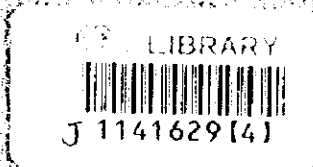


JAPAN INTERNATIONAL COOPERATION AGENCY
MINISTRY OF FORESTRY, REPUBLIC OF INDONESIA

**THE FEASIBILITY STUDY
ON
THE SOCIAL FORESTRY DEVELOPMENT PROJECT
IN
THE UPPER MUSI WATERSHED
IN
THE REPUBLIC OF INDONESIA
FINAL REPORT**

MARCH, 1998



**JAPAN FOREST TECHNICAL ASSOCIATION (JAFTA)
ASIA AIR SURVEY CO., LTD.**

AFF
JR
98-06

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PREFACE

In response to the request from the Government of the Republic of Indonesia, the Government of Japan decided to conduct the Feasibility Study on the Social Forestry Development Project in the Upper Musi Watershed in Indonesia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to the Republic of Indonesia the Study Team headed by Dr. Yutaka Taguchi, Japan Forest Technical Association, four times during the period from February 1996 to December 1997.

The Team held discussions with the officials concerned of the Republic of Indonesia, and conducted field studies in the study area. After the Team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Republic of Indonesia for their close cooperation extended to the team.

March, 1998



Kimio FUJITA

President

Japan International Cooperation Agency

LETTER OF TRANSMITTAL

To Mr. Kimio FUJITA
President
Japan International Cooperation Agency

It is my pleasure to submit to you the Final Report following the completion of the Feasibility Study on the Social Forestry Development Project in the Upper Musi Watershed in Indonesia.

The Report compiles the findings of field surveys conducted in the period from February, 1996 to December, 1997 in accordance with the agreement made between the Japan International Cooperation Agency (JICA) and the joint venture [Japan Forest Technical Association (JAFTA) and Asia Air Survey Co., Ltd.], the results of the subsequent analysis and the plan/project formulated.

In the course of the Study, the Social Forestry Project designed to achieve the conservation forest resources as well as soil and water conservation while seeking enhancement of the living standard/welfare of local people and the Trial Plot Project Implementation Plan as an implementation model for the Social Forestry Project were formulated through consultations with officials of the Government of the Republic of Indonesia and the feasibility of the Project was examined.

I sincerely hope that the Social Forestry Project will be implemented as planned with the concerted efforts of the Government of the Republic of Indonesia and all other organizations concerned to enhance the forest resources in Indonesia and to contribute to the development of Indonesia.

I would like to express my utmost gratitude to JICA, the Ministry of Foreign Affairs and the Ministry of Agriculture, Forestry and Fisheries for their kind understanding of and cooperation for the Study. As to Indonesian internal agencies, my gratitude is equally due to the JICA Office, Embassy of Japan, Directorate General of Reforestation and Land Rehabilitation of the Ministry of Forestry, Bengkulu Regional Forestry Office of the Ministry of Forestry and all other related organizations for their invaluable advice and assistance given to the Study Team.

I believe that JICA will find the Report useful for the future promotion of the Social Forestry Project in Indonesia.

March, 1998

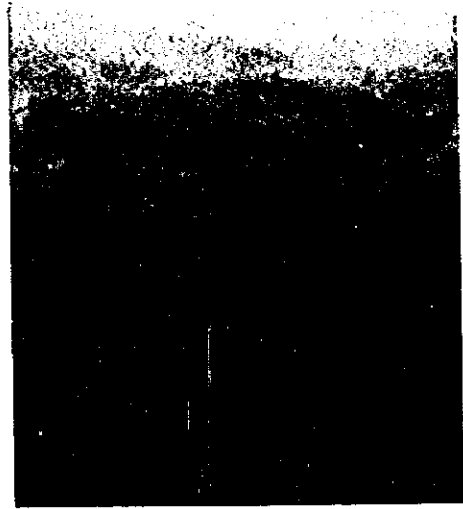
Yutaka TAGUCHI

Team Leader

Study Team for the Feasibility Study on the Social
Forestry Development Project in the Upper Musi
Watershed in the Republic of Indonesia



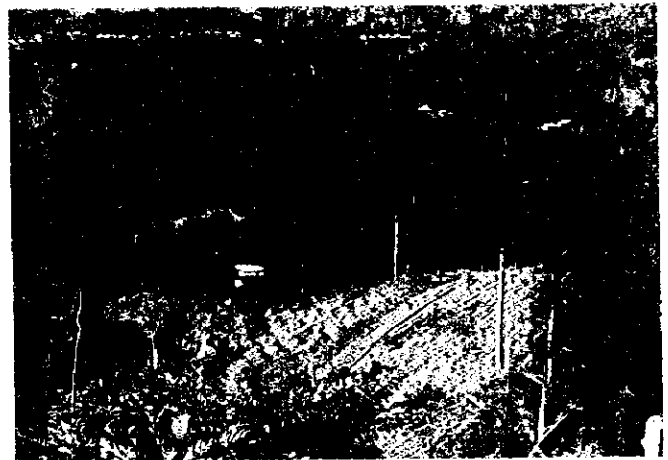
Area near Musi River (Desa Batu Ponce)



Natural forest (Bukit Daun protection forest)



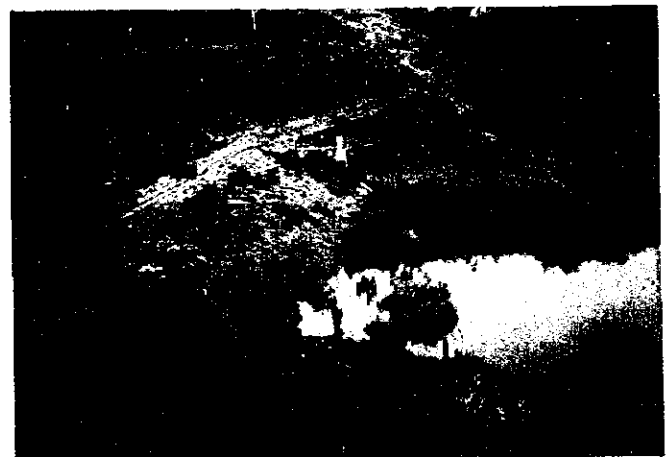
Mahogany plantation site in a national forest
(Bukit Daun protection forest)



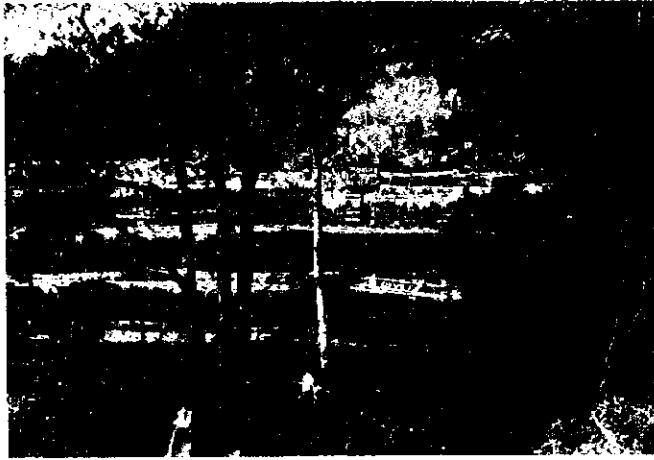
Coffee field (Desa Air Pikat)



Demonstration plot (Desa Sember Bening)



Check dam (Desa Bandung Baru)



Village nursery (Desa Bukit Sari)



Participatory rural appraisal (PRA) in progress: preparation of a village map by local people (Desa Kandang)



Damar mata kucing used for social forestry (Kec. Krui in Kab. Lampung Barat)



Workshop (Kec. Kepahiang)



Kayu bawang planted as upper trees at a coffee field (Desa Karang Tinggi in Kab. Bengkulu Utara)



Serik used for bamboo craftwork by local people (Desa Sumber Rejo)

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LIST OF ABBREVIATIONS

Abbreviations	English	Indonesian
AMDAL	Analysis of Environmental Impacts	Analisis Mengenai Dampak Lingkungan
BAPEDAL	Environmental Impact Management Agency	Badan Pengendalian Dampak Lingkungan
BAPPEDA	Regional Development Planning Agency	Badan Perencanaan Pembangunan Daerah
BAPPENAS	National Development Planning Agency	Badan Perencanaan Pembangunan Nasional
BIPHUT	Forest Inventory and Mapping Center	Balai Inventarisasi dan Pemetaan Hutan
BKSDA	Natural Resources Conservation Center	Balai Konservasi Sumber Daya Alam
BPP	Agriculture Extension Center	Balai Penyuluhan Pertanian
Bupati	Chief of District	Bupati
Cabang Dinas (Kehutanan)	Branch Office of Provincial Forestry Service	Cabang Dinas Kehutanan
Camat	Chief of Sub-District	Camat
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DBH	Diameter at Breast Height	Diameter at Breast Height
DEPHUT	Ministry of Forestry (MOF)	Departemen Kehutanan
Dinas Kehutanan (TK I)	Provincial Forestry Service	Dinas Kehutanan Tingkat I
Dinas PKT	District Forestry and Soil Conservation Service	Dinas Perhutanan dan Konservasi Tanah
GIS	Geographic Information System	Geographic Information System
INPRES	Presidential Instruction	Instruksi Presiden
JICA	Japan International Cooperation Agency	Japan International Cooperation Agency
KANWIL (Kehutanan)	Regional Forestry Office	Kantor Wilayah Kehutanan
Kec.	Sub-District	Kecamatan
KUD	Village Unit Cooperative	Koperasi Unit Desa
KUK-DAS	Small Credit for Watershed	Kredit Usaha Kecil-Daerah Aliran Sungai
LKMD	Village Institution for Community Development	Lembaga Ketahanan Masyarakat Desa
LMD	Village Institution for Community	Lembaga Masyarakat Desa
M/M	Minutes of Meeting	Minutes of Meeting
MPTS	Multi Purpose Tree Species	Jenis Pohon Serbaguna
NGO	Non Governmental Organization	Lembaga Swadaya Masyarakat (LSM)
OJT	On the Job Training	On the Job Training
Perw.	Sub-District Representative	Perwakilan
PKK	Women Organization	Pembinaan Kesejahteraan Keluarga
PLP	Field Regreening Extension Worker	Penyuluh Lapangan Penghijauan
PLR	Field Reforestation Extension Worker	Penyuluh Lapangan Reboisasi
PMP	Senior Regreening Extension Worker	Penyuluh Madya Penghijauan
PLDP	Field Check Dam Extension Worker	Penyuluh Lapangan Dam Pengendari
PPL	Field Agricultural Extension Worker	Penyuluh Pertanian Lapangan
PRA	Participatory Rural Appraisal	Participatory Rural Appraisal
PU	Ministry of Public Works	Departemen Pekerjaan Umum
Ranting Dinas (Kehutanan)	Small Branch Office of Provincial Forestry Service	Ranting Dinas Kehutanan
RPH	Forestry Police Administrative Office	Resort Polisi Hutan
RRA	Rapid Rural Appraisal	Rapid Rural Appraisal
Sub B (Balai) RLKT	Sub Center of Land Rehabilitation and Soil Conservation	Sub Balai Rehabilitasi Lahan dan Konservasi Tanah
S/W	Scope of Work	Scope of Work
UP-UPSA	Demonstration Plot of Natural Resources Conservation	Unit Percontohan Usaha Pelestarian Sumberdaya Alam
UP-UPM	Demonstration Plot of Permanent Settlement Agriculture Plot	Unit Percontohan Usaha Pertanian Mentap
USLE	Universal Soil Loss Equation	United Soil Loss Equation

