and 8 gr. Nitrogen per seedling for pine, and 6 gr. Nitrogen per seedling for Leguminans tree about 2 months after planting.

The area of each plot of fertilizer test is 0.25 Ha. (50mx50m) and repeated twice. The plot are settled on two categories of topography. Fertilizer to be examined during 3 years after planting. the amount of fertilizer in second year to be increase about 20% of the first year and in the third year will be increased more 20% than that 2nd year.

g. Effect of tending: 3 categories

- a) Weeding is done by clearing strip twice a year:
- b) Weeding is done by clearing strip three times a year.
- c) Weeding is done by using grass killers.

Categories:

- a) Will be carried on in general, while
- b) Will be examined separately.

h. The arrangement of plot:

The planting area for one species (petak) is 50 Ha. The area divided into 3 area equally according to the planting distance and also the half them is planted with soil improvement tree. So each petak has 6 "anak petak" or sub-petak. in each sub-petak 12 plots of fertilizer test are settled on two categories of topography. The area of a fertilizer test is 0.25 Ha. (50 m x 50 m).

Annual planting area of each species is as follows:

Species code	2nd	3rd	4th	5th	Total
PIM	50	-	50	50	150
ALF	50	-	50	50	150
EUU or EUD	50	-	50	50	150
SWM	50	-	50	50	150
SCB	-	50	50	50	150
ACA	-	50	-	-	50
PEC	-	50	-	-	50
ANC	-	50	50	50	150
TOTAL (Ha)	200	200	300	300	1,000

## 2. Mechanization experiment (Experiment B)

Under this experiment, the experimental introduction of mechanization for the site preparation, planting and tending in this grassland area and how to develop and improve the machine suitable for this area will be tried. Moreover, the effect of mechanization and the process of work be surveyed and analysed.

The tree species to be planted is the same as Experiment A.

The effect of mechanization in this area is examined on the following items:

- a. Effect of topography: 2 categories, this is the same as Experiment A
- b. Effect of site preparation : 2 categories
  - a. Strip clearing and strip cultivation
  - b) Cutover and strip cultivation, but this will be examined separately
- c. Planting season : it is performed only from November to January
- d. Planting method : to use Earth auger and tree planter will be employed

e. Arrangement of plot: the planting area (petak) for species is 50 Ha. This area is divided into 2 area equally according to the planting distance and also the half of them is planted with soil improving tree. So each petak has 4 "anak petak" or sub-petak. In each sub-petak 12 plots of fertilizer test are settled on two categories of topography. The area of fertilizer test is 0.25 Ha. (50 m x 50 m)

Annual planting area of each species as follows:

Species code	: 2nd	3rd	4th	5th	Total
PIM	-	50	50	50	150
ALF	-	50	50	50	150
EUU or EUD	-	50	50	50	150
SWM	-	-	50	50	100
SCB	-	-	50	50	100
ACA	-	-	50	50	100
PEC	-	-	-	50	50
ANC	-	-	-	50	50
Total	-	150	300	300	850

### 3. Introduction experiment of new tree species (experiment C)

Under this experiment, the indigeneous tree species in Indonesia and exotic tree species introduced in Indonesia will have adaptability and possibility of good growing, will be experimented.

The tee species that supposed to be tried are as follows, but they will be re-examined not only with the advancement of the project but, also with the accumulation of the information on the possibility of artificial planting by all kind of tree species:

Botanical name	Species code	local name
1. <u>Pinus merkusii</u>	PIC	-
2. <u>Aleurites moluccana</u>	ALM	Kemiri
3. <u>Eusideroxylon swageri</u>	EUZ	Ulin
4. <u>Shorea sp.</u>	SHS	Meranti
5. <u>Hopea sp.</u>	HOS	Hopea
6. <u>Octomalis sumatrana</u>	OCS	Benuang
7. <u>Dalbergia latifolia</u>	DAL	Sonokeling
8. <u>Cordia alliodora</u>	COA	-
9. <u>Cedrea odorata</u>	CEO	-
10. <u>Pterocarpus indicus</u>	PTI	Angsana
11. <u>Acacia mangium</u>	ACM	Mangium
12. <u>Khaya sp</u>	KHS	Kaya
13. <u>Enterolobium sp.</u>	ENS	Petai brasil
14. <u>Gmelina arborea</u>	GMA	-
15. <u>Leucaena leucocephalla</u>	LEL	Ipil-ipil
16. <u>Ochroma bicolor</u>	OCB	Balsa
17. <u>Pterygota allata</u>	PTA	-

However, it is necessary to collect enough seed to establish the plantation of 10 Ha. one species. Total number of species is expected to reach 25 species.

The experiment will be tried under following items:

- a. Effect of topography : this is the same to Experiment A
- b. Site preparation : It is performed only by strip clearing
- c. Effect of planting distance: 2 categories
  - a. 2 m x 2m
  - b. 4 m x 4 m
- d. Planting season : It is performed only from November to January
- e. Planting method : This is the same to Experiment B
- f. Effect of Fertilizer : 2 categories
  - a. standard amount of Experiment A
  - b. non fertilizer
- g. Tending : This is the same to Experiment A.

#### h. Arrangement of block, compartment (petak), sub-compartment and plot

Trial plantation area is divided into 3 experimental areas. Trial plantation are divided into experimental block (A,B,C), area are further divided into compartment and compartment are divided into sub-compartment. Every compartment is intended for one tree species and every sub-compartment has one kind combination of treatment.

Each block, compartment and sub-compartment has its code number as follows: I-B-10-a

I = Annual planitng area (I=80/81; II=81/82;  
III=82/83; IV 83/84)

B = TYpe of experiment

10 = Number of compartment

a = Code of sub-compartment

#### B. Nursery

1. Location of nursery site : the location is on teh west Bank of Baung river, about 12 Km, westward from pendopo.

2. Area of nursery site : total arae is about 16.2 ha; area of nursery bed is 3,5 ha and about 12,7 ha for arboretum.

3. Facility of nursery site :

a. Three pond for reservoir are established by utilizing the creek of Baung river. The capability of a pond is 500 m<sup>3</sup>

b. Shed for soil, shed for soil heating, shed for potting work, germination room, place for transplanting, germination beds, seedling beds, sprinkling systems, drainage ditch and sun shade lawn are established.

c. Seedling beds:

Size of bed is 1.2 m (width) x 12 m (length) x 0.1 m (height) and is paved with the bricks arpile up. The soil and cover with the mortar or plastic sheet. Total number of potted seedling beds about 1.000 beds, but they include 36 spare beds. Number of pot per a bed is 2.250 pots in case of Pinus merkusii. Total number of germination bed is about 85

### C. FOREST ROAD PLAN

Main road will be established along watershed running from north to south. Operation road is established around the trial plantation site and spur road. Main items of standard in construction of each forest road as follows:

Item	Main road	Operation road	Spur road
Expectant speed by car (KM/Hr)	20	10	-
Minimum radius of curvature (m)	30	20	10
Visual distance of curvature (m)	40	20	20
Maximum surface slope	7	10	12
Thickness of Sand	30	20	10
Surface of embankment	sodding work	sodding work	-
Culvert	Corrugated pipe	Corrugated pipe	-

### D. FIRE BREAK

Fire breaks are established along the main road, operation road, spur road and also around the trial plantation established annually (block). The width of fire breaks are 30 m along the main road and 20 m along the operation road and 20 m along the spur road including the width of road. The width of fire breaks will be covered with cover plant or planted with green fire breaks tree species.

### E. FIRE LOOK OUT TOWER

The fire look out tower with the height of 15 m will be constructed on 4 spots along the main road.



#### IV. BUDGET ALLOCATION

Budget allocation for the Trial Plantation Project is estimated budget from the Government of Indonesia and the Government of Japan. Budget allocation will be compared with available the budget from every Government in every year.

The Government of Indonesia prepares the budget which use for performance development objectives and the Government of Japan will contribute equipment, machinery and infrastructure. Infrastructure budget is used for construction of dormitory and other facilities.

Details budget allocation are as follows on table VIII B and VIII C. Budget available for each activity is as follows:

##### A. INDONESIAN BUDGET

<u>Item</u>	<u>Total x Rp. 1.000.-</u>
1. Nursery	39,000.-
2. Plantation	388.000.-
3. Tending	115.000.-
4. Fertilizing	52.000.-
5. Fire break	44.000.-
6. Road construction	112.000.-
7. Fire tower	4.000.-
8. Building & Facilities	95.670.-
9. Management contand operational cost	241.956.-
	Total 1.105.126.-

##### B. Japanese Budget

1. Machinery & Equipment	580.000.000 Yen
2. Infrastructure	180.000.000 Yen
	760.000.000 yen

## V. PERSONAL REQUIREMENT

The trial Plantation Project can success if personal requirement is enough. Personal requirement must in conformity with objectives, experts, counterparts, supervisor, formens and workers.

The Government of Japan will send for long term expert and short term experts, the other are Indonesian.

The Trial Plantation Project to execute objectives requirs persona; as follows:

<u>Objectives</u>	<u>Expert</u>	<u>Counterpart</u>	<u>Supervisor</u>	<u>Forman</u>
1. Chief Advisor	1	1	1	
2. Silviculture	1	1	2	6
3. Nursery	1	1	1	-
4. Forest protection	1	1	1	2
5. Forest engineering	1	1	1	-
6. Forest ecology	1	1	2	-
7. Liaison Officer	1	-	-	-

## VI. REGISTRATION, EVALUATION, AND REPORT

### A. Registration

Registration are made of nursery and plantation aim and to provide comprehensive and precise description and histories of plantation and also to storage the authentic date and information for the preparation of report, evaluation etc.

The registers will be maintained and will be kept up to date by regular entries.

Registers of nursery is made a tree species and registers of plantation is made per a "sub-petak" (form 1 and form 2)

### B. Evaluation

Periode evaluation of project activities and result will be made a twice a year in order to know which techniques are unsuitable and which one should be further developed.

Evaluation is made in the field and the result are then discussed in Joint Steering Group Meeting.

Evaluation is also made in order to prepare annual Work Plan ("DUP"), and working paper/publications.

### C. Reports

At the end of the project or during the project is implemented, various reports and manual will be is used as mentioned above.

(PART II-B.Output).

## VII. TABLES

## A. Activities and Work Plan

ACTIVITIES	79/80	80/81	81/82	82/83	83/84	Total
1	2	3	4	5	6	7
<b>1. Nursery</b>						
Seedlings (x1,000)	-	450	788	1,375	1,513	-
Beds (1.2 x 12 x 0.1m)	-	233	464	812	988	-
Soil for pots (m <sup>3</sup> )	-	267	660	1,139	1,271	-
<b>2. Planting</b>						
Experiment A (manual)	-	200	200	300	300	1,000
Experiment B (mechanization)	-	-	150	300	400	850
Experiment C (Species trial)	-	-	50	100	100	250
	-	200	400	700	800	2,100
<b>3. Tending</b>						
1st year old (one/year)	-	200	400	700	800	-
2nd year old (3 x/year)	-	-	200	400	700	-
3th year old (3 x/year)	-	-	-	200	400	-
4th year old (3 x year)	-	-	-	-	200	-
<b>4. Chemical (Ha)</b>						
	-	-	5	5	5	-
<b>5. Fertilizing (tons)</b>						
	-	15.5	18.5	33.25	45.25	
<b>6. Fire break (Km)</b>						
Along main road (30 m)	-	3.6	2.4	5.2	7.6	18.8
Along operational road (20m)	-	1.8	13.8	18.4	32.0	66.0
Along annual planting area	-	-	14.2	23.8	24.0	62.0
<b>7. Road Construction (Km)</b>						
Main road	0.7	2.3	2.6	3.8	-	9.4
Operational road	0.9	6.9	9.2	16.2	-	33.0
Spur road	-	7.1	11.9	12.0	-	31.0
<b>8. Fire Tower</b>						
	-	1	1	1	1	

1	2	3	4	5	6	7
<b>9. Building and Facilities</b>						
(1) Administration office (m <sup>2</sup> )	50	200	-	-	-	250
(2) Sheds (m <sup>2</sup> )	100	-	-	-	-	100
(3) Store house (m <sup>2</sup> )	25	125	-	-	-	150
(4) Experts dormitory (m <sup>2</sup> )	50	470	-	-	-	520
(5) Workshop garage (m <sup>2</sup> )	-	200	-	-	-	200
(6) Generator house (m <sup>2</sup> )	-	60	-	-	-	60
(7) Pump house (m <sup>2</sup> )	6	14	-	-	-	20
(8) Pond (m <sup>2</sup> )	12	-	-	-	-	12
(9) Laboratories and room (m <sup>2</sup> )	-	-	320	-	-	320
(10) Oil Stock room (m <sup>2</sup> )	-	30	-	-	-	30
(11) Plantation office (m <sup>2</sup> )	-	150	-	-	-	150
(12) Potting house (m <sup>2</sup> )	30	70	-	-	-	100
(13) Fertilizer stock house (m <sup>2</sup> )	80	-	-	-	-	80
(14) Guest house (m <sup>2</sup> )	-	380	-	-	-	380
	341	1,699	320	-	-	2,360
<b>10. Machinery and Equipment</b>						
<b>A. Nursery and Planting</b>						
(1) Wheel tractor (unit)	2					
(2) Auto-auger (unit)	1					
(3) Auger (unit)	10					
(4) Bush cleaner (unit)	4					
(5) Chain saw (unit)	2					
(6) Dump truck (unit)	1					
(7) Truck (unit)						
(8) Cransler (unit)						
(9) Trencher (unit)						
(10) Soil Mixer (unit)	1					
(11) Fork Lift (unit)						
(12) Sprinkler (unit)	1					
(13) Conveyor (unit)	1					
(14) Auto-seeder (unit)	1					
(15) Auto-seedling selector (unit)						
(16) Hand tractor (unit)						

1	2	3	4	5	6	7
<b>B. Road Construction</b>						
(1) Angle dozer (unit)	1					
(2) Shovel dozer (unit)						
(3) Rammer (unit)						
(4) Motor grader (unit)						
(5) Road roller (unit)						
(6) Dump truck (unit)						
(7) Crawler truck (unit)						
(8) Truck (unit)						
(9) Trencher (unit)						
(10) Conveyor (unit)						
(11) Road mark (unit)						
<b>C. General Machine</b>						
(1) Jeep (unit)	1					
(2) Bus (unit)	1					
(3) Motor cycle (unit)						
(4) Fire fighting equipment						
(5) Generator (unit)						
(6) Service equipment (unit)						
(7) Experimental equipment						
(8) Radio and electric equipment (unit)						
(9) Meteorological observation equipment (unit)	1					

B. Budget Covering Government Construction ( x Rp. 1.000.-)

No.	Activities	79/80	80/81	81/82	82/83	83/84	Total
1		2	3	4	5	6	7
1.	Plantation						
	To design Plantation area	-	2.000	4.000	7.000	8.000	21.000
	Experiment A (manual)	-					
	Experiment B (mechanical)	-	35.000	70.000	122.500	140.000	367.000
	Experiment C (Species trial)	-					
		-	37.000	74.000	129.500	148.000	388.000
2.	Nursery	3.700	7.300	13.000	15.000	-	39.000
3.	Tending		9.000	20.000	36.000	50.000	115.000
4.	Fertilizing		2.500	10.000	15.000	25.000	52.000
5.	Fire break		2.500	8.000	15.000	19.000	44.000
6.	Road Construction						
	Main Road						
	Operation road						
	Spur road						
			14.000	24.000	33.000	40.000	112.000
7.	Fire tower	-	4.000	4.000	4.000	4.000	4.000
8.	<u>Building and Facilities</u>						
	1. Administration office	1.500	8.000				9.500
	2. Sheds	500					500
	3. Store house	750	3.750				4.500
	4. Experts dormitory	2.750	25.850				
	5. Workshop and garage		5.000				5.000
	6. Generation house		2.400				2.400
	7. Pump House	90	280				370
	8. Pond	1.200					1.200
	9. Laboratories and lecture room			12.800			12.800
	10. Oil stock room		900				900
	11. Plantation office		4.500				4.500
	12. Potting house	300	700				1.000
	13. Fertilizer stock house						1.600
	14. Guest House		22.800				22.800
	<b>Total 8</b>	<b>7.090</b>	<b>75.780</b>	<b>12.800</b>			<b>95.670</b>