LIST OF PLANTS

No. 1

No.	English Name	Local Name	Scientific Name	Family Name
1	Acacia mangium	Acacia mangium	<i>Acacia mangium</i>	Leguminosae
2	Red onion	Bawang merah	<i>Allium ascalonicum</i>	Liliaceae
3	Avocado	Apokat/Alpukat	<i>Persea americana</i>	Lauraceae
4	Cogon grass	Alang alang	<i>Imperata cylindrica</i>	Gramineae
5	Albizia	Albizia/Segon	<i>Albizia falcataria</i>	Leguminosae
6	Strawberry	Arbei	<i>Fragaria vesicaria</i>	Rosaceae
7	French bean/Red bean	Kacang buncis/merah	<i>Phaseolus vulgaris</i>	Leguminosae
8	Elephant/Napir grass	Rumput gajah	<i>Penisetum purpureum</i>	Gramineae
9	Cacao	Coklat/Kakao	<i>Theobroma cacao</i>	Sterculiaceae
10	-	Kayu bawang	<i>Disoxylum molliscimum</i>	Meliaceae
11	Kapok	Kapuk/Kapok	<i>Ceiba pentandra</i>	Bombacaceae
12	Kaliandra	Kaliandra	<i>Kaliandra calothyrsus</i>	Leguminosae
13	Cauliflower	Blumkol	<i>Brassica oleracea</i>	Cruciferae
14	Citrus	Juruk	<i>Citrus spp.</i>	Rutaceae
15	Cassava	Ubi kayu/Ketela pohon	<i>Manihot utilisima</i>	Euphorbiaceae
16	Cabbage	Kol/Kobis	<i>Brassica oleracea</i>	Cruciferae
17	Cucumber	Mentimum	<i>Cucumis sativus</i>	Cucurbitaceae
18	King grass	-	<i>Pennisetum purpureophyodes</i>	Gramineae
19	Guatemala grass	-	<i>Itipisacum laxum</i>	-
20	Guava	Jambu biji/batu	<i>Psidium guajava</i>	Myrtaceae
21	Candlenut	Kemiri	<i>Aleurites moluccana</i>	Euphorbiaceae
22	Passion fruit	Markisa	<i>Passiflora edulis</i>	Passifloraceae
23	Gliricidia	Kayu res/Glirisidia	<i>Gliricidia maculata</i>	Leguminosae
24	Mulberry	Murbei	<i>Morus alba/ bombycis</i>	Moraceae
25	Coffee	Kopi	<i>Coffea spp.</i>	Rubiaceae
26	Coconut palm	Kelapa	<i>Cocos nucifera</i>	Palmae
27	Pepper	Lada/Sahang	<i>Piper nigrum</i>	Piperaceae
28	Rubber tree	Karet/Getah para	<i>Hevea brasiliensis</i>	Euphorbiaceae
29	Sweet potato	Ubi jalar	<i>Ipomoea batatas</i>	Convolvulaceae
30	Sugar cane	Tebu	<i>Saccharum officinarum</i>	Gramineae
31	Sugar palm	Aren	<i>Arenga pinnata/ saccharifera</i>	Palmae
32	Sapodilla	Sawo	<i>Achras zapota</i>	Sapotaceae
33	Salak	Salak	<i>Zalacca edulis</i>	Palmae
34	Cinnamon	Kayu manis	<i>Cinnamomum burmanni</i>	Lauraceae
35	Potato	Ubi kentang	<i>Solanum tuberosum</i>	Solanaceae
36	Jack fruit	Nangka	<i>Artocarpus integra</i>	Moraceae
37	-	Jering/Jengkol/Kabau	<i>Pithecellobium lobatum</i>	Leguminosae
38	Ginger	Jahe	<i>Zingiber officinale</i>	Zingiberaceae
39	Johar	Johar/Juar	<i>Cassia siamea</i>	Leguminosae
40	Paddy rice	Padi sawah	<i>Oryza sativa</i>	Gramineae
41	Duku/Langsar	Duku/Langsar	<i>Lansium domesticum</i>	Meliaceae
42	Star fruit	Belimbing manis	<i>Averrhoa carambola</i>	Oxalidaceae
43	Setaria grass	Setaria grass	<i>Setaria sp.</i>	Gramineae
44	Radish	Lobak	<i>Raphanus sativus</i>	Cruciferae
45	Soybean	Kacang kedelai	<i>Glycine max</i>	Leguminosae
46	Bamboo	Bambu	<i>Bambusa spp.</i> <i>Dendrocalamus spp.</i> <i>Gigantochloa spp.</i> <i>Schizostachyum spp.</i>	Bambusaceae

No.	English Name	Local Name	Scientific Name	Family Name
47	Purple coral tree	Daklap	<i>Erythrina fusca</i>	Leguminosae
48	-	Damar mata kucing	<i>Shorea javanica</i>	Dipterocarpaceae
49	Tobacco	Tembakau	<i>Nicotiana tabacum</i>	Solanaceae
50	Taro	Talas/Keladi	<i>Colocasia esculenta</i>	Araceae
51	Teak	Jati	<i>Tectona grandis</i>	Verbenaceae
52	-	Cengkering/Cangkering	<i>Erythrina</i> sp.	Leguminosae
53	Tea/Assam tea	Teh	<i>Thea sinensis</i>	Theaceae
54	Clove	Cengkeh	<i>Eugenia aromatica</i>	Myrtaceae
55	Rattan/Rotang	Rotan	<i>Calamus</i> spp.	Palmae
56	Chili	Cabe merah	<i>Capsicum annuum</i>	Solanaceae
		Cabe cengek	<i>Capsicum frutescens</i>	
		Cabe kriting	<i>Capsicum</i> sp.	
57	Maize	Jagung	<i>Zea mays</i>	Gramineae
58	Soursop	Sirsak	<i>Annona muricata</i>	Annonaceae
59	Tomato	Tomat	<i>Solanum lycopersicum</i>	Solanaceae
60	Durian	Durian/Duren	<i>Durio zibethinus</i>	Bombacaceae
61	Egg plant	Teroong	<i>Solanum melongena</i>	Solanaceae
62	Carrot	Wortel	<i>Daucus carota</i>	Umbelliferae
63	Garlic	Bawang putih	<i>Allium sativum</i>	Liliaceae
64	Scallion	Bawang daun	<i>Allium fistulosum</i>	Liliaceae
65	Pineapple	Nanas	<i>Ananas comosus</i>	Bromeliaceae
66	Chinese cabbage	Sawi	<i>Brassica</i> sp.	Cruciferae
67	Patchouli	Tilam wangi	<i>Pogostemon patchouli</i>	Labiatae
68	Banana	Pisang	<i>Musa</i> spp.	Musaceae
69	Vanilla	Panili	<i>Vanilla planifolia/fragrans</i>	Orchidaceae
70	Papaya	Papaya	<i>Carica papaya</i>	Caricaceae
71	Bread fruit	Sukun	<i>Artocarpus altilis</i>	Moraceae
72	Areca-nut palm	Pinang	<i>Areca catechu</i>	Palmae
73	-	Petai	<i>Parkia speciosa</i>	Leguminosae
74	Vetiver grass	Aga wangi/Larawestu	<i>Vetiveria zizanioides</i>	Gramineae
75	Mahogany	Mahoni	<i>Swietenia macrophylla</i>	Meliaceae
76	Mango	Mangga	<i>Mangifera indica</i>	Anacardiaceae
77	Mangosteen	Manggis	<i>Garcinia mangostana</i>	Guttiferae
78	Water apple	Jambu air	<i>Eugenia cajup</i>	Myrtaceae
79	Meranti	Meranti	<i>Shorea</i> spp.	Dipterocarpaceae
80	Gnemon tree	Melinjo/Tangkil	<i>Gnetum gnemon</i>	Gnetaceae
81	Merkusi pine	Pinus/Tusam	<i>Pinus merkusii</i>	Pinaceae
82	Moghania	Moghania	<i>Moghania macrophylla</i>	Leguminosae
83	Swamp cabbage	Kangkung	<i>Ipomoea reptans</i>	Convolvulaceae
84	Ground nut/Pea nut	Kacang tanah	<i>Arachis hypogaea</i>	Leguminosae
85	Rafflesia	Rafflesia	<i>Rafflesia</i> spp.	Rafflesiaceae
86	Lambutan	Rambutan	<i>Nephelium lappaceum</i>	Sapindaceae
87	Upland rice	Padi gogo	<i>Oryza sativa</i>	Gramineae
88	Green gram	Kacang hijau/tunggak	<i>Vigna radiata</i>	Leguminosae
89	Leucaena	Lamtoro/Petai cina/Leucaena	<i>Leucaena glauca</i>	Leguminosae
90	Lemon grass	Serai wangi	<i>Cymbopogon flexuosus</i>	Gramineae

SUMMARY

SUMMARY

1. Objectives of the Study

In October, 1994, the Government of the Republic of Indonesia prepared the Social Forestry Project designed to conserve forest resources and to improve the living standard/welfare of local people while establishing the Project Area in the upper Musi watershed in Sumatera and made a request to the Government of Japan for a feasibility study for the said Project. In response, the Government of Japan sent the Preliminary Study Team to Indonesia in November, 1995 and concluded the S/W with the Indonesian side.

The Study has formulated the Social Forestry Project which is designed to achieve the conservation of forest resources as well as soil and water in the Project Area of 50,000 ha selected from some 220,000 ha in Kab. Rejang Lebong and to improve the living standard/welfare of local people and has also formulated the Trial Plot Project Implementation Plan as an implementation model for the Social Forestry Project together with a feasibility study on both the Social Forestry Project and Trial Plot Project Implementation Plan.

In conducting the Study, special attention was paid to the transfer of technology to the counterparts which were mainly selected from staff members of the Sub-Balai RI.KT, Ketahun and this was achieved through OJT in Indonesia and also training in Japan.

2. Forests/Forestry and Social Forestry in Indonesia

Indonesia has a vast area of tropical rain forests and the total forest land area is 144 million ha. Such a vast forest area attracts worldwide attention from the viewpoint of global environmental conservation. Timber is Indonesia's second-most important export commodity after oil/natural gas and Indonesian timber has a strong influence on the international market price.

Many people live in and around forests and their lives are largely dependent on forests. Consequently, forests and forestry policies in Indonesia play a significant role in improving people's lives and also ensuring soil, water and environmental conservation.

The Government of Indonesia is currently implementing the Second Long-Term Forestry Development Plan for the period from 1994 to 2018. The overall objective of the Plan is "to create forestry resources which can perform multiple functions in a maximum fashion". The identified targets and tasks of the Plan include forest management in accordance with such designated land use as production forest, protection forest and natural reserve, etc., the

fostering and recruitment of capable manpower and the introduction of advanced technologies/techniques to suit the local conditions.

In accordance with the objective, targets and tasks of the Second Long-Term Forestry Development Plan, the Sixth Five Year Forestry Development Plan for 1994 through 1998 is in progress. While inheriting several issues from the Fifth Plan, including the maintenance/development of protection forests with excellent soil and water conservation functions, the Sixth Plan intends for the first time to encourage social forestry (over an area of some 250,000 ha) which aims at achieving sustainable and environment-friendly forest management through the participation of local people in forest management.

In Indonesia, a project of the Indonesian Forestry Corporation which commenced in 1986 in Jawa with the assistance of the Ford Foundation (work had been implemented over an area of some 37,000 ha by 1993) and a project in West Kalimantan with the assistance of Germany set the precedence for "social forestry", leading to the enforcement of the Ministerial Decree on Social Forestry in National Forests in November, 1995. According to this Decree, the subject areas for social forestry are areas in need of forest rehabilitation in production forests (those not subject to cutting and planting licenses) and protection forests. Each volunteer is given upto 4 ha of land to practice social forestry. The Decree also defines such non-timber forest products as sap, fruit, bamboo shoot and rattan, etc. as social forestry products.

3. Natural Environment

(1) Climate

The mean annual temperature and mean monthly temperature are 23.9°C and 23.5 - 24.4°C, showing little temperature fluctuation throughout the year. The annual rainfall of 2,490 - 3,695 mm is quite high and greatly fluctuates from one year to another. The monthly rainfall is high from November to January and March but is low from June to August.

(2) Topography and Geology

The Project Area is located to the south of the Barisan Mountains and shows major elevational fluctuations between approximately 275 m and approximately 2,456 m. The Project Area consists of volcanic and mountainous areas. The former are often characterised by such coarse volcanic deposits as recent Quaternary lava and lapilla. In contrast, mountainous areas are composed of Pleistocene tuff breccia, acid tuff and their weathered layers.

(3) Soil

1) Soil Properties and Distribution

Based on the newly prepared soil map (scale: 1/25,000), the Project Area has the following dominant soil groups.

- Acrisols group (AC, ACC I and ACC II soil phases), mainly consisting of Acrisols and distributed in hilly areas
- Cambisols group (CM I - IV soil phases), mainly consisting of Cambisols and distributed at mountainous land and steep slopes
- Andosols group (ANC and AN I-II soil phases), mainly consisting of Andosols and distributed at volcanic land and gentle slopes

In addition to the above, an immature soil group (LPR soil phase), mainly consisting of a volcanic deposit layer and a weathered layer and being located at steep cliff sites, wetland and swampy soil (WS soil phase) distributed along rivers and in flat areas and man-made immature soil (m soil phase) resulting from human activities are also found.

2) Evaluation of Soil Conditions

The soil phases with the highest productivity are believed to be the ACC I soil class of the Acrisols group and the AN I-II soil class of the Andosols group, all of which are rich in lava and coarse volcanic ejecta. In comparison, the soil productivity of the immature LPR soil class, WS soil class, AC and ACC II soil classes of the Acrisols group with a high clay content and CM I-II and IV soil classes of the Cambisols group with little gravel is low. Based on the respective soil conditions, the immature soil group and Acrisols group are considered to be highly vulnerable to soil erosion, followed by the Andosols Group and Cambisols group.

(4) Rare Flora and Fauna

Among the wild species subject to protection under Indonesia's domestic laws, the inhabitation (or traces of inhabitation) of the following species are confirmed or are likely to inhabit the Project Area. See 3.4 of the main report and Attached Appendix C-7 for sites of confirmation.

- Flora: *Rafflesia* spp., *Amorphophallus titanum*, *Vanda hookeriana*

- Fauna: *Helaretos malayanus*, *Neofelis nebulosa*, *Hilobates syndactylus*, *Accipiter* spp.,
Aethothena flavigaster

(5) Hydrology and Water Quality

1) Hydrology

Most of the Project Area belongs to the main Musi watershed (approximately 51,400 ha), mostly consisting of six sub-watersheds. The annual flow rate fluctuation is not particularly large as the flow rate at Desa Cawang Lama in Kec. Curup, situated at the entrance point to the Project Area, and Desa Kunduran Baru in Propinsi Sumatera Selatan, situated at the exit point from the Project Area, during the rainy season is only some four times higher than that during the dry season.

2) Water Quality

The water quality analysis results for the Project Area indicate that the legal threshold set by Indonesia's relevant domestic law is exceeded in the case of CaCO₃, COD, N-NH₃, CO₂, Mn and insecticide. These results suggest that water bodies in the Project Area suffer from a deterioration of the water quality, especially the chemical properties, presumably due to contamination or eutrophication. The self-cleaning capacity by means of dilution, diffusion and precipitation is assumed to be insufficient as it appears to be incapable of cleaning the high load flowing in from farmland and settlements.

(6) Scenic Landscape

Notable scenic landscape resources in the Project Area are restricted to natural forests which are scattered in national forests. Meanwhile, notable viewing spots are restricted to village centres and along main roads, all of which provide the main viewing spots for local people. The existence of forests in the distant view is more blurred in accordance with the distance of the viewpoint point from a national forest area. The number of viewing points for notable scenic landscape resources is accordingly limited.

(7) Land Use and Vegetation

The land area by land use and vegetation category in the Project Area is shown in the table below.

Area by Land Use And Vegetation Category in the Project Area

Land Use and Vegetation		Area (ha)		Land Use and Vegetation		Area (ha)	
Category		National Forest	Private Land	Category		National Forest	Private Land
Forest	Natural Forest	4,815	0	Non-Forest	Paddy Field	11	3,664
	Secondary Forest	5,157	0		Dry Crop Field	66	4,389
	Man-Made Forest	1,039	0		Coffee Field	1,597	25,201
	Shrub	561	3,575		Mixed Garden	0	549
	Bamboo Forest	9	46		Others	50	2,104
Sub-Total		11,581	3,621	Sub-Total		1,724	35,907
				Total		13,305	39,528

4. Socioeconomic Environment

(1) Characteristics of Local Community

- 1) The Study Area is spread over four kecamatans, i.e. Kepahiang, Padang Ulak Tanding, Kota Padang and Curup, in Kab. Rejang Lebong, incorporating 225 villages with a combined population of some 320,000 and a population density of 145 persons/km².
- 2) The Project Area is spread over Kec. Curup and Kec. Kepahiang, incorporating 93 villages with a combined population of approximately 120,000 and a population density of 226 persons/km². The average annual population growth rate is 2.3% in addition to a fairly large social increase due to resettlement (transmigrasi).
- 3) The RGDP per capita of Kab. Rejang Lebong is approximately 1,496,000 Rp as of 1994 with agriculture accounting for a large proportion. The local economy in the Project Area is heavily dependent on agriculture but the land ownership of 0.5 - 1.5 ha per household is relatively small.
- 4) There are relatively many primary schools and public health facilities and the trunk roads linking villages with local markets are in fairly good condition.
- 5) Both formal and informal organizations are operating in most villages with varying levels of activities and number of participants.
- 6) Most areas belong to the sphere of Rejang adat.

(2) Local Industries

1) Agriculture

Coffee is the Project Area's main agricultural product and the cultivation area of vegetables is small, presumably because of the high production cost. Rice can be cultivated all year round at well irrigated paddy fields. Sugar palm, cinnamon, pepper, kemiri, kapok, fruit trees and bamboo, etc. are grown in mixed gardens (Kebun Campuran), home gardens (Pecarangan), community forests (Hutan Rakyat) and farmland boundary areas.

2) Stock Raising

The production of livestock in the Project Area is mainly for home consumption. Popular animals are beef cattle in Kec. Curup and goats as well as beef cattle in Kec. Kepahiang. Many farmers express a wish to raise beef cattle in particular.

3) Fish Culture

Small-scale fish culture using small fishponds is observed in the Project Area, providing local people with a source of supplementary income. Many fishponds are, in fact, paddy fields but the reservoirs of check dams are sometimes used.

4) Use of Bamboo

Although bamboo products are seldom marketed in the Project Area, bamboo is frequently used by local people at home. Accordingly, local people have a strong bond with bamboo. Bamboo shoots provide another source of supplementary income for local people because of the market availability for tinned bamboo shoots.

(3) Land Use Plan and Related Projects

1) Land Use Plan

According to the land use planning map for Kab. Rejang Lebong, national forests in the Project Area are designated conservation forests and private land is designated cultivable land (Kebun Rakyat), excepting those areas of which the use for estates is permitted.

2) Related Projects

– The P.T. Perusahaan Listrik Negara (National Power Corporation) is implementing the Musi Hydroelectric Power Project near Desa Ujan Mas Atas in the Project Area and the new power station is expected to be commissioned in the year 2001.

- An environmental conservation project of the World Bank to prevent the devastation of the Kerinci-Seblat National Park is in progress in and around the Project Area. A poverty alleviation project is also in progress in areas around the said National Park to support the main environmental conservation project.

(4) Survey on Socioeconomic and Cultural Conditions

1) Survey Flow

During the second and third field survey periods, a village survey and a villagers survey were conducted at 10 and 20 villages respectively with a view to obtaining qualitative information on the actual living conditions and local needs based on the real opinions of local people in addition to obtaining basic quantitative data on villages and villagers.

2) Survey Findings

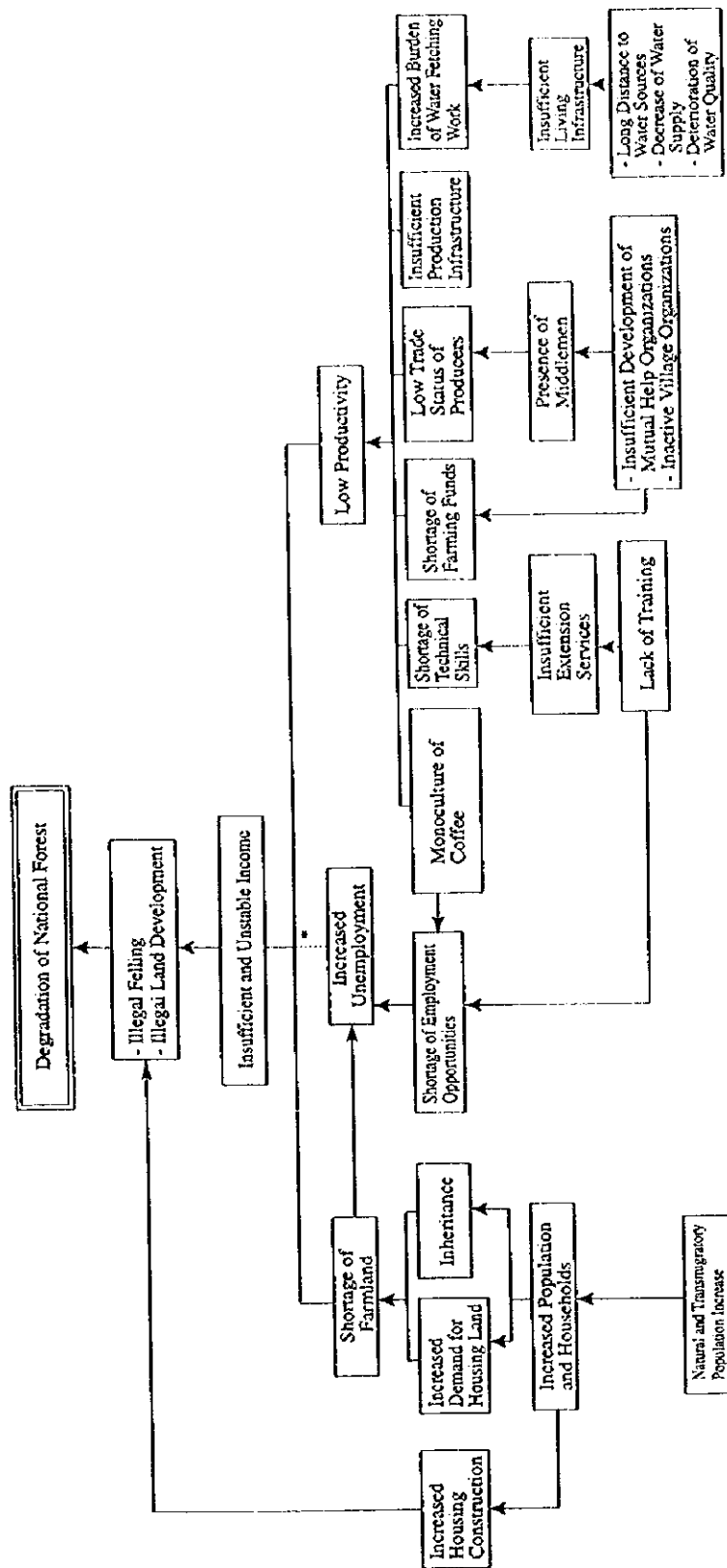
- The population density and ratio of landless households greatly vary from one village to another. Many settlers come from Kab. Bengkulu Utara and Kab. Bengkulu Selatan. For most villages, branch roads and/or public transport provide access to urban areas and farmland for the transportation of agricultural products. While many villagers depend on wells for the supply of domestic water, some depend on fountains or rivers.
- Farming is the main occupation in each village. While there are various side jobs, local employment opportunities are insufficient because of the population increase. Agriculture, particularly coffee cultivation, is the main source of income in most villages.
- The average paddy field area is 0.1 - 5 ha per household while the coffee field area is an average of 1 - 2 ha per household. Many agricultural products in the Study Area are marketed as commodities and the monoculture of coffee is particularly eminent. Coffee is sold to either wholesalers at the two major markets of Kepahiang and Curup, at village markets or to village middlemen. By size of ownership, such poultry as chickens and geese and goats are more popular than cattle and water buffalo.
- People in many villages think that the boundaries of conservation forests (BHL) established in 1988 cut into the village land compared to the old boundaries (BW) established under Dutch colonial rule. Firewood is the main domestic fuel in many

villages and coffee trees are mainly used to produce such firewood. The increase of the number of households in villages has led to an increased demand for construction timber to build new houses. Women enjoy prominent access to and control of economic reproduction activities and food in many villages. While women have equal access to men to capital, income, education and training, etc., men have more control than women over these matters.

- In many villages, an informal religious organization actively leads important activities. In contrast, such formal organizations as the LKMD, LMD, PKK and farmers' groups are less active. The level of participation by local people in formal organizations is generally low.
- The three major needs (problems) from the viewpoint of improving local life are (i) insufficient as well as unstable income, (ii) shortage of farmland which is the biggest problem faced by farmers in all villages and (iii) insufficient production level of rice which is the local staple food due to the shortage of irrigation facilities in many villages, forcing villagers to purchase rice for their own consumption.

3) Analytical Flow of Survey Findings

The relationship between the factors of the identified problems is shown in the following chart.



Note) *: Although neither the second field survey nor the third field survey confirmed the direct causal relationship between increased unemployment and forest destruction, it appears reasonable to assume a degree of causal relationship between the two.

Chart of Causality of the Identified Problems

(5) Workshop

A workshop in which local people participated was held as part of the process to encourage the participation of local people at the project planning stage and to reflect the opinions of local people on the Social Forestry Project. The opinions of local people and the replies of related organizations to questions made by participants in the workshop were analysed in a comprehensive manner as part of the survey on the socioeconomic and cultural conditions and other surveys related to the formulation of the Social Forestry Project with a view to identifying ways of making them reflect on the Social Forestry Project.