1	2	3	4	5	6	7
<b>9. Management</b>						
<b>A. Salary/Wages/Honorarium</b>						
<b>1. Head office personal</b>						
- Manager	600	600	600	600	600	3.000
- Co-Manager	480	480	480	480	480	2.400
- Staff (7)	2.520	2.520	2.520	2.520	2.520	12.600
<b>Total 9.A.1.</b>	<b>3.600</b>	<b>3.600</b>	<b>3.600</b>	<b>3.600</b>	<b>3.600</b>	<b>18.000</b>
<b>2. Field Personal</b>						
- Field Manager (1)	480	480	480	480	480	2.400
- Treasur (1)	360	360	360	360	360	1.800
- Administration (1)	360	360	360	360	360	1.800
- Staff Administration (6)	1.800	1.800	1.800	1.800	1.800	9.000
- Guard (3)	900	900	900	900	900	4.500
- Drivers (cars) (4)	1.200	1.200	1.200	1.200	1.200	6.000
- Mechanic (4)	1.920	1.920	1.920	1.920	1.920	9.600
- Driver(Tractor, bulldozer) (6)	2.880	2.880	2.880	2.880	2.880	14.000
<b>Total 9.A.2.</b>	<b>9.900</b>	<b>9.900</b>	<b>9.900</b>	<b>9.900</b>	<b>9.900</b>	<b>49.000</b>
<b>3. Counterpart</b>						
- Nursery (1)						
- Silviculture (1)						
- Road Construction (1)	2.880	2.880	2.880	2.880	2.880	14.400
- Forest protection (1)						
- Soil conservation (1)						
- Liaison officer (1)						
<b>Total 9.A.3.</b>	<b>2.880</b>	<b>2.880</b>	<b>2.880</b>	<b>2.880</b>	<b>2.880</b>	<b>14.400</b>
<b>Total 9.A.</b>	<b>16.380</b>	<b>16.380</b>	<b>16.380</b>	<b>16.380</b>	<b>16.380</b>	<b>81.900</b>
<b>B. Travelling</b>						
- Head personal	4.000	4.000	4.000	4.000	4.000	20.000
- Field personal	4.000	4.000	4.000	4.000	4.000	20.000
- Experts	4.000	4.000	4.000	4.000	4.000	20.000
- Counterparts	4.000	4.000	4.000	4.000	4.000	20.000



1	2	3	4	5	6	7
<b>C. Others</b>						
1. Jeep	5.090	6.500				11.500
2. Rent on office at Bogor (1)	-	2.500	2.500	2.500	2.500	10.000
3. Rent on house at Palembang(1)	2.000	2.000	2.000	2.000	2.000	10.000
4. Rent on house at Palembang(1)	2.000	2.000	2.000	2.000	2.000	10.000
5. Meetings						
- Bogor	1.000	1.000	1.000	1.000	1.000	5.000
- Palembang	1.000	1.000	1.000	1.000	1.000	5.000
6. Overtimes	200	500	500	500	500	2.000
7. Running/service (3cars)	1.466	3.000	3.000	3.000	3.000	13.466
8. Postage, telegram etc.	1.500	1.500	1.500	1.500	1.500	7.500
9. Film Documentation, fotocopy	300	500	500	500	500	2.300
<b>10. Medicines (experts)</b>						
Total 9. C	15.156	21.100	14.600	14.600	14.600	80.056
Total 9	47.536	53.480	46.980	46.980	46.980	241.956
Total 1 s/d 9	58.326	205.560	213.780	294.480	332.980	1.105.126

C. Budget Covering JICA Construction.

No.	Items	70/80	80/81	81/82	82/83	83/84	Total
1		2	3	4	5	6	7
<b>I. Machinery and Equipment</b>							
<b>A. Nursery and planting</b>							
	(1) Wheel tractor 50 Hp (2 unit)	11.600					
	(2) Auto auger (1 unit)	-					
	(3) Auger (10 unit)	5.000					
	(4) Bush cleaner (4 unit)	950					
	(5) Chain saw 13 Hp (2 unit)	400					
	(6) Dump Truck						
	(7) Truck						
	(8) Cransler dump						
	(9) Trencher						
	(10) Soil Mixer (1 unit)	2.000					
	(11) Forklift						
	(12) Sprinkler system (1 unit)	5.500					
	(13) Conveyer System (1 unit)	1.500					
	(14) Auto Seeder (1 unit)	2.500					
	(15) Auto seeding selector (1 unit)						
	(16) Hand tractor						
	(17) Others						
	<b>Total A</b>	<b>36.750</b>					
<b>B. Road Construction</b>							
	(1) Angledozer						
	(2) Shoveldozer						
	(3) Rammer						
	(4) Motor grader						
	(5) Road roller						
	(6) Dump Truck						
	(7) Crawler dump						
	(8) Truck						
	(9) Trencher						
	(10) Main road						

1	2	3	4	5	6	7
<b>C. General use machines</b>						
(1) Jeep & others						
(2) Bus						
(3) Motor cycle						
(4) Fire fighting equipment						
(5) Generator						
(6) Service equipment						
(7) Experimental electric equipment						
(8) Radio and electric equipment						
(9) Meteorological obser- vation equipment						
<b>Total C.</b>						
<b>Total A+B+C (machinery)</b>	120.000	160.000	100.000	100.000	580.000	
<b>II. Infrastructure</b>						
1. Model infrastructure for nursery and forest road	25.000.000					
2. Constrction of dormitory and other facilities			100.000.000			
3. Pilot infrastructure for agro-forestry			55.000.000			

MINUTES OF DISCUSSIONS BETWEEN THE JAPANESE CONSULTATION  
MISSION AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT  
OF THE REPUBLIC OF INDONESIA ON THE IMPLEMENTATION OF THE  
PILOT INFRASTRUCTURE SCHEME IN THE TRIAL PLANTATION PROJECT  
IN BENAKAT, SOUTH SUMATRA

---

The Japanese Consultation Mission (hereinafter referred to as the "Mission"), headed by Mr. Masato Furuya and organized by the Japan International Cooperation Agency (hereinafter referred to as "the JICA"), visited the Republic of Indonesia from June 25 to July 9, 1981, for the purpose of outlining the proposed pilot infrastructure scheme (hereinafter referred to as "the Scheme") established in the Trial Plantation Project in Benakat, South Sumatra, which is being implemented by Record of Discussions signed between the JICA and Directorate General of Forestry on April 12, 1979.

During its stay in the Republic of Indonesia, the Mission had a series of discussions and exchanged views with the Directorate General of Forestry on basic matters necessary for implementation of the Scheme.

As a result of discussion, the Directorate General of Forestry and the Mission recognized the importance and necessity of the Scheme and agreed to implement the Scheme according to herein general work plan under the cooperation of the implementing agencies of the two governments and to recommend the matters referred to in the attached general work plan to their respective governments.

Jakarta, July 6, 1981

Signed

Signed

---

MR. MASATO FURUYA  
Team Leader  
The Japanese Consultation  
Mission

---

IR. APANDI MANGUNDIKORO  
Director  
Directorate of Reforestation  
and Rehabilitation  
Directorate General of Forestry

THE GENERAL WORK PLAN ON  
THE PILOT INFRASTRUCTURE SCHEME IN  
THE TRIAL PLANTATION PROJECT IN BENAKAT, SOUTH SUMATRA

1. Purpose

The Trial Plantation Project in Benakat, South Sumatra aims at the development and improvement of afforestation techniques on tropical grasslands. For this purpose, new afforestation techniques are introduced and adjusted through trial plantation so as to fit into the conditions of the tropical grasslands. In order to promote a large scale afforestation in Indonesia in future, it is essential to involve local inhabitants in the process of afforestation so that established plantation can be well protected and improved techniques spread widely in many localities.

The Pilot Infrastructure Scheme aims at carrying out agroforestry and prepare required infrastructure for a model plantation to encourage people's participation in afforestation exercise.

2. Outline of the Pilot Infrastructure Scheme

1) Proposed Project Area.

Inside the Trial Plantation Project (ATA-186) area or its activity which has suitable geographical and topographical conditions.

2) Components of Infrastructure

Necessary infrastructure such as forest roads, bridges, look-out towers and fire breaks will be constructed in the Project area.

3) Tree Species Introduced.

Tree species suitable for fire wood, charcoal, construction and furniture manufacturing will be planted. In addition, fruit trees or other agricultural crops will be introduced.

### 3. Measures to be taken by JICA

- 1) To bear expenses necessary for the following construction works.
  - a. Forest roads
  - b. Cultivation of Project area
  - c. Fire prevention facilities
  - d. Bridges
  - e. Other appurtenants works (including procurement of materials and equipment)
- 2) To dispatch short-term experts for basic design and supervision of construction works.

### 4. Measures to be taken by Directorate General of Forestry.

- 1) To make necessary lands available for the Scheme
- 2) To bear all expenses necessary for the establishment of plantations for the following works other than those carried out by JICA.
  - a. Production of seedlings
  - b. Site preparation
  - c. Planting
  - d. Tending
  - e. Fertilization and supply of fertilizers.
- 3) To make necessary arrangements for the participation of local inhabitants in the Project area with full understanding of and cooperation with the Scheme.
- 4) Other related activities.