4. Forestry

(1) Actual Forest Conditions

1) Species Observed

- The most frequently observed species in natural forests are ihis (*Eumonymus javanica*), medang (*Litsea* sp.) and gelam (*Eugenia* sp.).
- The most frequently observed species in secondary forests are semantung (*Ficus toxicaria*) and medang (*Litsea* sp.).
- The most frequently observed species at shrub land are melung (*Mecaranga* sp.), johar (*Cassia siamea*) and semantung (*Ficus toxicaria*).

2) Volume at Sample Plots

The average number of standing trees and volume per 0.1 ha of the sample plots are 55 trees and 42.368 m³ respectively for Natural Forest I (crown density of 71% or more), 54 trees and 20.775 m³ for Natural Forest II (crown density of 31 - 70%), 33 trees and 8.381 m³ for Natural Forest III (crown density of 30% or less), 56 trees and 8.159 m³ for Secondary Forest and 29 trees and 2.163 m³ for Shrub Land.

3) Stand Structure

All natural forests, secondary forests and shrub land are characterised by the presence of many small diameter trees.

(2) Reality of Reforestation

- *Acacia mangium* are nine years old with an average number of surviving trees of 290 trees/ha (survival rate of 26.1%) and average growing stock of 172 m³/ha.
- *Pinus merkussi* are eight years old with an average number of surviving trees of 800 trees/ha (survival rate of 47.9%) and average growing stock of 109 m³/ha.
- *Swietenia macrophylla* (mahoni) are 45 years old with an average number of surviving trees of 380 trees/ha (survival rate of 34.2%) and average growing stock of 394 m³/ha.

(3) Social Forestry

1) Agroforestry Survey

① Coffee

a. Coffee Cultivation Techniques

The following table compares the coffee cultivation techniques employed in the Project Area and at the testing and research institution.

Comparison of Coffee Cultivation Techniques

Item	Project Area	Pusat Penelitian Kopi dan Kakao, Jember
Variety	<i>Coffea robusta</i> is the most popular variety grown in the area and a small quantity of <i>Coffea arabica</i> is also produced.	<i>Coffea robusta</i> and <i>Coffea arabica</i> are said to be suitable for below El. 800 m and above El. 800 m respectively. Grafting and cutting are said to be the preferred methods of coffee propagation rather than natural growth.
Planting Method	The planting distance is not uniform: 1.5 - 2 m × 1.5 - 2 m for coffee trees and 4 - 15 m × 5 - 15 m for shade trees. The intercropping of farming products is conducted for 1 - 2 years after planting.	The adequate planting distance is approximately 2 × 2 m for <i>Coffea arabica</i> and 2.5 × 2.5 m for <i>Coffea robusta</i> while the planting distance for shade trees is 3 - 6 m × 3 - 6 m (or 5 × 5 m). Leguminosae are preferred for intercropping.
Shade Trees	The most frequently used shade tree is kayu res (<i>Gliricidia maculata</i>). The composition of shade trees varies from one village to another. Shade trees are managed by means of pruning and regeneration by sprouting.	Lantoro (<i>Leucaena glauca</i>) and kayu res (<i>Gliricidia maculata</i>), etc. are used as permanent shade trees while moghania (<i>Moghania macrophylla</i>) and banana, etc. are used as temporary shade trees. Shade trees are managed by means of appropriate distribution and pruning, etc. to maintain a relative light intensity of 75% at coffee fields.
Tree Forming	Coffee trees are generally formed in the traditional manner. After regeneration, the cut wood is mainly used as firewood.	There are two coffee tree forming systems: single stem system and multiple stem system.
Fertiliser Application	Chemical fertiliser is generally used for coffee cultivation but there are many coffee fields where neither chemical nor organic fertiliser is used.	Weeds, hedge crops and the pruned branches of shade trees, etc. are used for mulching or are buried in holes dug between the coffee trees. It is said to be necessary to maintain an organic content of 2 - 3% of the top soil of coffee fields.
Miscellaneous	Weeding of coffee fields is conducted 2 - 3 times a year using tools or herbicides. The use of herbicides is increasing.	The use of agrochemicals, including herbicides, with a strong residual toxicity is avoided as much as possible and biological and ecological methods are encouraged instead to control diseases and harmful insects. Bench terraces are capable of containing the soil loss volume to approximately 6%. Line edge planting using hedge crops, particularly dense cover by grass, to reinforce terraces is very effective for soil conservation.

b. Upper Story Trees and Relative Light Intensity

The measurement results of the relative light intensity under the upper tree crown at coffee fields show high relative light intensity values for pulse species and species with bore height. In contrast, the relative light intensity under the crown is fairly low for kayu manis, mangosteen, durian and aren, etc.

② Panili

Panili (vanilla) is grown in the Project Area at Desa Suro Bali and fields belonging to the Kelopak Agricultural Extension Station.

③ Salak

In the Project Area, one farmer in Desa Pasar Ujung grows salak.

④ Aren

Aren grown in Desa Sindang Jaya in Kec. Curup was originally introduced from Yogyakarta in central Java more than 50 years ago and the current cultivation area is more than some 600 ha.

⑤ Kemiri

Kemiri is grown in Desa Kebanagung, Desa Embang Ijuk, Desa Talang Pito and Desa Pagaragung, etc. in Kec. Kepahiang in the southern part of the Project Area.

⑥ Kayu Manis

Local people in the Project Area have a strong desire to grow kayu manis as witnessed by such greening projects as the creation of Kebun Rakyat and village nurseries by the Rejang Lebong Dinas PKT. Kayu manis is a popular intercrop for coffee fields and dry crop land.

⑦ Damar Mata Kucing

At present, social forestry involving damar mata kucing is practiced in national forests (conservation forests as well as production forests) and at private land in Kec. Krui in Kab. Lampung Barat. The cultivation of damar mata kucing is also observed in the Kerinci-Seblat National Park in the Study Area.

⑧ Bamboo

The sampling survey and interview survey identified 12 varieties of bamboo in the Project Area, i.e. apus, aur, betung, dabuk, kuning, leman, manyan, pancing, selepah, serik, suling and wulung.

⑨ Mushrooms

While mushrooms are not grown artificially in the Project Area, local people pick wild mushrooms for their own consumption.

① Apiculture

While apiculture is not conducted in the Project Area, small-scale apiculture is conducted in Desa Karang Jaya, Desa Sumber Urip and Desa Sumber Bening, etc. in Kec. Curup, providing a secondary source of income for local people.

2) Biological Resources Survey

A further survey was conducted on usable biological resources around homesteads at 10 villages selected as the subject villages for the socioeconomic and cultural conditions survey and 80 items were identified, including vegetables, coffee, fruit trees and medicinal herbs.

(4) Current Development Conditions of Forestry Infrastructure

There are four fully paved main roads in and around the Project Area with a total length of 79.3 km while 16 major feeder roads (either surface-treated or gravel roads) total 85.8 km. Only three roads pass through national forests and this number is inadequate.

(5) Forest Damage

No major damage to forests due to fire or harmful insects is observed.

(6) Extension and Training

1) Extension

① Extension Activities

Forestry extension officers operating in the Project Area are classified as forestry extension officers responsible for reforestation (PLR: Penyuluh Lapangan Reboisasi), middle-ranked forestry extension officers responsible for regreening (PMP: Penyuluh Madya Penghijauan), general forestry extension officers (PLP: Penyuluh Lapangan Penghijauan) and forestry extension officers responsible for check dams (PLDP: Penyuluh Lapangan Dam Pengendari). Forestry extension activities in national forests are conducted by the PLR while those on private land are conducted by the PMP, PLP and PLDP.

② Extension Facilities and Equipment

Both forestry extension officers and agricultural extension officers point out the necessity to improve extension facilities as well as equipment to obtain a positive understanding of social forestry by local people.

2) Training

Forestry extension officers generally hope to learn soil conservation and yield improvement techniques and point out a need to improve extension facilities, etc., to educate farmers and to clarify the benefits of social forestry to farmers to obtain a positive understanding of social forestry by farmers. In general, local people are little interested in soil conservation and land productivity and the level of understanding of these issues among women appears to be rather low.

3) Regreening (Penghijauan)

While regreening projects were once implemented by the Sub-Balai RLKT, Ketahun, the Dinas PKT of Kab. Rejang Lebong took them over in fiscal 1994/95. Local people in the Project Area generally have little understanding of regreening projects and farmers do not know of the existence of demonstration plots, etc. in some villages.

① Demonstration Plots

UP-UPSA model units operate as demonstration plots in the Project Area.

② Creation of Hutan/Kebun Rakyat

Hutan Rakyat have been created in the Project Area with a size of 250 - 500 ha/site and kayu manis is currently cultivated.

③ Village Nurseries (Kebun Bibit Desa)

Village nurseries have been created in the Project Area with a size of some 1 ha/site and the seedlings of kayu manis are grown by farmers' groups.

④ Sericulture

Sericulture was introduced in fiscal 1980/81 by the Sub-Balai RLKT, Ketahun and is in place for the expansion, collectivisation and extension of farming activities, increased income for local people and/or increased working opportunities for farmers.

6. Watershed Conservation

(1) Land Devastation Survey

- Landslide sites, assumed to have been caused by an earthquake in 1979, are observed in some national natural forests. In general, landslides are rare outside national forests and are relatively small in size.
- There is little evidence of devastated torrents in the Project Area but bank erosion is observed along the main Musi River near Desa Tanjung Alan and Desa Suro Bali.

(2) Soil Erosion Survey

The Project Area was divided into the major watersheds and the soil erosion volume was estimated and corrected by means of the USLE (Universal Soil Loss Equation) method. The calculation results vary from 8.7 tons/ha/year to 24.5 tons/ha/year depending on the watershed with an average volume of 17 tons/ha/year or a total annual soil erosion volume of 900,000 tons/year for the entire Project Area.

(3) Soil Loss Survey

The annual soil loss in the Project Area is estimated to be 74,000 tons/year.

(4) Survey on Existing Erosion Control Works

The existing erosion control works in the Project Area include 16 check dams, revetments, wire gabion works and terraces (Teras Gulud and Teras Bangku).

(5) Natural Disasters

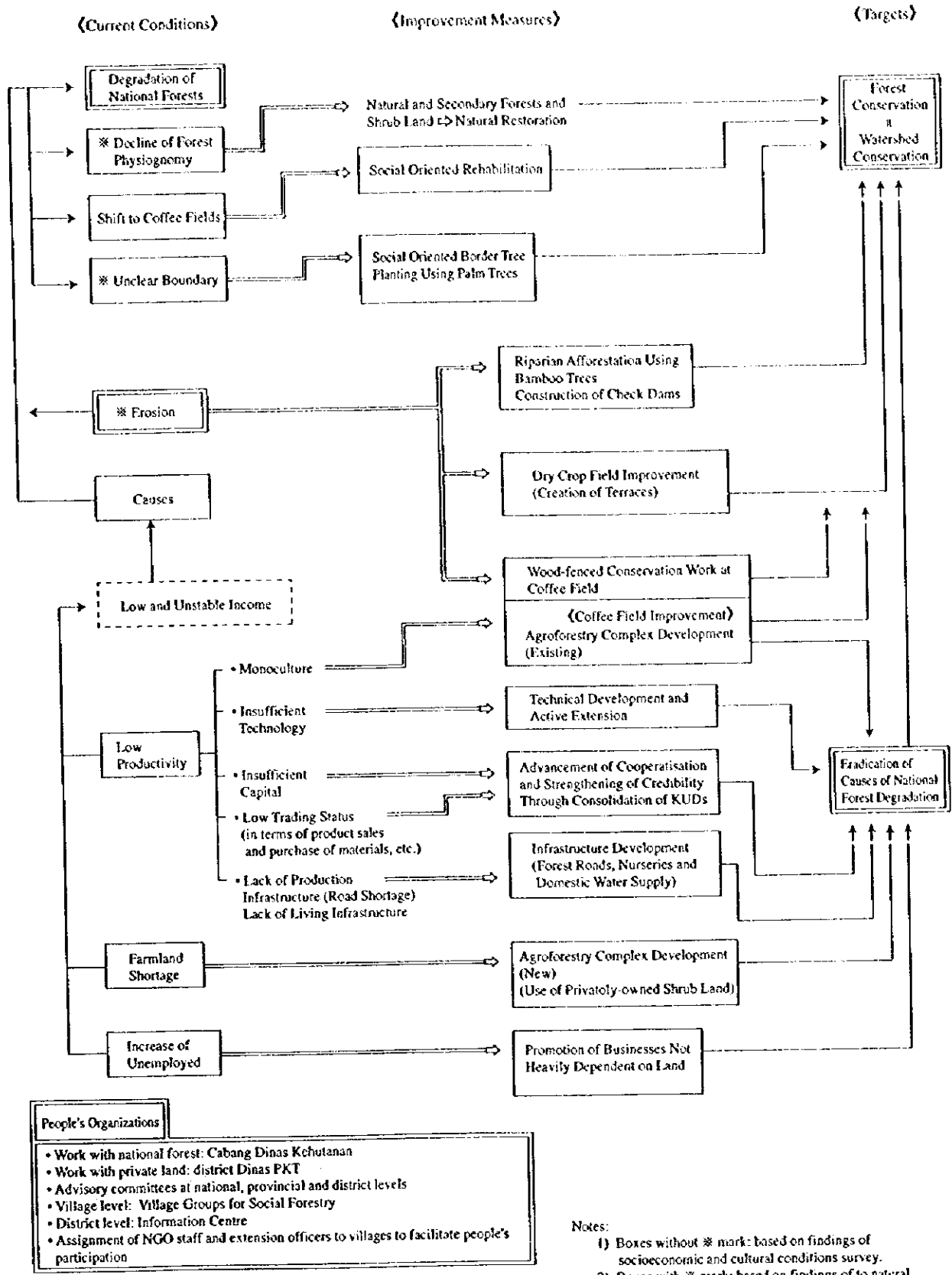
In 1979, an earthquake with a magnitude of six on the Richter scale struck the area, including the Project Area, creating a major landslide site near the summit of Mt. Daun.