THE RECORD OF DISCUSSIONS  
ON EXTENSION OF  
THE PERIOD OF THE TECHNICAL COOPERATION  
FOR THE TRIAL PLANTATION PROJECT  
IN BENAKAT, SOUTH SUMATRA (ATA-186)

Japan International Cooperation Agency (hereinafter referred to as "JICA"), with regard to the recommendation made by the Indonesian and Japanese Joint Evaluation Team which conducted the evaluation survey from August 30 to September 14, 1983, had a series of discussions, through its Jakarta office represented by Mr. Hiroshi Yamamura, with the authorities concerned of the Government of the Republic of Indonesia on the extension of the period of the Technical Cooperation for the Trial Plantation Project in Benakat, South Sumatera (hereinafter referred to as "the Project"), based on the Record of Discussion which was signed in Jakarta on April 12, 1979, and will be terminated on April 11, 1984 (hereinafter referred to as "the R/D").

As a result of the discussions, both sides agreed to recommend to their respective Government to extend the period of the Technical Cooperation based on the R/D until April 11, 1986 in order to achieve the anticipated objectives of the Project and to make necessary amendments in the Attached Document of the R/D as attached hereto.

Jakarta, March 24, 1984

Hiroshi Yamamura  
Resident Representative  
Japan International  
Cooperation Agency

Ir. Wartono Kadri  
Director General of  
Reforestration and  
Land Rehabilitation  
Ministry of Forestry

AttachmentAMENDMENT

To amend wording as follows through the attached Document of the R/D except Annex VI:

"The Directorate General of Forestry", "The Forest Research Institute" and "The Forest Product Research Institute" and "The Project Office at Bogor", should read "The Ministry of Forestry", "Forest Research and Development Centre" and "The Project Office in Jakarta" respectively.

I, To amend Annex VI as follows:

Annex VI      Composition of the Joint-Steering Group

1) Chairman

Director General of Reforestation and Land Rehabilitation

2) Members:

(1) Indonesian Side :

- Director of Reforestation, Directorate General of Reforestation and Land Rehabilitation.
- Chief of Sub Directorate of Forest Rehabilitation
- Secretary of Directorate General of Reforestation and Land Rehabilitation.
- Director, Bureau of Planning, Ministry of Forestry.
- Director, Forest Research and Development Centre, Agency for Forestry Research and Development.
- Director, Forest Education and Training Centre
- Director of Programming, Directorate General of Reforestation and Land Rehabilitation
- Director of Regreening and Arable Land Control.
- Director of Land Conservation, Directorate General of Reforestation and Rehabilitation.
- Director, South Sumatra Regional Forest Office, Ministry of Forestry.
- Head, South Sumatra Provincial Forest Office.
- Project Leader of P3PP- DAS Musi Palembang
- Field Manager of ATA-186



(2) Japanese Side:

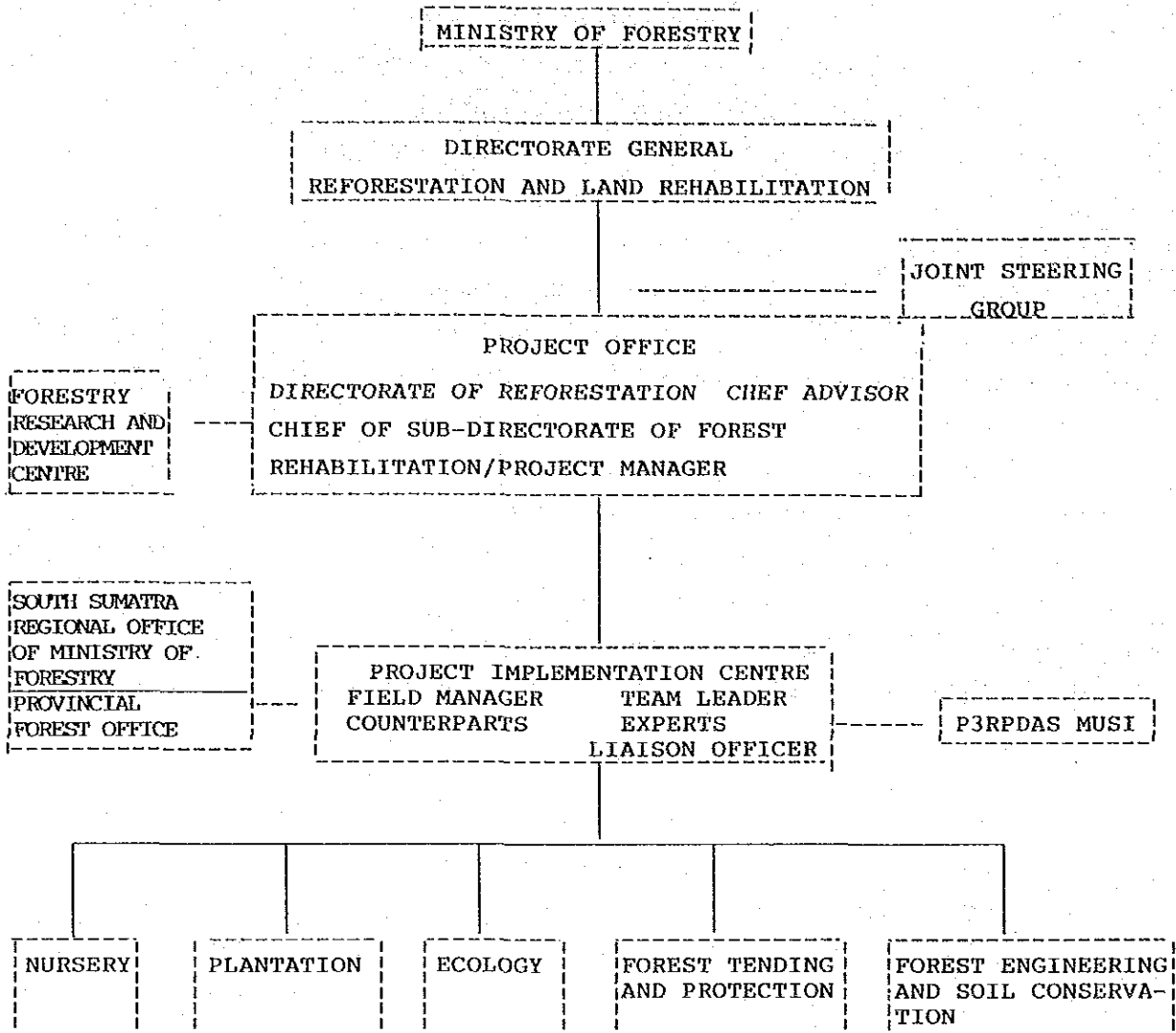
- Chief Advisor
- Team Leader
- Representative of JICA
- Expert(s) designated by Chief Advisor.
- Liaison Officer.

Note:

1. Director of Reforestation, Directorate General of Reforestation and Land Rehabilitation may be designated as Acting Chairman by the Chairman.
2. Officials of the Embassy of Japan may attend the meeting of the Joint Steering Group as observers.
3. Officials of the Government of the Republic of Indonesia assigned by the Chairman may attend the meeting of the Joint Steering Group as observers.

III. To amend Annex VII as shown in attached paper; organization Chart.

ORGANIZATION CHART



Note:

- INSTRUCTION
- CONSULTATION LINE

THE RECORD OF DISCUSSIONS  
ON THE EXTENSION OF  
PERIOD OF THE TECHNICAL COOPERATION  
FOR THE TRIAL PLANTATION PROJECT  
IN BENAKAT, SOUTH SUMATRA (ATA-186)

Japan International Cooperation Agency (hereinafter referred to as "JICA"), with regard to the recommendation made by the Indonesian and Japanese Joint Consultation Team which conducted the review survey from October 21 to 30, 1985, had a series of discussions, through its Jakarta Office represented by Mr. Hiroshi Yamamura, with the authorities concerned of the Government of the Republic of Indonesia on the extension of the period of the Technical Cooperation for the Trial Plantation Project in Benakat, South Sumatra (hereinafter referred to as "the Project") based on the Record of Discussions which was signed in Jakarta on March 24, 1984 and will be terminated on April 11, 1986.

As result of the discussions, both sides agreed to recomend to their respective Governments to extend the period of the Technical Cooperation for the Project a reduced scale as a follow-up until March 31, 1988, in order to achieve the initial objectives of the Project, based upon the Implementation Programme as attached hereto.