7. Social Forestry Project

(1) Concept of Social Forestry Development

1) Basic Concept of Social Forestry Development

The current problems identified by the natural, socioeconomic and cultural conditions survey were analysed to establish their causes. Among the wide-ranging measures to solve the identified problems, feasible methods based on the technical, institutional and economic conditions were selected to establish the basic framework for the Social Forestry Project. The examination results are shown in the following diagramme.



Structure of Social Forestry Development Project

2) Improvement Measures for National Forests

While national forests are designed conservation forests, they may actually be natural forests, shrub forests, secondary forests, reforestation sites or even coffee fields created by local people inside national forests, showing unfavourable conditions to act as conservation forests.

Under the Social Forestry Development Project, multi-purpose species which are beneficial for forest conservation will be planted to replace coffee trees so that the resulting consolidation of forest functions, including the use of fruit and sap, etc. produced by the newly planted trees, can actually improve the welfare of local people while enhancing the conservation function of forests. In the case of other types of forests, such as natural forests, shrub and secondary forests subject to different forest management methods, the Social Forestry Development Project opts for the natural restoration of these forests.

3) Improvement Measures for Private Land

Private land is mainly used as coffee fields and "low and unstable income" caused by the shortage of farm land and low productivity is a main causative factor among many factors. Under these circumstances, conversion of the remaining area to farmland and apiculture and other activities designed to reduce the unemployment level will be promoted together with the diversification of coffee fields, etc. to mixed gardens to improve productivity. Moreover, new KUDs will be established to cooperatise marketing and purchasing activities and to increase the income of local people.

4) Soil and Water Conservation

Cultivation methods and such measures as bench terraces (for dry crop fields), wood-fenced conservation work and strip planting conservation work (for coffee fields), all of which should prove effective to control soil loss, will be introduced for certain types of soil and steep slopes where the risk of top soil loss is high in order to stabilise local agriculture.

New check dams (which can be used for fresh water fish culture after completion) will be constructed, mainly in the upper reaches, to strengthen watershed management. In addition, the creation of riparian afforestation is planned along major rivers to prevent bank erosion.

(2) Basic Items of Social Forestry Development

1) Social Forestry Organization and System of People's Participation

LKMDs and village groups will be established as social forestry organizations at the village level. An information centre will be established to obtain information on the progress of social forestry while advisory groups will be established at the national, provincial and kabupaten levels. NGOs and extension officers acting as facilitators will be assigned to villages to facilitate the smooth participation of local people in social forestry.

2) Training and Extension

As part of the training and extension activities, training on social forestry will be provided for members of the village groups and KUDs and for extension officers.

3) Planting Species

The species to be used for social forestry development are planned based on the "Suitability Table of Planting Species and Intercropping Items" which has been prepared by adding the study findings to the list of species given in the notification of the Director General of Reforestation. If the species and planting distance planned at the examination and design stages with the participation of local people are found to be unsuitable, other species may be selected with reference to the said table.

4) Planned Project Period

The implementation period of the Social Forestry Project is set at seven years based on a general judgement on the project size, etc. Implementation priority will be given to 30 villages located near national forests and the work will be roughly completed in the first three years. The highest priority will be given to trial plots. The work will then move to 33 villages located near the first group of 30 villages and the work will commence in the fourth year and will be roughly completed in the fifth year. In the case of the last group of 30 villages, the work will be roughly completed in the final seventh year.

5) Government Assistance for People's Participation

The types of work associated with social forestry and the necessary funding for such work can be classified in terms of the project site, work objectives and existence of specific beneficiaries, etc. While the work in national forests (to be entirely paid for by the government) and the work at private land will, in principle, be paid for by the

owners, seedlings and fertiliser will be provided by the government once. In the case of landless people, the government will also provide the initial investment with a view to promoting businesses which do not rely on farming. In the case of work of a public character, government funding is generally planned.

6) Project Implementation System

As part of the project implementation system, the assignment of foreign consultants and Indonesian engineers to assist the foreign consultants is planned for special technical fields.

(3) Plan for National Forests

1) Social Oriented Rehabilitation

The planting of useful species (a general term describing afforestation species and multi-purpose species) will be planned to convert existing coffee fields. Suitable species for this purpose are mahogani (mahogany or *Swietenia macrophylla*), damar mata kucing, durian, aren, jengkol, ptai, kemiri, apokat, melinjo and merkussi pine.

Coffee fields will be classified into three categories based on the elevation, i.e. those at El. 900 m or less, those between El. 901 m - El. 1,500 m and those at El. 1,501 m or higher, and suitable species for each category will be planted.

2) Social Oriented Border Tree Planting

In order to clearly identify national forest boundaries, a variety of such palm trees as salak, betel palm and aren will be planted in lines along national forest boundaries.

(4) Plan for Private Land

1) Tree Planting and Soil Conservation Measures

① Agroforestry Complex Development (Existing)

Useful trees will be planted at existing coffee fields with all soil phases except the LPR soil phase to improve the upper story trees and to ensure the sustainable production of coffee.

a. Planting of Upper Story Trees

– The suitable species for planting are such useful species as durian, sugar palm, jack fruit, ptai, kayu bawang, avocado, melinjo and kayu manis in addition to leucaena and others as shade trees.

-- Coffee fields will be classified as those at El. 900 m or less and those between El. 901 m and El. 1,500 m and upper story trees suitable for each elevation category will be planted.

b. Soil Conservation Measures

In order to prevent soil erosion at coffee fields, wood-fenced conservation work and/or strip planting conservation work will be employed depending on the soil characteristics and degree of slope gradient.

② Agroforestry Complex Development (New)

Agroforestry complex development (new) is planned at existing shrub land where the soil phase is other than LPR.

a. Tree Planting

-- The planting density for coffee will be 1,600 trees/ha (planting distance of 2.5 m × 2.5 m).

-- The planting species, number of trees to be planted and planting method for upper story trees will be the same as those for agroforestry complex development (existing).

b. Coffee Field Management and Improvement of Cultivation Techniques

Management to constantly maintain the same relative light intensity, use of an appropriate tree forming method, fertiliser application in accordance with the relevant criteria and effective weeding, etc. will be conducted.

c. Intercropping

Intercropping will be possible for two years after the planting of coffee trees before the harvesting of coffee commences.

d. Soil Conservation Measures

The measures described for agroforestry complex development (existing) will be employed.

③ Conservation Plantation Development

Conservation plantations will be planned at existing coffee fields or dry crop fields with clayey LPR soil. The suitable species for planting are kayu res, bamboo and kapok, all of which are effective in terms of soil conservation.

④ Dry Crop Field Improvement

Bench terraces will be created to prevent soil erosion at dry crop fields depending on the characteristics and degree of slope gradient.

2) Building of Check Dams and Riparian Afforestation

① Check Dams

The building of check dams is planned for sub-watershed where the rate of soil erosion appears to be 25 tons/ha/year or more in order to control the discharged sediment.

② Riparian Afforestation

The creation of riparian afforestation is planned along major river banks to prevent soil erosion. Bamboo will be planted on both riverbanks at those sites where the vegetation cover is inadequate.

(5) Sediment Discharge Control Effect

The estimated annual volume of soil discharge from the Project Area in the period of 30 years from the commencement of the Social Forestry Project is expected to reduce the overall soil discharge, based on continuation of the present discharge rate, by 25%.

(6) Infrastructure Development Plan

1) Construction of New Roads

The construction of new roads is planned in mountainous areas where the current road density is low in order to promote local development and the smooth implementation of the Social Forestry Project. Five new roads with a total length of 26.8 km will be constructed. These roads will have a roadway width of 4 m with an additional 1 m provided on both sides to accommodate shoulders and side ditches.

2) Establishment of New Semi-Temporary Central Nursery

The new semi-temporary central nursery will only operate during the project implementation period. Assuming an annual maximum production volume of 336,100 seedlings, the land area for the new semi-temporary central nursery will be 1 ha, including land for auxiliary facilities.

3) Water Supply System

A new water supply system is planned for Desa Air Lanang where a strong hope for such a system was expressed by villagers during the village survey.

(7) Promotion of Businesses Not Heavily Dependent on Land

- 1) The raising of beef cattle is planned for groups of local people who have only dry crop fields or coffee fields of less than 0.5 ha.
- 2) The raising of goats is planned for those households which have little or no land.
- 3) Apiculture is planned for 30 villages (each with a group of 10 participants) near natural forests which have relatively many honey source trees, such as coffee, kemiri, cinnamon and caliandra, etc. The same household criterion as that for goat raising will apply to apiculture.
- 4) Freshwater fish culture, particularly the culture of ikan mas, is planned using the reservoirs created by check dams.

(8) Organization and Extension Plan

1) Implementation Bodies for Social Forestry

① Organizational Structure

The administrative organizations responsible for social forestry are the Cabang Dinas Kehutanan for national forests and the Dinas PKT for private land (both of which are kabupaten organizations). The Ministry of Cooperatives will assume joint responsibility at the national, provincial and district levels because of the expected KUD involvement.

② Organizations at Village Level

The possibility of using such existing village organizations as the LKMD and farmers' groups will be examined and efforts will be made to strengthen these organizations to facilitate the implementation of social forestry.

③ Establishment of Social Forestry Information Centre

An information centre will be established as an organization to liaise and coordinate with the village implementation organizations and administrative organizations responsible for the implementation of social forestry and to obtain and provide relevant information and data from and to the relevant government organizations and universities, etc. and its activities will be in line with such objectives. The centre will be manned by several staff members of the Sub-Balai RI.KL under the supervision of the provincial Forestry Service. In addition, members of NGOs and universities, etc. will also work on a contract basis.

④ Establishment of Advisory Committees

Advisory committees will be established to obtain the guidance and assistance of the many government ministries and agencies involved in social forestry. The advisory committee members will consist of the head of the administrative organization (at the provincial or kabupaten level) and representatives of such ministries involved in local development planning and coordination as BAPPEDA (including BAPPENAS), Ministry of Interior, Ministry of Cooperatives, Ministry of Commerce, Ministry of Public Works, Ministry of Agriculture (the responsibilities of which include fruit trees, estates and stock raising), Ministry of Settlement and Ministry of Forestry.

2) Participation of Local People and Role of NGOs

NGO staff and extension officers will join in the discussions on the participation of local people to smoothly obtain the consent of local people to social forestry.

① People's Participation System

a. Decision-Making Process

A long time will be allowed for decision-making to ensure that a project reflects a wide range of opinions.

b. Process Upto Decision on Participants

Those villagers wishing to participate in national forest-based social forestry will, in principle, be allowed to do so as long as they abide by the rules of social forestry. In some villages, it will be necessary to restrict the number of participants, albeit reluctantly. Those groups with special priority will be farmers with little or no farmland of their own and young people without a regular job.

c. Incentives for Participation of Local People

It will be necessary for government funding to be provided for planting, tending and soil/water conservation work in national forests, the single provision of seedlings, fertiliser and tools at the time of planting for private land-based social forestry and the provision of a grant to cover the initial investment cost for goat raising and apiculture.

② NGO Staff

NGO staff will play the role of facilitating the participation of local people in the implementation of social forestry. They will also liaise between local people and government organizations and will act as a catalyst to stimulate the understanding of social forestry among local people. In regard to the possible nature of contracts with NGOs, a type of temporary staff contract between district level organizations (Cabang Dinas Kehutanan and Dinas PKT) and NGOs appears appropriate in view of the actual local conditions.