Jakarta, April 2nd, 1986

Hideo Endo  
Resident Representative  
Japan International  
Cooperation Agency

Wartono Kadri  
Director General of  
Reforestation and  
Land Rehabilitation  
Ministry of Forestry.

Attachment

Implementation Programme of  
the "Follow-Up Cooperation" of the Project

## A. Activities

Item	Year	
	1986/87	1987/88
1. Techniques for counter-measures against fire, insect, disease and meteorological damage		
2. Studies on the social and environmental implication of afforestation		
3. Planning, management and evaluation techniques of afforestation projects		
4. Other necessary techniques		

B. Measures to be taken by the Japanese Side

<div style="text-align: center;">YEAR</div> <div style="text-align: left;">ITEM</div>	1986/87	1987/88
1. Dispatch of Experts		
(1) Long Term Experts		
Chief Advisor/Forest Protection Silviculture Agroforestry		
(2) Short Term Experts		
2. Acceptance of Trainees	_____	_____
3. Provision of Equipment	_____	_____

## C. Measures to be taken by the Indonesian Side

Item	YEAR	
	1986/87	1987/88
1. Counterparts		
(1) Project Manager		
(2) Field Manager		
(3) Silviculture		
(4) Nursery		
(5) Forest Protection		
(6) Forest Ecology		
(7) Forest Engineering and Soil Conservation		
(8) Agroforestry		
2. Administrative		
(1) Clerical and Service Employees		
(2) Labourers		
3. Local Cost		

THE REPORT OF THE JOINT EVALUATION TEAM ON  
THE TRIAL PLANTATION PROJECT IN BENAKAT, SOUTH SUMATERA  
(ATA-186)

Four and half years have passed since the Trial Plantation Project in Benakat, South Sumatera (ATA-186) was started in April 1979, and the remaining cooperation period based on the Record of Discussions (hereinafter referred to as "the R/D") is about half a year.

Hereupon, for the purpose of reviewing the achievements of the project and giving suggestions for the future course, the Joint Evaluation Team Joint Evaluation Team (hereinafter referred to as "the Team") was organized.

The Team, which consisted of the Indonesian team headed by Mr. Victor M. Sinaga, Director of Reforestation, Directorate General of Reforestation and Land Rehabilitation, Department of Forestry, and of the Japanese team headed by Mr. Yasushi Nomura, Director of Planning Division, Forestry Agency, and co-headed by Mr. Minoru Kumazaki, Director of Forest Economic Division, Forestry & Forest Products Research Institute, conducted an evaluation of the Project starting with the First Joint Evaluation Meeting on September 1, 1983 to draft the Terms of Reference. After visiting the Project site and a series of discussions with the authorities concerned and the Indonesian/ Japanese staffs concerned of the Project, the Final Joint Evaluation Meeting was held in Jakarta on September 13, 1983. As a result of the Meeting, the Team presented, its evaluation report and accordingly agreed to recommend to their respective governments the matter referred to in the attached document hereto.

Jakarta, September 13, 1983

(Signed)

(Signed)

---

Minoru Kumazaki  
Co-leader of the Japanese  
Evaluation Team

---

Victor M. Sinaga  
Head of the Indonesian  
Evaluation Team.

## ABSTRACT

The Joint Evaluation Team agreed that the Government of Indonesia and the Government of Japan have taken their own responsibilities as stated in the R/D at the satisfactory degree. During the period of cooperation a number of data and information concerning reforestation techniques and management aspects has been attained.

Nevertheless, in the light of the initial purpose of the Project which is development and transfer of reforestation techniques so as to ensure successful afforestation on the tropical grassland, there are remain some outstanding issues. Among them there are four points regarded to be important, namely fire protection system, agroforestry system, transfer of technology and further techniques and development of plantation aspects.

In order to cope with the outstanding issues as mentioned above, the Indonesian-Japanese Evaluation Team deems it necessary and recommend to their respective government that the term of cooperation of the Project be extended for at least another two years.



THE MINUTES OF UNDERSTANDING  
CONCERNING  
THE TECHNICAL COOPERATION  
FOR  
TRIAL PLANTATION PROJECT IN BENAKAT  
SOUTH SUMATERA (ATA-186)

The Japanese Project Consultation Team (hereinafter referred to as "the Team"), organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Ryosuke Kato, Forestry and Forest Products Research Institute, Forestry Agency, Ministry of Agriculture, Forestry and Fisheries, visited Indonesia from May 16 to May 29, 1984, for the purpose of working out the tentative implementation plan (April 1984-March 1986) concerning the Trial Plantation Project in Benakat, South Sumatera in the Republic of Indonesia (hereinafter referred to as "the Project").

During its stay in the Republic of Indonesia, the Team exchanged views and had a series of discussions with the Indonesian authorities concerned with regard to the above-mentioned plan and the desirable measures to be taken by the Government of Japan and the Government of the Republic of Indonesia for further successful implementation of the Project.

As a result of the discussions at the Joint Meeting held on May 28, 1984, the Joint Steering Group and the Japanese Consultation Team agreed to approve the minutes of understanding attached hereto as an Annex, which was formulated within the framework of the Record of Discussion signed on April 12, 1979 and the Record of Discussion of Extension signed on March 26, 1984

Jakarta, May 28, 1984

Mr. Ryosuke Kato

Japanese Consultation Team  
Leader  
Japan International  
Cooperation Agency.

Mr. Victor M. Sinaga

On behalf of Director General  
of Reforestation and Land  
Rehabilitation  
Ministry of Forestry.

ANNEX

## I. Tentative Schedule of Implementation

ITEM	YEAR	
	1984/1985	1985/1986
1. Species trial		
2. Nursery technics		
3. Planting technics		
4. Technics for counter-measures against fire, insect, disease and meteorological damage		
5. Technics for designing and managing forest roads and soil conservation work		
6. Technics for the application of machine power		
7. Tests and investigation on the environmental implication of afforestation		
8. Tests and studies on the social implication of afforestation		
9. Planning and evaluation technics of afforestation project		
10. Other necessary technics		

## II. TECHNICAL COOPERATION PROGRAMME

Item	Year	1984/1985	1985/1986
A. Japanese Side.			
1. Long-term experts			
(1). Chief Advisor	1		
(2). Forest Protection	1		
(3). Silviculture	1		
(4). Nursery	1		
(5). Forest Ecology	1		
(6). Forest Engineering	1		
(7). Liaison Officer	1		
2. Short-term experts			
Short term experts in the fields mentioned above and other fields may be dispatched when necessity arises.		several months in necessary fields	
3. Provision of equipments and material by the Japanese Government.			
4. Counterpart training in Japan		Several personnel every year	
B. Indonesian side.			
1. Counterparts			
(1). Project Manager	1		
(2). Field Manager	1		
(3). Silviculture	1		
(4). Nursery	1		
(5). Forest Protection	2		
(6). Forest Ecology	1		
(7). Forest Engineering and Soil Conservation	2		
2. Administrative personal			
(1). Clerical and Service Employee		necessary number of personnel	
(2). Laborer			
3. Local cost			

Note: Team Leader will be nominated by JICA from among the above mentioned (2) to (6) experts.

### III. RESEARCH AND DEVELOPMENT PROGRAMME

#### A. Legal Context.

The Operational Plan for the extension period is a continuation and a further development of several activities being conducted during the 5 years period, as mentioned in the 5 years Plan of Operation (1979/1980 until 1983/1984).

The Operational Plan is used by Field Manager, Experts and Counterparts as a guide in implementing the programme, so that it will run smoothly and successfully.

#### B. The Objectives.

With regard to the recommendation proposed by the Joint Evaluation Team on September 13, 1983, activities which need to be continued and developed during the extension period are as follows:

1. Fire Protection System.
2. Agroforestry Scheme.
3. Transfer of Technology.
4. Further Study and Development.

#### C. The Output.

The Project is designated to become a model of reforestation programme in grassland area and will be able to produce data and information concerning technical and management aspects of reforestation, by means of reports, manuals, publications and qualified personnel as well.

The study and development of the above mentioned activities are dealing with the following works:

1. Fire Protection System.
  - 1.1. To examine and determine appropriate methods and technics of establishing firebreaks.

- 1.2. To select suitable and adaptable fire control equipments.
  - 1.3. To develop a forest fire control system and its working procedures suitable for reforestation in grassland.
  - 1.4. To conduct a calculation of expense for forest fire control.
  - 1.5. To train the members of forest fire team.
  - 1.6. To carry out an extension programme for the local communities concerning forest fire control.
2. Agroforestry Scheme.
- 2.1. To examine and select a suitable combination between agricultural patterns and silvicultural technics.
  - 2.2. To examine and select a suitable combination between cash crops and forest tree species.
  - 2.3. To examine and select a diversification of activities in agroforestry.
  - 2.4. To conduct a socio-economic survey of the participants.
  - 2.5. To develop a management framework of agroforestry scheme suitable to South Sumatera.
3. Transfer of Technology.
- 3.1. To conduct seminar, discussion and other training activities concerning technical and management aspects of reforestation for the counterparts and other forestry staff.
  - 3.2. To conduct on-the-job training and demonstration in the field, workshop and laboratory for the counterparts and other forestry staff as well.
  - 3.3. To study possible modification of equipments and to develop simple tools suitable for the existing condition.

#### 4. Further Study and Development.

4.1. To continue observation of species trials.

#### 4.2. Nursery.

4.2.a. To conduct a study on cost for raising seedling of selected species.

4.2.b. To work out a standard cost, a standard of activities and a technical guidance of nursery activities for selected species.

4.2.c. To examine a suitable tools and equipments for seed sowing, pricking-out, watering, seed packing and seed storage.

4.2.c. To introduce technics of raising seedling in consideration of tree breeding.

#### 4.3. Plantation

4.3.a. To examine a suitable technics of soil cultivation for selected species in an operational scale.

4.3.b. To examine effective weeding intensity for selected species.

4.3.c. To work out a standard cost, standard of activities and technical guidance of land preparation, planting and tending.

4.3.d. To initiate a trial of two stories stand of fast growing and slow growing species.

#### 4.4. Machinery Operation.

4.4.a. To conduct a training course in order to raise the ability of machinery operators and drivers.

4.4.b. To recommend suitable machines and equipments for reforestation programme in grassland area in South Sumatera.

#### 5. Others Technics.

- 5.1. To conduct an ecological study on alang-alang and other vegetation growth as well as the way suppress them.
- 5.2. To suggest a management framework of large scale industrial plantation on grassland.
- 5.3. To suggest a system of data recording and storage in order to support the national reforestation programme.
- 5.4. To conduct a training for planning and designing forest road network.
- 5.5. To conduct a training for measuring planting area and forest road network.

#### IV. OPERATIONAL PROGRAMME.

With regard to the above items of Research and Development Programme, the Project will select a suitable grassland area for establishing plantation of forest tree and implementing the experiments. The annual target of planting shall be confirmed to the condition of the Project.

REVIEW REPORT OF THE JOINT CONSULTATION TEAM ON THE EXTENSION  
PERIOD OF THE TRIAL PLANTATION PROJECT IN BENAKAT,  
SOUTH SUMATERA (ATA-186)

The Trial Plantation Project in Benakat, South Sumatera (ATA-186) was extended in April 1984 through a revision of the Record of Discussions (R/D) for a period of two years. Three quarters of the extension period have passed and the project activities are to be completed in about six months time. In order to review the progress of the Project during the extension period, a Joint Consultation Team (hereinafter referred to as "the Team") was formed consisting of an Indonesian group headed by Mr. Victor M. Sinaga, Director of Reforestation, The Directorate General of Reforestation and Land Rehabilitation, Ministry of Forestry, and a Japanese group headed by Mr. Katsura Watanabe, Forestry Advisor, JICA. The Team reviewed the project activities during the extension period in the First Joint Consultation Meeting on October 22, 1985, and after inspecting the Project site and holding a series of discussions with the authorities concerned and the Indonesian as well as the Japanese staff of the Project, held the Final Joint Consultation Meeting in Jakarta on October 28, 1985. As a result of the review, the Team prepared a report as attached hereto and agreed to submit it to their respective governments.

Jakarta, October 28, 1985

Katsura Watanabe  
Head of the Japanese  
Consultation Team.

Victor M. Sinaga  
Head of the Indonesian  
Consultation Team.



## I. INTRODUCTION

The Trial Plantation Project in Benakat, South Sumatra (ATA-186) has been in operation since 1979. The First Period of the Project (1979-1984) was completed satisfactorily and the Record of Discussion was signed on March 24, 1984, to extend the Project activities for another two years (1984-1986).

The main activities during the extension period of the Project are as follows:

1. Fire Protection System
2. Agroforestry Scheme
3. Transfer of Technology
4. Further Study and Development.

In this context, the Joint Consultation Team was organized for the purpose of reviewing the implementation and the achievements of the Project and giving suggestions for the future activities.

## II. PROJECT IMPLEMENTATION AND ACHIEVEMENTS

### A. Achievements during the Extension Period.

#### 1. Fire Protection System

Equipment and facilities were made available and organization of fire control was studied. In addition, trials on systems, methods and techniques of fire fighting were carried out involving all project personnel.

The result of the trials and training in fire control was satisfactory and a suitable system and fire control techniques using appropriate equipment were developed locally, and skilled fire fighters were brought up. However, cost analysis in forest fire control is still being undertaken.

#### 2. Agroforestry Scheme

The trial according to the original design of a combination of agricultural crops and trees has progressed smoothly and

socio-economic data of participating farmers are being collected regularly. Generally speaking, agroforestry activities of the project are satisfactory and expected to develop a useful method to expand afforestation in Sumatra. Other activities such as a diversification of agroforestry in the form of bee keeping or a flexible application of tree planting density should be considered in the future.

### 3. Transfer of Technology.

Transfer of technology through on-the-job training in the fields of fire control, maintenance of machines, operation of heavy duty machines, nursery and plantation techniques, tree breeding and forest ecology has been satisfactory, and routine field discussion between the experts and the counterparts helped its progress.

The transfer will be further enhanced by means of counterpart training in Japan.

### 4. Further Study and Development.

Studies and field experiments on species trials, nursery and plantation techniques, field operation of heavy duty machines, tree breeding and forest ecology have been conducted and the results contributed to the improvement of plantation management. It is foreseen, however, that an appropriate forest tending system focusing on thinning should be studied.

## B. Indonesian Contribution

### 1. Provision of counterparts and other staff

A sufficient number of project personnel consisting of counterparts and other staff has been provided since the First Period of the Project. A gradual increase in the number was necessary, due to expansion of the trials and field experiments and additional equipment and machines delivered in the meantime. The Indonesian side has met the requirements of the Project all through the period (Ref. Tables 1,2, and 3 of Annex 1).

2. Lands, buildings and other necessary facilities

Most of lands, buildings and other facilities have been provided in line with the progress of the project activities. Particularly, during the extension period, several compost processing sheds have been constructed and two working houses will soon be established.

3. Local cost for the project implementation

Budget provided by the Indonesian side for the extension period would amount to Rp. 680,000,000.- 40% of which was spent during the first year of the extension period, and the rest will be earmark for the second year. Budget for various activities can be seen in Table 4 of Annex I.

C. Japanese Contribution

1. Dispatch of Japanese Experts

As to the long term experts, Chief-Advisor, Liaison Officer, and five other experts in the fields of silviculture, nursery, forest ecology, forest protection and forest engineering were dispatched as planned. Regarding the short term experts, who were to be dispatched as necessity arose, the total number would amount to eight during the extension period including two experts still on the plan (Ref. Tables 6 and 7 of Annex I).

2. Provision of equipment and supplies.

The equipment and supplies provided by the Japanese side would amount to more than 100 million yen (Ref. Tables 8 of Annex I).

3. Acceptance of counterparts for training in Japan

The Japanese government continued to accept Indonesian personnel engaged in the Project for technical training in Japan. Two Senior officials and five junior staff (out of whom three were for group training) were invited to Japan in FY 1984 (Ref. Table 10 of Annex I) One senior official and two junior staff will be accommodated in FY. 1985.

#### 4. Construction of Model Infrastructure

An amount of about 25 million yen was provided for the construction of trunk road (1.3 Km), working road (3.0 Km), fire belt (11,5 Km), five look-out towers and other facilities (ref. Table 18 of Annex I).

### III. CONCLUSIONS AND RECOMMENDATIONS

The Project has progressively been showing tangible results since 1979 in developing afforestation techniques on grass lands. Especially, Japanese experts and Indonesian Counterparts can be proud of the achievements of the Project during the extension period as mentioned in the foregoing chapters.

It is necessary, however, for the further improvement of afforestation and forest management techniques, to extend the Japanese Technical Cooperation until the end of March 1988 as "follow-up cooperation". Details of "follow-up cooperation" would be as shown in Annex II.