③ Role of Extension Officers

Jointly with NGO staff, extension officers will use various discussion techniques to establish a common understanding and consensus of local people regarding their daily needs, types of land use and details of village level Social Forestry Projects, acting as advisors on forestry administration.

3) Extension and Training

① Extension Activities

The positive progress of extension activities requires the training of useful extension officers to promote the implementation of social forestry and to give mobility to efficient extension activities.

- a. The training of extension officers should equip them with basic knowledge on the cultivation techniques of multi-purpose species. It is also desirable for extension officers to understand participatory discussion techniques.
- b. Approximately six or seven extension officers will be required to promote social forestry.
- c. Extension equipment, including motorbikes, and extension facilities should be provided.

② Training

In addition to the training of extension officers described earlier, technical training will be provided twice a year for about three years for members of the village groups and KUDs.

(9) Improved Trading Status Through Cooperative Activities

Improvement of the trading status of producers through cooperatisation can be achieved firstly by the active use of the KUD system to establish new KUDs together with consolidation of the existing KUDs and secondly by expanding the trading unit as well as the uniformisation and improvement of the product quality which form the basis for advantageous trading.

(10) Monitoring and Evaluation

1) Monitoring

Monitoring is designed to assess the implemented work in order to identify problems and to examine possible solutions with a view to using the results for modification of the project contents and for the improved planning of subsequent new projects. It will be conducted on such issues as reforestation, farmland improvement, soil/water conservation, production of seedlings and the environment.

2) Evaluation

The evaluation will not involve a detailed assessment of each project component which is the case for monitoring but will make a more general assessment of the project achievements, suitability of the project implementation method and other issues using the RRA and similar techniques.

(11) Implementation Schedule

The Social Forestry Development Project is planned to be completed in seven years, taking the total work volume, implementation system, necessity/availability of farmers' groups and their current activities into full consideration. The annual work volume is shown in the table below.

Table of Annual Work Plan

Work				Unit	Year							Total		
					1	2	3	4	5	6	7			
National Forests	Social oriented rehabilitation	Planting of Useful Species	Elevation: upto 900 m	ha		170 (128)	190	190	190	190			930	
			Elevation: 901 - 1,500 m	ha		117 (12)	130	130	130	130			637	
			Elevation: 1,501 m or higher	ha		6	6	6	6	6			30	
	Social oriented planting of boundary trees			km		6	6	6	6	6			30	
Private Land	Agroforestry complex development (existing)	Planting of Upper Trees	Elevation: upto 900 m	ha		3,417 (50)	3,425	3,425	3,425	3,425	3,425		20,542	
			Elevation: 901 - 1,500 m	ha		602 (50)	715	715	715	715	715	715	4,267	
		Soil Conservation Measure	Wood-fenced conservation work	ha	870 (31)	880	880	880	880	880	880	880		6,150
			Wood fenced and strip planting conservation work	ha		20	40	40	40	40	40		180	
	Agroforestry complex development (new)	Planting of Trees	Elevation: upto 900 m	ha		355	355	355	355	355			1,775	
			Elevation: 901 - 1,500 m	ha		70	75	75	75	75		370		
		Soil Conservation Measure	Wood-fenced conservation work	ha	90	110	110	110	110				530	
	Wood fenced and strip planting conservation work		ha		3	3	3	3	3		15			
	Conservation Plantation Development			ha		78	85	85	85	85		418		
	Improvement of Dry Crops Field (Construction of Bench Terraces)			ha	282	290	290	290	290			1,442		
	Check Dam			ha	5	5	6					16		
	Riparian Afforestation			No(s)		30	35	35	35	35	35		205	
	Construction of New Road			ha	28	6.0	6.0	6.0					268	
	Nursing (Establishment of Central Nurseries)			Set(s)	1								1	
	Domestic Water			Set(s)	1								1	
Beef Cattle Raising			Village(s)		10	10	10					30		
Goats Raising			Village(s)		10	10	10					30		
Apiculture Facilities			Village(s)		10	10	10					30		
Freshwater Fish			Sites	5	5	6						16		
Extension and Training			Occasion	1	1	1	1	1	1	1	1	7		
Expansion of KUIDs			Occasion	1	1	1	1	1	1			5		

Note: Figures in brackets indicate the work volumes for the trial plots.

(12) Project Cost

Based on the contents of the planned Social Forestry Development Project, the project cost is estimated as shown in the table below. Assuming that the Project will be jointly implemented by the Ministry of Forestry and local farmers, the project cost for the planned project period of 7 years includes taxation (income tax and sales tax). The total project cost is divided into the Ministry of Forestry portion (71,435 million Rp = ¥3.33 billion) and the farmers' portion (367,198 million Rp = ¥17.09 billion). The project cost includes farmers' labor costs such as labor costs for farming.

Project Cost Details (Total Cost for 7 Years)

(Unit: million Rp)

Item	Base Cost	Nominal Total Cost
Total	265,202	379,361
Riparian	200	276
Check Dams	815	945
New Roads	5,485	6,894
Central Nursery	322	409
Domestic Water Supply	131	140
Animal Raising (Beef Cattle, etc.)	1,678	2,198
Training and Extension Facilities	3,153	3,890
KUD	137	157
Income Tax (for Farmers)	2,742	3,925
Project Management (Consultants)	6,704	7,947
Project Cost (Sub-Total)	286,569	406,141
Physical Reserves	0	32,491
Project Cost (Total)	286,569	438,633

8. Project Analysis

(1) Technical Analysis

The projects planned for implementation under the Social Forestry Development Project centre on the cultivation techniques of trees, etc. from which food, fruit and sap, etc. are obtained. None of these techniques, excepting the asexual reproduction of fruit trees, etc., are particularly new or highly advanced as local people already have knowledge of them or they have already been employed by local government organizations. Accordingly, the Project is deemed to be sufficiently feasible based on the present level of local technical expertise.

(2) Social Analysis

In regard to the conformity of the project contents with the current conditions of local communities, the fact that the Rejang tribe, which is the area's original ethnic group and which does not particularly like transmigration but is tolerant of changes of specific social norms and customs, etc., is dominant in most villages and allow other ethnic groups to move into their villages on either a voluntary basis or through government resettlement with peaceful integration into the local community suggests that there are no special problems in regard to the implementation of social forestry.

In addition, the Project is deemed feasible as its contents do not contradict the characteristics of local people and the characteristics of local village communities, including the norms and customs of the Rejang tribe and specific village structure.

(3) Organizational Analysis

The planned organizations to support the Social Forestry Project are the advisory committees at the national, provincial and district levels, information centre, village level village groups, NGO staff members, extension officers and other participants' groups. All of these organizations fully conform to the various administrative organizations and informal organization in the local community.

(4) Financial/Economic Analysis

1) Financial Analysis

The cash flows for the case of project implementation and the case of without project implementation were estimated and the respective net present values (nominal discount rate: 18%) were compared. The resulting incremental net present price is 59,178 million (Rp) with a financial internal rate of return (FIRR) of 20.6%, indicating the financial feasibility of the Project for 30 years.

2) Economic Analysis

The incremental net price for the case of project implementation compared to the case of without project implementation is 68,473 million Rp with an economic internal rate of return (EIRR) of 21.0%, indicating the economic feasibility of the Project.

9. Environmental Care

(1) Approach to Environmental Care

1) Background of Environmental Care

The Project Area of some 50,000 ha, which constitutes the subject area of the Social Forestry Development Project formulated on the basis of the S/W, includes a conservation forest area of some 13,000 ha. This conservation forest area is classified as a protected zone to which the application of the AMDAL should be considered pursuant to the relevant government ordinance of 1993 (Peraturan Pemerintah Republik Indonesia Nomor 51 Tahun 1993 Tentang Analisis Mengenai Dampak Lingkungan). Consequently, it was decided that the Project should be much more

carefully examined from the viewpoint of environmental care than common Social Forestry Development Projects.

2) Screening Results Based on Indonesia's AMDAL.

Based on the screening results (174/DJ-VI/AMDAL/96; see Attached Appendix I-1) of the Environmental Impacts Assessment Committee of the Ministry of Forestry regarding the application of the AMDAL as requested by the Directorate General of Reforestation and Land Rehabilitation of the Ministry of Forestry, it was decided to prepare environmental control measures (Upaya Pengelolaan Lingkungan: UKL) and environmental monitoring measures (Upaya Pemantauan Lingkungan: UPL) in accordance with the interpretation of the above-mentioned government ordinance of 1993.

(2) Environmental Care at Project Formulation Stage

At the project planning stage, rough scoping of the anticipated environmental impacts due to project implementation was conducted using the draft Social Forestry Development Project in order to establish measures to alleviate the anticipated negative environmental impacts within the framework of the Social Forestry Development Project.

(3) Environmental Impacts Assessment and Preparation of Environmental Control and Monitoring Measures Required at Project Implementation Stage

The likely negative environmental impacts resulting from project implementation were identified. Draft environmental management measures (UKL) and monitoring measures (UPL) were then prepared to prevent negative impacts while promoting positive impacts. On December 17, 1997, a meeting was held at the Directorate General of Reforestation and Land Rehabilitation to explain and discuss these draft measures. It was planned that these UKL and UPL, incorporating the modifications necessitated by the discussions, were submitted to the Technical Cooperation Division, Directorate of Planning and Programming, Directorate General of Reforestation and Land Rehabilitation. These measures will be reviewed by all related organizations, particularly by the Directorate General of Reforestation and Land Rehabilitation, and should form the basis for the implementation of environmental measures at the project implementation stage.

10. Trial Plot Project Implementation Plan

(1) Trial Plots in National Forests

A Type A trial plot will be established in view of preserving conservation forests, particularly those located upstream of a dam, without eliminating the use of forest by-products and forest land by local people. At the plot to be established at existing coffee fields, useful species (both reforestation species and multi-purpose species) will be planted with a view to achieving the conversion of the growing species.

- 1) The species to be planted will be selected based on the criteria adopted for social oriented rehabilitation work in national forests in the Project Area.

The existing coffee fields will be classified into those at El. 900 m or less and those at El. 901 m - El. 1,500 m and species suitable for each elevation category will be planted. In the case of the former, the suitable species are mahoni, damar mata kucing, durian, aren, jengkol, ptai and kemiri. In the case of the latter, the suitable species are pinus, damar mata kucing, apokat, melinjo and kemiri.

- 2) Reforestation species (mahoni, damar mata kucing and merkussi pine.) will be planted with an approximate density of 400 trees/ha while multi-purpose species will be planted between the reforestation species with an approximately density of 100 trees/ha.

(2) Trial Plots at Private Land

Type B trial plots will be established at private land to introduce a rational land use method with a view to improving local welfare and mitigating the degradation of both land and forests. The subject sites will be existing coffee fields with a soil phase other than LPR and upper story tree improvement measures and soil conservation measures will be introduced to successfully conduct agroforestry complex development (existing).

1) Trial Plot at Desa Tebat Pulau

① Planting of Upper Story Trees

- a. The trial plot at Desa Tebat Pulau belongs to the elevation category of El. 901 m - El. 1,500 m. Suitable upper story trees are such useful species as apokat, melinjo and kayu manis and leukaena as a shade species.

b. The subject coffee fields will be those where the upper story tree crown density is 70% or less. The target planting distance is approximately 5 m × 5 m to increase the crown density of upper story trees.

– Some 250 trees/ha, consisting of 100 useful species/ha and 150 shade trees/ha, will be planted at coffee fields with an upper story tree crown density of 10% or less.

– Some 100 useful species/ha will be planted at coffee fields with an upper story tree crown density of 31 - 70%.

c. Shade trees will be planted between coffee trees at equal intervals (approximately 5 m × 5 m) while useful species will be planted at equal intervals to mix with shade trees.

② Soil Conservation Measures

In order to prevent soil erosion at coffee fields, wood-fenced conservation work will be conducted along the contour lines of coffee fields consisting of the Cambisols group and with a slope gradient of 40% or more.

2) Trial Plots at Desa Tanjung Alam

① Planting of Upper Story Trees

a. Suitable upper story trees for the trial plots at Desa Tanjung Alam which are located below El. 900 m are such useful species as durian, aren, nangka, ptai, kayu bawang and kayu manis.