Two years Plan of Operation  
of The Trial Plantation in Benakat,  
South Sumatra

## TABLE OF CONTENTS

	Page
I. RESEARCH AND DEVELOPMENT PROGRAMME	3
A. LEGAL CONTEXT .....	3
B. THE OBJECTIVES .....	3
C. THE OUTPUT .....	3
1. Fire Protection System .....	4
2. Agroforestry Scheme .....	4
3. Transfer of Technology .....	4
4. Further Study and Development .....	5
5. Others Technics .....	5
II. OPERATIONAL PROGRAMME	6
A. Indonesian Budget .....	6
B. Japanese Budget .....	7
III. EXPERTS, COUNTERPARTS AND TRAINING	9
A. Japanese Experts .....	9
B. Counterparts and other personnel .....	9
C. Training .....	10

## ANNEX

I. TENTATIVE SCHEDULE OF IMPLEMENTATION	11
II. TECHNICAL COOPERATION PROGRAMME	12
1. Japanese side .....	12
2. Indonesian Side .....	12

## I. RESEARCH AND DEVELOPMENT PROGRAMME.

### A. LEGAL CONTEXT

The Operational Plan for extension period is a continuation and a further development of several activities being conducted during the 5 years period, as mentioned in the 5 years Plan of Operation (1979/1980 until 1983/1984).

The Operational Plan is used by Field Manager, Expert and Counterparts as a guide in implementing the programme, so that it will run smoothly and successfully.

### B. THE OBJECTIVES.

With regard to the recommendation proposed by the Joint Evaluation Team on September 13, 1983, activities which need to be continued and developed during the extension period are as follows:

1. Fire Protection System.
2. Agroforestry Scheme.
3. Transfer of Technology.
4. Further Study and Development.

### C. THE OUTPUT.

The Project is designated to become a model of reforestation programme in grassland area and will be able to produce data and information concerning technical and management aspects of reforestation, by means of reports, manual, publications and qualified personnel as well.

The study and development of the above mentioned activities are dealing with the following works:

## 1. Fire Protection System.

- 1.1. To examine and determine appropriate methods and technics of establishing fire breaks.
- 1.2. To select suitable and adaptable fire control equipment.
- 1.3. To develop a forest fire control system and its work is procedures suitable for reforestation in grassland.
- 1.4. To conduct a calculation of expense for forest fire control.
- 1.5. To train the members of forest fire team.
- 1.6. To carried out an extension programme for the local communities concerning forest fire control.

## 2. Agroforestry Scheme.

- 2.1. To examine and select a suitable combination between agricultural patterns and silvicultural technics.
- 2.2. To examine and select a suitable combination between cash crops and forest tree species.
- 2.3. To examine and select a diversification of activities in agroforestry.
- 2.4. To conduct a socio-economic survey of the participants.
- 2.5. To develop a management framework of agroforestry scheme suitable to South Sumatra.

## 3. Transfer of Technology.

- 3.1. To conduct seminar, discussion and other training activities concerning technical and management aspects of reforestation for the counterparts and other forestry staff.
- 3.2. To conduct on-the-job training and demonstration in the field, workshop and laboratory for the counterparts and other forestry staff as well.
- 3.3. To study possible modification of equipments and develop simple tools suitable for the existing condition.



#### 4. Further Study and Development.

4.1. To continue observation of species trials.

#### 4.2. Nursery.

4.2.a. To Conduct a study on cost for raising seedling of selected species.

4.2.b. To work-out a standard cost, a standard of activities and a technical guidance of nursery activities for selected species.

4.2.c. To examine a suitable tools equipments for seed sowing, pricking-out, watering, seed packing and storage.

4.2.d. To introduce technics of raising seedling in consideration of tree breeding.

#### 4.3. Plantation

4.3.a. To examine a suitable technics of soil cultivation for selected species in an operational scale.

4.3.b. To examine effective weeding intensity for selected species.

4.3.c. To work-out a standard cost, standard of activities and technical guidance of land preparation, planting and tending.

4.3.d. To initiate a trial of two stories stand of fast growing and slow growing species.

#### 4.4. Machinery Operation

4.4.a. To conduct a training course in order to raise the ability of machinery operators and drivers.

4.4.b. To recommend suitable machines and equipments for reforestation programme in grassland area in South Sumatra.

#### 5. Others Technics.

5.1. To Conduct ecological study on alang-alang and other vegetation growth as well as the way to suppress them.

- 5.2. To suggest a management framework of large scale industrial plantation on grass-land.
- 5.3. To suggest a system of data recording and storage in order to support the national reforestation programme.
- 5.4. To conduct a training for planning and designing forest road network.
- 5.5. To conduct a training course for measuring planting area and forest road network.

## II, OPERATIONAL PROGRAMME.

Operational activities during 1984/1985 till 1985/1986 are summarized as follows:

### A. Financed by Indonesia Budget.

#### 1. Nursery.

- Planning : 3 has 1.200.000 seedlings  
 Species : 10 species, among others are:
- a. Eucalyptus sp.
  - b. Swietenia macrohylla
  - c. Schima bancana
  - d. Acacia mangium
  - e. Others species (for study)

#### 2. Plantation.

- Planning : 400 has, divided into :
- Mechanized plantation : 340 has
  - Agroforestry scheme : 60 has

#### 3. Tending.

Planning : 2.500 has.

#### 4. Fire belt.

- Planning : 10 Km, consisting 3 types:
- yellow fire belt
  - green fire belt
  - combination.

#### 5. Forest road.

Planning : 12 Km

## 6. Working House.

Planning : 2 units (96 m<sup>2</sup>)

## 7. Budget.

For the 2 years period the budget is estimated to teach some Rp. 796.549.200,00 consisting of:

Nursery	Rp. 26.793.800.00
Plantation	Rp. 117,568,000.00
Tending	Rp. 104.768.800.00
Fire belt and Tending	Rp. 1.183.800.00
Forest road and Working house	Rp. 44.480.600.00
Study, development of technics and administration.	<u>Rp. 501.754.200.00</u>
	Rp. 796.549.200,00

## B. To be financed by Japanese Budget (estimated ¥ 120 million)

## 1. Machinery and Equipment.

## a. Fire protection Equipment.

a.1. Knapsack fire extinguisher/ jet shooter	50 units
a.2. Water pump	5 units
a.3. Tank lorry	2 units
a.4. Fire control truck	2 units
a.5. Chemical fire extinguisher	12 units
a.6. Equipments for fire fighters	28 units
a.7. Cargo truck	2 units
a.8. Radio Communication appartus	24 units
a.9. Spare parts	8 units.

## b. Agroforestry.

b.1. Tractor	4 units
b.2. Truck	3 units
b.3. Pick-up	2 units

## c. Nursery.

c.1. Straw cutter	1 unit
c.2. Soil shredder	5 units
c.3. Water pump	2 units
c.4. Loupe	3 units

## d. Plantation

d.1. Abney level	1 unit
d.2. Planimeter	1 unit
d.3. Measuring tape 100 m	10 units
d.4. Disc plow	2 units
d.5. Disc harrow	2 units
d.6. Plastic container	200 units
d.7. Reservoir	3 units
d.8. Tractor John Deere	2 units
d.9. Hammer knife mover	10 units
d.10. Trailer	1 unit

## e. General Use.

e.1. Computer for data processing	2 units
e.2. Vehicle (diesel engine)	2 units
e.3. Radio receiver	2 units
e.4. Over head projector	1 unit
e.5. Motor cycle	5 units
e.6. Photocopy machine	2 units
e.7. SSB. Radio Telephone	10 sets
e.8. Generator	2 units
e.9. Others.	

### III. EXPERTS, COUNTERPARTS TRAINING.

#### A. Japanese Experts.

The number of long term experts during the next 2 (two) years 1984-1986 are 7 (seven) persons as follows:

Category	Field	Number
1. Chief adviser	Forest Management	1
2. Experts	Silviculture	1
	Nursery	1
	Forest protection	1
	Forest Ecology	1
	Forest Engineering	1
3. Liaison Officer	Forest Administrative	1
Total amount		7

Short term experts are also needed in the field of:

1. Nursery
2. Plantation
3. Forest Ecology
4. Forest Engineering
5. Agroforestry

#### B. Counterparts and other personnels

Indonesian Government for 2 years extension period appointed 6 (six) counterparts and administrative staff for the Project i.e.:

Category	Field	Number
a. Field Manager		1
b. Counterpart	- Nursery	1
	- Silviculture	1
	- Forest Ecology	1
	- Forest Protection	2
	- Forest Engineering	2
	- Agroforestry	1
c. Treasurer		1
Total amount		8

### C. Training.

In period 1984/1985 and 1985/1986 the project propose 10 (ten) persons to attend training course in Japan.