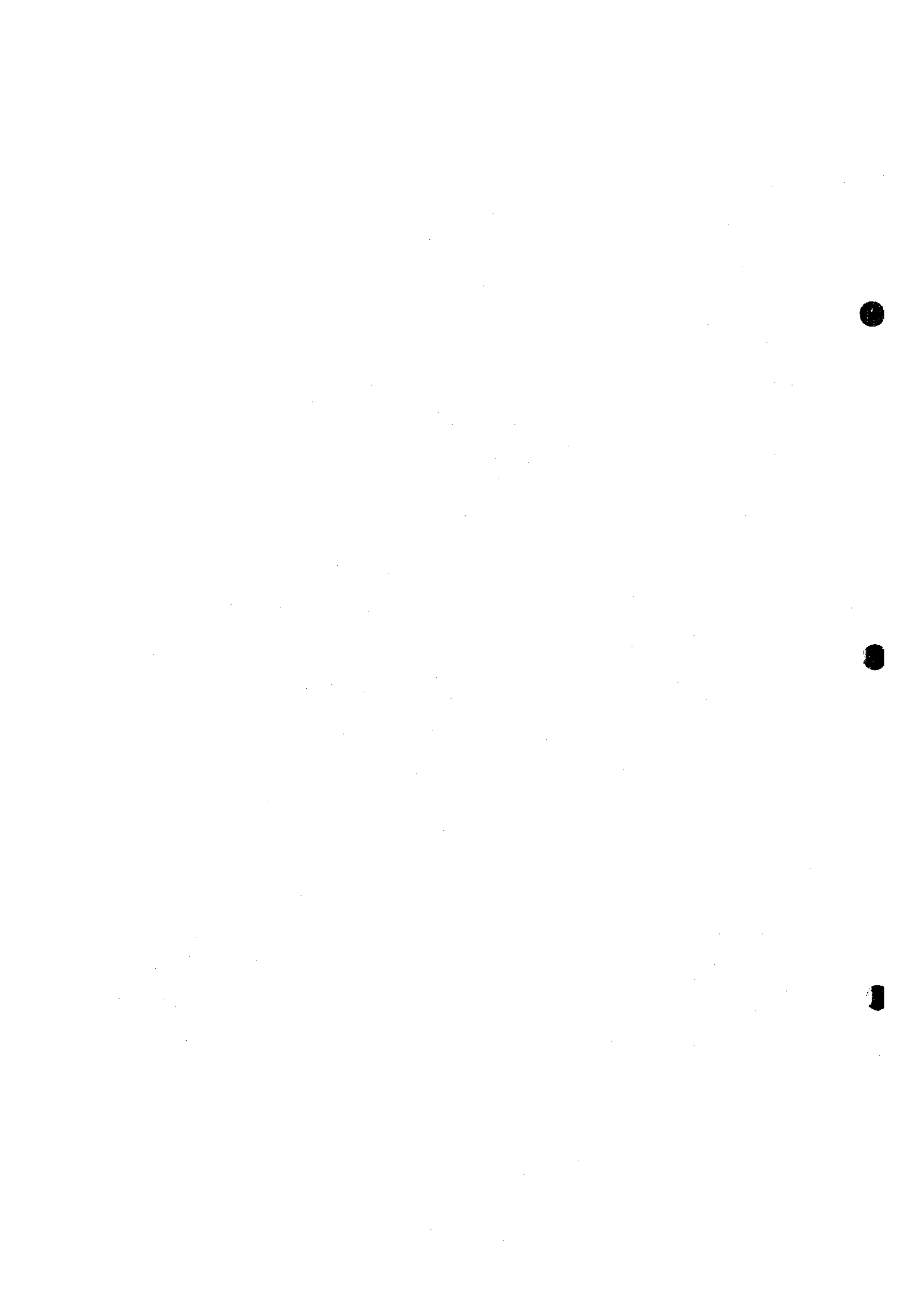
b. Some 100 useful species/ha will be planted at those coffee fields with a current upper story tree crown density of 31 - 70% to increase the crown density of upper story trees.

c. Useful species will be planted at equal intervals to mix with shade trees.

② Soil Conservation Measures

In order to prevent soil erosion at coffee fields, wood fencing conservation works will be erected along the contour lines of coffee fields consisting of the Andosols group and with a slope gradient of 15 - 40% and coffee fields consisting of the Cambisols group and with a slope gradient of 40% or more.

RECOMMENDATIONS



RECOMMENDATIONS

The planned Social Forestry Project not only puts forward workable formulas for the conservation of forests, water and soil in the Project Area but also offers beneficial means of improving the living standard of local people. As the Project is feasible from the technological, social, organizational and financial/economic viewpoints, its implementation as soon as possible is highly desirable. The main planning components of the Project are social oriented rehabilitation in natural forests, social oriented border tree planting, agroforestry complex development (existing), agroforestry complex development (new), conservation plantation development, dry crop field improvement, building of check dams, riparian afforestation, infrastructure development, promotion of businesses not heavily dependent on land, organization/extension and cooperatisation. Here, the following recommendations are made in regard to important issues for project implementation and issues requiring further refinement in order to enhance the conservation effects of the Project in the years to come.

1. Recommendations Regarding Project Implementation

(1) Development of Road Network

The level of road development in the Project Area appears to be still rather low. It is particularly necessary to develop roads to transport fruit, etc. produced by the upper trees to be planted at coffee fields as part of the social forestry development work. Even though the planned Social Forestry Project incorporates the development of the required access roads in its scope of work, it is still necessary to consolidate the system and funding for road development together with the early construction of main public roads to materialise the construction of access roads.

(2) Assistance for Expansion of KUDs

The findings of the socioeconomic and cultural conditions survey clearly indicate that efforts to organize local groups (or cooperatives) for the purposes of marketing local products, purchasing necessary equipment and materials and securing vital funding have made only slow progress among farmers in the Project Area. As it is essential to facilitate efforts to organize local farmers to promote social forestry development, the Social Forestry Project envisages the expansion of KUDs. In this context, it is essential for the government to enhance its technical and financial assistance to vitalise the existing KUDs as well as new KUDs which will be organized in the course of the implementation of the Social Forestry Project.

(3) Encouragement of Technical Development

People's livelihoods in the Project Area largely depend on such trees as coffee, kayu manis, durian, kemiri and aren. As traditional techniques are still employed to cultivate these trees, the productivity of all trees is not necessarily high, constituting one factor in the illegal use of national forests. Various measures, including the introduction of superior species (or varieties) and the development of new cultivation techniques, advantageous propagation techniques and new products, must be encouraged from the long-term point of view to ensure the effective and efficient progress of the social forestry practices envisaged by the Project.

(4) Financial Assistance for Farmers

The results of the financial analysis suggest that the financial balance of the farmers participating in the Project will continue to show a deficit in the early years to the extent that small-scale farmers will be unable to meet the actual cost. Financial assistance in the form of low interest loans by the KUK-DAS and others will, therefore, prove vital to sustain social forestry practices.

2. Establishment of Protection Forest Management Method Emphasising Forest Quality

In regard to protection forests in the Project Area, natural forests with a crown density of 71% or more only account for some 25% of the total area of protection forests while natural forests with a crown density of upto 70%, secondary forests, shrub land, man-made forests and coffee fields constitute the bulk of protection forests. Under the Social Forestry Project, social oriented rehabilitation is considered the main concrete social forestry work for protection forests, leaving areas not covered by this work to natural rehabilitation. However, natural rehabilitation is a lengthy process and it is an indisputable fact that the composition of species in existing secondary forests and at shrub land is greatly inferior to that of excellent natural forests. For these reasons, the implementation of the Social Forestry Project will not automatically guarantee sufficient forest conservation results.

Forest conservation measures are also necessary from the viewpoint of enhancing forest quality. The enhancement of forest quality is also important to secure a water supply source for the dam which is currently under construction in the Project Area for hydroelectric power generation. In regard to forest work techniques emphasising the full functioning of protection forests, theoretical research as well as actual experiments are in progress in many countries and several techniques have already been put into practice in some countries.

It is anticipated that the management of protection forests in a manner stressing their functional performance will further increase the applicability of social forestry in protection forests. This prospect calls for the establishment of a forest management method which emphasises the full functioning of protection forests even more in the coming years.

CHAPTER 1.
INTRODUCTION

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1.1 Background of the Study

The upper watershed of Musi River (one of Indonesia's 39 most important rivers), located in the north of the central highlands of Propinsi Bengkulu, has an important function as the supply source for forest products and water for neighboring areas. However, the disappearance and degradation of forests in recent years means that some 75,000 ha of approximately 220,000 ha have been devastated or rendered unsuitable for production activities. As many poor farmers and their families live in forest areas, the simultaneous achievement of improvement of their standard of living and forest conservation is urgently required. Moreover, in view of the ongoing implementation of the Musi Hydroelectric Power Project in the area, watershed management in the upper Musi watershed should prove useful for the operation of the power station to be constructed under this project in terms of suppressing soil erosion and enhancing the area's water retaining function.

Against this background, the Government of Indonesia made a request to the Government of Japan in October, 1994 to conduct a feasibility study for the preparation of a social forestry development project with a view to conserving the forest resources in the above area while attempting to improve the standard of living and welfare of local people. In response to this request, the Government of Japan dispatched the Preparatory Study Team (for consultation on the S/W) to Indonesia which conducted an initial study on the subject area, confirmed the background and contents of the request and discussed the feasibility and scope of the requested cooperation with the Indonesian side. Having agreed the contents of the main study and scope of cooperation, the S/W was concluded and signed on November 14th, 1995 (see Attached Appendix N-1).

1.2 Objectives of the Study

The main objective of the Study is to establish a project area in the upper Musi watershed, located in the north of the central highlands of Propinsi Bengkulu in Sumatera, Indonesia and to prepare a social forestry project aiming at both conserving forest resources and improving the standard of living and welfare of local people. In addition, it also aims at transferring certain technologies to the project implementation body through the work related to the Study.

1.3 Subject Areas

(1) Study Area

As shown on the Study Area Location Map (see Fig. 1-1), the subject area of the Study (hereinafter referred to as the Study Area) is the upper Musi watershed of some 220, 000 ha which is located in the central highlands of Propinsi Bengkulu in Sumatera, Indonesia. A land use and vegetation map covering the Study Area has been prepared based on the interpretation results of the aerial photographs to be taken as part of the Study.

(2) Project Area

Based on the survey findings on the Study Area, the Project Area of some 50,000 ha has been selected to prepare the Social Forestry Project for the Project Area. The following criteria were used to select the Project Area.

- ① Presence of a very active farmers' group, etc. with good leadership and a strong desire for a development project
- ② Presence of much critical land required vis-a-vis the conservation function, thereby commanding high priority for the implementation of the envisaged project
- ③ Balanced area between national forests and private land
- ④ Area with well-established demarcation between national forests and private land
- ⑤ Area where the implementation of the envisaged project is expected to have positive impacts in terms of the need for environmental conservation

(3) Trial Plots

A and B type trial plots to be exhibited as models for social forestry development plan within the Project Area have been established and project implementation programmes are formulated.

According to the November, 1995 S/W as well as July, 1996 M/M (see Attached Appendix N-3) discussions, the purpose of the installation of the trial plot type A is to assure the conservation of protection forests, especially the upper watershed area of a dam, without precluding the use of forest byproducts and forest land on the part of the local people. The type B plot aims to boost resident welfare and cut forest degradation by instituting a more utilitarian method of land use on private land. In terms of scale, there is a single type A site (300 ha), and two type B sites (50 ha each).

The trial plot selections were based on the preferences set forth in the proposals of the Directorate General of Reforestation and Land Rehabilitation regarding social forestry (at the November, 1996 stage) as well as the afore-mentioned M/M and were chosen according to the following criteria, deemed the most suited to the field conditions. (see Fig. 1-1)

1) Forest Conditions

- ① National forests in which shrub zones almost totally devoid of standing arbor as well as secondary forests, and immature afforestation zones with an entrenchment rate of less than 30 % total more than approximately 300 ha in size.
- ② Regions with approximately 50 ha of private land in which practical application is possible on inhabitant-participation basis.
- ③ That the topography and the slope of the land be somewhat average as regards the project area as a whole.
- ④ That the forestry operations and infrastructure maintenance not be overly difficult.
- ⑤ That it be located in an effective position with respect to watershed conservation.

2) Socioeconomic and Cultural Conditions

- ① The symbiotic relationship between local people and forests is intimate and inseparable.
- ② There are no significant conflicts regarding the demarcations of the national forests and so on, and the cooperation of the local people may be expected.
- ③ That there be a strong desire on the part of local people to participate in social forestry.
- ④ That the standards of living of the local people be somewhat below average.
- ⑤ That the site is located approximately 5 km from the residential area of local people and can be accessed on a daily basis.