They are consisting of:

#### a. Year 1984/1985:

- a.1. Senior Staff (1 month) : 2 (two) persons
- a.2. Counterpart (3 months) : 1 (one) person
- a.3. Other (Group Training) (3 months): 2 (two) persons

#### b. Year 1985/1986

- b.1. Senior staff (1 month) : 2 (two) persons
- b.2. Counterpart (3 months) : 1 (one) person
- b.3. Other (Group Training) (3 months): 2 (two) persons

## ANNEX I

## TENTATIVE SCHEDULE OF IMPLEMENTATION

No.	Item	Schedule	
		1984/1985	1985/1986
1.	Species trial	-----	-----
2.	Nursery technics	-----	-----
3.	Planting technics	-----	-----
4.	Technics for counter-measures againsts fire insect, disease and meteorological damage	-----	-----
5.	Technics for designing and managing forest roads and soil conservation work	-----	-----
6.	Technics for the application of machine power	-----	-----
7.	Test and investigation on the environmental implication of afforestation	-----	-----
8.	Tests and studies on the social implication of afforestation	-----	-----
9.	Planning and evaluation technics of afforestation project	-----	-----
10.	Other necessary technics	-----	-----

## ANNEX II

## TECHNICAL COOPERATION PROGRAMME

No.	Item	Schedule	
		1984/1985	1985/1986
1.	<u>Japanese side</u>		
	a. Long term experts		
	(1) Chief Adviser (1)	-----	
	(2) Forest Protection (1)	-----	
	(3) Silviculture (1)	-----	
	(4) Nursery (1)	-----	
	(5) Forest Ecology (1)	-----	
	(6) Forest Engineering (1)	-----	
	(7) Liaison Officer (1)	-----	
	b. Short term experts.		Several months in
	Short term experts in the field		every field
	mentioned above and other field		
	may be dispatched when necessity		
	arises.		
	c. Dispatch of equipment and supply		
	material by the Japanese side	-----	
	d. Counterpart training in Japan		Several personnel
			every year.
2.	<u>Indonesian side</u>		
	a. Counterparts staff.		
	(1) Project Manager (1)	-----	
	(2) Field Manager (1)	-----	
	(3) Silviculture (1)	-----	
	(4) Nursery (1)	-----	
	(5) Forest protection (2)	-----	
	(6) Forest ecology (1)	-----	
	(7) Forest engineering and		
	Soil Conservation (2)	-----	



No.	Item	Schedule	
		1984/1985	1985/1986
	b. Administration personnel	-----	
	(1) Clerical and service employee	necessary number of	
		personnel	
	(2) Labourers		
	c. Local cost	-----	
		sufficient	

Note: Team Leader will be nominated by JICA from among the above mentioned (2) to (6) experts.

## List of Report Concerning The Project Activities.

## I. In Japanese

1. Report of Feasibility Survey (1st/2nd survey) on Silviculture Project in Indonesia South Sumatra (December, 1976), JICA.
2. Report of Preliminary Survey on the Technical Cooperation for the Trial Plantation (December 1979), JICA.
3. Report of Advice Team for Forestry Technical Cooperation Project in Burma and Indonesia (February, 1981), JICA.
4. The Operational Report for the Silviculture Section of The Trial Plantation Project in Benakat, South Sumatra (November 1981), Katzuyuki OHMI.
5. Report of JICA Consultation Mission, JICA Guidance Team and Short Term Expert for Pilot Infrastructure Scheme on the Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (March, 1982), JICA.
6. The Operational Report of The Forest Protection Section of the Trial Plantation Project in Benakat, South Sumatra (March 1984) Masaharu TABATA.
7. The Operational Report for The Forest Ecology Section of The Trial Plantation Project in Benakat, South Sumatra (March 1983) Seiichi OHTA.
8. A Report Concerned with Pilot Infrastructure for Agroforestry in Benakat, South Sumatra: A Cosio-Economic Survey (October 1983) Takashi KATO.
9. The Operational Report for the Forest Engineering Section of The Trial Plantation Project in Benakat, South Sumatra (April 1984) Koji TASHIRO.
10. The Operational Report for The Nursery Section of The Trial Plantation Project in Benakat, South Sumatra (April 1984) Hirota YAMATE.
11. The Report of Technical Guidance Team for The Technical Cooperation for The Trial Plantation in Benakat, South Sumatra (March 1984) JICA.

12. The Report of Technical Consultation Team for The Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (October 1984) JICA.
13. The Operation Report for Plantation Sector for The Trial Plantation Project in Benakat, South Sumatra (ATA-186) (April 1986) Minoru ARAI.
14. The Technical Report of Trial Plantation Project in Benakat, South Sumatra (ATA-186) on Forest Engineering (April 1986) Hirosato TAGUCHI.

## II. In English

1. Collected Illustrations of Soil Profiles Benakat Area South Sumatra (June, 1979) JICA.
2. Report of Cooperation Planning Survey Team on The Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (June, 1980) JICA.
3. Final Report of The Technical Cooperation for The Trial Plantation Project ATA-186 in Benakat, South Sumatra (November 1981) Katsuyuki OHMI.
4. Report of Some Important Disease observed in Benakat Nursery Yoshiyuki ZINNO.
5. Interim Report for Forestry Engineering The Trial Plantation Project (ATA-186) at Benakat, South Sumatra (July 1982), Koji TASHIRO.
6. Mission Report for The Forest Mechanization (April 1983) Eizo IWAYA.
7. The Interim Report of The Trial Plantation Project in Benakat, South Sumatra (September, 1982) JICA.
8. Final Report The Technical Cooperation for The Trial Plantation Project (October 1983) Kuniaki KATO.
9. Final Report The Technical Cooperation for The Trial Plantation Project (ATA-186) at Benakat, South Sumatra (January, 1984) Sadao SUGIMOTO.

10. Interim Report of Silviculture The Trial Plantation Project (July, 1984) Tadao OHARA.
11. Interim Report on Analysis of Data for Experiment and Examination (December, 1984) Tadao OHARA.
12. Socio-Economic Data on Participants in Agroforestry Scheme (December, 1984) Sukeharu Tsuru.
13. Review Report of The Joint Consultation on The Extension Period of The Trial Plantation Project in Benakat, South Sumatra (ATA-186) October 1985.
14. A Tentative Analysis on Changing Economic of Agroforestry Participants a Case in Benakat, South Sumatra (December, 1985) Takashi KATO.
15. The Technical Report for The Trial Plantation Project in Benakat, South Sumatra (ATA-186) (April, 1986) Osamu TANDO.
16. The Technical Report of Forest Protection for The Trial Plantation Project in Benakat, (ATA-186) (April 1986) Tsuyoshi IKEDA.
17. Technical Report, Frame work for Project Forest Ecology section (April 1986) Motohiro ARIHARA.

### III. In Japanese and English.

1. Report of Development Planning Survey for Afforestation Project in Benakat, South Sumatra, The Republic of Indonesia (June, 1979) JICA.
2. Report of Development Planning Survey for Afforestation Project in Benakat, District, South Sumatra, The Republic of Indonesia (June, 1979) JICA.
3. Final Report Proposal for The Mechanization Afforestation (December 1981), JICA Yoshiichi SAKAMOTO.
4. A Recommendation to Mechanized Afforestation (December. 1981) Yoshiichi SAKAMOTO.
5. Report of Implementation Design Survey Team on Technical Cooperation for The Trial Plantation Project in Benekat, South Sumatra (February 1980) JICA.

6. Report of Implementation Design Survey Team on the Technical Cooperation for The Trial Plantation Project in Benakat, South Sumatra (February, 1980), JICA.
7. The Operational Report for the Nursery Section of The Trial Plantation Project in Benakat, South Sumatra (September, 1982), Hirota YAMATE.
8. An Interim Report of Nursery Section (September, 1982) Hirota YAMATE.
9. Interim Report Field Survey of Forest Pathology in Ben kat, (March 1983) Hanuyoshi SAHO.
10. Report of The Survey of Forest Diseases in Benakat, South Sumatra, Haryoshi SAHO.
11. The Report of The Joint Evaluation Team on The Trial Plantation Project in Benakat, South Sumatra (September 1983), JICA.
12. Surveying Report of Forest Pests in Benakat Region, Hiroshi MAKIHARA.
13. Report of The Survey for Forest Pests in Benakat, South Sumatra Hiroshi MAKIHARA.

#### IV. In Indonesia

1. Laporan Akhir Persemaian (April 1984) Hirota YAMATE.

#### V. Japanese and Indonesian

1. Report for fire fighting method (December, 1984) Kiyoshi FUJII.