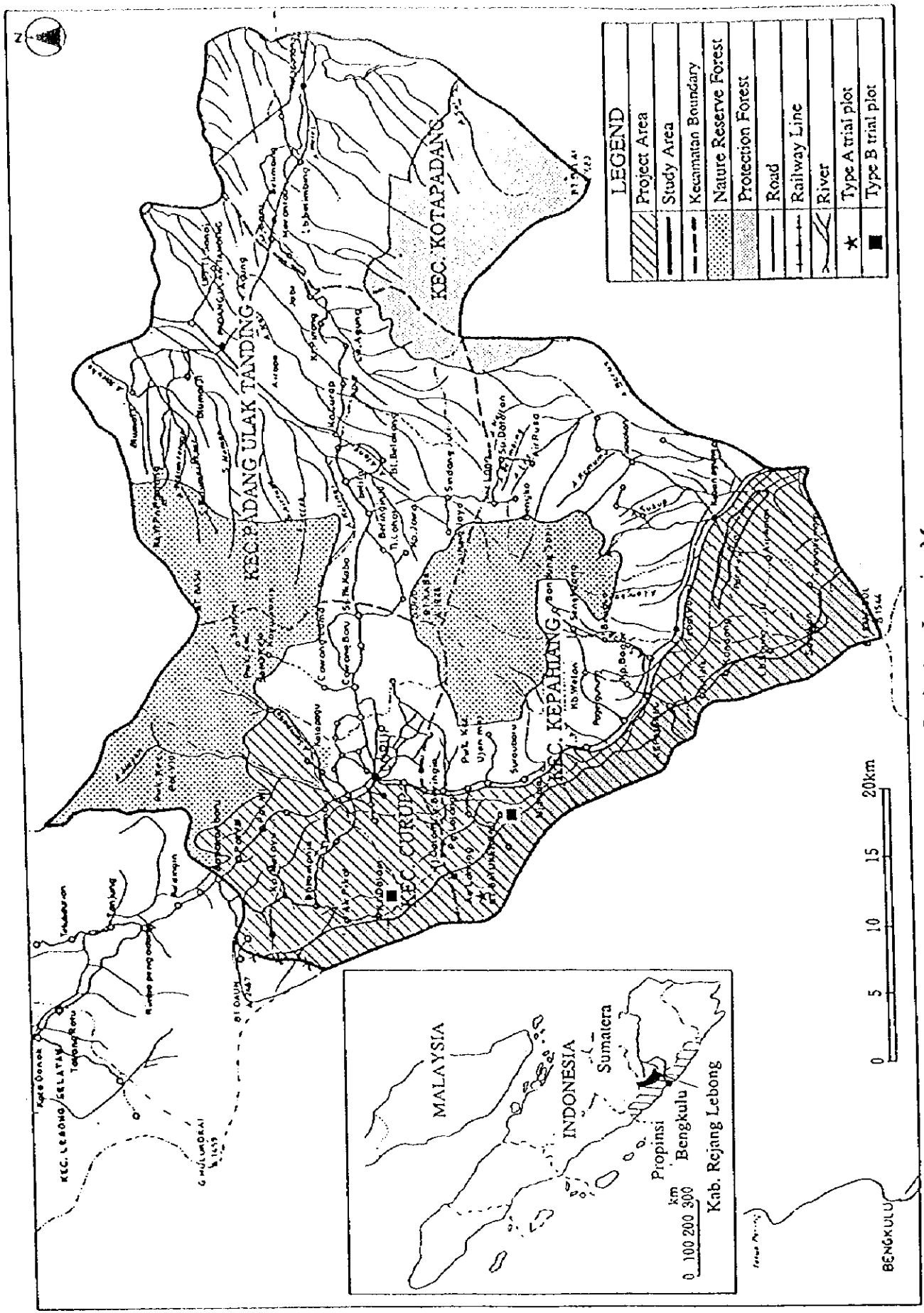


Fig. 1-1 Study Area Location Map

1.4 Outline of the Study

The Phase 1 Study in fiscal 1995 (first project year) and Phase 2 Study in fiscal 1996 and 1997 (second and third project years) are outlined below.

(1) Phase 1 Study (First Project Year) in Fiscal 1995

1) Preparatory Work in Japan

- ① Preparation of the general implementation plan for the Study
- ② Preparation of the draft specifications for subcontracting agreements relating to the aerial photography and preparation of the land use and vegetation map (scale: 1/50,000)
- ③ Preparation of the Inception Report
- ④ Preparation of the draft technology transfer plan

2) First Field Survey

- ① Explanation of and discussions on the Inception Report (see Attached Appendix N-2)
- ② Initial field survey on the natural conditions and forestry practices
- ③ Initial field survey on the socioeconomic and cultural conditions
- ④ Aerial photography of the Study Area (see Attached Appendix J.)
- ⑤ Preparation of the land use and vegetation map of the Study Area (see Attached Appendix K.)
- ⑥ Survey on a possible local subcontractor for the socioeconomic and cultural conditions survey
- ⑦ Preparation of the draft technology transfer plan
- ⑧ Preparation of draft criteria for the selection of the Project Area

3) Work in Japan (1)

- ① Compilation of the first field survey findings
- ② Selection of the Project Area

- ③ Preparation of the draft specifications for subcontracting agreement
- ④ Review of the planned contents of the second field survey
- ⑤ Preparation of the Progress Report

(2) Phase 2 Study (Second Project Year) in Fiscal 1996

1) Explanation of and discussions on the Progress Report (see Attached Appendix N-3)

2) Second Field Survey

- ① Preparation of the topographical map (scale: 1/25,000) (see Attached Appendix J.)
- ② Preparation of the land use and vegetation map (scale: 1/25,000) (see Attached Appendix K.)
- ③ Preparation of the soil map (scale: 1/25,000) (see Attached Appendix L.)
- ④ Full-scale survey on the natural conditions, watershed management and forestry practices
- ⑤ Full-scale survey on the socioeconomic and cultural conditions
- ⑥ Survey on a possible subcontractor for the AMDAL
- ⑦ Preliminary consultations on the method of organizing and implementing the workshop
- ⑧ Collection of reference materials to estimate the project cost

3) Work in Japan (2)

- ① Compilation and analysis of field survey findings
- ② Formulation of the basic concept of the social forestry development plan
- ③ Preparation of the draft specifications for the subcontracting of the AMDAL
- ④ Review of the planned contents of the third field survey
- ⑤ Preparation of the Interim Report

(3) Phase 2 Study Third Project Year in Fiscal 1997

1) Third Field Study

- ① Explanation of and discussions on the Interim Report (see Attached Appendix N-4)
- ② Workshop
- ③ Social forestry development project preparation survey
- ④ Drafting of implementation programme for the trial plot project
- ⑤ Drafting of the social forestry development project map
- ⑥ Implementation of AMDAL
- ⑦ Financial and economic analyses
- ⑧ Supplemental survey and field verification

2) Work in Japan (3)

- ① Sorting and analysis of the third field survey results
- ② Establishment of social forestry development project
- ③ Preparation of the social forestry development project map (see Attached Appendix G-8)
- ④ Preparation of the trial plot implementation programme
- ⑤ Project evaluation
- ⑥ Preparation of the draft final report
- ⑦ Preparation of reference materials for technology transfer seminar

3) Fourth Field Survey

- ① Explanation of and discussions on the draft final report
- ② Participation in and cooperation with the technology transfer seminar

4) Work in Japan (4)

- ① Preparation of the final report

The flow chart for the above study process is shown in Fig. 1-2.

1.5 Technology Transfer

(1) Technology Transfer in the Locality

1) On-the-job training (henceforth referred to as OJT) in the context of fieldwork

Using the Sub-Balai RLKT Ketahun as the main site, technical transfer was carried out via OJT on selected counterparts in the following skill areas:

① Social forestry planning

Biological resource survey method, social forestry survey method and other skills.

② Forest management

Natural forest research method, man-made forest survey method, regeneration survey method, upper trees survey method in mixed gardens and other skills.

③ Land use and vegetation

Field survey for the purpose of compiling land use and vegetation maps

④ Watershed conservation

Soil erosion survey method, flow rate survey method, devastated land survey method, and other skills

⑤ Social analysis

RRA and PRA methods and other skills

⑥ Agroforestry

Agroforestry survey method, bamboo forest survey method and other skills

⑦ Environmental impacts and soil

Selection of target area for soil profiles survey, soil profile observation and description methods, allophane testing and other skills

⑧ Photography and surveying

Aerial photography, control point survey, leveling and other skills

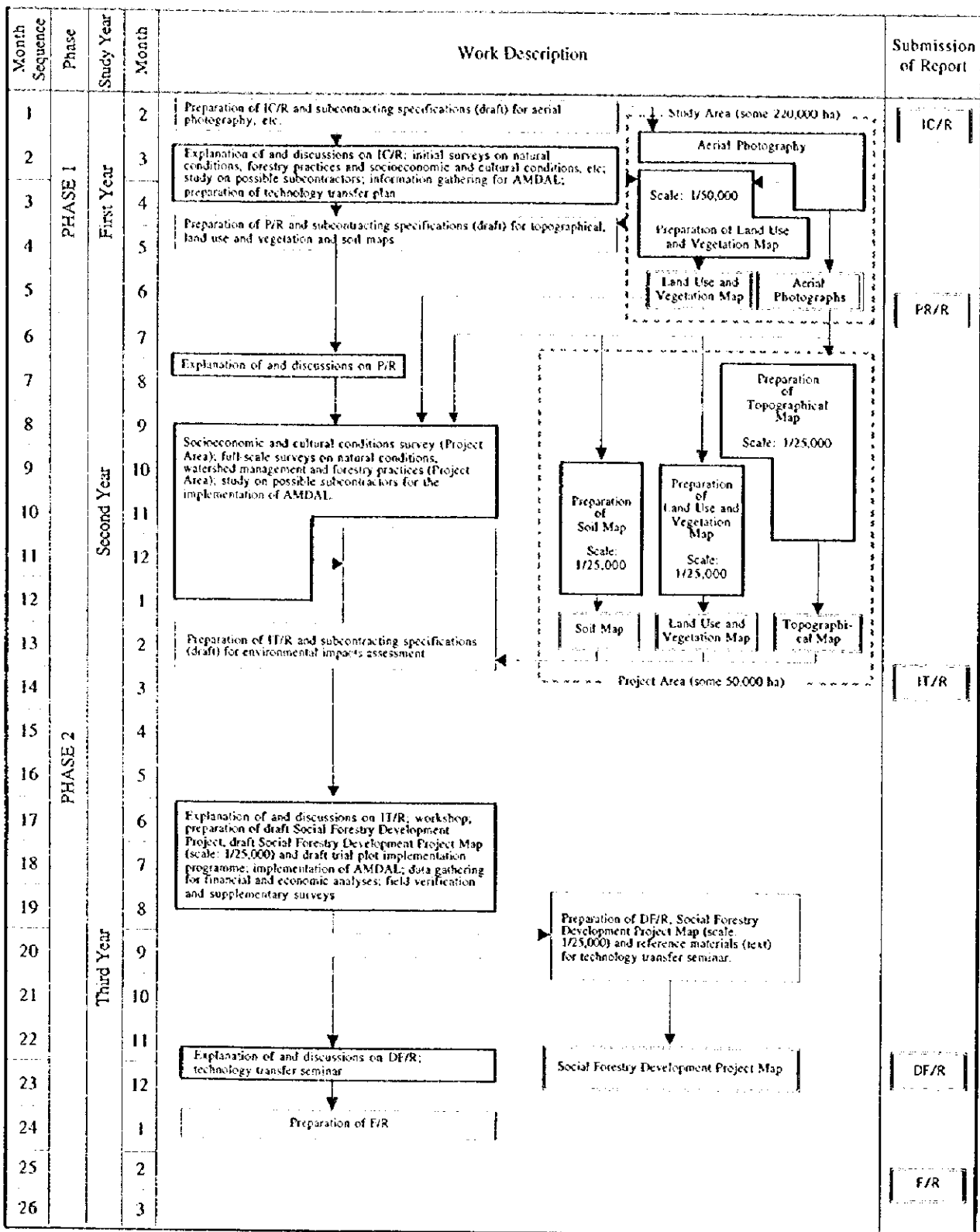
2) Technology Transfer Seminars

Cooperation for the holding of technology transfer seminars was provided at the time of the draft report

(2) Technology Transfer in Japan (domestic internship)

Trainees accepted under the counterpart training scheme received lectures and took part in observation tours and practical training in the following skill areas.

- ① Forestry and forest industry
- ② Water conservation and erosion control projects
- ③ Experiments and research
- ④ Geographic Information System (GIS)
- ⑤ Forest aerial reconnaissance, etc.



Notes: IC/R = Inception Report; PR/R = Progress Report; IT/R = Interim Report; DF/R = Draft Final Report; F/R = Final Report

Work in Japan Work in Indonesia Result

Fig. 1-2 Study Flow Chart